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Editorial path and the visibility of scientific publications: an exploratory case study on the journal Tchê Química

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ABSTRACT

Introduction: Traditionally, the Hard Sciences have journals as their preferred channel for disseminating research results. However, in Brazil these disciplines are predominantly publish in international journals. Thus, it is understandable that the national journals linked to the Rigid Sciences seek international relevance. Objective: The study aims understand the problems related to journals in the field of Chemistry, mainly that concern visibility. Methodology and Results: We chose to select a single journal and analyze its editorial path, through the Journal Ranking provide by the Scimago Journal & Country Rank (SJR), belonging to Scopus. The journal chosen was Tchê Química and its editorial path was analized. The journal remained indexed to the Scopus database from 2011 to 2020. The analyzes included the data provided by the SJR and a citation network built in the VOSviewer software from the citing journals of Tchê Química. Conclusion: It is concluded that the journal has a strong relationship with specific journals and that is ranking results are linked to the citations of these journals and to selfcitations.

KEYWORDS

Scientific journals. Journal indexes. Citation analysis.

Percurso editorial e a visibilidade das publicações científicas: um estudo de caso exploratório sobre o periódico Tchê Química

RESUMO

Introdução: Tradicionalmente, as Ciências Rígidas têm nos artigos de periódicos seu canal preferencial para disseminação dos resultados de pesquisa. Entretanto, no Brasil, essas disciplinas publicam predominantemente em periódicos internacionais. Assim, é compreensível que os periódicos nacionais vinculados às Ciências Rígidas busquem relevância internacional. Objetivo: Nesse sentido, o presente estudo tem por objetivo compreender quais são os problemas enfrentados por periódicos da área de Química, principalmente no que concerne à visibilidade. Metodologia e Resultados: Para tanto, optou-se por selecionar um único periódico e analisar seu percurso editorial, por meio do Journal Ranking, fornecido pelo Scimago Journal & Country Rank (SJR) pertencente a Scopus. Como resultado foi escolhido o periódico Tchê Química e analisou-se seu percurso editorial, o periódico permaneceu indexado à base Scopus de 2011 a 2020. As análises incluíram os dados disponibilizados pelo próprio SJR e uma rede de

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citação construída no software VOSviewer a partir dos periódicos citantes do Tchê Química. Conclusão: Ao fim conclui-se que o periódico possui forte relacionamento com periódicos específicos e que seus resultados no ranking são vinculados às citações desses periódicos e às autocitações.

PALAVRAS-CHAVE
Periódicos científicos. Índices de periódicos. Análise de citação.

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1 INTRODUCTION

The Brazilian scenario in the publication of scientific journals has grown in recent times, especially with the increased use of web technologies. So much so that Shintaku, de Brito and Neto (2014) identified, at the time, more than 125 portals of scientific journals in Brazil using the Open Journal Systems (OJS) tool, with more than 1600 journals, mostly linked to public educational institutions. Thus, the scenario of Brazilian scientific journals is direct access, published by public teaching and research institutions and OJS users.

However, quantity does not always represent visibility or representativeness, since traditionally rigid science disciplines, such as Chemistry, for example, publish in internationally renowned foreign journals. Moreover, Meneghini (2014) in an editorial, reported that only two Brazilian chemistry journals, at the time, were indexed in the Web of Science (WoS), even though there were many national publications in this discipline.

In another indexing base, Scopus, Quartieiro (2018) presented the analysis of eight chemistry journals, in studies focused on the internationalization process of these journals, it was identified that the Brazilian journals indexed on the platform had an increase from 2013 to 2015, the year in which the survey studied in the article was carried out, they also observed that there is a predominance of publications that scientific collaborations are between authors from the same country, with no international interactions in the articles analyzed.

This predilection for publishing in foreign journals may in many cases have an impact on national journals. Currently, only two Brazilian chemistry journals are indexed by the Scientific Electronic Library Online (SciELO), out of a total of 304 indexed journals, i.e., representing 6.58% of the journals. When compared to Colombia or Mexico, with proportionally smaller quantities of publications than Brazil, there are two and six indexed chemistry journals, respectively, a larger quantity.

The low representativity of national chemistry journals in the world publication scenario can be observed in many ways. When searching for journals with the term Chemistry in the title, for example, in google academic in July 2021, only four journals in the list of the 15 with the highest H index are Brazilian, with low rates, if compared with the search using the English term Chemistry. In Google Scholar in this period, the journal Química Nova, published by the Sociedade Brasileira de Química, has an H index of 18 and a median h5 of 27, while the Journal of Materials Chemistry has an H index of 161 and a median h5 of 216.

In this context, this study aims to understand the problems faced by journals in the field of chemistry, especially regarding the visibility of these publications in the information dissemination scenario. To deepen the study, the research was carried out with only one journal, selected through criteria of representativeness in the international scenario. Even though the study is restricted, it contributes to the discussion about the representativeness of Brazilian chemistry journals since there is little literature on the subject in the field of information science.

The choice was made through a search for Brazilian journals in chemistry in the Scimago Journal & Country Rank (SJR). Among the results, the journal Tchê Química stood out for occupying the first place and the best ranking by quartiles in 2019. When performing a new query with data from 2020 updated by SJR, it was observed that the same journal had been deindexed. Considering both these results and those of previous periods that pointed to the growth of the journal, it was decided to select it as the object of this study. The journal Tchê Química belongs to a private organization and is an international multidisciplinary journal with a four-monthly frequency and direct access.

2 INDEXING SYSTEMS

The visibility of a journal can be checked using the so-called indexing systems that, in most cases, use bibliometric metrics to analyze the indicators. According to Stumpf (1996) any database that gathers information about articles in one or more areas can be considered a scientific indexing system. Each system adopts different criteria for inclusion of journals in its base, in which it extracts indicators about characteristics of the articles, as well as citations.

Krzyzanowski and Ferreira (1998) classify indexing systems as databases, indexes, and directories. To maintain the idea that indexers have qualities, criteria are established for the inclusion of journals in their databases, which may be, in short, related to bibliometric and systematic issues of the journals. Thus, indexing systems publish ordered lists of journals, according to their analyses.

In most cases, funding agencies that support scientific journals use indexing systems as strategic information for decision making, aiming to achieve more success in scientific development (SIQUEIRA, 2018). The promotion of the use of indexing systems as a strategy can hinder access to funding by new journals or those with low visibility.

Journals with better positions in indexing systems receive more submissions. With a globalized world, it is expected that increased journals have international visibility; however, globally recognized databases give much visibility to more developed countries, making it difficult to analyze the scientific production of peripheral countries (OLIVEIRA, 2018).

When conducting a scientific work on the main bibliographic databases, Gonçalves, Ramos and Castro (2006) state that the most used criteria for indexing selection is related to the scientific content of the journal, usually based on the area of activity of the journals and their relevance before its specificity, with the trend of content and relational excellence profiles in which such journals should have.

They also note a need for databases to work more on interoperability between systems and even free access, both elements, if present within the databases, facilitate the observation to survey indicators of production, collaboration, impact, and visibility and improve the achievement of accesses generating more visibility (GONÇALVES; RAMOS; CASTRO, 2006).

Traditional indexing systems use bibliometric indicators. The use of these indicators involves social, national, and local mechanisms, and several other aspects. Oliveira (2018) highlights the points highlighted by the indicators:

> Among the various aspects analyzed, the indicators highlight the researchers, institutions, themes, areas of knowledge, the most fertile or productive countries, as well as the research front of a field of knowledge, the collaboration networks between scientists, groups, institutions, or countries, and the citation and co-citation networks (p. 54).

Specifically, production indicators can be divided between basic production indicators and linkage indicators. The basic production indicators are those that reflect the impact of the number of publications and group of researchers, institution, or country, and how these numbers give visibility to the most productive and most sought-after themes. The linking indicators, on the other hand, are used for "mapping and building the network of scientific collaboration between researchers, institutions or countries" (OLIVEIRA, 2018 p. 55).

Of the basic output indicators and linkage indicators mentioned above, scientific collaboration analysis, network and collaboration analysis, citation analysis, and cocitation analysis (WHITE; GRIFFITH, 1982) stand out among the analysis methods.

One of the best-known indicators is the Science Citation Index (SCI), pointed out by Garfield (2007) as the most successful, through the SCI Journal Citation Report (JCR), as an instrument used to measure scientific productivity from impact factor ratings. The SCI database operates seeking to identify the publications of each journal, where these publications are and

the frequency in which the articles are cited, in addition to allowing to determine the publications and their frequency by country or institution.

According to Gomes (2013) the Science Citation Index (SCI) was the first representation based on statistical evidence that made possible the realization of a list of scientific titles capable of representing the core science. The list gained credibility and became a reference among professional librarians for assisting in the choice of titles that would belong to the collection of scientific journals in their libraries at a time when the collections were physical.

Thus, the Web of Science (WoS), an electronic version of SCI, unites these functions and allows one to list publications chronologically, by author or according to citation frequency (GARFIELD, 2007). Currently the WoS is managed by the publishing company Clarivate Analytics that describes the base as "the most reliable source of direct access data".

It happens that the scientific production present in worldwide recognized databases, as is the case of WoS, receives attention from researchers from various countries, especially mainstream nations, and over the years has often been evaluated by them. It is notorious that the main tools for scientific production studies are found in these databases (OLIVEIRA, 2018).

The international publisher Elsevier in 2004 created one of the world's top three databases, Scopus. Scopus has vast article titles on its web platform, which includes full text links when available. The platform uses Elsevier's Scirus search engine. According to Mesquita et. al. (2006), in their studies pertinent to the use of Scopus, the system available on the site is easy to use and is among librarians the most recommended database for users.

Belonging to Scopus and SCImago, the SCImago Journal & Country Rank (SJR) is a disclosure database with journals divided into 4 levels, represented by Q1, Q2, Q3 and Q4. The journals classified as Q1 are the journals with the highest impact factor level. The last 3 years are always considered (CARDOSO et. al, 2019).

The SJR is a free virtual database that makes public bibliometric indicators for a large set of journals according to countries and fields of knowledge. It is considered one of the most relevant alternatives for metric and impact factor analysis (MAÑANA-RODRIGUEZ, 2015).

In 2009 Gonzalez-Pereira, Guerrero-Bote and Moya-Anegon proposed in their article that the SJR would be the newest indicator until then, with an adaptation of the PageRank algorithm, developed by the creators of the Google company, to measure the prestige of journals in each country. The new indicator model observed in the SJR is called by them "Journal prestige", which would be the prestige of the journal.

This model interprets journals as nodes, which represent the probability of researchers on a given subject going from one journal to another, selecting references from the first journal read. Obtained values become a "random search walk". The method defines an iterative algorithm that starts from certain initial pre-set values and calculates centrality values until a steady state solution is reached (GONZALEZ-PEREIRA; GUERRERO-BOTE AND MOYA-ANEGON, 2009).

The SJR indicator calculates the journal citation network where the nodes represent the academic journals in the database and the connections. The SJR is calculated in two stages: by calculating prestige, where a unit of measure reflects the overall prestige of the journal; and normalizing this measure, which provides a metric independent of its size. The SJR indicator sets different values for citations according to scientific influence. Self-citations of a journal are restricted to a maximum of 33% of its issued references, thus extinguishing problems such as inflated artificial values (GONZALEZ-PEREIRA; GUERRERO-BOTE E MOYA-ANEGON, 2009).

There is no national ranking equivalent to the SJR or the WoS, however, the Coordination for the Improvement of Higher-Level Personnel (CAPES) has a journal evaluation system called Qualis-Periódicos or Qualis/CAPES, which in Brazil, plays a significant role and gives visibility to national journals.

The Qualis is subsidized by CAPES and serves to qualify the scientific production of professors and students. The evaluation criteria are elaborated to consider characteristics according to each area. The classification of the journals is subdivided by Qualis into A, B or C. The initiated as a form of subsidy for the evaluation of Brazilian post-graduation courses has taken a form beyond the objective (COSTA; YAMAMOTO, 2008).

Currently, the scientific communities behave according to the classification obtained by the journals, and may have interference in policies of promotion, release of funding, incentives for publishers to promote the quality of scientific journals and choice of titles for indexing libraries, especially university libraries (COSTA; YAMAMOTO, 2008). Thus, it can be stated that the visibility of a journal is intrinsically related to receiving good evaluations in indexing systems (GONÇALVES; RAMOS; CASTRO, 2006).

3 METHODOLOGY

As the study aims to understand what are the problems faced by journals in the area of chemistry, especially with regard to the visibility of these publications in the scenario of information dissemination, the exploratory and descriptive methodology is applied here (GIL, 2007) since it seeks to become familiar with the theme of visibility of national chemistry journals, while describing the characteristics of the sample.

The methodology used is of the exploratory and descriptive type, with a qualitative approach. Case study and observational data analysis was used for data collection, such as citation and cocitation analysis, and technical description.

In this sense, the study supports the qualitative and quantitative approach, since it uses techniques of documentary research, with characteristics of case study (GIL, 2007), to the extent that the sample consists of a single journal, seeking the desired depth to the research, and quantitative in the sense of making an analysis of citations from a journal in the field of chemistry, in order to demonstrate the citations of the journal to be adopted.

Stake (1995) considers that the case study is the understanding of a case in its particularities and in its complexities. Merriam (1988) calls the case study a delimited description of a phenomenon, whether this phenomenon is a social institution or even a person. The case study must be centered on a particular situation or event, it always seeks the solution of some problem or question, it has descriptive procedures, either as a report or data observation (such as analyses of quotes for example); it follows inductive reasoning that goes from the particular to the whole and uses several sources of data, thus observing the same phenomenon from more than one perspective (YIN, 2001).

According to Godoy (1995) the case study can be descriptive, when it presents a detailed account of a social phenomenon seeking only to report and describe how the specific phenomenon occurs, being particularly important to provide data bases for future comparative work, or theory formation. The evaluative case study has a more analytical look besides being descriptive or interpretive, to observe a delimited phenomenon the use of the case study research strategy is, among the methods, the most indicated (MERRIAM, 1998).

Citation analysis is a pure bibliometric action, which aims to understand the profile of authors, journals, or institutions, through the authors who seek their sources of information to base themselves and defend their views. Citation analysis is also used in library and database decision-making regarding the purchase or acquisition of scientific journals or their evaluation (GLANZEL et al, 2006). In the context of this paper, it will be used to support the evaluative perspective.

To perform the analysis, it is necessary to observe in indexing systems such as Web of Science, Scopus, SJR and Qualis, for this case, it is sought to observe elements relevant to the current context, understanding which are the main journals that are currently listed within the platforms and if there are relational trends in these indexed journals.

The choice of the journal to be analyzed is justified for having characteristics where most authors are not Brazilian, and other characteristics that, when better evaluated, may justify or not its availability within a platform for scientific dissemination. As well as the journal that occupies the first place in the Scimago Journal & Country Rank (SJR) in 2019.

To understand the framework in which the chosen journal finds itself, were observed, characteristics pertinent to the condition of this journal in the other years within the SJR. To observe the characteristics pertinent to the journal, such as its frequency, its formats, submission guidelines. And for data analysis results observe its visibility in the indexers cited above, as well as perform citation analysis to understand relational aspects of the period that the case study is worked.

4 RESULTS

With the objective of understanding the problems faced by periodicals in chemistry, especially about their visibility, we chose to select only one periodical and analyze its editorial path, since the universe itself is small. With a small sample it is possible to deepen the studies to obtain the desired results

The choice of journal was made through Scimago Journal & Country Rank (SJR), a direct access portal that includes scientific indicators for journals and countries. In the Journal Rankings tab, the subject area Chemistry, the country Brazil (All regions/countries: Brazil) and the year 2019 (most recent year available at the time of the search) were selected as search criteria.

Eleven results were obtained, and it was observed that the journal Tchê Química occupied the first place and had the best quartile ranking (Q2), which means a better performance than at least 50% of the journals in the same category. However, when the search was repeated with data from 2020 updated by the SJR platform, it was noted that this same journal occupied the last position in the ranking, with no classification attribution. There was only the warning that the journal was discontinued from the ranking.

When applying the same search on the said platform for the year 2018 it was found that the index of Tchê Química jumped from 0.198 in 2018 to 0.689 in 2019, a substantial increase of approximately 348%, accompanied by the change of quartiles from Q3 to Q2. In view of the previously mentioned objective and the performance of the Tchê Química journal in the ranking during the last three years it was chosen to select it as the object of the present study.

The Tchê Química journal is an international multidisciplinary journal with a four-monthly frequency and free access. Its first edition dates to 2004, and it currently works with both printed and electronic versions. Its website states that the submitted papers are fully peer-reviewed in double-blind evaluation, and that its scope covers the multi- and interdisciplinary fields of Chemistry, Biology, Physics, Mathematics, Pharmacy, Medicine, Engineering, Agriculture, and Science Education.

Articles accepted for publication must pay a fee that varies according to the classification that the country of origin occupies on the World Bank's list of economies. The cost for Brazilian authors is R$600, for other countries it varies from USD 80 to USD 300, low income and highly indebted countries pay the lowest fee while high income and nuclear capacity countries pay the highest.

In its guidelines it is emphasized that original articles, review articles, educational articles, technical notes, general subjects, and interviews are accepted, provided they are unpublished and must be submitted in English or Portuguese. Regarding ethical guidelines, the journal's official portal informs that it is based on the guidelines and norms developed by the Committee of Ethics in Publication (COPE) and confirms that it endorses a series of documents on ethical conduct listed on its website.

Regarding the duties and expectations of authors, reviewers, and editors the journal

stresses that it maintains high standards regarding publication ethics, submitted papers undergo an initial screening, and if the submission is suitable, both in composition and arrangement and in line with ethical guidelines, it is sent to two reviewers. Research involving humans or animals must be authorized by the ethics committee.

The submission process is via e-mail; there is no system for this purpose. The authors submit their manuscripts formatted in the template provided by the journal and the editor evaluates whether they are adequate according to the guidelines and scope. If deemed adequate, the manuscripts are sent to two reviewers and the review takes up to 90 days from the date of receipt. The reviewers give their opinion, and the editor decides whether to accept or reject the manuscripts. Authors whose manuscripts are accepted must pay the fee for publication to occur.

There are some opportunities for a discount on the fee and free publication for authors who support the journal group's initiatives. This information can be found at the end of the last issue of the journal under Instructions for Authors specifically on page 317. Authors who have one manuscript approved for publication in the Southern Brazilian Journal of Chemistry receive a 50% discount; authors who have two manuscripts approved for publication in the same journal receive a 100% discount; authors and/or collaborators who have four manuscripts published in Tchê Química with the full fee may publish a fifth manuscript free of charge.

Young researchers who wish to publish their first manuscript in Tchê Química may also request exemption from paying the publication fee but must follow certain criteria. A maximum of two authors are accepted and the manuscript must have been previously accepted by the Southern Brazilian Journal of Chemistry or the author must have two manuscripts previously accepted in the Journal of Law, Public Policies, and Human Science.

Both Tchê Química and the journals Southern Brazilian Journal of Chemistry and Journal of Law, Public Policies, and Human Science are hosted at the deboni.he.com.br domain and have the same editors-in-chief. The editors-in-chief of Tchê Química and Journal of Law, Public Policies, and Human Science are Dr. Luis Alcides Brandini De Boni and Dr. Eduardo Goldani, while the Southern Brazilian Journal of Chemistry has only one editor, Dr. Luis Alcides Brandini De Boni. Both complement their subscriptions with Tchê Química Group (TQG), i.e., there is confirmation that the three journals come from the same initiative.

Another point to highlight is that both the periodical that is being analyzed, Tchê Química, and the others belonging to the same group are not linked to any research institute or university, i.e., they come from a private initiative without institutional ties.

The journal Tchê Química remained indexed in the Scopus database from 2011 to 2020, the same period in which it appeared in the SJR and has been indexed in the Web of Science from where it was also de-indexed in 2020. In Chart 1 you can see the evolution of Tchê Química in SJR.

Chart 1. The evolution of the Tchê Química journal in SJR (2011-2020)

Year	Position	SJR	Total Docs. in year	Total Docs (3 years)	Total Refs. in year	Total citations (3 years)	Docs. Cited (3 years)	Citations/ Doc. (2 years)	Ref./Doc in year
2011	9		17	0	356	0	0	0.00	20.94
2012	10	0.101 Q4	18	17	364	1	17	0.06	20.22

2013	10	0.101 Q4	18	35	369	0	35	0.00	20.50
2014	8	0.123 Q4	11	53	203	4	52	0.06	18.45
2015	9	0.100 Q4	25	47	509	4	45	0.10	20.36
2016	6	0.160 Q4	26	54	592	6	52	0.14	22.77
2017	9	0.102 Q4	41	62	929	6	60	0.08	22.66
2018	4	0.198 Q3	163	92	4337	117	91	1.21	26.61
2019	1	0.689 Q2	265	230	8777	570	229	2.43	33.12
2020	11		277	469	11034	1104	469	2.53	39.83

Source: Translated and adapted from SJR (2021).

Chart 1 shows data extracted directly from the SJR about Tchê Química during the years in which it remained indexed and has the following fields: position in the ranking, SJR index accompanied by the classification by quartiles, total documents in the year, total documents based on the last 3 years, total references in the year, total citations considering the previous 3 years, cited documents based on the previous 3 years, ratio between citations and documents considering the previous 2 years and ratio between references and documents in the year.

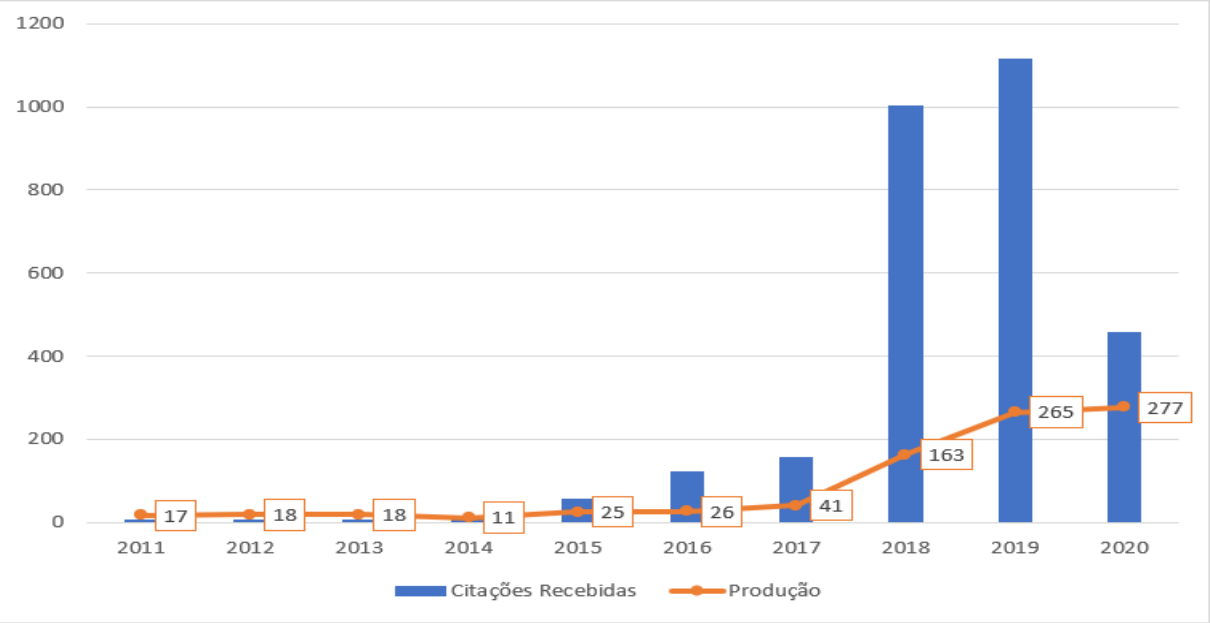
Between the years 2011 and 2017 the classification reached by the journal alternates between the last three positions (eighth, ninth and tenth), there is a single exception that occurs in the year 2016 where the sixth position is reached, however, despite there being oscillations in the indexes - especially in 2016 where there is an increase of 60% in relation to the previous year - the classification by quartiles remains the same (Q4) throughout the period. Also, in the same period the number of publications remained higher than the number of citations and only changes from 2018.

In the years 2018 and 2019 significant changes occurred. In 2018 the journal reached the fourth position in the ranking and became classified as Q3, its index grew about 94% compared to 2017 and expressive increases are observed in all fields present in the table. The

total number of documents produced, for example, increased by 297.5%, 122 more documents than in the previous year. The total number of citations, considering the last 3 years, went from 6 in 2017 to 117 in 2018, that is, it increased by 1,850%. The number of documents cited, also in the last 3 years, increased by about 52%. The citation index per document (last 2 years) experienced an increment of 1,412% between those same years.

In 2019, the journal achieved the first position in the ranking and the Q2 classification, being the only Brazilian chemistry journal to achieve this classification in that year. Once again, we note significant increases. All the values presented in the table increase, except for the total number of documents in the year and the index of documents per references in the year, by more than 100% in relation to the previous year. Chart 1 presents the annual distribution of production and citations between 2011 and 2020. The data were obtained from the journal profile on Scopus.

Graph 1. Received Citations and Production by Year (2011 to 2020)



Source: Prepared by the authors (2021).

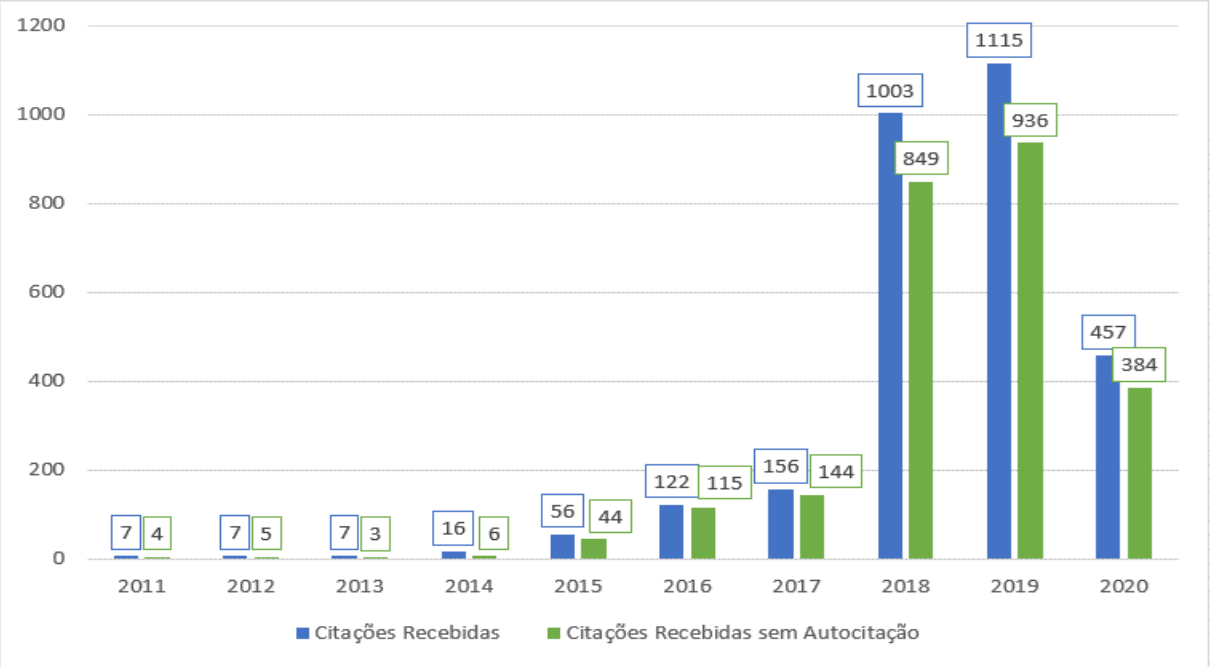
The labels shown in Graph 1 denote the number of articles produced (orange line), while the values corresponding to the citations received (blue bars) can be observed by the scale. The number of citations between the years 2011 and 2013 remained constant (7 citations each year), similar behavior to the number of productions that has a small variation between 2011 and 2012 (6% growth) but remains at the plateau (18 documents) in 2013.

Although there is a 39% drop in production in the year 2014, the citations more than double, from 7 in 2013 they go to 16 in 2014, that is, they increase 128%. Between the years 2015 and 2018 both production and citations grow year by year. However, in the case of citations, the growth is halted in 2020.

Between the years 2017 and 2018 the growth is impressive. The journal increases the number of published papers by 297% and citations by 543%, from 156 in 2017 to 1,003 in 2018. The numbers advance even further in 2019, with increases of 62% and 11% in publications and citations, respectively.

In 2020, the year of journal de-indexing from SJR and Scopus, output shows a 4% increase, while citations exhibit a 41% drop from the previous year. In Scopus it is also possible to retrieve data regarding citations received by the journal, excluding self-citations. Chart 2 shows the citations received by the journal Tchê Química with (blue bars) and without self-citations (green bars).

Graph 2. Comparison between Quotes with and without Self-Citations



Source: Prepared by the authors (2021)

Graph 2 shows that especially in the first years of the journal's indexing (2011 to 2014), self-citations represent a significant portion of the citations received, accounting for 62% of the total in 2014. In 2015 the percentage decreases to 21% and reaches 6% and 8% in the years 2016 and 2017, respectively.

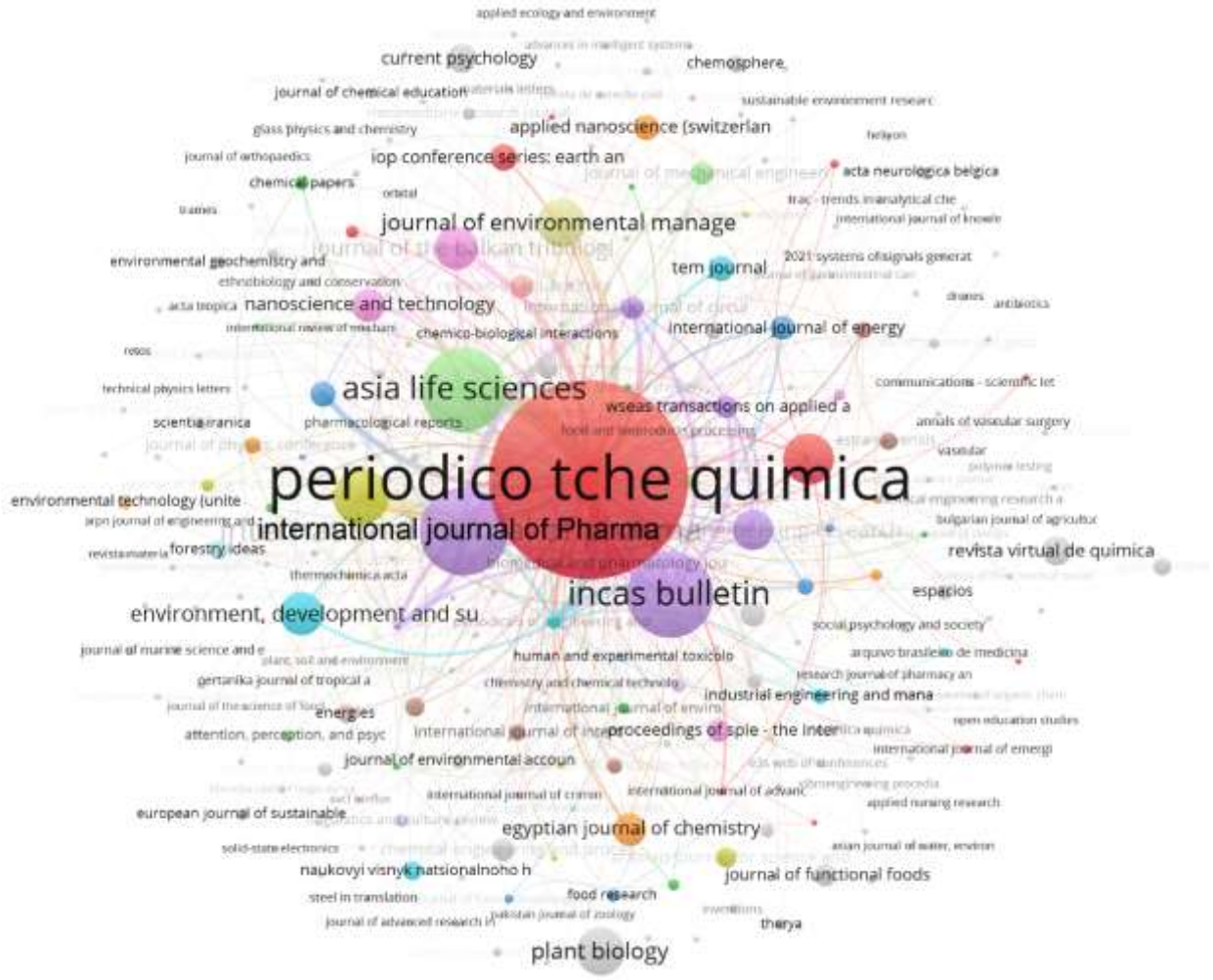
Self-citations in the years 2018, 2019, and 2020 are around 15%. In total the journal received 2,946 citations, of these 456 come from self-citations, which is 15.5% of all citations received. To deepen the citation analysis of the journal we performed an advanced search in Scopus with the query REFSRCTITLE ("periodic tche chemistry") OR ISSN (2179-0302).

The query used retrieves all documents in the database that contain in the title of their references the term "periodic tchê chemistry" and the documents published by Tchê Química from its ISSN. The base itself prevents the duplication of retrieved documents. For the analysis to include the period in which the periodical remained indexed, documents from 2008 and 2022 were excluded.

Thus, we obtained 1,879 documents that cite the journal under analysis or that were published by it. Recovering both the documents that cite Tchê Química and those that were self-published made it possible to build the citation network using the software VOSviewer (version 1.6.16).

The software, from the Scopus data, interprets the source of the retrieved documents as citing and the citation analysis is processed between them to create the network. Thus, the search strategy made it possible to analyze the journals as citing, including Tchê Química itself, which has an expressive number of self-citations, and the relationships established between them. The result of the citation network can be seen in Figure 1.

Figure 1. Citation Network



Source: Elaborated by the authors

In Figure 1 the items (circles) represent the journals and the links (lines) the connection between the items. The weight was distributed according to the number of citations, so the larger the size of the item the more citations it received. The links also show the strength of relational connection between the journals from the citations exchanged between them, the greater the thickness the greater is the amount of citations between them and vice versa.

The colors displayed, represent the clusters formed by the software according to the connections established. The clusters are exclusive, that is, it is not possible for an item to correspond to two clusters; however, there are items that do not cluster. In all, 186 clusters were formed, but of these, 162 have a single item, so 24 clusters with at least 2 items are noted.

The most prominent clusters are 1 (red), 4 (yellow), 5 (purple), 11 (green), and 13 (grayish yellow). In addition, the software also calculates total link strength, an attribute that numerically shows the total link strength of an item with the others, and link strength that displays the calculation for each item.

Since this is an analysis of the citations received by the journal Tchê Química (cluster 1), it is not surprising that it is the item with the highest presence in the network. It connected with 253 other items and had total link strength of 2,454. Also noteworthy are the journals Asia Life Sciences (cluster 11), Incas Bulletin (cluster 5), International Journal of Pharmaceutical Research (cluster 5), Journal of Environmental Management and Tourism (cluster 13) and Journal of Applied Engineering Science (cluster 4).

Asia Life Sciences is the second journal with the highest number of citations. It established 24 links from 533 citations, the journal most connected to it, i.e., the most cited by it is Tchê Química. The link strength between them is 759. Its total link strength was 1,044. It

also connects to Incas Bulletin with link strength 89 and to Journal of Environmental Management and Tourism (JEMT) with link strength 39. JEMT is also cited by Incas Bulletin and the link shows link strength 2.

The Incas Bulletin appears with 479 citations, connected to 16 other items its total link strength was 536. The link strength of its connection with Tchê Química is 164. Even being part of the same cluster (cluster 5) there is no direct connection with the journal International Journal of Pharmaceutical Research (IJPR). The IJPR has 9 links, 421 citations and total link strength of 421. The link strength between it and Tchê Química is 74.

In addition to the connection with Asia Life Sciences and the IJPR, the Incas Bulletin also connects to the Journal of Applied Engineering Science (JAES) with link strength of 19. JAES, which belongs to cluster 4, established 21 links and was cited 152 times. Its total link strength was 263 and its link strength with Tchê Química was 108.

The network shows the main citants of Tchê Química, but also establishes the relationships between them. The journal analyzed received pulverized citations in several journals, however, it is noteworthy that a few journals cite it in a significant way, and especially these have links between them.

Asia Life Sciences, besides the strong connection with Tchê Química, cited and presented strong connections with the Incas Bulletin and JEMT. In turn, the Incas Bulletin cited the JAES, the JEMT and indirectly connected to the IJPR through four other journals that both cited.

5 FINAL CONSIDERATIONS

Increasing and maintaining visibility is a major challenge for most journals, however, each area exhibits its own particularities. In the case of Hard Sciences journals in Brazil there is a preference to publish in foreign journals, in Chemistry this preference is also confirmed.

Thus, the Brazilian chemistry journal that ensures internationalization, especially if indexed in prestigious databases such as Scopus and Web of Science, for example, has the possibility of expanding its visibility, gaining a greater number of submissions for its publication and increase the number of citations received, a detail that contributes to the impact factor of the journal.

When analyzing the journal Tchê Química and, especially, its course during the period in which it remained indexed in the Web of Science and Scopus bases, it was observed that internationalization and indexing benefited it. Both the volume of publications and the number of citations received grew considerably.

In the beginning, self-citations represented up to more than half of the citations received, over time they decreased, and in the last years of indexing they remained at the average level of 15.5%. In terms of publications and citations received, the years 2018 and 2019 showed impressive numbers, which led to the need to understand a little more about the origin of citations and their relational aspects.

The citation network run using VOSviewer software from Scopus data showed that the top citants of Tchê Química establish citation relationships with each other. There are also scattered citations from other journals, but the journals Asia Life Science, Incas Bulletin, International Journal of Pharmaceutical Research, Journal of Environmental Management and Tourism and Journal of Applied Engineering Science establish a strong connection with Tchê Química by the high number of citations directed to it.

It is possible that the journals mentioned above have driven the change in positions occupied by Tchê Química in the SJR. It is also noted that even indexed in the databases and having gained relevance in SJR, the journal does not present strong relationships with other Brazilian journals.

From 2020, however, the journal showed a decline in the number of publications and

citations received and was subsequently deindexed from the bases and from the ranking. On the SJR page that contains the profile of the journal there are complaints from users who identify themselves as authors of articles published by Tchê Química requesting a justification for the deindexation.

The SJR team, when answering these users, pointed out that the deindexing is not done by the ranking, but by Scopus and that the justification given by the base was that the journal itself did not send the necessary information to calculate the scient metric indicators for 2020.

It is understood that the trajectory of the journal in question may have been affected by any changes in its main citants, i.e., to maintain the level reached, it was necessary that the citants remained citing it or that its visibility raised a suitable number of new citants. Thus, this study warns that another difficulty faced by this type of journal is to guarantee growth independent of receiving many citations from specific sources, since overall, it may become unsustainable.

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