Informology

Homepage: www.informology.org

Patent Citations to Journals: The Innovation Impact of the Lancet

Alireza Noruzi

Editor-in-Chief, Associate Professor; Informology Center, Marseille, France. E-mail: anoruzi@gmail.com

Article Info

Article type:

Editorial note

Keywords:
Patent analysis,
Patentometrics,
Journal citations,
Patent citation analysis,
The Lancet

ABSTRACT

Objective: The purpose of this study was to analyze citations to the *Lancet* journals in patents based on the Lens database. This study indicates to what extent the *Lancet* is used and cited by inventors worldwide. We analyzed the *innovation impact* and distributions of patent citations to the *Lancet*.

Materials and Methods: The primary source of patent data utilized in this study was the Lens database (www.lens.org).

Results: This study indicates to what extent the *Lancet* is used and cited by inventors. We analyzed the distributions of patent citations to the *Lancet*. The results show that the total number of patent citations to the *Lancet* papers on the Lens was 114,069. Most patents cited to the *Lancet* papers have been granted by the United States, WIPO, European Patens, China, Japan, Korea, Germany, UK, France, and Russia. It was noted that the highest number of patents were in the A class (Human necessities), especially the following CPC subclass: A61P 35/00 (Antineoplastic agents: Drugs); A61P 43/00 (Drugs for specific purposes, not provided for in groups A61P 1/00-A61P 41/00); A61K 45/06 (Mixtures of active ingredients without chemical characterisation, e.g. antiphlogistics and cardiaca); A61P 29/00 (Non-central analgesic, antipyretic or antiinflammatory agents, e.g. antirheumatic agents; Non-steroidal antiinflammatory drugs [NSAID]); A61P 25/00 (Drugs for disorders of the nervous system).

Conclusion: This study analyzed the frequency of patent citations to the *Lancet*. The results show that the total number of patent citations to papers published in the *Lancet* was 114,069. The *Lancet*'s papers are cited in patents of the Class A (Human Necessities). Thus, the *Lancet* serves the human necessities and health care.

Cite this article: Noruzi, A. (2022). Patent citations to journals: The innovation impact of the Lancet. *Informology*, 1(2), 1-10.

Introduction

A patent is a legal document granted to an inventor by the government that permits the inventor to prevent others from unauthorizing use of the invention. Although patent indicators have serious limitations, they remain a unique tool for analysis of the progress of technology innovation (Noruzi & Abdekhoda, 2012). Patents can offer mature and objective indicators that reflect technology trends (Lee et al., 2012) and technical accomplishment.

Patents are highly detailed documents which allow inventors to register their inventions at the national and international level for a specified length of time. Patents are very important and valuable in the process of knowledge production and knowledge commercialization. They can make products more competitive and desirable in national and international markets and increase the value of products to consumers. Accessibility to patent information is an important element for research, innovation and development (Noruzi & Abdekhoda, 2014). Patents are important vehicles for R&D and technological development. They are also important mechanisms for appropriating returns from R&D.

In patents, similar to other scientific documents, references should be indicated. These references concern mainly earlier patents (‘prior art’) in order to prove novelty in view of the existing technological developments and, generally to a lesser extent, to non-patent items, particularly scientific publications, the scientific non-patent references (e.g., journal papers) (van Raan, 2017).

The relationship between science and technology is an essential issue, as science-based technologies play a vital role in modern economies. Analysis of patent citations to journals is one of the available methods to measure the relationship between science and technology. Patent citations, particularly the citations to scientific references, are considered as the most popular indicator to track the relation between science and technology. During the patent granting procedure, the examiners should review the prior art and list them in the front page of the patent document in order to ensure the innovative and usefulness of the invention. Compared with the references provided by the inventors/applicants, the examiners references are determinant for the patent granting. The patent examiners can add new references or remove the existent ones given by the inventors/applicants (Narin & Olivastro, 1998; van Looy et al., 2006).

The idea of using patent citations as an indicator is comparatively old and appears to have originated from Seidel in 1949 (Bakker et al., 2016). However, patents citation study evolved since 1980 and Francis Narin, is a pioneer, who has contributed significantly to the field of science and technology policy and has worked extensively on the methodology of ‘citations’. Initially, he used the Science Citation Index (SCI) to identify the frontiers of various fields. He has developed methods involving citations from one patent to another and from a patent to publications and shown that the creation of new technology is strongly determined by the creation of new knowledge in the sciences. He also has developed a method based on citations and the technology cycle time (and patented it as a business method) to identify the leaders in an industrial sector, as he finds that certain patent indicators have a strong positive relationship with stock market evaluations (Ramani & De Looze, 2002).

Non-patent references (e.g., journal papers) represent explicit connections between scientific research and technological innovations and thus can describe the features of science–technology linkages. Journal papers cited in patent applications can be used as indices to analyze the relationships between academic research and technology, which are called science linkages. It can also be used to measure the strength of the relationship between science and technology, or science intensity (Fukuzawa & Ida, 2016; Meyer, 2000; Tijssen et al., 2000).

The number of citations to a journal in patents indicates to what extent the journal is industry-technology oriented and centered on applications and has quality and impact of the journal (Noruzi & Abdekhoda, 2014). Therefore, it is an ideal place for specialists from industry and research, and is consistently focused on staying at the leading edge of the industry. This study purported to appraise the existence and the importance of citation linkages between the scientific journals cited in patents (i.e., authors of scientific papers) and the generators of patented inventions (i.e., inventors).

Obviously, the scientific non-patent references represent a bridge between science and technology although they do not necessarily indicate the direct scientific basis of the invention described in the patent (van Raan, 2017). Nevertheless, many studies (for an overview see for instance (Callaert et al., 2014) emphasize the importance of further research of the role of scientific non-patent references in relation to the patented technological invention.

In the current study, we focus on a particular phenomenon, patent citations to a journal, the *Lancet* as an example. It was founded in England in 1823. The *Lancet* is a weekly peer-reviewed general and internal medical journal. It is also the world's highest-impact academic journal.

Materials and Methods

The primary source of patent data utilized in this study was the Lens database (www.lens.org). The LENS serves all of the patent documents and scholarly work in the world as an open access database. It serves the interests of inventors, researchers and businesses with respect to their inventions and corporate products, and service identifications. The LENS can be used for patent/paper citation analysis, which measures the citation impact of an individual patent/paper (also a journal) as a function of the number of citations it receives from subsequent inventors/patens. In addition, any inventor or author may legitimately wish to determine whether his/her own patent/paper has been criticized or used by others patents on the LENS. Inventors and authors are interested in knowing whether anyone has cited their patents/papers. The LENS facilitates this type of feedback in the scholarly communication cycle. Regardless of the year that the patent was granted, the LENS permits inventors to identify where that patent was cited. Inventors and authors can locate recent patents that have cited the particular patent/paper.

A further use of the LENS is to identify technology-oriented journals. An important feature of the LENS is that inventors and researchers can use it to trace interconnections among patents/papers referencing or citing patents/papers on the same topic and to determine the frequency with which others reference or cite a specific patent/paper. In order to retrieve the patents citing to the *Lancet*, we searched the word “Lancet” in Patents and in the “Flags” we limited it to “Cited by Patent” in any date and in any jurisdictions, as shown in Figure 1.

The flag “*Cited by Patent*” on the Lens database contains patents cited to an entity (a journal, a book, a paper, a scientist, an author, an inventor, etc.). In other words, we can conduct patent citation analysis to journals, authors, scientist, inventors, books, papers, and so on via this flag.

Finally, the data has been analyzed to measure the number of patent citations to the *Lancet*, using the Lens analysis facilities. The result set contains 114,069 patents on Lens, cited to the *Lancet*. This research also analyzes patent classifications to explore the subject area of patents, jurisdictions, owners, years, and so on.

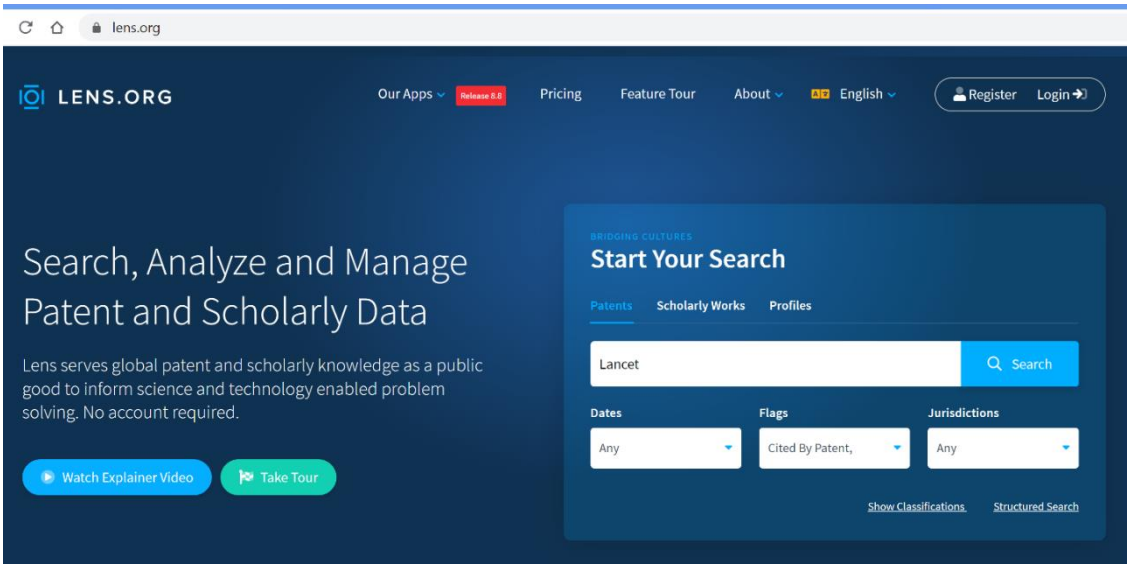

Figure 1. Search command

Citing patents are classified according to the International Patent Classification (IPC) schema. The IPC divides patentable technology into eight major sections; each patent classification includes a code (class/sub class/groups/sub-groups). The classification code attached to a patent defines the technological class of the patent in the IPC.

Table 1. Classification of patents

Section	Definition
A	Human necessities
B	Performing operations; Transporting
C	Chemistry; Metallurgy
D	Textiles; Paper
E	Fixed constructions
F	Mechanical engineering; Lighting; Heating; Weapons; Blasting
G	Physics
H	Electricity

Results

The number of citations to a journal in patents is considered as an important indicator of the quality and *Innovation Impact* of the journal; although, different data and methods are used to calculate this measure. Figure 2 shows the number of patent citations to the *Lancet*.

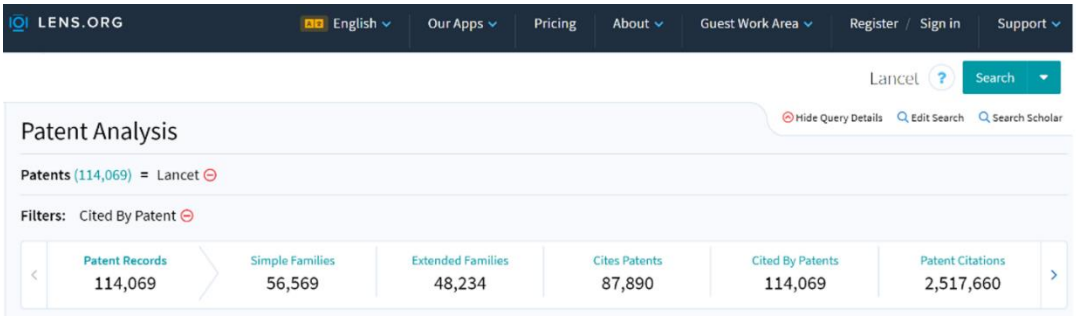

Figure 2. The number of times the Lancet cited by patents

Figure 3 indicates the number of patent documents cited to the *Lancet* over time. Based on the Figure 3, there is a strong increase in patent applications and granted patents cited to the *Lancet* from 2000.

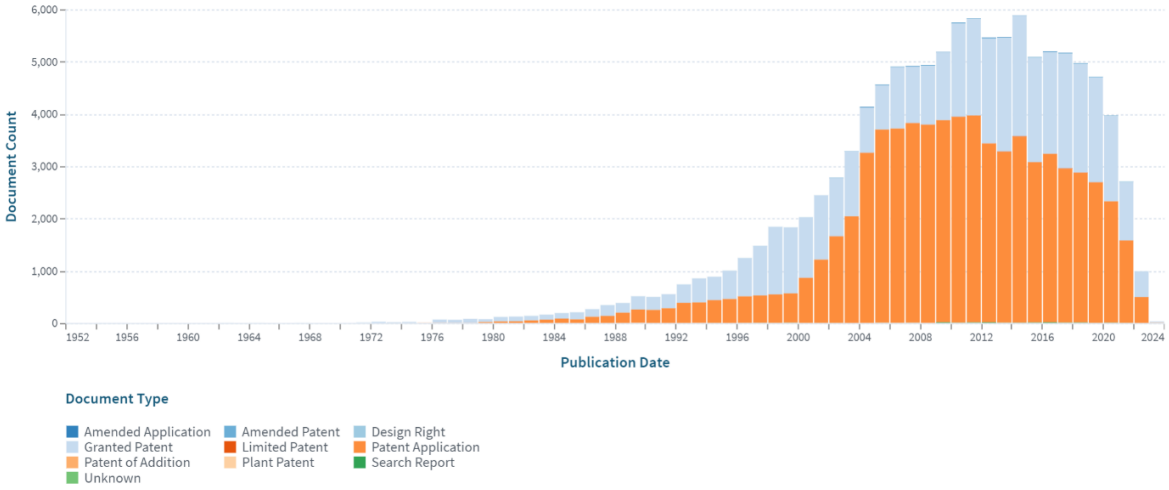

Figure 3. Patent documents cited to the *Lancet* over time

Figure 4 presents the number of patent documents cited to the *Lancet* by Published, Filed and Granted Date.

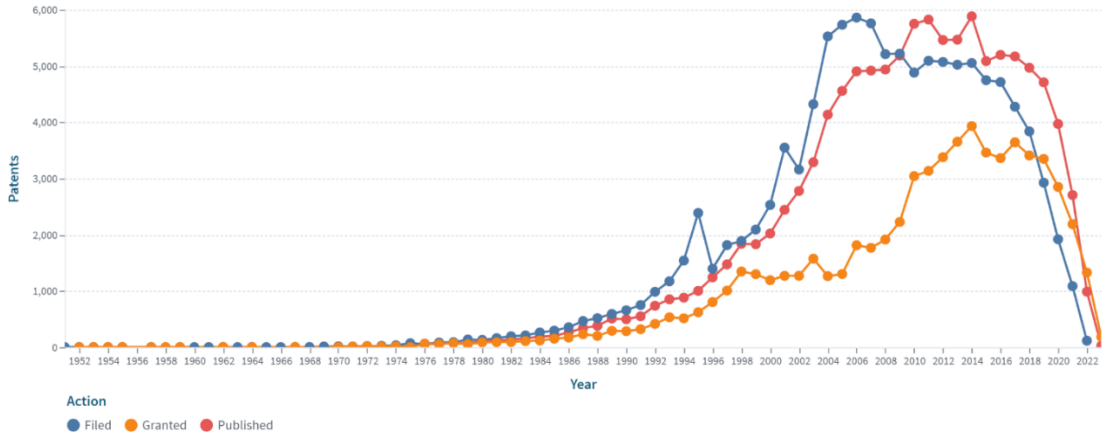

Figure 4. Patent documents by Published, Filed and Granted Date

Figure 5 shows the type of patent documents cited to the *Lancet*.

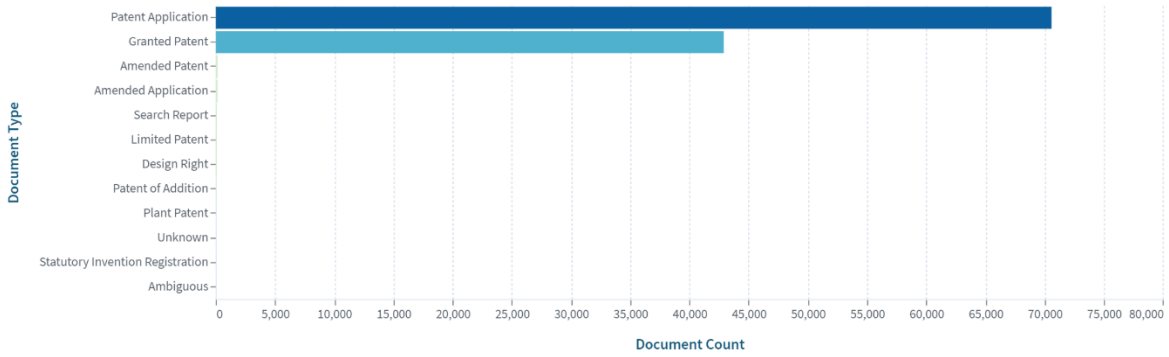

Figure 5. The type of patent documents cited to the *Lancet*

Figure 6 indicates the legal status of patent documents cited to the *Lancet*.

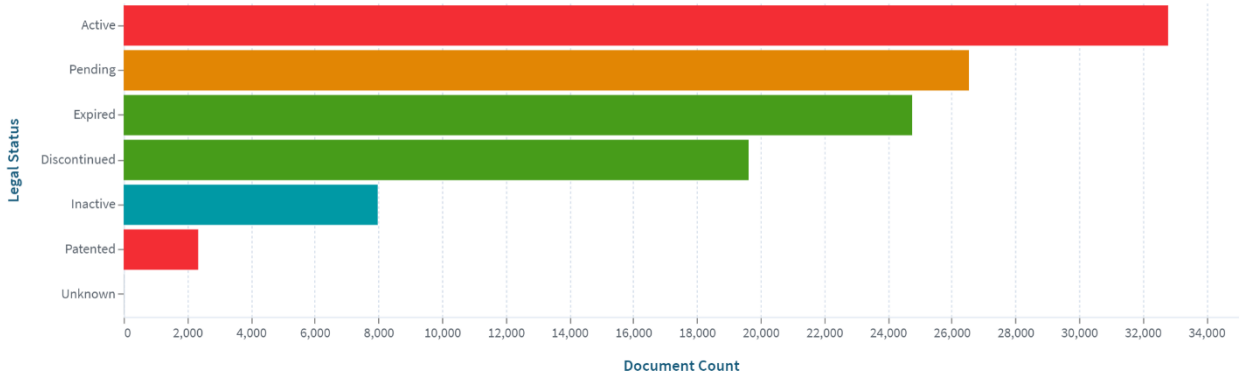

Figure 6. Legal status of patent documents cited to the *Lancet*

Figure 7 shows the top applicants of all patent documents cited to the *Lancet*. It is worth noting that each patent has an applicant. The word applicant refers to the inventor or all joint inventors that applies for the intellectual property rights of the patent.

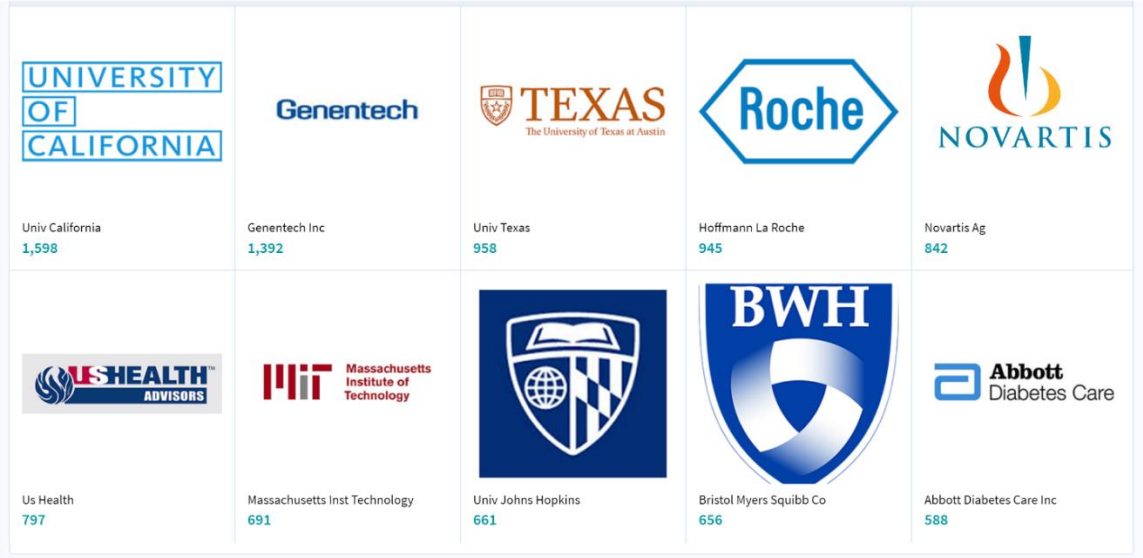

Figure 7. Top applicants of patent documents cited to the *Lancet*

Figure 8 shows the top owner of patent documents cited to the *Lancet*.

Figure 8. Top owners of patent documents cited to the *Lancet*

Figure 9 demonstrates the top CPC Classification Codes of patent documents cited to the *Lancet*. This section analyzes patent classification to explore the subject area of patents, which cited to the *Lancet*. Based on the data presented in Figure 9, it was found that the highest number of patents were classified in the Class A (Human Necessities), especially in the following CPC subclasses: A61P 35/00 (Antineoplastic agents: Drugs); A61P 43/00 (Drugs for specific purposes, not provided for in groups A61P 1/00-A61P 41/00); A61K 45/06 (Mixtures of active ingredients without chemical characterisation, e.g., antiphlogistics and cardiaca); A61P 29/00

(Non-central analgesic, antipyretic or antiinflammatory agents, e.g., antirheumatic agents; Non-steroidal antiinflammatory drugs [NSAID]); A61P 25/00 (Drugs for disorders of the nervous system).

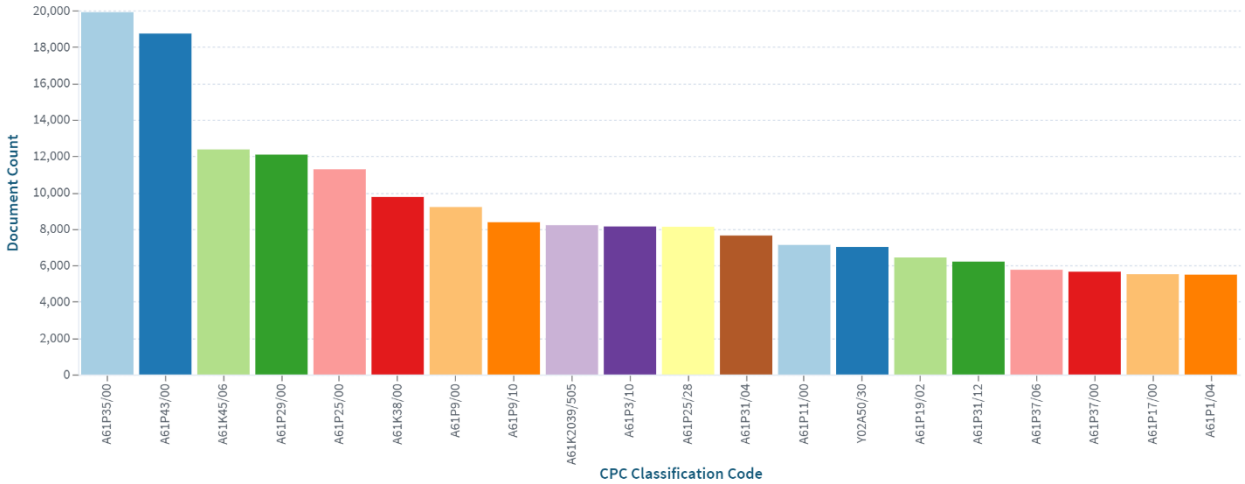

Figure 9. Top CPC Classification Codes of patent documents cited to the *Lancet*

Figure 10 summarizes the results of the analysis about jurisdiction and countries of inventors of patent documents cited to the *Lancet* worldwide. Figure 10 proves that most patents cited to the *Lancet* papers have been granted by the United States (USPTO), WIPO, European Patent Office (EPO), China, Japan, South Korea, Germany, the United Kingdom, and France. Seventy percent of patents were granted in the United States.

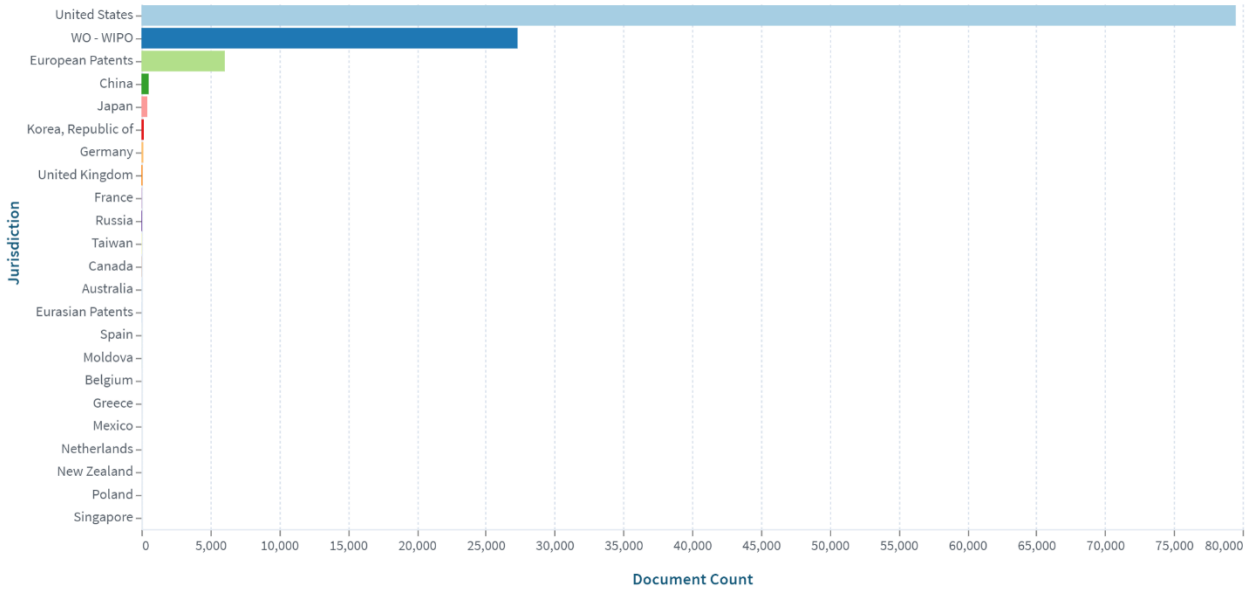

Figure 10. The jurisdiction of patent documents cited to the *Lancet*

Discussion and Conclusion

Patent citation measures can be used to analyze the relative competitiveness of a journal at the national and international level. In this study, we analyzed the frequency of patent citations to the papers published in the *Lancet*. We focused on patent citations data from the Lens database. The results show that the total number of patent citations to the *Lancet* papers on Lens was 114,069. It is worth noting that the *Lancet*, as the world-leading source of clinical, public health, and global health knowledge, is highly cited in scientific papers and patents. It is a highly cited journal with a high *research impact* that have a high *innovation impact*. Scheerooren and Kamalski (2013) argue that "there is a distinct connection between citations in patents and the citation impact of a paper", which relates to the field in which it is published and the type of paper (research paper, technical paper, conceptual-theoretical paper, case study, viewpoint, literature review, general review, systematic review, ...). The *Lancet*' papers cited in patents are generally classed in the subject areas of Class A (Human Necessities).

It is interesting that the Lens database facilitates patent-journal citation analysis (citations to a journal in patents) and patent-patent citation analysis (citations to a patent in other patents). The current study can be used as a pattern for analyzing and comparing other journals in the same field to measure not only the *research impact*, but also the *innovation impact* of journals.

Data Availability Statement

Not applicable.

Ethical considerations

The author avoided from data fabrication and falsification.

Funding

Not applicable.

References

Bakker, J., Verhoeven, D., Zhang, L., & van Looy, B. (2016). Patent citation indicators: One size fits all?. *Scientometrics*, 106(1), 187-211. https://doi.org/10.1007/s11192-015-1786-0

Callaert, J, Vervenne, J.B., van Looy, B., Magerman, T., Song, X. & Jeuris, W. (2014). *Patterns of science-technology linkage*. European Commission. https://doi.org/10.2777/55249

Fukuzawa, N., & Ida, T. (2016). Science linkages between scientific articles and patents for leading scientists in the life and medical sciences field: the case of Japan. *Scientometrics*, 106(2), 629–644. https://doi.org/10.1007/s11192-015-1795-z

Lee, C., Cho, Y., Seol, H., & Park, Y. (2012). A stochastic patent citation analysis approach to assessing future technological impacts. *Technological Forecasting and Social Change*, 79(1), 16-29. https://doi.org/10.1016/j.techfore.2011.06.009

Meyer, M. (2000). Does science push technology Patents citing scientific literature? *Research Policy*, 29(3), 409-434. https://doi.org/10.1016/S0048-7333(99)00040-2

Narin, F., & Olivastro, D. (1998). Linkage between patents and papers: An interim EPO/US comparison. *Scientometrics*, 41(1-2), 51–59. https://doi.org/10.1007/BF02457966

Narin, F., Noma, E. & Perry, R. (1987). Patents as indicators of corporate technological strength. *Research Policy*, 16(2-4), 143–155. https://doi.org/10.1016/0048-7333(87)90028-X

Noruzi, A. (2016). Impact factor, h-index, i10-index and i20-index of Webology. *Webology*, 13(1), 1-4. https://www.webology.org/2016/v13n1/editorial21.pdf

Noruzi, A. (2018). Patent citations to Webology journal on the USPTO database. *Webology*, 15(1), 1-7 http://www.webology.org/2018/v15n1/editorial25.pdf

Noruzi, A., & Abdekhoda, H. (2012). Mapping Iranian patents based on International Patent Classification (IPC), from 1976 to 2011. *Scientometrics*, 93(3), 847-856. https://doi.org/10.1007/s11192-012-0743-4

Noruzi, A., & Abdekhoda, H. (2014). Google Patents: The global patent search engine. *Webology*, 11 (1), 1-12. https://www.webology.org/data-cms/articles/20200515041611pma122.pdf

Ramani, S.V., & De Looze, M.-A. (2002). Country-specific characteristics of patent applications in France, Germany and the UK in the biotechnology sectors. *Technology Analysis & Strategic Management*, 14(4), 457-480. https://doi.org/10.1080/0953732022000028755

Scheerooren, S., & Kamalski, J. (2013). The impact of science on technology, as measured by patent citations. *Research Trends*, 1(33). https://www.researchtrends.com/researchtrends/vol1/iss33/6/

Tijssen, R. J. W., Buter, R. K., & van Leeuwen, T. N. (2000). Technological relevance of science: An assessment of citation linkages between patents and research papers. *Scientometrics*, 47(2), 389-412. https://doi.org/10.1023/A:1005603513439

USPTO (2022). *General information concerning patents: Functions of the United States Patent and Trademark Office*. Alexandria, Virginia. https://www.uspto.gov/patents/basics

van Looy, B., Debackere, K., Callaert, J., Tijssen, R., & van Leeuwen, T. (2006). Scientific capabilities and technological performance of national innovation systems: An exploration of emerging industrial relevant. *Scientometrics*, 66 (2), 295-310. https://doi.org/10.1007/s11192-006-0030-3

van Raan, A. F. (2017). Sleeping beauties cited in Patents: Is there also a dormitory of inventions?. *Scientometrics*, 110(3), 1123-1156. https://doi.org/10.1007/s11192-016-2215-8