



## PATENT DOCUMENTS AS A SOURCE OF INFORMATION FOR SCIENTIFIC AND TECHNOLOGICAL STUDIES IN THE FIELD OF APPLIED SOCIAL SCIENCES

 Kátia Cinara Tregnago Cunha<sup>1</sup> Giandra Volpato<sup>2</sup> Cristiane Drebes Pedron<sup>3</sup>

Cite as – American Psychological Association (APA)

Cunha, K. C. T., Volpato, G. & Pedron, C. D. (2023, Jan./Apr.). Patent documents as a source of information for scientific and technological studies in the field of applied social sciences. *International Journal of Innovation - IJI*, São Paulo, 11(1), 1-36, e22122. <https://doi.org/10.5585/2023.22122>

### SUMMARY

**Purpose of the study:** To analyze how Applied Social Sciences (ASS) field uses patent documents in articles, in addition to non-patent literature.

**Methodology/approach:** A Systematic Literature Review (SLR) was carried out, by selecting articles statistically analyzed regarding the year of publication, authors' nationality and knowledge area. Articles from the ASS area which explore technical information of patent documents were qualitatively analyzed as for content and ways patent information was used.

**Originality/Relevance:** The use of technical information present in patent documents is unusual in articles, in which bibliographic references prevail as the main data source. Knowledge fields with interdisciplinary profile lack specific studies.

**Main results:** The results obtained point that the ASS area explores little technical patent information, with patentometric studies prevailing. Articles that explore technical information observe on average one patent document, with a matter description based on textual data obtained from the title or abstract.

**Theoretical/methodological contributions:** Systematization of SLR selected articles that allowed performing relevant quantitative analysis to understand how ASS researchers use information obtained from patent documents (metric analysis or exploration of technical information) for the construction of scientific knowledge.

**Social Contributions/Management Contributions:** Potential opportunity to offer actions and tools to help students and researchers towards exploring patent bases in order to select documents relevant to the research topic.

**Keywords:** patents, systematic literature review, Applied Social Sciences.

<sup>1</sup> M.Sc. in Intellectual Property and Technology Transfer for Innovation - Federal Institute of Education, Science and Technology of Rio Grande do Sul / Porto Alegre, Brazil - [katia.patentes@gmail.com](mailto:katia.patentes@gmail.com)

<sup>2</sup> Ph.D. in Chemical Engineering - Federal Institute of Education, Science and Technology of Rio Grande do Sul / Porto Alegre, Brazil  
[giandra.volpato@poa.ifrs.edu.br](mailto:giandra.volpato@poa.ifrs.edu.br)

<sup>3</sup> Ph.D. in Management Nove de Julho University and Federal Institute of Education, Science and Technology of Rio Grande do Sul / Porto Alegre, Brazil - [cdpedron@gmail.com](mailto:cdpedron@gmail.com)

## DOCUMENTOS DE PATENTE COMO FONTE DE INFORMAÇÃO PARA ESTUDOS CIENTÍFICOS E TECNOLÓGICOS NA ÁREA DAS CIÊNCIAS SOCIAIS APLICADAS

### RESUMO

**Objetivo do estudo:** Analisar de que forma a área das Ciências Sociais Aplicadas (CSA) utiliza os documentos de patente em artigos, complementarmente à literatura não patentária.

**Metodologia/abordagem:** Realizada uma Revisão Sistemática da Literatura (RSL), sendo selecionados artigos que foram analisados estatisticamente quanto ao ano de publicação, nacionalidade dos autores e áreas do conhecimento. Os artigos da área CSA que exploram as informações técnicas de documentos de patente foram analisados qualitativamente quanto ao conteúdo e a forma de utilização das informações patentárias.

**Originalidade/Relevância:** O uso das informações técnicas contidas em documentos de patente é pouco frequente em artigos, prevalecendo as referências bibliográficas como principal fonte de dados. As áreas do conhecimento com um perfil interdisciplinar carecem de estudos específicos.

**Principais resultados:** Os resultados obtidos indicam que a área das CSA explora timidamente as informações técnicas de patentes, prevalecendo os estudos patentométricos. Os artigos que exploram as informações técnicas citam, em média, um documento de patente, com descrição da matéria a partir de dados textuais extraídos do título ou do resumo.

**Contribuições teóricas/metodológicas:** A sistematização da RSL selecionou artigos que permitiram realizar análises quantitativas relevantes para entender de que forma os pesquisadores da CSA utilizam as informações extraídas de documentos de patente (análises métricas ou exploração das informações técnicas) na construção do conhecimento científico.

**Contribuições Sociais/contribuições gerenciais:** Potencial oportunidade de oferecer ações e ferramentas para auxiliar discentes e pesquisadores a explorar as bases patentárias de forma a selecionar documentos relevantes para o tema de pesquisa.

**Palavras-chave:** Patentes; Revisão Sistemática da Literatura; Ciências Sociais Aplicadas.

## LOS DOCUMENTOS DE PATENTE COMO FUENTE DE INFORMACIÓN PARA LOS ESTUDIOS CIENTÍFICOS Y TECNOLÓGICOS EN EL ÁMBITO DE LAS CIENCIAS SOCIALES APLICADAS

### RESUMEN

**Propósito del estudio:** Analizar cómo el área de Ciencias Sociales Aplicadas (CSA) utiliza documentos de patente en artículos, además de literatura no patentada.

**Metodología/enfoque:** Se realizó una Revisión Sistemática de la Literatura (RSL), seleccionando artículos que fueron analizados estadísticamente en cuanto al año de publicación, nacionalidad de los autores y áreas de conocimiento. Los artículos del área CSA que exploran la información técnica de los documentos de patentes fueron analizados cualitativamente en cuanto al contenido y la forma en que se utiliza la información de patentes.

**Originalidad/Relevancia:** El uso de la información técnica contenida en los documentos de patente es poco frecuente en los artículos, prevaleciendo las referencias bibliográficas como principal fuente de datos. Las áreas de conocimiento con perfil interdisciplinario carecen de estudios específicos.

**Principales resultados:** Los resultados obtenidos indican que el área CSA explora tímidamente la información técnica de patentes, prevaleciendo los estudios patentométricos. Los artículos que exploran información técnica citan, en promedio, un documento de patente, con una descripción del asunto basada en datos textuales extraídos del título o resumen.

**Aportes teóricos/metodológicos:** La sistematización de artículos seleccionados de RSL que permitieron realizar análisis cuantitativos relevantes para comprender cómo los investigadores de CSA utilizan información extraída de documentos de patente (análisis métricos o exploración de información técnica) en la construcción de conocimiento científico.

**Contribuciones Sociales/Contribuciones de Gestión:** Oportunidad potencial para ofrecer acciones y herramientas para ayudar a estudiantes e investigadores a explorar bases de patentes para seleccionar

documentos relevantes para el tema de investigación.

**Palabras clave:** patentes, revisión sistemática de la literatura, Ciencias Sociales Aplicadas.

## INTRODUCTION

Patent documents are a rich source of technical, legal and business information and an important resource for researchers and inventors, entrepreneurs, commercial companies and professionals in the field of intellectual property (Singh Singh, Chakraborty, & Vincent, 2016). The use of information present in patent documents adds specialized knowledge (Tigre & Kupfer, 2004), providing information that has not been published in scientific journals or conference proceedings (Singh et al., 2016) and is often more detailed than those present in scientific articles (Reymond & Quoniam, 2018).

However, the use of patent documents as a source of scientific or technological information is not very significant in academic environment (Pimenta, 2017), as well as among enterprises that operate in Research, Development, and Innovation (R&D&I) processes (Mazieri, Quoniam, & Moraes Santos, 2016).

Several studies report that patent documents as a source of technical information are still little used in all areas of knowledge (Mazieri et al., 2016; Reymond & Quoniam, 2016), being the use rate not significant in relation to other types of documents (Pimenta, 2017).

Bregonje (2005) identified that in many organizations' scientists consider patents more as a legal issue than as a source of scientific information.

Given this context, this study addresses the following research problem: how can articles in Applied Social Sciences field explore the information present in patent documents for the construction of scientific knowledge?

## Theoretical reference

Patents are a temporary property title granted by the State to inventors, authors or other natural or legal persons holding rights over their creations (National Institute of Industrial Property, 2020).

Patent documents present bibliographic information and technical information. Bibliographic information is displayed in the form of structured data, including dates, name and address of the inventor, patent holder and his legal representative, patent classification, as well as identification of the country of origin of the document and title of the invention (World Intellectual Property Organization, 2013; Oliveira, Suster, Pinto, Ribeiro, & Silva, 2005; Liu,

Liao, Pi, & Hu, 2011). These data are uniform in terms of semantics and format, making it possible to use the tools available in patent databases for metric analysis. The technical information of patent documents is presented in the form of texts and images. This unstructured data describes the state of the art, the details of the invention and the scope of protection, in the form of claims (World Intellectual Property Organization, 2021a).

In addition to the legal functions indicating issues related to property and exclusivity rights, patents have an informational function related to the publishing of the invented technology for general knowledge, through the descriptive report (Barbosa, 2011).

Patents present purely technical and technological research to the market (Quoniam, Knies, & Mazieri, 2014), so that the information held in patent documents can lead to research, in academic field or in private sector, being an important source of scientific and technological information (Pimenta, 2017), and providing knowledge even more detailed than scientific articles (Reymond & Quoniam, 2018).

According to data from the World Intellectual Property Organization, it is estimated that 15.9 million patents were in effect in 135 jurisdictions, in 2020 (World Intellectual Property Organization, 2021b). These documents, available in international, national, free, and commercial repositories, can be accessed by any interested party, as well as the bibliographic bases, requiring the planning of a search strategy.

However, data retrieval requires the researcher to have a basic idea about the terms and techniques related to the invention, a basic knowledge on the search tool and an understanding of the logic of term sets (Lopes, 2002).

Several studies point that the limited use of patent bases, and consequently, of the information contained in patent documents, is due to the technical and legal terminology present in patent documents (Tseng, Lin, & Lin, 2007; Xie & Miyazaki, 2013), the complexity of texts (Donald, Kabir, & Donald, 2018), the little familiarity with technological prospecting tools, classification taxonomy and with the structuring of the patent document (Tseng et al., 2007).

Therefore, exploring patent bases requires skills that are not often incorporated into professional training (Quintella, Meira, Kamei, Tanajura, & Da Silva, 2011). According to Reymond & Quoniam (2016), patent bases are featured as being of non-obvious use, often providing complex data, which requires interdisciplinary collaboration.

Likewise, to read and understand patent documents, it is necessary the knowledge of basic concepts of intellectual property, and of organizing bibliographic and technical data (Liu et al., 2011; Tseng et al., 2007; Xie & Miyazaki, 2013), which differs from conventional technical literature.

Although the state of the art points to several computational methods and analytical tools for extracting and analyzing bibliographic (structured) and technical (unstructured) information from patent documents, such as modeling, multicriteria analysis, technological maps, content analysis, scientometrics and bibliometrics (Teixeira, 2013), the definition of the search strategy is essential to obtain the documents closest to the research topic. Likewise, the technical information extracted from patent documents do not dispense with the analysis of an expert, and in some technological areas, interdisciplinary collaboration.

## METHOD

To collect data on scientific production of the many areas of knowledge that explore the technical information of patent documents, in addition to the bibliographic review, a bibliographic survey was carried out in the Scopus and Web of Science databases – Main Collection, with a time limit of up to 31/12/2021.

The selection of publications was conducted through a Systematic Literature Review (SLR), by using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses tool (PRISMA). The choice for this tool was due to the strict and systematic logic, with the generation of a flow diagram that portrays the sequence of information, mapping the number of identified, included, and excluded records, and the reasons for exclusions, favoring the interpretation of results (PRISMA, 2021).

The search expression was elaborated with keywords that identify the bibliographic references of patents placed in the Espacenet Search Base, expressed through the descriptors *Espacenet* or the website *worldwide.espacenet.com*. The definition of the Espacenet database is justified because it is the largest free patent database of patent documents (around 129 million documents), covering patents in 80 countries since 1782 (European Patent Office, 2022). In Scopus Base, the references field was selected, and the search strategy was defined as *REF ((Espacenet) OR (worldwide.espacenet.com))*, with no time bound.

In the document selection stage, using the search expression defined for the search in the Scopus database, 1839 articles, reviews, conference documents, book chapters, books, editorials and notes were obtained. For the selection of articles only, a second search expression *REF ((espacenet) OR (worldwide.espacenet.com) AND (LIMIT-TO (DOCTYPE, "ar"))* was defined, obtaining 1138 records.

For the search in the Web of Science database, the search expression was defined as *cited title (Espacenet) OR cited work (Espacenet) AND 2021-12-31*, yielding 95 records,

excluding one article published in 2022, two papers defined as editorial material, 27 papers presented at conferences (and therefore not peer-reviewed), and one journal.

For selecting the articles, their abstracts were read. Among those selected in the Scopus Base, four were excluded for having no relation to the theme, and 118 articles were not available in full in the Coordination for the Improvement of Higher Education Personnel in Brazil (CAPES) Journals Base, reaching 1016 articles. From 64 articles selected in the Web of Science Base, 12 articles matching those obtained in the Scopus Base were excluded, reaching 52 articles, of which eleven were excluded for dealing with different themes (Espacenet satellite project), and one article was not completely available.

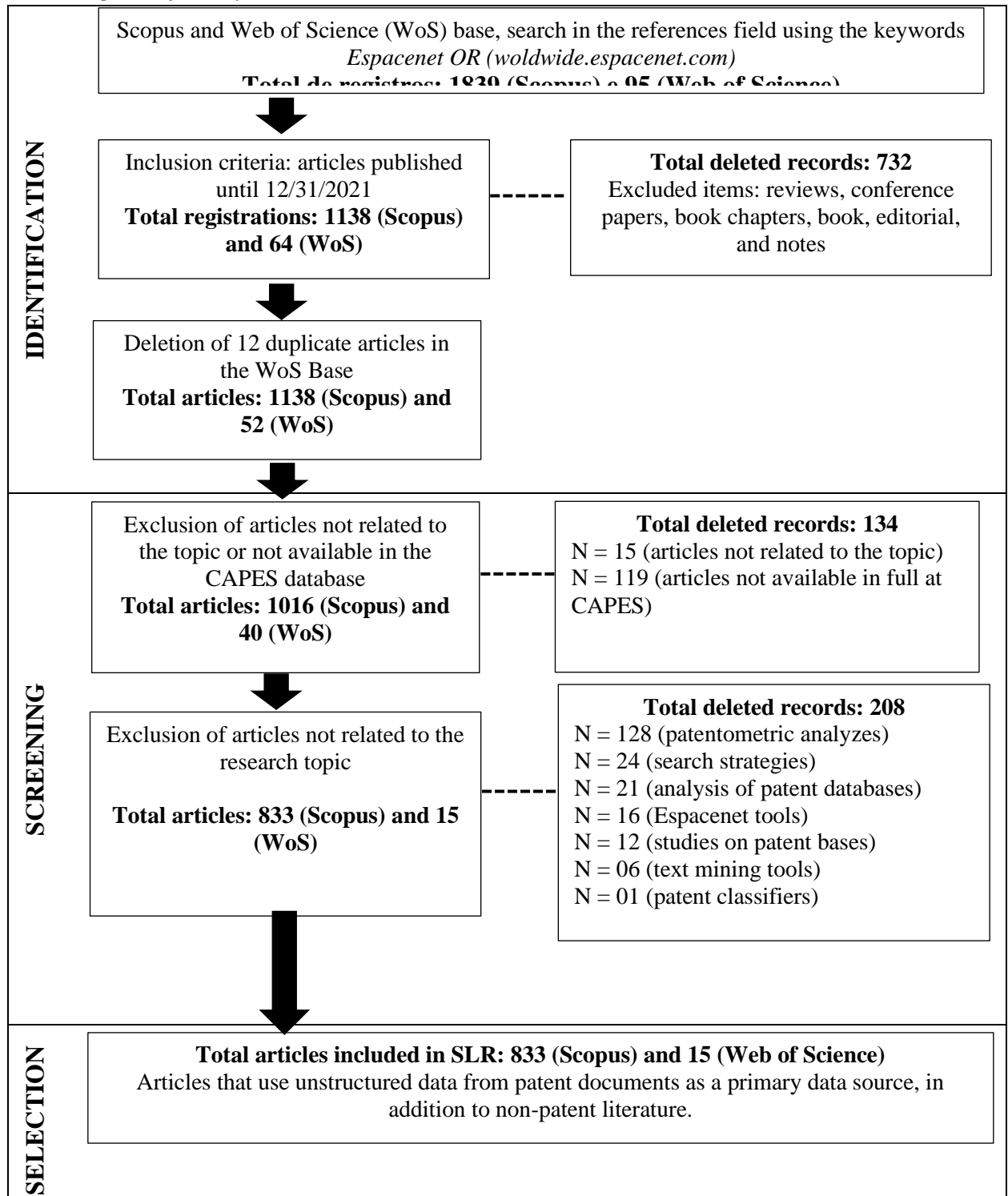
Among the remaining articles (n=1056), the exclusion criteria were applied, 200 articles being excluded from the initial analysis, where 128 records described studies of quantitative approach to patents (patentometric analysis); 24 articles described search strategies in patent databases; 21 articles dealt with patent databases as a source of technological information; 16 articles described data or tools from the Espacenet search engine; 12 documents presented studies on patent bases; six articles dealt with text mining tools and one article addressed patent classifiers.

Specifically on the articles dealing with patentometric analysis - an analytical technique for studying metric characteristics and uses of patent documents (Sánchez, 1999) -, framing as an exclusion criterion in the SLR is justified since it analyzes statistically the data structured from patent documents, without compelling necessarily the researcher to explore technical information.

In the end, 848 articles were selected from the Scopus and Web of Science databases that explore technical information from patent documents as a source of primary research data, in addition to non-patent literature. The data are shown in Figure 1.

**Figure 1**

*Flow diagram of the Systematic Literature Review*



Source: Prepared by the authors, adapted from Page et al. (2021).

For the statistical analysis of the 848 selected articles, the statistical tools available in the databases consulted were used, filtering the records according to year of publication, affiliation (authors' institution and countries) and thematic areas.

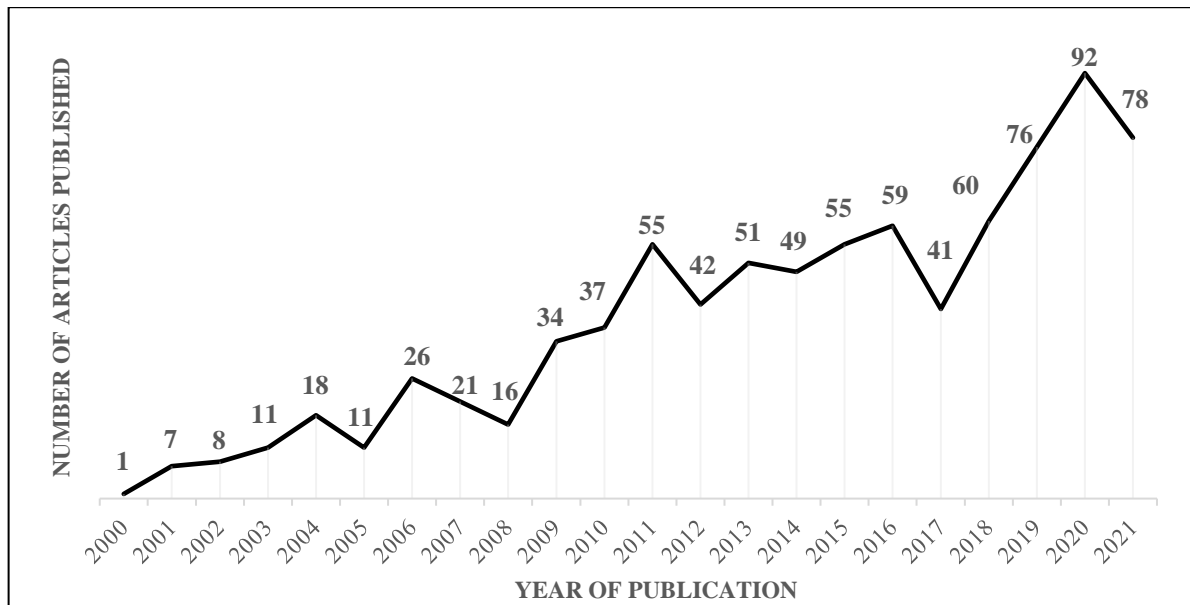
From the universe of 848 articles covering different areas of knowledge, articles related to the area of Applied Social Sciences were selected, reaching 71 records distributed in areas such as Social Sciences, Business, Management and Accounting, Decision Sciences and Economics, Econometrics, and Finance. These articles were read in full for a qualitative analysis to find how these primary data contributed to the construction of scientific knowledge.

**RESULTS**

Quantitative analysis of selected records in the SLR shows an upward growth in the number of articles that explore the technical information of patent documents in addition to non-patent literature. In the year 2000, only one article uses information extracted from unstructured data from patent documents, reaching 78 articles in 2021. The data are shown in Figure 2.

**Figure 2**

*Distribution of articles selected in the Systematic Literature Review that explore the technical information of patent documents, by year of publication*



Source: Prepared by the authors (2023).

To analyze the behavior of scientific production in different areas of knowledge, the articles selected in the SLR, and categorized in thematic areas defined in the Scopus and Web of Science Bases, were reorganized in accordance with the Major Areas of Knowledge, defined by the Brazilian National Council for Scientific and Technological Development (2022), with the results shown in Table 1.



**Table 1**

*Distribution of articles selected through Systematic Literature Review exploring the technical information of patent documents, according to the Major Areas of Knowledge of Brazilian National Council for Scientific and Technological Development*

Major Area of Knowledge	Number of records	Percentage (%)
Exact and Earth Sciences (EES)	403	27,80
Engineering (ENG)	388	26,80
Biological Sciences (BS)	245	16,90
Health Sciences (HS)	160	11,00
Agrarian Sciences (AS)	143	10,15
Applied Social Sciences (ASS)	71	4,90
Multidisciplinary	20	1,30
Arts and Humanities <sup>(2)</sup>	17	1,15
Total article ratings <sup>(1)</sup>	1447	100

(1) Some articles were ranked in more than one area of knowledge, based on thematic areas defined in the Scopus and WoS Bases.

(2) The records ranked in the Scopus Base as “Arts and Humanities” were added to the records of Human Sciences, constituting a hybrid Classification “Arts and Humanities”.

**Source:** Prepared by the Authors (2023).

The Exact and Earth Sciences Area has the highest number of selected articles in the SLR, followed by the Engineering Area. The area of Applied Social Sciences (ASS), focused by this study, is ranked sixth.

About this ranking, some questions can be raised, among which the finding that the areas in the first five positions (EES, ENG, BS, HS and AS) are connected to basic or applied research, dealing with product development and processes that often generate patents. That is, these areas have in their DNA the development of new solutions to existing problems, being more familiar with matters related to patents. It does not mean that other areas of knowledge do not predict these conditions, but they are commonly concerned with studying phenomena and social interactions, so that the development of patentable solutions generally requires interdisciplinarity.

Additionally, patent documents are ranked by technological areas, using the IPC (International Patent Classification) and/or CPC (Cooperative Patent Classification). These technological areas are coincidentally very similar to the areas of knowledge.

The way technological knowledge is divided into the classifiers sections allows for a quicker identification of a “basic” area, and its subclassifications. It is possible to find more than one patent classification, what is usual, but it’s easier to identify the subclassifications.

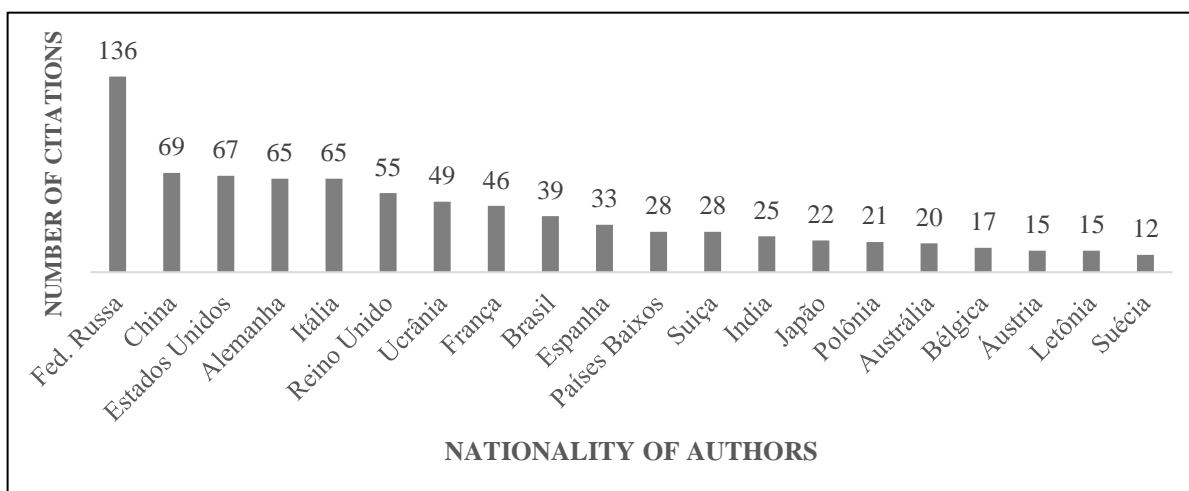
Also, the use of specific keywords, or technical terms, can make the search process more assertive.

Differently, interdisciplinary studies are usually ranked in more than one section, and the classification process demands a very technical knowledge by those performing the task. Likewise, the definition of keywords proves to be a complex task, considering that synonymic terms can be widely used to refer to the same product or the same technique.

Regarding the countries that stand out in the publication of articles with qualitative studies of unstructured data extracted from patent documents, the Russian Federation is in the first position, presenting approximately twice the number of citations of national authors compared to China, which is in second place, followed by the United States, Germany and Italy. The first four economies hold important S&T clusters, according to the Global Innovation Index 2021 (IGI) (World Intellectual Property Organization, 2021b). Brazil is in the ninth position, being the only representative of Latin America, confirming the data mentioned in the IGI 2020 Report: that this country produces high levels of scientific and technical articles, being the only one in Latin America with a high ranking in patents by origin (World Intellectual Property Organization, 2020). Figure 3 presents the ranking of the twenty countries most cited in articles regarding authors.

**Figure 3**

*Ranking of the twenty most cited countries regarding the authors' nationality of the articles selected in the Systematic Literature Review*



Source: Prepared by the Authors (2023).

As far as affiliations are concerned, the Russian Academy of Sciences stands out with 123 registrations. Among Brazilian institutions, only the Federal University of Rio de Janeiro is in the ranking of the ten most cited institutions, with nine records of affiliations (Table 2).

**Table 2**

*Ranking of the ten most cited institutions in the affiliations of authors of articles selected in the Systematic Literature Review*

Affiliation	Number of records
Russian Academy of Sciences	124
National Academy of Sciences of Ukraine	22
Moscow State University Lomonosov	21
National University of Pharmacy of Ukraine	19
CNRS National Center for Scientific Research (France)	17
China's Ministry of Education	12
Southern Federal University (Russian Federation)	10
Vladimir Dal Eastern Ukrainian National University	10
Federal University of Rio de Janeiro	09
Donghua University (China)	09

Source: Prepared by the Authors (2023).

As to Brazil specifically, only institutions in the Southeast Region are cited in the affiliations of authors with articles selected in the RSL. This ranking includes the Federal University of Rio de Janeiro (UFRJ) with nine records, the State University of Campinas (UNICAMP) with six records, the University of São Paulo (USP) with four records, the State University of Rio de Janeiro (UERJ) with two records of affiliations and Nove de Julho University (UNINOVE) with one record. The first four educational institutions of a public character are listed among the 50 largest patent depositors of residents in Brazil, according to the INPI ranking (National Institute of Industrial Property, 2022).

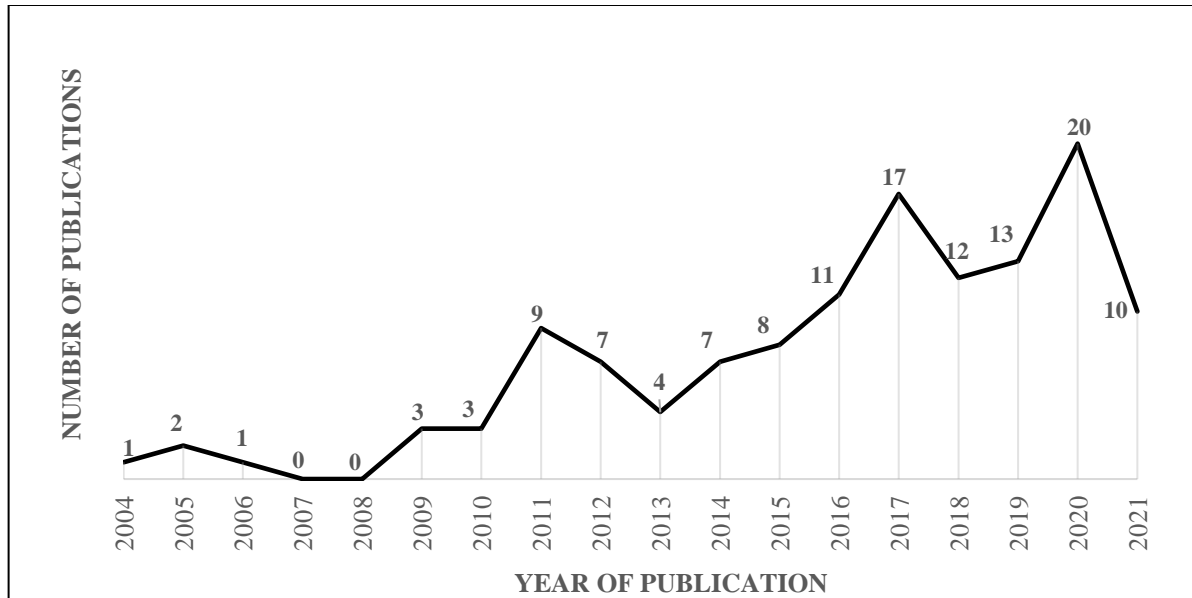
To expand the analysis of data selected in the SLR, mainly due to limited presence of Applied Social Sciences area, studies with a quantitative approach to patents, firstly categorized in the exclusion criteria of the SLR, were analyzed. The 128 articles included in this second analysis deal with the metric study of patent documents (Sánchez, 1999), known as the patentometric technique. The analysis of these articles allows complementing the initial approach of SLR, as recommended by Coelho and Coelho (2003) who suggest the use of more than one technique, method or tool in prospective studies.

By analyzing the year of publication of the articles dedicated to patentometric studies, an upward growth was found, as well as a rising growth when analyzing the articles that use

unstructured patent data as a source of information. However, the growth curve has more frequent peaks and depressions, as shown in Figure 4.

**Figure 4**

*Distribution of articles selected in the Systematic Literature Review dedicated to patentometric studies*



Source: Prepared by the Authors of this article (2023).

For the analysis of 128 articles ranked under “patentometric analyses”, the same correlation previously established was used according to the thematic areas of Base Scopus and Base Web of Science, and the Major Areas of Knowledge of National Council for Scientific and Technological Development (2022). The data are presented in Table 3.

**Table 3**

*Distribution of articles selected in the Systematic Literature Review dedicated to patentometric studies, according to the Major Areas of Knowledge of Brazilian National Council for Scientific and Technological Development*

Major Areas of Knowledge	Total articles <sup>(1)</sup>	Percentage (%)
Applied Social Sciences	74	30,00
Engineering	65	26,30
Exact and Earth Sciences	28	11,30
Agrarian Sciences	34	13,80
Biological Sciences	25	10,12
Health Sciences	14	5,66
Humanities, and Linguistics, Letters and Arts <sup>(2)</sup>	06	2,42
Multidisciplinary	01	0,40
<b>Total</b>	<b>199</b>	<b>100</b>

(1) Some articles were classified in more than one area of knowledge.

(2) The records classified in the Scopus Base as “Arts and Humanities” were added to the records of the Human Sciences Area.

**Source:** Prepared by the Authors (2023).

In articles dealing with patentometric studies, the area of Applied Social Sciences is in the first position, unlike the result obtained when analyzing articles that explore the unstructured data of patent documents.

Brazil stands out in terms of number of citations of national authors in articles on patentometric studies, standing in the first position in the ranking of the 20 countries analyzed. The data are shown in Figure 5.

**Figure 5**

*Ranking of the twenty most cited countries regarding the nationality of the authors of articles selected in the Systematic Literature Review dedicated to patentometric studies*



Source: Prepared by the Authors (2023).

Figure 5 presents the distribution of articles with patentometric studies indexed in the databases consulted, limiting the analysis of articles to national authors. The affiliations of the authors were checked, and it was found that academic and scientific institutions were represented in four regions of Brazil, mostly in the Southeast region. Most of the institutions are public at federal level, being cited in the ranking of the largest depositors in Brazil in the year 2020 (National Institute of Industrial Property, 2022).

**Table 4**

*Distribution of articles selected in the Systematic Review of Patent Literature connectet to patentometric studies, according to the authors' institutional affiliations*

Region of Brazil	Institution
South	Federal University of Rio Grande do Sul (UFRGS) Federal University of Santa Maria (UFSM)* Federal University of Santa Catarina UFSC Federal Technological University of Paraná (UTFPR)
Southeast	University of São Paulo (USP) Federal University of Rio de Janeiro (UFRJ) Paulista State University Julio de Mesquita Filho (UNESP) <i>Nove de Julho</i> University (UNINOVE) Oswaldo Cruz Foundation (FIOCRUZ) National Institute of Industrial Property (INPI) Federal Fluminense University (UFF)* Federal University of Minas Gerais (UFMG)
Midwest	Federal University of Goiás (UFG)*
North East	State University of Southwest Bahia (UESB)* Federal University of Maranhão (UFMA) Rural Federal University of Pernambuco (UFRPE) Federal University of Campina Grande (UFCG) Federal University of Sergipe (UFSE) Federal University of Bahia (UFBA)
North	----

\* Institutions not listed in the INPI ranking (National Institute of Industrial Property, 2022).

Source: Prepared by the Authors of this article (2023).

For qualitative analysis of articles that use the technical information shown in patent documents (n=71), the full text was read to identify how technical information in patent documents is used by the authors. These articles, mostly registered in at least two fields of knowledge, deal with topics somehow related to areas of Business, Management and Accounting, Decision Sciences, Economics, Econometrics and Finance and Social Sciences.

Most of the articles use technical information from patents to build their theoretical framework, describing briefly the technical matter. The means of citation of patent documents in the article follows the traditional shape for indirect citations, referring to the inventor followed by the year of deposit or publication. That is, the textual search for patent citations in the body of the article is not effective, and therefore the bibliographic references must be analyzed.

From the universe of articles that explore technical information of patent documents to track the state of the art in a given technological field, on average one patent document is referenced, and it is noticed that the author uses textual elements present in the abstract and/or in the title.

Examples of articles that use technical information from patent documents not only to build the theoretical framework, but also to provide the analysis of a technological area from the identification of similar technologies are presented.

Symeonidou, Zioga and Papadopoulou (2021) introduce a mathematical tool to manage the energy produced by residential photovoltaic panels, the energy stored in batteries and the energy obtained from the main grid. In the description of the state of art on flow batteries and their applications, they cite the technical information described in patent WO03043170.

Milković and Ognjan (2020) investigate the current state of blockchain technology and its application in media, especially in the field of media ecology, copyright protection and monetization in digital media. In their theoretical framework, they cite the technical matter described in patent CN108563924.

Chen, Zhang, Gong and Lee (2019) analyze smartphone addiction as a form of information technology (IT) addiction. In the description of the state of the art, patent CN101557439 is cited, showing a value-added service function of an embedded multimedia device (VOIP/V2OIP) with a network function.

Hwang, Yeom, Kim and Kim (2021) describe a cutting robot for high strength concrete pile heads used in foundations. In the topic on review of elements technology related to the function of cutting the pile head using a robot, the technical matter of the patent document WO2015044503 is briefly presented.

Hanelt, Firk, Hildebrandt and Kolbe (2021) analyze the link between digital mergers and acquisitions, and the consequences for digital innovation among the world's largest car manufacturers. In the description of the state of the art, patent US9231998 is cited as an example, which deals with the interface between a vehicle and cloud computing resources.

Van Dongen, Hejazi, Noor and Claassen (2017) perform a case study using the patent EP0833934 that deals with gene therapy. The author does not analyze the patent's technical information, but checks the number of third-party citations of this patent, concluding that this data can be used as an indicator to define the value of gene therapies on the market.

Deng & Lee (2019) developed a patent map from a patented product. The authors reviewed patent US6263732 and analyzed citations in the patent and third-party references to this document to identify product-related improvements.

From the universe of articles that use different patent documents to build their theoretical framework from prospection in patent databases, it is noticed that few articles indicate how the patent documents were selected, pointing that it was a random choice, not



based on a research method. Among the articles that cite the methodology for researching patent databases, the use of keywords as the only way of selecting documents is prevalent.

Kuzmichev, Moskvina and Pryor (2018) describe the employment of CAD software for the virtual reconstruction of women's riding clothes between 1875-1915. In this article, the authors cite historical patents deposited between 1916-1918 that describe technical solutions for the comfort and safety of riding clothes.

Usmanov, Illetško and Šulc (2021) describe the use of robotic bricklaying in construction. The authors carried out a search in the patent base, using the keywords “brick” and “robot” to select robotic systems for construction, showing that 4673 results were selected. They assert that a careful examination of the records was made, pointing that none of them referred to a reliable method of transporting objects from BIM environment to the robotic bricklaying environment. The article does not reveal how that careful examination of patents was performed.

Allison, Carter and Gibbs (2020) review the history of voice interaction in digital games, identifying and classifying all games that feature some form of voice interaction. The article analyzes the technical matter of three historic patents for toys that used voice recognition technology, but it does not present how the documents were prospected.

Brown and Cheng (2014) review the description and design of e-cigarette products to understand their potential impact on individual users and public health. The authors described the search on patent bases using the terms 'thermal runaway' OR 'battery fire' OR 'battery explosion' OR 'lithium battery explosion' OR 'electronic nicotine devices' OR 'electronic nicotine delivery systems' OR 'electronic cigarettes' OR 'e-cigarette' OR 'electronic' AND 'cigarette' which, after being analyzed, resulted in 28 patent documents published between 2004 and 2013, that shows important data for the research topic.

Two articles analyze the technical information of patents having as search object the tracking of bibliographic fields.

Viswanathan (2010) analyzes the patents of Wallace Carothers, inventor of Nylon and Neoprene. From the selection of patent documents, the subject and method or product protected in the field of polymers were analyzed.

Hsiao (2011) investigates the patenting situation of Chinese nano herbal medicine in China. The author conducts a survey of patents owned by an individual who, from a single process, claims more than 900 formulations on nanometric scale by using data from traditional

Chinese medicine, and analyzes the technical matter to state that they do not provide evidence of industrial applicability.

## DISCUSSION

A systematic literature review shows that unstructured data from patent documents (basically technical information) are explored and used, with greater prevalence by the Exact and Earth Sciences and Engineering Areas. In these two major fields of knowledge, the selected articles cite at least one patent document as source of primary data in addition to non-patent literature, indicating that the author explored unstructured data to extract relevant technical information.

It is important to observe that the countries in the first four positions in the ranking of articles selected in the RSL that explore the unstructured data of patent documents as a source of technical information - Russian Federation, China, United States and Germany -, are economies with high density of important clusters of S&T (World Intellectual Property Organization, 2021b), where it is assumed that the culture of intellectual property is spread among the entities involved (industry, academia and government).

In the area of Applied Social Sciences, the articles selected in the SLR show that the exploration of unstructured data from patent documents as a complementary source to literature is still little used. More frequently studies of quantitative nature of patent documents (patentometric studies) are observed, where metric surveys are focused on exploring structured fields by using statistical tools.

Articles from the AAS area that explore the technical information of patent documents, on average cite one patent document, often presenting the description of the state of the art. It is observed that, for description of the technical matter of the patent, the author uses textual elements from the abstract and/or title, even though the matter effectively protected in a patent is revealed in the set of claims.

The articles that use the largest number of patents, around two to four references, do not indicate how this data was extracted from the patent base. Therefore, it is a random selection, with no systematized method for prospecting.

Among the articles citing several patent documents, the means of prospecting is limited to the use of keywords, which obviously can be biased due to the possibility of synonyms and different terms for different technological areas.

Articles assigned to the area of AAS that explore the technical information of patent documents, are most of the time interdisciplinary in nature. In this sense, prospecting patent documents and understanding the claimed technical matter requires collaborative work.

Thus, the study suggests that one of the explanations for the little use of patent data in AAS may be related to its interdisciplinary nature, which demands the need for knowledge and skills in different professionals to prospect the patent databases by itself of high complexity, regarding the use of tools and the access language, as well as the reading of documents and the understanding of the effectively protected technical matter.

A second consideration regarding the use of patent documents in the AAS concerns the classification of patent documents by technological areas. At AAS, technological areas are often made up of cross-cutting themes, relating to different disciplines. Therefore, the classification of a research topic in the AAS can be defined in more than one section, with multiple combining possibilities of patent classifiers, which, again, may require the interdisciplinary collaboration of researchers from different areas of knowledge.

For the selection of patent documents to restrict the documentary body, the use of keywords implies predicting the use of synonyms, lexical variations, and technical terms, being a very complex task for multidisciplinary areas, which extends the set of possible combinations that will constitute the search strategy.

Thus, the exploration of unstructured data from patent documents requires a set of technical skills not often mastered by the user, and may require collaboration, since it involves multiple knowledge for qualitative analysis and to obtain answers to the questions "who, where, when, what, how and why?", typical of competitive technical intelligence (MA & Porter, 2015).

On the contrary, patent metric studies can be more easily carried out using tools available in patent databases that allow quantifying structured data, uniform in semantics and format.

## **FINAL CONSIDERATIONS**

The exploration of unstructured data from patent documents is still not very representative in articles in the field of Applied Social Sciences. The SLR showed that, in this large area of knowledge, metric studies prevail, providing data that allow formulating important indicators for decision-making and management processes.

The analysis of articles that explore the technical information of patent documents highlights important research opportunities for the AAS. Even though the number of patent

citations is infinitely smaller than the number of non-patent literature documents, the exploration of technical information present in patent documents can provide the researcher with a network of important citations for the research topic, since the description of the state of the art is the main condition to assure the descriptive sufficiency of the invention.

For the AAS, which deals with social problems by articulating with other areas of knowledge, the knowledge and exploration of the technical information present in patent documents enable to analyze products and processes, project trends for development or improvements in products or processes, monitor the state of the art and assimilate this knowledge to enable studies that will meet society's demands.

As a proposal for future studies, it is possible to analyze how studies in AAS can increase the exploration of technical information in patent documents, and what is the effect of this information in studies that use these primary data. Similarly, it is possible to analyze with academics and researchers in the area the motivations for the little use of patent bases, to understand which mechanisms can be improved to increase familiarity with research bases.

#### AUTHORS' CONTRUBUTION

CONTRIBUTION	CUNHA, K. C. T.	VOLPATO, G.	PEDRON, C. D.
Contextualization	X	X	X
Methodology	X	X	X
Software	---	---	----
Validation	X	X	X
Formal analysis	X	X	X
Investigation	X	X	X
Resources	X	-----	----
Data curation	X	---	---
Original	X	---	---
Revision and editing	X	X	X
Viewing	X	X	X
Supervision	X	X	X
Project management	X	--	--
Obtaining funding	---	---	---

#### REFERENCES

Allison, F., Carter, M., & Gibbs, M. (2020). Word play: a history of voice interaction in digital games. *Games and Culture*, 15(2), 91-113.

<https://doi.org/10.1177/1555412017746305>

Barbosa, D. B. (2011). *Where is patentability verified*. Academia.

[https://www.academia.edu/4397074/Consist%C3%AAncia\\_da\\_patente](https://www.academia.edu/4397074/Consist%C3%AAncia_da_patente)

Bregonje, M. (2005). Patents: A unique source for scientific technical information in chemistry related industry? *World Patent Information*, 27(4), 309-315.

<https://doi.org/10.1016/j.wpi.2005.05.003>

Brown, C. J., & Cheng, J. M. (2014). Electronic cigarettes: product characterization and design considerations. *Tobacco control*, 23, ii4-ii10.

<https://doi.org.br/10.1136/control-do-tabaco-2013-051476>

Chen, C., Zhang, K. Z., Gong, X., & Lee, M. (2019). Dual mechanisms of reinforcement reward and habit in driving smartphone addiction: the role of smartphone features. *Internet Research*, 29(6), 1551-1570. <https://doi.org/10.1108/INTR-11-2018-0489>

Coelho, G. M., & Coelho, D. M. S. (2003). Technological prospecting: national and international methodologies and experiences. Brazilian Regulatory Agency of Petroleum, Gas and Biofuel (*Nota Técnica 12/2003*).

<https://doi.org/10.13140/RG.2.2.34008.21765>

Deng, J., & Lee, J. Y. (2019). The Patent Map of a Measuring Cup. *International Journal of Systematic Innovation*, 5(3), 17-27. [https://doi.org/10.6977/IJoSI.201903\\_5\(3\).0002](https://doi.org/10.6977/IJoSI.201903_5(3).0002)

Donald, K. E., Kabir, K. M., & Donald, W. A. (2018). Tips for reading patents: a concise introduction for scientists. *Expert Opinion on Therapeutic Patents*, 28(4), 277-280.

<https://doi.org/10.1080/13543776.2018.1438409>

European Patent Office. (2022, Jul 20). *Bibliographic coverage in Espacenet and OPS*.

<https://www.epo.org/searching-for-patents/technical/patent-additions.html>.

- Hanelt, A., Firk, S., Hildebrandt, B., & Kolbe, L. M. (2021). Digital M&A, digital innovation, and firm performance: an empirical investigation. *European Journal of Information Systems*, 30(1), 3-26. <https://www.doi.org/10.1080/0960085X.2020.1747365>
- Hsiao, J. I. (2011). Nano Chinese Herbal Medicine Patenting in China: Industrial Applicability as the Benchmark in Assessing Patentability. *Nanotech. L. & Bus.*, 8(2), 106-116.
- Hwang, J. Y., Yeom, D. J., Kim, J. S., & Kim, Y. S. (2021). Final detailed design of an all-in-one attachment based PHC pile head cutting robot and its structural stability analysis. *Journal of Asian Architecture and Building Engineering*, 20(5), 533-545. <https://doi.org/10.1080/13467581.2020.1838912>
- Kuzmichev, V., Moskvina, A., Moskvina, M., & Pryor, J. (2018). Research on 3D reconstruction of late Victorian riding skirts. *International Journal of Clothing Science and Technology*. <https://doi.org/10.1108/IJCST-12-2017-0192>
- Liu, S. H., Liao, H. L., Pi, S. M., & Hu, J. W. (2011). Development of a Patent Retrieval and Analysis Platform—A hybrid approach. *Expert systems with applications*, 38(6), 7864-7868. <https://doi.org/10.1016/j.eswa.2010.12.114>
- Lopes, I. L. (2002). Search strategy in information retrieval: literature review. *Information Science*, 31(2), 60-71. <https://doi.org/10.1590/S0100-19652002000200007>
- Ma, J., & Porter, A. L. (2015). Analyzing patent topical information to identify technology pathways and potential opportunities. *Scientometrics*, 102(1), 811-827. <https://doi.org/10.1007/s11192-014-1392-6>
- Mazieri, M. R., Quoniam, L., & Santos, A. M. (2016). Innovation from the patent information: proposition model Open Source Patent Information Extraction (Crawler). *Journal of Management & Technology*, 16(1), 76-112. <https://doi.org/10.20397/2177-6652/2016.v16i1.734>

Milković, M., Samardžija, J., & Ognjan, M. (2020). Application of blockchain technology in media ecology. *Croatian Scientific Bibliography*, 26(1), 29-52.

<https://doi.org/10.22572/mi.26.1.2>

National Council for Scientific and Technological Development. (2022, June 15). *Table of Knowledge Areas*.

<http://www.lattes.cnpq.br/documents/11871/24930/TabeladeAreasdoConhecimento.pdf/d192ff6b-3e0a-4074-a74d-c280521bd5f7>

National Institute of Industrial Property. (2020, Jul 29). *Patents*. <https://www.gov.br/inpi/pt-br/servicos/perguntas-frequentes/patentes#patente>

National Institute of Industrial Property. (2022, Nov 3). *INPI publishes rankings of the largest depositors in 2020*. <https://www.gov.br/inpi/pt-br/central-de-conteudo/noticias/inpi-divulga-rankings-dos-maiores-depositantes-em-2020>

Oliveira, L. G. D., Suster, R., Pinto, A. C., Ribeiro, N. M., & Silva, R. B. D. (2005).

Information on patents: an indispensable tool for research and technological development. *New chemistry*, 28, S36-40. <https://doi.org/10.1590/S0100-40422005000700007>

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372(71), article PMC8005924.

<https://doi.org/10.1136/bmj.n71>

Pimenta, F. P. (2017). Patents as an (un)necessary source of information for Biotechnology in Health. *TransInformação*, 29(3), 323-332. <https://doi.org/10.1590/2318-08892017000300009>

<https://doi.org/10.1590/2318-08892017000300009>

PRISMA. (2021). *Transparent reporting of systematic reviews and meta-analyses*.

<https://www.prisma-statement.org>

Quintella, C. M., Meira, M., Kamei, A. G., Tanajura, A. S., & da Silva, H. R. G. (2011).

Technology Assessment as a tool applied in science and technology to achieve innovation: optical methods for fuels quality assessment. *Revista Virtual de Química*, 3(5), 406-415. <https://doi.org/10.5935/1984-6835.20110044>

Quoniam, L., Kniess, C. T., & Mazieri, M. R. (2014). The patent, object of research in Information Science and Communication. *Encontros Bibli: revista eletrônica de biblioteconomia e ciência da informação*, 19(39), 243-268.

<http://dx.doi.org/10.5007/1518-2924.2014v19n39p243>

Reymond, D., & Quoniam, L. (2016). A new patent processing suite for academic and research purposes. *World Patent Information*, 47, 40-50.

<https://doi.org/10.1016/j.wpi.2016.10.001>

Reymond, D., & Quoniam, L. (2018). Patent documents in STEM and PhD education: Open-source tools and some examples to open discussion. *Proceedings of Conference Global Engineering Education 2018 IEEE*, Santa Cruz de Tenerife, Spain, 4-9.

<https://doi.org/10.1109/EDUCON.2018.8363100>

Sánchez, G. (1999). *Patentometry: tool for the analysis of technological opportunities*. [Doctoral dissertation, University of Havana].

Singh, V., Chakraborty, K., & Vincent, L. (2016). Patent database: their importance in prior art documentation and patent search. *Journal of Intellectual Property Rights*, 21(1), 42-56.

Symeonidou, M. M., Zioga, C., & Papadopoulos, A. M. (2021). Life cycle cost optimization analysis of battery storage system for residential photovoltaic panels. *Journal of Cleaner Production*, 309, article 127234.

<https://doi.org/10.1016/j.jclepro.2021.127234>



Teixeira, L. P. (2013). *Technological prospecting: importance, methods, and experiences at Embrapa Cerrados*.

<http://www.infoteca.cnptia.embrapa.br/infoteca/handle/doc/981247>

Tigre, P. B., & Kupfer, D. (2004). Technological Propecting. In: *SENAI model of Prospecting: Methodological Document* (pp. 1-19). CINTERFOR.

<https://www.ie.ufrj.br/images/IE/grupos/GIC/CORPO%20DOCENTE/DAVID%20SE RGIO%20KUPFER/Cap%C3%ADtulo%20de%20Livros/2004/KUPFER,%20D.;%20 TIGRE,%20P.%20B.%20Prospec%C3%A7%C3%A3o%20Tecnol%C3%B3gica.pdf>

Tseng, Y. H., Lin, C. J., & Lin, Y. I. (2007). Text mining techniques for patent analysis.

*Information processing & management*, 43(5), 1216-1247.

<https://doi.org/10.1016/j.ipm.2006.11.011>

Usmanov, V., Illetško, J., & Šulc, R. (2021). Digital Plan of Brickwork Layout for Robotic Bricklaying Technology. *Sustainability*, 13(7), 3905.

<https://doi.org/10.3390/su13073905>

Van Dongen, P., Hejazi, E., Noor, Z., & Claassen, E. (2017). Analysing Patent Terms and Citations to Determine the Value of Gene Therapies. *Journal of Commercial*

*Biotechnology*, 23(2), 61-73. <https://doi.org/10.5912/jcb777>

Viswanathan, A. (2010). Wallace Carothers: More than the inventor of Nylon and Neoprene.

*World Patent Information*, 32(4), 300-305. <https://doi.org/10.1016/j.wpi.2009.09.004>

World Intellectual Property Organization. (2013, June). *Handbook on industrial property information and documentation*.

<https://www.wipo.int/export/sites/www/standards/en/pdf/03-09-01.pdf>

World Intellectual Property Organization. (2020). *Global index of innovation 2020. Who Will Fund Innovation?*

[https://tind.wipo.int/record/42278/files/wipo\\_pub\\_gii\\_2020\\_keyfindings.pdf](https://tind.wipo.int/record/42278/files/wipo_pub_gii_2020_keyfindings.pdf)

World Intellectual Property Organization. (2021a). *What is a patent?*.

[https://www.wipo.int/patents/en/faq\\_patents.html](https://www.wipo.int/patents/en/faq_patents.html)

World Intellectual Property Organization. (2021b). *Global Innovation Index 2021: executive summary*. [https://tind.wipo.int/record/44366/files/wipo-pub-2000-exec-2021-en-](https://tind.wipo.int/record/44366/files/wipo-pub-2000-exec-2021-en-global-innovation-index-executive-summary-2021.pdf)

[global-innovation-index-executive-summary-2021.pdf](https://tind.wipo.int/record/44366/files/wipo-pub-2000-exec-2021-en-global-innovation-index-executive-summary-2021.pdf)

Xie, Z., & Miyazaki, K. (2013). Evaluating the effectiveness of keyword search strategy for patent identification. *World Patent Information*, 35(1), 20-30.

<https://doi.org/10.1016/j.wpi.2012.10.005>

### APPENDIX A

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Viswanathan, A. (2010). Wallace Carothers: More than the inventor of Nylon and Neoprene. <i>World Patent Information</i> , 32(4), 300-305. <a href="https://doi.org/10.1016/j.wpi.2009.09.004">https://doi.org/10.1016/j.wpi.2009.09.004</a>	Museology, Chemistry	14	92	Analyzes Wallace Carothers patents related to vinyl polymers, which was directed to the Duprene polymer that later evolved into Neoprene (DuPont).	Analyzes the 92 patents owned by Carothers, identifying patenting trends in synthetic polymers categorized into vinyl polymers and condensation polymers. A search was carried out in the European Patent Database in the search field «Inventor» for «Wallace Carothers».
Hanelt, A., Firk, S., Hildebrandt, B., & Kolbe, L. M. (2021). Digital M&A, digital innovation, and firm performance: an empirical investigation. <i>European Journal of Information Systems</i> , 30(1), 3-26. <a href="https://www.doi.org/10.1080/0960085X.2020.1747365">https://www.doi.org/10.1080/0960085X.2020.1747365</a> .	Industrial Economy, Computer Science	94	1 [US9231998]	It analyzes the link between digital mergers and acquisitions and the impact on digital innovation in industrial age contexts, evaluating the world's largest car manufacturers. The paper suggests that executing digital mergers and acquisitions contributes to building the digital knowledge base of industrial age companies, which in turn allows them to drive digital innovation, leading to increased company performance. Also, the positive effect of digital mergers and acquisitions on digital innovation, partially mediated by new digital patents filed by the acquirer, leads to the perception that digital mergers and acquisitions positively influence digital innovation, helping to build the acquirer's digital knowledge base.	It describes in the methodology the search in the patent base to identify digital patents. It mentions a single patent, as an example, to show how the patents were codified, where it is evidenced that the unstructured fields of the patents were read, although it is mentioned in the article that such coding was carried out by independent researchers. Information extracted from the Espacenet database, with extraction of potential digital patents by performing a keyword search (“digital”, “cloud computing”, “social media”, “mobile technology” and “big data”) followed by analysis from three independent researchers who evaluated the patent information applied for the digital patent.
Moskvin, A., Kuzmichev, V., & Moskвина, M. (2019). Digital replicas of historical skirts. <i>Journal of the Textile Institute</i> , 110(12), 1810-1826. doi:10.1080/00405000.2019.1621042	Museology, Computer Science	86	7 [US2843851, US3010113, US37336, US22426, US22875, US20720, US49447]	Describes the creation of a scientific virtual reality reconstruction method to generate replicas of skirts from the late 1850s and 1860s.	The patents describe the state of the art of skirts, basically the skirt design of the 1850s-1860s.
Symeonidou, M. M., Zioga, C., & Papadopoulos, A. M. (2021). Life cycle cost optimization analysis of battery storage system for residential photovoltaic panels. <i>Journal of Cleaner Production</i> , 309, 127234. <a href="https://doi.org/10.1016/j.jclepro.2021.127234">https://doi.org/10.1016/j.jclepro.2021.127234</a> .	Economics of Natural Resources, Chemistry	45	1 [WO03043170]	It presents a mathematical tool to manage the energy produced by residential photovoltaic panels, the energy stored in batteries and the energy acquired from the main grid, as an alternative in the decarbonization of the energy sector, mainly through the promotion of renewable energies. At the same time, it makes it possible to efficiently manage the energy generated on site within a community.	In the description of the state of the art on flow batteries and their applications, he mentions the patent WO03043170, but without making further considerations regarding the technical matter. It does not inform the method of obtaining the patent data.
Allison, F., Carter, M., & Gibbs, M. (2020). Word play: a history of voice interaction in digital games. <i>Games and Culture</i> , 15(2), 91-113. <a href="https://doi.org/10.1177/1555412017746305">https://doi.org/10.1177/1555412017746305</a>	Industrial Design, Computer Science	54	03 [US1279831, US1243380, US1209636]	Analyzes the history of vocal interaction in digital games through a detailed examination of publicly available information.	The patents cited in the article serve to illustrate that speech recognition technology in the form of children's toys predates the digital computer by three decades. It quotes and describes the Wireless Pup toy, patented in 1916 and refined in the following years. It informs that data was obtained through a detailed examination of publicly available information, without identifying how the aforementioned patents were obtained. The patents are reported to describe a pioneering toy in speech recognition technology.
Van Dongen, P., Hejazi, E., Noor, Z., & Claassen, E. (2017). Analysing Patent Terms and Citations to Determine the Value of Gene Therapies. <i>Journal of Commercial Biotechnology</i> , 23(2). <a href="https://doi.org/10.5912/jcb777">https://doi.org/10.5912/jcb777</a> .	Biology, Business Administration	39	01 [EP0833934]	It describes a case study using the patent EP0833934 that deals with a gene therapy.	The author does not analyze the patent's technical information, but checks the number of third-party citations to this patent, concluding that this data can be used as an indicator to determine the value of gene therapies on the market. The patent selected for the case study meets the criteria of describing a gene therapy, classified in A61K48, C12N7 and C12N15/86; deposited in 1995, owned by companies or research institutes and to be exploited commercially.

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
da Silva, J. A., & Druzian, J. I. (2020). Technological Prospection of Patents of Xanthan Gum in the Food Industry Context. <i>Revista GEINTEC-Gestão, Inovacao e Tecnologias</i> , 10, 5527-5536.	Food Science and Technology, Law, Business Administration	21	396	Prospection of technological application of xanthan gum not combined with other microbial gums in foods or foodstuffs. Several applications of xanthan gum in the area of food are verified, indicating the importance of the use of biopolymer in the preparation, modification of the nutritional qualities and preservation of food or food.	Identifies the applications of xanthan gum in the method of preparing food or foodstuffs, as a biopolymer in medicinal compositions, as a gelling agent, as a stabilizing agent, as an emulsifying agent or thickening agent, properties that are of great interest to the food industry. The patents were obtained by searching the Espacenet database, using the keywords "Xanthan Gum", "Xanthomonas campestris" and "Exopolysaccharide".
Fric, U., & Starc, N. T. (2021). Computer-Implemented Inventions and Computer Programs–Status Quo in Slovenia and EU. <i>Informatica</i> , 45(5). <a href="https://doi.org/10.31449/inf.v45i5.3468">https://doi.org/10.31449/inf.v45i5.3468</a>	Computer Science, Business Administration	23	04 [GB1039141, SI 24058, SI23715, SI 25646]	It analyzes the history of patents implemented in computer programs and the situation of legal protection in Slovenia, there is no legal basis for inventions related to computer programs, and in the European Union where these inventions are not yet clearly defined.	It cites examples of computer-implemented inventions, describing the technical matter, and the situation of patent protection, without revealing how the patent data was obtained.
Joossens, L., & Gilmore, A. B. (2014). The transnational tobacco companies' strategy to promote codentify, their inadequate tracking and tracing standard. <i>Tobacco Control</i> , 23(E1), e3-e6. <a href="https://doi.org/10.1136/tobaccocontrol-2012-050796">https://doi.org/10.1136/tobaccocontrol-2012-050796</a>	Industrial Economy, Computer Science	31	01 [EP1719070]	Analyzes Codentify, a visible code printed on tobacco packages, patented by PMI, which aims to verify the authenticity of a product (ie whether a product is genuine or counterfeit).	It describes the technical subject matter of the patent, its limitations and analyzes compliance with the WHO Framework Convention on Tobacco Control.
Hsiao, J. I. (2011). Nano Chinese Herbal Medicine Patenting in China: Industrial Applicability as the Benchmark in Assessing Patentability. <i>Nanotech. L. &amp; Bus.</i> , 8, 106.	Planning in Science and Technology, Business Administration, Pharmacy	51	01 [CN1368367]	It investigates the patenting situation of Chinese nano phytotherapy in China and concludes that the granted patents have a broad scope, without evidencing the applicability, recommending that these patents be granted when the existence of applicability is verified.	The author conducts a survey of patents owned by an individual who, from a single process, claims more than 900 formulations on a nanometric scale using data from traditional Chinese medicine and analyzes the technical matter of these patent documents to state that they do not provide evidence of industrial applicability.
Albors-Garrigos, J., de Miguel Molina, B., & de Miguel Molina, M. (2014). Positioning in the global value chain as a sustainable strategy: A case study in a mature industry. <i>Administrative Sciences</i> , 4(2), 155-172. <a href="https://doi.org/10.3390/admsci4020155">https://doi.org/10.3390/admsci4020155</a>	Industrial Economy	31	diversas	It analyzes the governance structure of the territorial value chain in the Spanish and Italian ceramic tile industry, through understanding the previous and current roles of various industries involved in the value creation system. It identifies that suppliers of mechanical equipment for ceramic coatings constitute a balanced network with manufacturers of ceramic coatings and producers of enamels, paints and pigments, which shows that the interaction between these two subsectors is remarkable and has contributed to the development of a series of technological innovations, which have contributed to the technological leadership of the European ceramic tile industry.	No specific patent is cited. The authors analyze several patents owned by various players in the coating industry, in Spain and Italy. The authors identify the applications of patents in the development of technology for ceramic coating processes, and note that technological development, reflected in patents in the mechanical equipment sector, leads to the evolution of patents for products and processes for enamel and pigment producers. From the consulted patents, it also verifies that the ceramic tile manufacturers do not register patents, since the enamel sector is the main technological agent in their processes.
Usmanov, V., Illetško, J., & Šulc, R. (2021). Digital Plan of Brickwork Layout for Robotic Bricklaying Technology. <i>Sustainability</i> , 13(7), 3905.	Computer Science, Architecture	50	4673	Describes the use of robotic masonry in civil construction.	The authors carry out a search in the patent base, using the keywords "brick" and "robot" to select robotic systems for civil construction, revealing that 4673 results were selected and citing that a careful examination of the records was made, which revealed that none of them referred to a reliable method of transporting objects from the BIM environment to the robotic masonry environment. The article does not reveal how the careful examination of patents developed.
Buss, A. H., Kovaleski, J. L., Pagani, R. N., da Silva, V. L., & Silva, J. D. M. (2019). Proposal to reuse rubber waste from end-of-life tires using thermosetting resin. <i>Sustainability</i> , 11(24), 6997. <a href="https://doi.org/10.3390/su11246997">https://doi.org/10.3390/su11246997</a>	Chemistry, Economy	52	60	It describes a process that favors the recycling of waste rubber from end-of-life tires.	For the construction of the state of the art, in addition to the literature review, a search was carried out in patent databases using the key phrase "Tire Recycling", allowing the patents obtained to be categorized into four major groups of recycling methods: cryogenic, microbiological, pyrolysis and microwave.
Coutinho, L. L., Rosário, M. F. D., & Jorge, E. C. (2010). Animal biotechnology. <i>Estudos avançados</i> , 24, 123-147.	Veterinary, Economy	131	02 [WO02064820, WO2004070055]	It analyzes the use of animal biotechnology by approaching different techniques for analyzing the information contained in DNA for applications in genetic improvement programs for species of zootechnical interest, such as cattle, pigs, poultry, among others.	He cites two patents to describe the state of the art of methods for assessing meat quality in beef cattle ( <i>Bos taurus</i> breed) by mutations in genes. It does not indicate how it obtained the patent documents.

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Feindt, P. H. (2012). The politics of biopatents in food and agriculture, 1950–2010: Value conflict, competing paradigms and contested institutionalisation in multi-level governance. <i>Policy and Society</i> , 31(4), 281-293. <a href="https://doi.org/10.1016/j.polsoc.2012.09.002">https://doi.org/10.1016/j.polsoc.2012.09.002</a>	Agrarian Sciences, Economy, Law	76	03 [EP1069819, EP1646287, EP1651777]	Analisa o estabelecimento de biopatentes na agricultura que remontam à década de 1950, impulsionado principalmente por decisões judiciais, pela inclusão da agricultura nos principais tratados internacionais sobre direitos de propriedade intelectual e pela nova legislação de patenteamento.	Three examples of patents related to biopatents that were opposed for being considered essentially biological processes and therefore not patentable are presented, mobilizing a group of farmers and discussions about the patentability and monopolization of traditional breeding methods.
Biasizzo, A., Seljak, B. K., Valenčič, E., Pavlin, M., Santo Zarnik, M., Blažica, B., ... & Papa, G. (2021). An open-source approach to solving the problem of accurate food-intake monitoring. <i>IEEE Access</i> , 9, 162835-162846. <a href="https://doi.org/10.1109/ACCESS.2021.3128995">https://doi.org/10.1109/ACCESS.2021.3128995</a>	Nutrition, Economy	51	05 [SI22693, GB2525403, US20070010721, CN20202757684, US20160018255]	Describes an open source solution to the serving size estimation problem for people with special nutritional needs who must monitor their nutritional requirements.	The cited patents serve to describe the state of the art of patented solutions. It does not describe how the patent documents were obtained.
Arnau, P. A., Navarro, N., Soraluce, J., Martínez-Iglesias, J. M., Illas, J., & Oñate, E. (2019). Cool steam method for desalinating seawater. <i>Water (Switzerland)</i> , 11(11) <a href="https://doi.org/10.3390/w11112385">https://doi.org/10.3390/w11112385</a>	Engineering, Economics of Natural Resources	33	02 [US2016122205 US10315932 EP20130382196 EP20110382198]	It describes the technology patented by the authors (system, method and device), called "Cool Steam" for obtaining fresh water from unsafe water sources with substantially low energy consumption through low temperature thermal distillation.	The cited patents are described throughout the article, having been developed by the authors of the articles. It only describes the technology protected by patents, without any presentation of the state of the art.
Dhankar, D. (2016). Commercialisation and Biopiracy of Genetic Resources in the 21 st Century: The Imminent Need for Stronger Regulation. <i>Journal of Intellectual Property Rights</i> . 21, 193-210.	Ciências Biológicas (CB), Agrarian Sciences, International Law	82	14 [EP05852369, EP11154255, EP08835291, EP2192910, EP0436257, US5401504, US5663484, US5900240, US6042834, EP1827362, EP2689806, EP2361602, EP06835672, EP1962578]	It analyzes issues related to inventions involving Traditional Knowledge, Traditional Cultural Expressions and Genetic Resources, and the need to establish an international instrument that provides effective and balanced protection for traditional knowledge, due to attempts to obtain monopoly rights over inventions developed from the misappropriation of genetic resources and associated traditional knowledge.	Presents and describes several patents that protect genetic resources and teachings derived from traditional knowledge.
Adler, P., Dumas, T., Deyris, P. A., Petit, E., Diliberto, S., Boulanger, C., & Grison, C. (2021). II- from ecological recycling of Pd to greener sonogashira cross-coupling reactions. <i>Journal of Cleaner Production</i> , 293, 126164. <a href="https://doi.org/10.1016/j.jclepro.2021.126164">https://doi.org/10.1016/j.jclepro.2021.126164</a> .	Chemistry, Economics of Natural Resources	58	02 [WO202074758, WO2015036714]	Describes the development of a product (Eco-Pd) which is a recyclable palladium catalyst prepared from material of plant origin for Sonogashira coupling reaction in order to suit the criteria of green and sustainable chemistry.	The author mentions the two patents, absorbing explicit knowledge in them, to compose the process. It does not describe how the patent documents were obtained.
Prytulaska, N., & Bondarenko, E. (2015). Research of prospects for using zeolites in the food industry. <i>Eastern-European Journal of Enterprise Technologies</i> , 5(11), 4-9. <a href="https://doi.org/10.15587/1729-4061.2015.51067">https://doi.org/10.15587/1729-4061.2015.51067</a>	Business Administration, Economics, Nutrition	31	04 [WO2014037877, US1995/012860, EP2000/001241, EP20000304608]	Describes the use of zeolites in food production.	The cited patents serve to present some applications of bentonites in the food industry, as an anti-caking and anti-caking component for cheese; flavoring additives and processing of perishable foods.
Caetano, R., Cordeiro Dias Villela Correa, M., Villardi, P., Almeida Rodrigues, P. H., & Garcia Serpa Osorio-de-Castro, C. (2021). Dynamics of patents, orphan drug designation, licensing, and revenues from drugs for rare diseases: The market expansion of eculizumab. <i>PLoS one</i> , 16(3), e0247853. <a href="https://doi.org/10.1371/journal.pone.0247853">https://doi.org/10.1371/journal.pone.0247853</a>	Pharmacy, Commercial/Economic Politics	96	98	Analyzes the dynamics of the eculizumab patenting process worldwide, with approved clinical indications for rare diseases (eg, paroxysmal nocturnal hemoglobinuria syndrome, atypical hemolytic uremic syndrome, refractory and generalized myasthenia gravis, and neuromyelitis optica spectrum disorder).	A search was carried out in several patent databases using the active ingredient "eculizumab" as a keyword, which resulted in 32 patent families divided into 98 applications. Analyzes current patents and clinical indications.

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Chen, C., Zhang, K.Z.K., Gong, X. e Lee, M. (2019). Dual mechanisms of reinforcement reward and habit in driving smartphone addiction: The role of smartphone features. <i>Internet Research</i> , 29 (6), pp. 1551-1570. <a href="https://doi.org/10.1108/INTR-11-2018-0489">https://doi.org/10.1108/INTR-11-2018-0489</a>	Information Science, Psychology	87	01 [CN101557439]	Analyzes smartphone addiction, reinforcement reward and automatic habit were identified as two underlying mechanisms.	It cites a single patent to inform the multiple functions of the smartphone ranging from basic functions, such as making calls, to several value-added functions (for example, games and social networks). It does not inform how the patent document was obtained.
Di Martino, M., Quax, P., & Lamotte, W. (2020). Knocking on IPs: Identifying HTTPS websites for zero-rated traffic. <i>Security and Communication Networks</i> , <a href="https://doi.org/10.1155/2020/7285786">https://doi.org/10.1155/2020/7285786</a>	Information Science, Computer Science	59	03 [US20180048729, US2019/0130036, US2017/0374017]	Writes "Open-Knock" technology, which is able to accurately identify a website with a zero rating (called Zero-rating, a technique in which internet service providers (ISPs) allow consumers to use a specific website without charging your internet data plan).	It mentions three patents that describe methods of identifying zero-rating sites, owned by Facebook, T-Mobile and Cisco, and states that such patented techniques present the same technical limitations and vulnerabilities observed in the academic literature, such as the inability to detect or automatically prevent gratuitous attacks, in which an attacker can modify their own network traffic in such a way that it resembles a service or site with zero ratings and the fact that they do not support the emergence of new encryption protocols. Does not identify how patent documents were obtained, being cited in the article from the name of the holder.
Osipov, V., Kuleshov, S., Zaytseva, A., Levonevskiy, D., & Miloserdov, D. (2021). Neural network forecasting of news feeds. <i>Expert Systems with Applications</i> , 169. <a href="https://doi.org/10.1016/j.eswa.2020.114521">https://doi.org/10.1016/j.eswa.2020.114521</a>	Information Science, Computer Science	41	01 [RU2446463]	Describes a neural network prediction method of news feed content.	It describes the state of the art of streaming recurrent neural networks (RNN) with controlled elements, citing a single patent whose author of the article appears as an inventor.
Achternbosch, M., Dewald, U., Nieke, E., & Sardemann, G. (2015). Is Coal Fly Ash a Suitable Alkaline Resource for Manufacturing New Calcium Carbonate-based Cements? <i>A Systems Analytical Evaluation. Journal of Industrial Ecology</i> , 19(1), 71-81. <a href="https://doi.org/10.1111/jiec.12147">https://doi.org/10.1111/jiec.12147</a>	Chemistry, Engineering, Industrial Economy	56	01 [WO2008148055]	It analyzes the use of coal fly ash as a cement substitute for the development of "green cements" with lower CO2 emissions. It shows that the availability of qualified ash is limited and that the usable alkalinity for the mass production of cements is poor, so that fly ash could only be used as a supplementary resource. Furthermore, the extraction of calcium from fly ash is a more polluting process, with a risk of unwanted environmental effects.	Three innovations designated by the authors as radical are analyzed, one of which is a patented technology, describing a process for obtaining green cement with a binder based on alkaline residues and sea water.
Elesini U.S., Knez E., Leskovšek M. (2004). Incorporation of microcapsules into textile fibres. <i>Tekstilec</i> , 175-184.	Chemistry, Industrial Economy	19	04 [US4756958, US4851129, GB1392508, WO0224830]	It describes the use of microcapsules in the textile industry and the problems that occur during incorporation of microcapsules into textile fibers, such as microcapsule conglomeration and stability of microcapsules at high temperature and pressure.	The patents are cited to illustrate the state of the art of processes for incorporating microcapsules into fibers. It does not reveal how patent documents were obtained.
Dotti, F., Ferri, A., Moncalero, M., & Colonna, M. (2016). Thermo-physiological comfort of soft-shell back protectors under controlled environmental conditions. <i>Applied ergonomics</i> , 56, 144-152. <a href="https://doi.org/10.1016/j.apergo.2016.04.002">https://doi.org/10.1016/j.apergo.2016.04.002</a>	Industrial Design, Product Engineering	31	01 [US2005037189]	Investigates the thermophysiological comfort of three back protectors used in winter sports, identifying design features that affect heat loss and moisture management.	The patent is used as a source of information for the description of the state of the art of energy absorbing materials based on soft-shell technology, made of polymeric foams with a pseudo-dilating nature. It does not identify how the patent document was obtained, limiting itself to informing that it is a technology available on the market.
Milkovic, M., Samardžija, J., & Ognjan, M. (2020). Application of blockchain technology in media ecology. <i>Medijska Istrazivanja</i> , 26(1), 29-52. <a href="https://doi.org/10.22572/mi.26.1.2">https://doi.org/10.22572/mi.26.1.2</a>	Information Science, Computer Science	67	01 [CN108563924]	It analyzes the current application of blockchain technologies, especially in the field of media ecology, copyright protection and digital media monetization.	It describes a patented technology related to a blockchain-based multimedia ecosystem.
de Souza Carvalho, D., Guimarães de Oliveira, L., Winter, E., & Gonçalves Mothé, C. (2009). Technological foresight based on citing and cited patents of cellulose with pharmaceutical applications. <i>Journal of Technology Management &amp; Innovation</i> , 4(4), 32-41.	Pharmacy, Industrial Economy	09	01 [WO9745131]	It presents the relevance of cellulose through the study of technological forecasting, analyzing the citation of documents of a patent application (WO 9745131) as an indicator of innovation.	It cites a single patent document that describes a compound using cellulose derivatives, and also the therapeutic method for treating blood vessel embolism using such compound. Evaluates citations and cited documents, as well as the patent family, allowing analysis of the sector's technological evolution, using the European patent database (Espacenet), combining keywords and IPC.

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Hwang, J. Y., Yeom, D. J., Kim, J. S., & Kim, Y. S. (2021). Final detailed design of an all-in-one attachment-based PHC pile head cutting robot and its structural stability analysis. <i>Journal of Asian Architecture and Building Engineering</i> , 20(5), 533-545.	Engineering, Management of Specific Sectors, Architecture	10	01 [WO2015044503]	Performs a trend analysis of the pre-tensioned pile head cutting process, as this is a construction stage with a high risk of injuries caused by cutting fragments or cutting equipment and which requires qualified workers.	Conducts a survey of technologies for cutting head of pile robots, citing a patent that describes the state of the art of cutting devices for tubular structures. It does not show how the patent document was obtained.
Deng, J., & Lee, J. Y. (2019). The patent map of a measuring cup. <i>International Journal of Systematic Innovation</i> , 5(3), 17-27. <a href="https://doi.org/10.6977/IJoSI.201903_5(3).0002">https://doi.org/10.6977/IJoSI.201903_5(3).0002</a>	Industrial Design	14	06 [US4073192, US4566509, US5588747, US7306120, US8517219, US9354098]	Describes a measuring cup, called OXO, with specific constructive characteristics, protected in patent US6263732.	Analyzes the forward and backward citations of the US6263732 patent to identify similar or distinct characteristics, trends and the possibility of incorporating functions into the OXO cup from the technical matter described in the patents.
Perez-Molina, E. (2018). The role of patent citations as a footprint of technology. <i>Journal of the Association for Information Science and Technology</i> , 69(4), 610-618. <a href="https://doi.org/10.1002/asi.23979">https://doi.org/10.1002/asi.23979</a>	Computer Science, Business Administration	60	02 GB1283915 US3541541	It analyzes two patents, in the form of case studies, to verify the patent citations and illustrate what the author calls the "technological footprint", that is, the history and evolution of technology.	The two cited patents were intentionally chosen by the author for the case study.
Brown CJ & Cheng JM. (2014). Electronic cigarettes: product characterisation and design considerations. <i>Tobacco Control</i> , 23:ii4-ii10. <a href="https://doi.org/10.1136/control-2013-051476">https://doi.org/10.1136/control-2013-051476</a>	Industrial Design	35	15 [EP1618803, EP1736065, US20130213419, US8528569, US20110265806, US20110277780, US20050016550, US8550069, US8490628, CA02731485, US20130192623, EP2641490, US20130220315, US20130213418, US20130192621]	Conducts a review of e-cigarette design to understand their potential impact on individual users and public health	It analyzes several patents to analyze the constructive characteristics, materials and means to influence the aerosol properties and the efficiency in the delivery of nicotine. Searches four patent databases (SciFinder, Espacenet, Google Patent and US Patent Office) using keywords "thermal runaway" or "battery fire" or "battery explosion" or "lithium battery explosion" or "electronic nicotine devices" or "electronic nicotine delivery systems" or "electronic cigarettes" or "e-cigarette" or "electronic" and "cigarette".
Deng, J. (2019). The origin of the reverse umbrella. <i>International Journal of Systematic Innovation</i> , 5(3), 28-46. <a href="https://doi.org/10.6977/IJoSI.201903_5(3).0003">https://doi.org/10.6977/IJoSI.201903_5(3).0003</a>	Industrial Design	17	08 [TW1254619, TWM522603, GB2346556, US8893736, US20150265013, GB1233564, US20150265013, TW1254619]	Analyzes inventions related to reverse umbrellas authored by three inventors, analyzing forward and backward citations.	It analyzes in detail the technical description of each patent in order to obtain categories of improvements and a comparative table with the differences between the product designs. Conducts research on the basis of patents from Taiwa, USPTO and Espacenet, based on the names of inventors LiSheng-Chiun, Shen-Mei and Jenan Kazim.
Julien Gardan (2016). Additive manufacturing technologies: state of the art and trends. <i>International Journal of Production Research</i> , 54:10, 3118-3132, <a href="https://doi.org/10.1080/00207543.2015.1115909">https://doi.org/10.1080/00207543.2015.1115909</a>	Industrial Economy, Production Management, Engineering	72	09 [FR3002179, US5519816, US4961154, US5121329, US5340433, US 4938816, US20150097315, US5730817, US5597589]	Review on additive manufacturing technology, with a survey of some evolutions related to the exchange format, the fastest 3D printing systems, advanced numerical simulation or the emergence of new uses.	Patents are cited to describe the state of the art, including an article author patent (FR3002179).

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Aleksandrov, Y. (2020). Agricultural modules situated in arcology skyscrapers for production of certain oil crops, soft fruits and vegetables as well as honey realized. <i>Bulgarian Journal of Agricultural Science</i> , 26(4), 737-743.	Architecture and Urbanism, Agrarian Sciences	19	04 [BG66192, BG111651, BG111658, BG 63644]	Describes skyscraper roof installations for growing oilseeds.	It describes the patents developed by the author to deal with positive temperature chambers adapted to grow fruits and vegetables and the other patents describe the state of the art.
Eichberger, A., & Wallner, D. (2010). Review of recent patents in integrated vehicle safety, advanced driver assistance systems and intelligent transportation systems. <i>Recent Patents on Mechanical Engineering</i> , 3(1), 32-44. <a href="https://doi.org/10.2174/1874477X11003010032">https://doi.org/10.2174/1874477X11003010032</a>	Urban Planning/Architecture, Economy	72	44	It analyzes road safety systems integrated into vehicles.	It mentions 44 patents that describe Advanced Driver Assistance Systems incorporated in vehicles, analyzing the technical matter. Describes a search on patent bases with the keywords driver assistance system; environmental recognition system; Man-machine interface and intelligent transport systems and integrated vehicle safety system, obtaining 44 patents, among which those published between 2007 and 2009 were selected.
Dumesnil I, C. (2005). Les savoirs traditionnels médicinaux pillés par le droit des brevets?. <i>Revue internationale de droit économique</i> , (3), 321-343.	International Law, International Economy, Pharmacy	62	04 [EP1962578, US5894079, US5124349, EP1429795]	It analyzes the patentability of products from collections of medicinal plants and traditional knowledge.	It presents patents that describe products derived from traditional medicinal knowledge. It does not describe the selection criteria for patent documents.
Kovaleva, V.L., Shilova, E.V. & Poroikov, V.V. (2003). Modern Trends in Research and Development of Antiasthmatic and Antiallergic Drugs. <i>Pharmaceutical Chemistry Journal</i> , 37, 293-297. <a href="https://doi.org/10.1023/A:1026097529934">https://doi.org/10.1023/A:1026097529934</a>	Pharmacy, International and Industrial Economy	16	04 [EP178073, EP849445, EP842994, EP842943]	Analyzes the development of pharmacotherapy of bronchial asthma and other allergic disorders mainly related to the development of new medicinal forms of known bronchodilators and glucocorticosteroids (intranasal, inhalational and oral routes and administration with extended release).	Patents are cited to describe the state of the art. It does not reveal how the patents were selected.
Rubik, B. (2016). Interactions of pyramidal structures with energy and consciousness. <i>Cosmos and History</i> , 12(2), 259-275.	Museology, Industrial Design	28	02 [JP9313624 DE3525521]	It analyzes the great stone pyramids of ancient civilizations and presents Evidence that pyramidal structures collect or allow a new form of energy – cosmic energy or bioenergy – to flow in an unusual way, producing a variety of unforeseen effects unexplained by conventional science.	It cites two patents for pyramid-shaped products (medical treatment devices include a Japanese plastic pyramid, reported to kill all pathogenic microbes, which can be placed under the bed, and a pyramidal device that removes energy disturbances in the human body). It does not mention the criteria for selecting the patents cited in the article.
Pal, P., Sambhakar, S., Dave, V., Paliwal, S. K., Paliwal, S., Sharma, M., Dhama, N. (2021). A review on emerging smart technological innovations in healthcare sector for increasing patient's medication adherence. <i>Global Health Journal</i> , 5(4), 183-189. <a href="https://doi.org/10.1016/j.glohj.2021.11.006">https://doi.org/10.1016/j.glohj.2021.11.006</a> .	Industrial Design, Health Sciences	68	04 [US7937829, US6574166, WO2007070847, WO03055769]	The article reviews the various advanced technologies and methods that can help measure patient medication adherence.	Patents describe the state of the art of smart blister packs. The article mentions that the concept of intelligent blister packaging has been discussed in several patent applications, without detailing how the cited patents were selected.
Basson, A. R., Rodriguez-Palacios, A., & Cominelli, F. (2021). Artificial sweeteners: History and new concepts on inflammation. <i>Frontiers in Nutrition</i> , 8. <a href="https://doi.org/10.3389/fnut.2021.746247">https://doi.org/10.3389/fnut.2021.746247</a> .	Nutrition, Public Health, Industrial Economy	166	01 [EP3128855]	Conducts a historical review of FDA-approved artificial sweeteners and their chemical composition, metabolism, and bacterial utilization, and provides an overview of the scope of disease mechanisms associated with the induction or prevention of inflammatory bowel disease (IBD), a disorder that is growing exponentially in westernized countries. Epidemiologic and animal studies have suggested that artificial sweeteners may induce changes in gut bacteria and immune reactivity of the gut wall, which could negatively affect individuals with or susceptible to chronic inflammatory conditions.	Describes a patent example whose formulation features sugar-silica as a carrier compound whose oral consumption of small particles has been shown to exacerbate colitis.
Karanović, J. (2010). Contentious Europeanization: The paradox of becoming European through anti-patent activism. <i>Ethnos</i> , 75(3), 252-274. <a href="https://doi.org/10.1080/00141844.2010.509511">https://doi.org/10.1080/00141844.2010.509511</a> .	Law, International Economy	54	01 [EP1320972]	It analyzes software patents in Europe, where it encounters resistance. In 1986, the European Patent Office (EPO) revised its guidelines for examining patents and defined the criterion of "technical contribution" to identify patentable inventions.	The only patent cited serves as illustrative information about the technical character required for patent granting in the European Community. The patent describes software that adapts the layout of a web page for display on cell phones. This technology would not be patentable under the European Convention, but the EPO recognized this patent in 2003 as being of "technical character".
Karaszewska, A.. (2013). Agrotexiles used for the protection against the hail. <i>Przegląd Włokienniczy</i> . 67. 29-32.	Agrarian Sciences, Agrarian Economy	24	01 [CN202455987]	It analyzes the protection networks of orchards against adverse atmospheric agents (hail).	The cited patents describe the state of the art, revealing the technical characteristics of the patented nets.



REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Kon TC, Onu A, Berbecila L, Lupulescu E, Ghiorgisor A, Kersten GF, Cui YQ, Amorij JP, Van der Pol L. (2016). Influenza Vaccine Manufacturing: Effect of Inactivation, Splitting and Site of Manufacturing. Comparison of Influenza Vaccine Production Processes. <i>PLoS One</i> . 9;11(3):e0150700. <a href="https://doi.org/10.1371/journal.pone.0150700">https://doi.org/10.1371/journal.pone.0150700</a> .	Industrial Economy, Health Sciences	38	1 [CN202455987]	Evaluates the impact of different inactivation and splitting procedures on the composition, stability and recovery of influenza vaccine products to support process technology transfer.	The only cited patent describes the state of the art of deoxycholate cleavage methods, using Triton X-100, reported by the author as present in most commercial products. The method of selection of the cited patent is not mentioned.
Kuzmichev, V., Moskvina, A., Moskvina, M., & Pryor, J. (2018). Research on 3D reconstruction of late Victorian riding skirts. <i>International Journal of Clothing Science and Technology</i> .	Museology, Industrial Design	77	04 [US685770, US631949, US689215, US320954]	Describes the application of 2D and 3D CAD for the virtual reconstruction of women's riding clothes (side saddle) used in 1875-1915.	Features historic patents to highlight the improvements applied to clothing and saddle for comfort and safety. It does not describe how the patent documents were obtained.
Letondal, C., Vinot, J. -, Pauchet, S., & Leriche, S. (2019). Exploring a touch-based flight control panel for pilots using tangible design principles. <i>Transportation Research Procedia</i> , 43 257-268. <a href="https://doi.org/10.1016/j.trpro.2019.12.041">https://doi.org/10.1016/j.trpro.2019.12.041</a> .	Industrial Design, Engineering	29	01 [EP2715507]	It describes the development of touch technologies that tend to replace existing pilot-system interfaces in aircraft cockpits.	Describes a single patent to describe the state of the art of tangible and touch-based systems combined with digital interaction. It does not describe the selection criteria and how to search for the cited patent document.
Maresova, P., Krejcar, O., Barakovic, S., Husic, J. B., Lameski, P., Zdravovski, E., ... & Trajkovic, V. (2020). Health-related ICT solutions of smart environments for elderly-systematic review. <i>IEEE Access</i> , 8, 54574-54600. <a href="https://doi.org/10.1109/ACCESS.2020.2981315">https://doi.org/10.1109/ACCESS.2020.2981315</a> .	Information Sciences, Computer Science	128	19	Presents current trends and possibilities in the application of intelligent information and communication technology (ICT) solutions for home care related to diseases in old age.	The cited patents reveal technical solutions in the field of Smart Homes, especially in monitoring biomedical information from home residents, as well as speech recognition applications to process user input. The patents were obtained by searching the Espacenet, PatentInspiration and Google Patent databases, covering documents published between 1990 and 2018, using keywords related to the smart home with connection to the elderly population and connecting with 14 keywords that reflect age-related diseases.
Araújo, N. S., Delazari, L. S., Fernandes, V. O., & Júnior, M. A. (2020). A bibliometric study of graphic variables used on tactile maps. <i>International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives</i> , 43(B4) 25-32. <a href="https://doi.org/10.5194/isprs-archives-XLIII-B4-2020-25-2020">https://doi.org/10.5194/isprs-archives-XLIII-B4-2020-25-2020</a> .	Industrial Design, Visual Communication	27	01 [US2006169783, US2006169783, BR102017018174]	It describes the development of graphic variables in tactile cartography for visually impaired people.	The cited patents describe the state of the art for tactile maps and the use of color coding in association with thermal sensation. It does not indicate how the patent documents were selected.
Bochkovskiy, A. P., & Sapozhnikova, N. Y. (2021). Development of system of automated occupational health and safety management in enterprises. <i>Journal of Achievements in Materials and Manufacturing Engineering</i> , 107(1), 28-41. <a href="https://doi.org/10.5604/01.3001.0015.2454">https://doi.org/10.5604/01.3001.0015.2454</a> .	Engineering, Business Administration, Health Sciences, Work Social Service	32	07 [CN203745919, CN107374133, EP0378465, US 20120146789, US 20070285222, UK65121, UK53753]	Describes an automated occupational health and safety management system, which due to the connection of functionally independent elements (according to a given scheme) allows to provide comprehensive protection of employees against the impacts of negative factors of the "man-machine-environment" system and reduce occupational injuries and illnesses.	It analyzes a set of patents to state that there are no automated systems capable of effectively managing occupational health and safety in the company, constantly monitoring and promptly correcting the impacts of negative factors in the "man-machine-environment" system. The article only mentions that normative-legal documents and technical-scientific literature in the area of construction and operation of occupational health and safety management systems were analyzed.
Sowiński, A., Szczepański, T., & Koralewski, G. (2021). Car braking effectiveness after adaptation for drivers with motor dysfunctions. <i>Open Engineering</i> , 11(1), 617-623. <a href="https://doi.org/10.1515/eng-2020-0219">https://doi.org/10.1515/eng-2020-0219</a> .	Engineering, Industrial Economy	19	01	It presents the results of measurements of the braking efficiency of vehicles adapted to be operated by drivers with motor dysfunctions. In these cars, the braking system is extended with an adaptive device that allows braking with the upper limb.	It uses information described in a patent to state that the distribution of forces on the upper and lower limbs during the braking operation is significantly different.
Quade, M. H. (2021). Frictionless commerce and seamless payment. <i>New Trends in Business Information Systems and Technology</i> , 294, 223-235. <a href="https://doi.org/10.1007/978-3-030-48332-6_15">https://doi.org/10.1007/978-3-030-48332-6_15</a> .	Information Sciences, Computer Science	26	01 [US5960411]	Looks at the e-commerce customer experience and the challenges of reducing time-consuming entries that can lead to a purchase being abandoned.	Describes a single patent to describe the state of the art with regard to system and method for placing a purchase order through a communications network.
Niehorster DC. (2021). Optic Flow: A History. <i>Iperception</i> . 12(6):20416695211055766. <a href="https://doi.org/10.1177/20416695211055766">https://doi.org/10.1177/20416695211055766</a> .	Physics, Museology	235	02 [GB830043, GB640045]	It describes the development of the concept of optical flow by authors Gwilym Grindley and Edward Calvert, and concludes that it is an intriguing example of convergent thinking in the progress of science.	Cites two patents owned by Sparke, developed from Calvert, (discussion of optical properties of various visual landing aids).

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Root, W., Bechtold, T., & Pham, T. (2020). Textile-integrated thermocouples for temperature measurement. <i>Materials</i> , 13(3). <a href="https://doi.org/10.3390/ma13030626">https://doi.org/10.3390/ma13030626</a> .	Physics, Industrial Economy	102	08 [US6550963, US3284247, US5071258, US20050257822, US20160194792, US20060148351, US4448804, WO2014128505]	Describes the integration of conductive materials into textiles for sensing temperature in the wearer's environment.	It describes methods of integrating sensors into various substrates, such as cotton, cellulose, polymers, carbon and optical fiber-based textiles, referenced in patents. It does not mention how the patents were selected, reporting that they are recent technologies for temperature measurement or reporting a method of integrating sensors into substrates.
Ortega-Gras, J.J., Bueno-Delgado, M., Cañavate-Cruzado, G., & Garrido-Lova, J. (2021). Twin Transition through the Implementation of Industry 4.0 Technologies: Desk-Research Analysis and Practical Use Cases in Europe. <i>Sustainability</i> . <a href="https://doi.org/10.3390/su132413601">https://doi.org/10.3390/su132413601</a> .	Industrial Economy, International Economy	77	04 [CN110138877, CN103276910, AU2021101897, CN109981791]	It analyzes the main existing policies at European level that promote the dual transition of Industry 4.0 - digital and green, and reviews practical use cases and international projects where circular economy practices are driven through the implementation of key enabling technologies.	Describes patents that reveal circular economy practices in different industry sectors to make processes more efficient, avoiding waste and/or the use of electricity.
Burlando, B., & Cornara, L. (2017). Revisiting amazonian plants for skin care and disease. <i>Cosmetics</i> , 4(3). <a href="https://doi.org/10.3390/cosmetics4030025">https://doi.org/10.3390/cosmetics4030025</a> .	Economics of Natural Resources, Biological Sciences	84	05 [JPS62192308, JPH04230308, US2012148695, KR20100013095, JP2003081850]	It analyzes five species of trees and palm trees that occur as dominant plants in different areas of the Amazonian rainforest that due to their abundance can be exploited as sustainable sources of botanical materials.	The patents describe the state-of-the-art medicinal properties and dermatological and cosmetic applications of products that include <i>A. speciosa</i> and <i>C. guianensis</i> seed oils, <i>O. bataua</i> fruit oil and active compounds such as limonoids from <i>C. guianensis</i> , flavonoids from <i>E. falcata</i> and <i>Q. amara</i> quassinoids. It is only informed that the patent data was obtained from the Espacenet base.
Rajagopalan, Sundararaman & Amirtharajan, R. & Upadhyay, H.N. & Rayappan, John Bosco Balaguru. (2012). Survey and Analysis of Hardware Cryptographic and Steganographic Systems on FPGA. <i>Journal of Applied Sciences</i> . 12. 201-210.	Information Sciences, Computer Science	52	01 [WO/2011114196]	It presents a survey of cryptographic and steganographic image methods implemented in reconfigurable hardware such as FPGAs.	The only cited patent describes the method proposed by the authors, in which they appear as inventors.
Wojdalski, J., Grochowicz, J., Drózd, B., Bartoszewska, K., Zdanowska, P., Kupeczyk, A., . . . Wójcik, G. (2015). Energy efficiency of a confectionery plant - case study. <i>Journal of Food Engineering</i> , 146, 182-191. <a href="https://doi.org/10.1016/j.jfoodeng.2014.08.019">https://doi.org/10.1016/j.jfoodeng.2014.08.019</a> .	Economy, Business Administration	53	01 [EP2428121]	It analyzes the energy consumption profile of a randomly chosen confectionery factory. It describes technical and technological factors that can be applied in a detailed analysis of energy efficiency in the confectionery industry to facilitate the selection of the best techniques.	It cites a single patent, without describing the technical matter, but pointing out that it is a specific technology related to energy efficiency in the confectionery industry.
Kotova, M. B., Poddubskaya, E. A., Uchevatkina, N. V., & Smirnova, V. R. (2017). Investigation of the patent situation for smoking treatment and prevention, by using the databases of different patent offices. <i>Profilakticheskaya Meditsina</i> , 20(4), 45-52. <a href="https://doi.org/10.17116/profmed201720445-52">https://doi.org/10.17116/profmed201720445-52</a> .	Health Sciences, Information Sciences	36	322	Analyzes trends in patent decisions (methods, substances, and devices) on smoking cessation treatment and prevention based on worldwide patent documentation.	The analysis of patent documents showed that drugs and synthetic substances, psychotherapeutic methods and procedures, natural and herbal drugs; reflexology; and devices (electronic cigarettes, ashtrays, accessories for electronic devices and inhalers) were used to treat and prevent smoking. It informs that the patents were selected in the period from 1997 to 2015, being selected only methods of treatment and prevention of smoking.
Scally, K. (2011). Beware Greeks bearing steam engines: a response to the Kastelle and Steen proposition. <i>Prometheus</i> , 29(2), 207-217. <a href="https://doi.org/10.1080/08109028.2011.608551">https://doi.org/10.1080/08109028.2011.608551</a> .	Law, Economy, Business Administration	22	03 [UK436290, UK457536, US1927756]	It analyzes the proposition of Kastelle and Steen who argue that ideas are not innovations, and that an innovation implementation process must be followed that intends to provide a repeatable and reliable path to new and commercially exploitable improvements. They reject the use of patent counts as a simple measure of a company's innovation.	It analyzes the technical matter of car's eye patents for roads to explore the cascade model that postulates that, during the development of an innovation, performance problems - recognized by people as deficiencies in that technology stimulate sequential bursts of invention. As adopted inventions solve a problem, people encounter new performance and often unforeseen problems that spur more inventive spurts, and so on. The result is a series of "invention cascades".

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Ataide, E. J. G., Sinha, R. K., & Maiya, G. A. (2018). Understanding the need for a non-invasive wearable real-time database device for diabetic patients. <i>Journal of Health Management</i> , 20(2), 190-196. <a href="https://doi.org/10.1177/0972063418763654">https://doi.org/10.1177/0972063418763654</a> .	Information Sciences, Health Sciences	21	03 [US9451920, US8649839, US6064898]	Performs survey of existing wearable devices in the detection of diabetes or diabetes risk in a non-invasive way, paired with wearable devices, in addition to allowing real-time documentation in patient records.	Describes research on the Espacenet and USPTO databases on non-invasive methods for detecting diabetes. A flowchart of the methodology is presented, but it is not explained how the selection of patent documents cited in the article was carried out.
Nielsen, T. D., Cruickshank, C., Foged, S., Thorsen, J., & Krebs, F. C. (2010). Business, market and intellectual property analysis of polymer solar cells. <i>Solar Energy Materials and Solar Cells</i> , 94(10), 1553-1571. <a href="https://doi.org/10.1016/j.solmat.2010.04.074">https://doi.org/10.1016/j.solmat.2010.04.074</a> .	Economy, Engineering, Chemistry	87	962	Analyzes the polymeric solar cell market and analyzed opportunities based on performance and manufacturing cost and possible new ones. It also analyzes the patent protection of these solar cells in Europe, indicating that the central patents are only valid in France, Germany, the Netherlands and the United Kingdom. Several countries with a great potential for photovoltaics, such as Portugal and Greece, are completely open and apparently do not have relevant patents.	Analyzes patents on polymeric solar cells, defining primary patents that are based on core concepts of the technology; the materials and structure of the device; secondary patents related to basic concepts established many years ago – and therefore in the public domain; and peripheral patents that refer to patents that are not directly based on polymeric solar cell technology, but still related to the field of technology. It reveals the use of specific software (Cintellig) to search for patents, briefly presenting the use of specific terminology (polymer solar cell, organic PV, flexible solar cell, company names, inventors, IPC codes and ECLA codes to identify patents).
Stuiver, M. H., & Custers, J. H. (2001). Engineering disease resistance in plants. <i>Nature</i> , 411(6839), 865-868. <a href="https://doi.org/10.1038/35081200">https://doi.org/10.1038/35081200</a> .	Agrarian Economy, Biological Science	54	03 [WO9904012, WO0026391, WO9214824]	It analyzes the molecules and genes involved in disease resistance in plants, to design durable disease resistance in economically important agricultural plants.	It cites three patents to describe the molecules involved in pathogenicity and efficient resistance alternatives, but it does not mention the way of selecting the patent documents.
Thiele, Ulrich. (2018). Circular economy of PET waste by loop recycling - Dream, fiction or reality?. <i>Chemical Fibers International</i> . 68. 75-77.	Chemistry, Economics of Natural Resources	22	07 [US2002077500, EP2384873, WO2013014650, US5840968, WO1998031653, US4391985, US3043870]	Describes polyester chemical recycling processes, noting that most of the recycling processes are mechanical in nature and a small portion (< 5%) is converted through chemical recycling.	The patents describe the state of the art in recycling processes. The selection of patent documents seems to have been random, since the author describes that numerous patented processes on PET recycling based mainly on hydrolysis are described.
Fuentes, P. (2022). Auguste fabre and the construction of tile vaults in france. the industrialization of a traditional technique. <i>International Journal of Architectural Heritage</i> , 16(10), 1496-1515. <a href="https://doi.org/10.1080/15583058.2021.1894504">https://doi.org/10.1080/15583058.2021.1894504</a> .	History/Architecture Projects	54	05 [FR395858, DE221816, BE203775, FR796253, FR909840]	It describes the work of Auguste Fabre, a French contractor specializing in the construction of masonry vaults, who built thousands of vaults in France, Belgium and Algeria, some of them of great importance, such as the dome of the Petit Palais for the international exhibition in Paris in 1900, or the dome of the Congo Museum in Tervuren (Belgium).	It presents the patents authored by Auguste Fabre.
Janko, S., & Johnson, N. G. (2020). Reputation-based competitive pricing negotiation and power trading for grid-connected microgrid networks. <i>Applied Energy</i> , 277. <a href="https://doi.org/10.1016/j.apenergy.2020.115598">https://doi.org/10.1016/j.apenergy.2020.115598</a> .	Economy, Engineering	58	01 [CN107844055]	It describes the integration of renewable energies and microgrids in the electrical grid, the control strategies that allow the energy trade between microgrids that provide a more efficient use of distributed energy resources.	The only cited patent is used to describe the state of the art on the control of a single microgrid and the coordination of many distributed energy resources internal to the microgrid. It does not reveal how the patent document was selected.
Tsagkari, M., Kokossis, A., & Dubois, J. -. (2020). A method for quick capital cost estimation of biorefineries beyond the state of the art. <i>Biofuels, Bioproducts and Biorefining</i> , 14(5), 1061-1088. <a href="https://doi.org/10.1002/bbb.2114">https://doi.org/10.1002/bbb.2114</a> .	Economy, Business Administration, Engineering	90	16 [US2013150621, US5892109, US7932063, US7901511, CA2078364, US304476, EP1182261, WO2014018757, WO2012103261, WO2013039647, WO2007020465, WO2010053896, US20060186020, CA2698414, WO2008048364, US5494653]	It describes the development of suitable cost parameters (expons and reference capital costs) for 11 types of biochemical, chemical and thermochemical biorefineries, as well as reference block efficiencies to estimate the costs of state-of-the-art and in-house biorefineries. Technical analysis involves detailed process designs based on patents and documents from leading technology providers.	Uses technical documents from leading technology and patent providers to estimate capital cost for chemical plants.

REFERENCE	KNOWLEDGE AREA	NUMBER OF REFERENCES	NUMBER OF CITED PATENTS	ABSTRACT	CONTRIBUTION OF PATENT TECHNICAL INFORMATION AND HOW TO OBTAIN PATENT DATA
Valadas, L. A. R., de Oliveira-Filho, R. D., de Oliveira, M. B. L., Fiallos, A. C. M., Lotif, M. A. L., Fonteles, M. M. F., & Bandeira, M. A. M. (2020). Products of dental use containing copaiba oil-resin: Technological prospecting based on patents. <i>Recent Patents on Biotechnology</i> , 14(1), 33-40. <a href="https://doi.org/10.2174/1872208313666190719153114">https://doi.org/10.2174/1872208313666190719153114</a> .	Health Sciences, Economy	39	07 [US20090087501, JP2006062993, BR1020160212626, PI0402262, PI0404266, BR1020150132310, JP2002114658]	Describes a prospective study on patents on products containing copaiba oil-resin for dental use.	It identifies 9 patents using copaiba oil-resin in products for medical, dental or hygienic purposes, with the INPI/BR having the highest number of deposits (5). Reveals the search in six patent banks, using keywords.
Belović, M., Torbica, A., Pajić-Lijaković, I., & Mastilović, J. (2017). Development of low calorie jams with increased content of natural dietary fibre made from tomato pomace. <i>Food Chemistry</i> , 237, 1226-1233. <a href="https://doi.org/10.1016/j.foodchem.2017.06.045">https://doi.org/10.1016/j.foodchem.2017.06.045</a> .	Health Sciences, Business Administration, Agrarian Economy	38	02 [HUH3113, KR20100105250]	Describes a process for obtaining a product (low-calorie jellies) obtained from tomato pomace, a product rarely used as an ingredient for the production of jellies.	It describes two patents to illustrate the state of the art referring to common tomato jelly and green tomato jelly.
Sara, M., Elina, H., Julia, P., Ilkka, K., & Kujala, U. M. (2014). Objectively measured physical activity in finnish employees: A cross-sectional study. <i>BMJ Open</i> , 4(12). <a href="https://doi.org/10.1136/bmjopen-2014-005927">https://doi.org/10.1136/bmjopen-2014-005927</a> .	Health Sciences, Business Administration, Economy	36	02 [US7460901, US7330752]	Describes a study that measures the amount of intensity-specific physical activity by sex and age in relation to body mass index (BMI) during workdays and days off among Finnish employees.	It uses technical information from two patents (using neural network modeling of the data and the short-term Fourier transform method) to validate the method it describes in the article.
Amin, T., & Kesselheim, A. S. (2012). Secondary patenting of branded pharmaceuticals: A case study of how patents on two HIV drugs could be extended for decades. <i>Health Affairs</i> , 31(10), 2286-2294. <a href="https://doi.org/doi:10.1377/hlthaff.2012.0107">https://doi.org/doi:10.1377/hlthaff.2012.0107</a> .	Industrial Economy, Health Sciences	37	108	It examines how secondary patents can enhance market exclusivity and thus delay generic competition, using as an example two antiretroviral drugs essential for the management of HIV: ritonavir (Norvir) and lopinavir/ritonavir (Kaletra).	108 patents are identified, which together could delay generic competition until at least 2028 – twelve years after patents on the drug's basic compounds expire, and thirty-nine years after the first patents on ritonavir were filed. Some of the secondary patents that were reviewed were found to be of questionable inventiveness.