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MAPEAMENTO DA PRODUÇÃO CIENTÍFICA SOBRE TRANSFERÊNCIA DE TECNOLOGIA RELACIONADAS COM A ÁGUA DIRECIONADAS PARA O REUSO DA ÁGUA

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Resumo: A preocupação com a água se deve ao aumento da população, e com isso, houve um aumento no consumo de água. Diante de um cenário de escassez hídrica, é necessário direcionar esforços para que isso não ocorra. Uma das formas de atender a demanda é por meio da tecnologia de reuso de água. Nesse sentido, a proposta de pesquisa foi realizar uma revisão sistemática e integrativa da literatura sobre transferência de tecnologia relacionada à água, com foco no reuso da água. Utilizou-se revisão sistemática e integrativa, utilizou-se *Methodi Ordinatio* e consultaram-se as bases de dados *Web of Science*, *Scopus* e *ScienceDirect*, ao final, foram selecionados 33 artigos sobre o tema. As principais constatações foram que o foco da pesquisa está relacionado à promoção do reuso da água e às preocupações com o consumo de água. O estudo elucida a importância das políticas públicas relacionadas ao consumo e reuso da água. Reforça a importância de compreender a conscientização e aceitação da população para tais aspectos. Uma das alternativas para suprir o cenário de escassez de água foi através da dessalinização da água. Ainda assim, são necessários avanços para superar a barreira do alto consumo de energia e geração de resíduos. No que diz respeito à transferência de tecnologia, o compartilhamento de conhecimento em nível global é necessário para que a transferência de tecnologia ocorra de forma eficaz e tenha resultados satisfatórios. Conclui-se que a discussão sobre o tema está longe de se esgotar, e este artigo incentiva discussões sobre o tema.

Palavras-chave: Antropotecnologia. Transferência de tecnologia. Água. Reuso de água. Revisão da literatura.

MAPPING OF SCIENTIFIC PRODUCTION ON TECHNOLOGY TRANSFER RELATED TO WATER DIRECTED TO WATER REUSE

Abstract: The concern with water is due to the increase in population, and with that, there was an increase in water consumption. In the face of a water scarcity scenario, it is necessary to direct efforts so that this does not occur. One of the ways it can meet the demand is through technology for water reuse. In this sense, the research proposal was to carry out a systematic and integrative review of the literature on technology transfer related to water, focusing on water reuse. A systematic and integrative review was used, Methodi Ordinatio was used, and the databases of Web of Science, Scopus, and ScienceDirect were consulted; at the end, 33 articles on the subject were selected. The main findings were that the focus of the research is related to the promotion of water reuse and concerns about water consumption. The study elucidates the importance of public policies related to the consumption and reuse of water. It reinforces the importance of understanding the awareness and acceptance of the population to such aspects. One of the alternatives to supply the water scarcity scenario was through the desalination of water. Still, advances are needed to overcome the barrier of high energy consumption and waste generation. Concerning technology transfer, knowledge sharing at a global level is necessary for technology transfer to occur effectively and have satisfactory results. It is concluded that the discussion on the subject is far from being exhausted, and this article encourages discussions on the topic.

Keywords: Anthropotechnology. Technology transfer. Water. Water reuse. Literature review.

1. Introduction

In 2015, with the 2030 Agenda, which contains the 17 sustainable development goals (SDGs) and 169 goals which should guide the behaviour of public and private organizations and all individuals on the planet. Highlights the importance of water, specifically SDG 6 – drinking water and sanitation; SDG 9 – industry, innovation, and infrastructure and SDG 12 – responsible consumption and production (ONU, 2015). The SDGs are related to water, as the issues addressed in these SDGs directly impact water consumption.

The concern with water is due to the increase in population and, consequently, the increase in the consumption of fresh water in agriculture for the cultivation of plants, and the lack of water can compromise agriculture; in the industries, which are used in the productive processes and the cities, for the consumption of the population (ALCON et al., 2014; BRAME; LI; ALVAREZ, 2011; MANJU; SAGAR, 2017; RITCHIE; ROSER, 2017). In addition, large amounts of water are used to produce traditional energy. (BRAME; LI; ALVAREZ, 2011). With a possible water shortage, the reuse of water is seen as an alternative so that there is no lack of water for consumption (ANGELAKIS; SNYDER, 2015).

Given this scenario in which the global population can be impacted, alternatives such as the recovery, reuse and reuse of water are alternatives that deserve attention to minimize possible water shortages on the planet, thus maintaining sustainability in the long term (ANGELAKIS; DURHAM, 2008; HELMECKE; FRIES; SCHULTE, 2020; MILLER, 2006).

Due to the importance of water reuse, water reuse technologies were developed, such as sand filters, filtration coagulation, flocculation, constructed swamps, ultraviolet radiation, and chlorination. However, it is essential to highlight that it is necessary to improve existing technologies to be sustainably viable in a specific context (CURIEL-ESPARZA et al., 2014).

Still, when aspects of technology are discussed, it is essential to emphasize that technology is used in another context, called technology transfer. It is necessary to observe issues related to the conditions under which the country that intends to use the technology lives, the level of maturity concerning technology, and sociocultural issues are seen as challenges to be faced and overcome (KIRLIDOG, 1996).

In addition to the challenges mentioned earlier, it is necessary to rupture identified barriers related to water reuse. Being the lack of innovative technologies, the transfer of existing technology, and the understanding of how this technology transfer was carried out; education and public acceptance, and the promotion of public policies all this so that there is no shortage of drinking water in the world (BRAME; LI; ALVAREZ, 2011; MANJU; SAGAR, 2017; MILLER, 2006). On the other hand, it is already possible to observe some movements towards including water reuse in water planning (SMITH et al., 2018).

However, it is essential to point out that, despite the benefits presented on the reuse of water, issues related to the health of the population and the possible impacts on the environment deserve the attention of stakeholders (HELMECKE; FRIES; SCHULTE, 2020). As a result of the concern about the population's health, there is a concern about SARS-CoV-2, which can contaminate individuals through water consumption (LANGONE et al., 2021).

In this sense, the present study aims to elucidate the research directed towards the transfer of technology related to water directed towards water reuse, which seeks to meet all criteria on aspects of sustainability and technical issues. The following research questions arise: (i) are there research related to water-related technology transfer aimed at water reuse? (ii) in what ways are these surveys treated?

In this sense, to answer the research questions, the general objective of the research was to carry out a systematic and integrative review of the literature on technology transfer related to water with a focus on water reuse. The specific objectives are: (i) to identify the scientific production on the subject; (ii) present the evolution of publications on the subject over time; (iii) to analyze in an integrative way the identified articles; (iv) propose a research agenda on future directions on the subject and, finally, (vi) discuss the practical and managerial implications of research related to the transfer of technology related to water.

This article is structured as follows: in this first section, the contextualization of the theme is presented, together with the research question and the objectives that guided the research; in the second section, there is the methodological path in the development of the study; in the third section the results are presented together with the discussions and, finally, in the last section the final considerations are presented together with the limitations and suggestions for future work.

2. Methodology

The present research is characterized as a systematic and integrative review of related research on water-related technology transfer aimed at water reuse. The databases consulted were: (i) Web of Science; (ii) Scopus, and; (iii) Science Direct. Furthermore, the Methodi Ordinatio was used.

The research is characterized as a systematic review since the objective proposed by the research is clear. The research questions are: (i) are there researches related to technology transfer of water directed to water reuse? (ii) In what ways are these surveys being treated? In addition, the inclusion and exclusion criteria are clearly described throughout the methodology. To identify the most relevant research on the subject, the InOrdinatio Index was used, which will be explained later in this section. Finally, a summary of the primary research on the topic is presented (AROMATARIS; PEARSON, 2014).

The research developed fits as an integrative review. It aims to identify the primary research on the subject under study, seeking to advance knowledge about technology transfer related to water directed to water reuse. (WHITTEMORE; KNAFL, 2005). The integrative review protocol is based on the model presented by Whittemore (2005), which seeks problem identification, literature search, data evaluations, data analysis, and presentation.

Seeking to make the research methodologically robust, the Methodi Ordinatio proposed by Pagani, Kovaleski e Resende (2015) presents criteria for the choice of scientific articles. This methodology has proved to be efficient to the proposals for identifying the most relevant research on the subject.

The first stage of the research was carried out by defining the search strings. It used the following combinations: ('Technology Transfer' OR 'Anthropotechnology' OR 'Knowledge Transfer' OR 'Knowledge and Technology Transfer') AND ('Water Reuse' OR 'Water Recovery' OR 'Water Recycle' OR 'Water Reclamation'), which aimed to identify research related to the transfer of technology related to water with a focus on water reuse.

The second stage of the research in January 2022 used the strings mentioned above in selected databases and applied five filters to exclude articles. Selected only articles and review articles in the first filter. In the second filter, duplicate articles were excluded. In the third filter, papers from conferences were identified and excluded. In the fourth filter, articles published before 2000 were excluded, in which the authors defined the time frame of 20 years. Finally, in the last filter, books or book chapters still in the sample of articles and journals that did not have the Journal Citation Reports (JCR) were excluded.

Continuing the methodological process followed, with the Methodi Ordinatio, the InOrdinatio index is presented. Which Formula 1 is presented, which takes into account the impact factor (IF), α being the weighting to the year attributed by the researcher, with 1 being little importance and 10 being very important; in addition to the year of publication and the number of citations (ci). With the InOrdinatio index, it is possible to identify the most relevant articles on a given topic (PAGANI; KOVALESKI; RESENDE, 2015).

$$InOrdinatio = \left(\frac{IF}{1000} \right) + \alpha * [10 - (Year\ of\ Research - Year\ of\ Publication)] + \left(\sum ci \right) \dots(1)$$

In Formula 2, the calculation of the InOrdinatio Index of the most relevant article on the subject under study is presented, being: IF the JCR of 9.501 from the journal Desalination; 10 was assigned to α , which considered the year of publication of the article important; the year in which the survey was carried out was in 2022; the year of publication of the article was 2006 and, finally, ci being 517 the number of citations that the research has in Google Scholar, thus obtaining the InOrdinatio index of 457.01. With the help of Microsoft Excel 2019, the InOrdinatio index of the 198 articles identified on water-related technology transfer aimed at water reuse was calculated.

$$InOrdinatio = \left(\frac{9,501}{1000} \right) + 10 * [10 - (2022 - 2006)] + (517) \dots(2)$$

$$InOrdinatio = 457.01$$

After calculating the InOrdinatio index, the articles with the InOrdinatio index ≥ 100.00 were selected for the subsequent analysis stage; adopting this criterion, 129 articles were excluded, leaving 69 articles that obtained ≥ 100.00 . The next step in selecting articles was to read titles, abstracts and keywords. Only 33 remaining articles were analyzed, excluding 36 of them due to not being in the scope of the research.

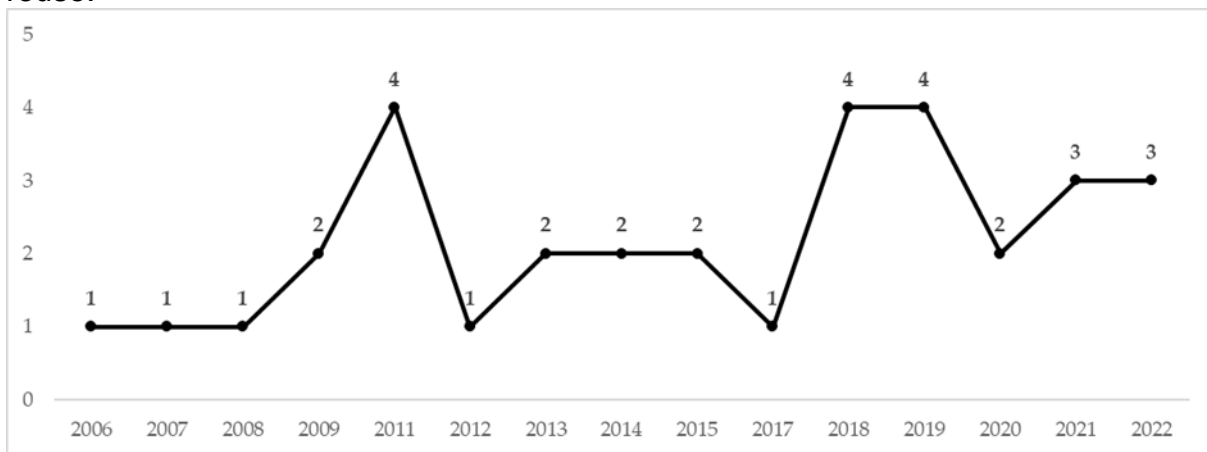
Finally, the 33 articles were analyzed, and it was possible to identify five categories, as follows: (i) promotion of water reuse – 14 articles; (ii) concern with water consumption – 12 articles; (iii) water in agriculture – 5 articles; (iv) pharmaceutical waste – one article and; (v) SARS-CoV2 – one article.

The results obtained from the research are organized as follows: it begins by presenting the history of publications; then the articles classified according to the InOrdinatio index are given; the most relevant journals are presented, pointing out the journals with the most publications; word clouds of the titles and keywords of the 33 selected articles; then the articles are discussed according to their categories; prepared a future research agenda based on the insights generated from the analysis of the articles and, finally, the practical and managerial implications are discussed.

3. Analysis and Discussion of Results

This section begins the presentation and discussions based on the Web of Science, Scopus and ScienceDirect databases review. From the inclusion and exclusion criteria detailed in the previous section, 33 articles were analyzed in total. In Figure 1, it is presented the history of publications on the theme proposed in the study. It is observed that the years with the most publications were 2011, 2018, and 2019 with four publications in each year. The research was carried out in January 2022, and in that same year, it already had three published articles.

Figure 1 - History of publications on technology transfer related to water directed towards reuse.



Source: Prepared by the authors (2022).

Reading the titles and abstracts of the 33 articles made it possible to categorize the articles according to the theme worked in each of them. The categories identified were: (i) promotion of water reuse, (ii) concern with the water consumption, (iii) water in agriculture, (iv) pharmaceutical waste, and (v) SARS-CoV2. The articles according to their categories are discussed below.

The category with the most publications identified was the promotion of water reuse, in which 14 articles were identified that discuss this theme.

Based on the research findings, the importance that the USA, Australia and Europe (MILLER, 2006); Spain (BLANCO GÁLVEZ; GARCÍA-RODRÍGUEZ; MARTÍN-MATEOS, 2009; DOWNWARD; TAYLOR, 2007); China (BINZ et al., 2012; GENG et al., 2013); India (MANJU; SAGAR, 2017); all countries that are part of the EurEau - European Federation of National Associations of Water & Waste Water Services (ANGELAKIS; DURHAM, 2008); the Mexico (BLANCO GÁLVEZ; GARCÍA-RODRÍGUEZ; MARTÍN-MATEOS, 2009) already visualized the importance of water reuse.

For the practice of water reuse to be carried out in different contexts around the world, it is necessary to encourage governments (BINZ et al., 2012; MANJU; SAGAR, 2017; MILLER, 2006); the resistance of individuals with water reuse is a barrier to be overcome (MILLER, 2006), mainly due to the risks and threats to the water reuse (MANKAD; TAPSUWAN, 2011);

have assertive and accurate communication highlighting the main benefits and public awareness of water reuse (ANGELAKIS; DURHAM, 2008; MANJU; SAGAR, 2017; SMITH et al., 2018) are aspects to be taken into account.

In a water scarcity scenario, desalination is seen as an opportunity to meet possible water shortages and has been attracting attention from researchers (BLANCO GÁLVEZ; GARCÍA-RODRÍGUEZ; MARTÍN-MATEOS, 2009; DOWNWARD; TAYLOR, 2007; KIM et al., 2009; MANJU; SAGAR, 2017). Desalination is considered an environmentally friendly process that can obtain fresh water to be used by the community, primarily if it uses solar energy (BLANCO GÁLVEZ; GARCÍA-RODRÍGUEZ; MARTÍN-MATEOS, 2009). However, aspects related to the high investment and concern with energy consumption and waste generation deserve the attention of those involved (DOWNWARD; TAYLOR, 2007; MANJU; SAGAR, 2017). Nanotechnology makes it possible to assist water desalination (BRAME; LI; ALVAREZ, 2011).

As stated, there are technological alternatives for water reuse. However, before investing in these technologies, it is necessary to understand the population's acceptance of water reuse (BINZ et al., 2012; MANJU; SAGAR, 2017; MANKAD; TAPSUWAN, 2011). In addition, it is necessary to identify other locations that are already used to carry out a visit to understand the best ways to carry out the transfer of technology in a powerful way, thus obtaining satisfactory results (MANJU; SAGAR, 2017). When it comes to technology and knowledge, there are already green universities that direct attention to aspects of sustainability in which it is possible to train individuals with environmental awareness (GENG et al., 2013).

Directions regarding individuals are related to anthropotechnology issues and geographic, demographic, epidemiological, sociological, economic, linguistic, anthropological, and historical issues. All this is to improve technology transfer (WISNER, 2004).

In a manufacturing context, but specifically in the manufacture of bricks, it was studied, which used the reuse and regeneration of water, which was possible to reduce the total consumption of water for the manufacture of bricks (SKOUTERIS et al., 2018).

The next category to be analyzed is the concern with water consumption. Concern about water consumption was observed in countries such as China (DONG et al., 2014; LI; SEE; CHI, 2019; ZHANG; PLATTEN; SHEN, 2011); in Switzerland (LIENERT; SCHNETZER; INGOLD, 2013); the Mediterranean region (IGLESIAS et al., 2011); in the United States of America (NIZKORODOV, 2021) and on the African continent (KILESHYE ONEMA et al., 2022).

Concerns about water consumption were identified in real estate projects (ZHANG; PLATTEN; SHEN, 2011); in water resources planning (LIENERT; SCHNETZER; INGOLD, 2013); were discussed about public-private partnerships (NIZKORODOV, 2021); studies related to effluent treatment patents, China stands out as the country with the most patents (MAO et al., 2022), In terms of patent issues, China is seen as an outlier than other countries (TATUM; LEITÃO RUSSO, 2020; YUAN et al., 2010). Due to the vital participation of Chinese universities and companies which seek global trends and can collaborate with the Chinese government's public policies (YUAN et al., 2010) in the context of the geography of eco(innovation) (CASTELLANI et al., 2022).

Due to the concern with water consumption, projects related to green technologies and innovations were identified (DUIĆ; URBANIEC; HUISINGH, 2015; LI; SEE; CHI, 2019; WEHN; MONTALVO, 2018; ZHANG; PLATTEN; SHEN, 2011); these technologies related to water reuse and appliances that reduce water consumption (ZHANG; PLATTEN; SHEN, 2011). However, to implement these technologies, it is necessary to overcome the barrier of high investments (ZHANG; PLATTEN; SHEN, 2011). In addition, efforts should be

directed towards organizational and individual learning with the proposed innovations (WEHN; MONTALVO, 2018).

In addition to technological issues, it is necessary to implement public policies that can preserve water resources and be designed for long-term sustainability (DONG et al., 2014; IGLESIAS et al., 2011; KOOP; VAN DORSSSEN; BROUWER, 2019; LIENERT; SCHNETZER; INGOLD, 2013). For this to occur, investment in research and development is necessary (LI; SEE; CHI, 2019). One of the possible alternatives is to monitor the behaviour of consumers with demand and the rates charged (DONG et al., 2014; IGLESIAS et al., 2011; LI; SEE; CHI, 2019); reinforces the importance of public awareness (KOOP; VAN DORSSSEN; BROUWER, 2019; LIENERT; SCHNETZER; INGOLD, 2013).

Finally, aspects related to technology transfer deserve the attention of stakeholders due to its importance and because economically less favoured countries may have difficulties in having access to technologies (IGLESIAS et al., 2011). Technology transfer must be aligned with public policies linked to standards. Therefore, laboratories and universities can effectively serve the population (BARTON; SLADE; ANDERSON, 2021).

Knowledge transfer is seen as weak, and the available information is misused by stakeholders or is little explored (CASTELLANI et al., 2022; IGLESIAS et al., 2011). This knowledge exchange can occur through events related to water innovations (KILESHYE ONEMA et al., 2022). For progress about green technology innovations to occur, it is vital that the level of education of individuals increases (LI; SEE; CHI, 2019).

Discusses the research related to specific aspects of water in agriculture, in which five articles have been identified that deal with this theme. Concern about water in agriculture was observed in Spain (ALCON et al., 2014) and Germany (KÖNIG et al., 2018).

The concern of farmers to water is that they lack irrigation of their plantations (ALCON et al., 2014). To prevent this from happening, they are willing to pay more for water, as long as they guarantee supply (ALCON et al., 2014). In addition, small-scale water reservoirs on rural properties can be an alternative for farmers (IGLESIAS; GARROTE, 2015). The alternative of water reuse in irrigation was considered, but it is necessary to verify the existence of chemical contaminants that can compromise irrigation without risks (HELMECKE; FRIES; SCHULTE, 2020).

The identified difficulty related to water in agriculture is the lack of alignment between the interests of farmers and the government (ALCON et al., 2014). However, farmers must invest in their training and be aware of technological changes not being considered (IGLESIAS; GARROTE, 2015). A technology that is seen as sustainable is aquaponics, being the combination of pisciculture and the cultivation of soilless culture, but there is distrust about this technology (KÖNIG et al., 2018).

In addition to the research exposed so far, research was identified in which it directs its attention to pharmaceutical residues in the water. Sustainable technologies are necessary to treat them, and, in some cases, specific technologies are necessary to identify these types of residues. The main techniques used are chromatographic (DE OLIVEIRA et al., 2020). Recently, due to SARS-CoV2, water managers need to direct their attention, as contamination by water is possible, so it is necessary to optimize processes that can identify whether SARS-CoV2 contaminates the water. Consequently, public water services must direct their attention to low-income communities with poor sanitation (LANGONE et al., 2021).

After discussing the 33 articles on the subject of the research, it is observed that the discussion is not exhausted. It is necessary to conduct more research to supply the insights generated from the discussions. Thus, it was possible to present an agenda of future research, the suggestions being:

(i) There was a predominance of studies carried out in China (BINZ et al., 2012; DONG et al., 2014; GENG et al., 2013; LI; SEE; CHI, 2019; ZHANG; PLATTEN; SHEN, 2011) and in European countries such as Germany (KÖNIG et al., 2018), Spain (ALCON et al., 2014; BLANCO GÁLVEZ; GARCÍA-RODRÍGUEZ; MARTÍN-MATEOS, 2009; DOWNWARD; TAYLOR, 2007) and Switzerland (LIENERT; SCHNETZER; INGOLD, 2013). Due to the research concentration in these places, the importance of studies related to water consumption, technology transfer and water reuse in other contexts is understood.

(ii) The predominance of theoretical studies on the subject under study was noted. To better understand the situations experienced in different contexts, more empirical research on the subject is needed.

(iii) Research that identifies countries that already use a particular technology for water reuse and identifies countries looking for this technology, that the process of technology transfer is monitored, deserves the attention of researchers so that it is possible to understand in what way it should be done. Carry out technology transfer to obtain satisfactory levels (MANJU; SAGAR, 2017).

(iv) Efforts to understand the population to be adept at water reuse in different ways in different contexts deserve the attention of researchers, given the adoption of water reuse is seen as a barrier to be overcome (MANKAD; TAPSUWAN, 2011).

(v) Direct attention to contexts that already use population awareness about the consumption and water reuse and analyze the population's awareness levels longitudinally from actions taken (KOOP; VAN DORSSSEN; BROUWER, 2019).

(vi) Research that analyzes contexts in which water reuse is a reality due to water scarcity is necessary since several studies are carried out in theoretical contexts. That is, water reuse remains an option and not necessarily an obligation of the population (SMITH et al., 2018).

(vii) Public policies related to the consumption and water reuse are seen as an essential factor in the face of possible water scarcity, so discussing public policies in different contexts and identifying the costs and potential benefits for the population, in addition to discussing whether these public policies are in line with what the population expects (ALCON et al., 2014; IGLESIAS et al., 2011).

(viii) Carry out a mapping of water innovations and present the costs and benefits generated by these innovations. It would be possible to use these innovations (WEHN; MONTALVO, 2018).

(ix) The proposal presented by Skouteris et al. (2018) directs attention to sustainable consumption strategies in brick manufacture. It was possible to produce bricks with little water, which is a path several manufacturers should direct their eyes.

It is essential to highlight that even with the discussions held and the proposal for a future research agenda, the field that relates technology transfer, knowledge transfer for consumption and water reuse is a fertile field. The discussions are far from finishing.

Finally, this research's practical and managerial implications highlight the importance that public policies impact consumption and water reuse. However, the government's interest in these public policies is essential to consider the population's interest to have effective results. It reinforces the attention managers should have to the population since awareness of water consumption, and water reuse is feasible for effective results. Thus, the section of analysis and discussion of the results ends, and the next section discusses the final considerations of the study.

4. Final Considerations

Entering the final considerations, given the different scenarios exposed during the research, it is worth mentioning that the global population must direct efforts to save drinking water in homes, industries, and agriculture. Seeking greater efficiency in processes involving water consumption and reducing water waste are aspects to be considered a priority at the global level (HELMECKE; FRIES; SCHULTE, 2020).

In addition, it was possible to answer the proposed research questions. The first one was possible to identify studies that relate the transfer of technologies related to water. The research findings made it possible to identify that the research is related to promoting water reuse, the concern about water consumption, water in agriculture, and pharmaceutical waste and SARS-CoV2.

Consequently, it was possible to achieve all the aims proposed in the research, and the years with the most publications were 2011, 2018, and 2019. The research of Miller (2006) was the highest InOrdinatio index, which is considered the most relevant article. The prominent journals identified were: Journal of Cleaner Production, Journal of Environmental Management and Desalination.

In addition, it was possible to discuss the 33 articles identified in the research, which made it possible to visualize the panorama of research considering the identified categories. From these discussions, it was possible to propose a future research agenda. Finally, some practical managerial implications were regarding the subject under study were discussed. It is reinforced that the present research does not exhaust the discussion on the subject. On the contrary, the intention is to encourage more research to advance its knowledge.

Finally, the present research has the following limitations: (i) only articles that had the InOrdinatio index greater than or equal to 100.0 were analyzed due to this index cut, which may have left research of interest for the present research aside ; (ii) for the categorization and selection of articles, only the titles, abstracts and keywords were read, which may have left out research that could contribute to the research findings and, finally, (iii) the strings used in search engines, and there may be other combinations of keywords.

To the identified limitations, it is suggested as future research: (i) in a new review of the scientific production to analyze all the articles identified over time; (ii) direct efforts to carry out specific reviews for the identified categories, such as a review only on technology transfer for water reuse or a review aiming to identify the technologies that are used for water reuse.

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