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A bibliometric analysis of global research trends in solar still development for clean water production

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Abstract

The world knows how important clean drinking water is. Many people worldwide struggle to acquire pure drinking water. People need a cost-effective, energy-efficient, easy-to-use, zero-discharge technology to resolve this difficulty. Solar is still applicable here. Research on solar has continued since the mid-20th century. This study bibliometrically analyses peer-reviewed solar still research publications. The current study guides new researchers on where to start a literature review. This study aims to provide the groundwork for future solar still development. From this bibliometric analysis, it has been found that the first study on solar stills was published in 1964 and was titled "Design and performance evaluation of a multiple-effect tilted solar distillation unit". The study published in 2013 on nanoparticle utilisation in solar systems, including solar still, has been mentioned over 1,000 times. It is the top-most cited article to date. India, Egypt, Saudi Arabia, Iran, and China are the top countries working on solar stills. Top keywords in published publications on solar stills include distillation, solar heating, solar stills, and desalination. The top five index words include distillation, solar heating, solar stills, desalination, solar power, solar energy, and distillation equipment. These bibliographic literature reviews help researchers start their research quickly and methodically.

Keywords: Bibliometric analysis, Citations, Desalination, Distillation, Energy efficiency, Nano particles, Solar still.

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Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
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1. Introduction

Since the world is well aware of the importance of clean drinking water. Even though many people around the globe are facing challenges in getting clean and fresh drinking water [1]:

a) By 2021, the number of people living in water-stressed nations has surpassed 2 billion.
b) This issue is projected to worsen in some areas due to the combined effects of climate change and population expansion.
c) By 2022, a minimum of 1.7 billion people worldwide use a drinking water source polluted with faecal matter.
d) The primary hazard to the safety of drinking water is the presence of microbial contaminants, which occur when the water becomes contaminated with faecal matter.
e) Access to clean and enough water enables the implementation of proper hygiene practices, which are crucial in preventing not only diarrheal disorders but also acute respiratory infections and several neglected tropical diseases.
f) Drinking water polluted with microorganisms may spread illnesses, including diarrhoea, cholera, dysentery, typhoid, and polio.
g) It is estimated that this contaminated water causes over 5,05,000 fatalities from diarrhoea annually.
h) In 2022, 73% of the world's population, which amounts to 6 billion individuals, had access to a drinking water service that was adequately managed. This means that the service was conveniently accessible, readily available, and free from any pollution.

Fulfilling the demand for clean and fresh drinking water is essential to fulfil United Nations Sustainable Development Goal 6. United Nations Sustainable Development Goal 6 focuses on providing universal access to clean water and adequate sanitation facilities [2].

The water purification systems are not affordable or environmentally friendly at all. An RO purifier typically has a water wastage ratio of around 3:1, meaning that for every 1 litre of filtered water, roughly 3 litres of water are wasted. Based on this estimation, 25% of the whole water supply undergoes purification, while 75% is discharged as trash, often finding its way into sewer drains. To address this issue, people need a cost-effective, energy-efficient, easy-to-operate-and-maintain, and zero-discharge system.

In this context, solar still is a beneficial device. Hence, researchers have been researching solar still since the middle of the twentieth century. The primary objectives for conducting research on solar still are as follows:

a) To improve its distillate yield and energy efficiency.
b) To develop a cost-effective system so that people in drinking water-fed regions and remote and rural areas can use it to generate potable water and save the time required to bring it to their homes. Girls and women in drinking water shortages often travel more than 5 km to fetch water [3].
c) To reduce costs and reliance on external drinking systems such as water tankers. The price of water transported by tankers varied from USD 3.75 to USD 7.5 per cubic metre, depending on the quantity bought and the level of purity [4].

Solar still is a device which converts saline water into potable water using the energy of the sun. They are broadly of two types: a) Passive solar still and b) Active solar still. In passive solar still, impure water in the distiller basin is directly evaporated using solar energy and vapours are condensed on the underside side of condenser cover as shown in Fig. 1. However, in active solar still, impure water is first pre-heated using some other device such as solar water heater [5], solar cooker [6], solar air heater [7], then this pre-heated water is supplied to distiller basin as shown in Figure 2.

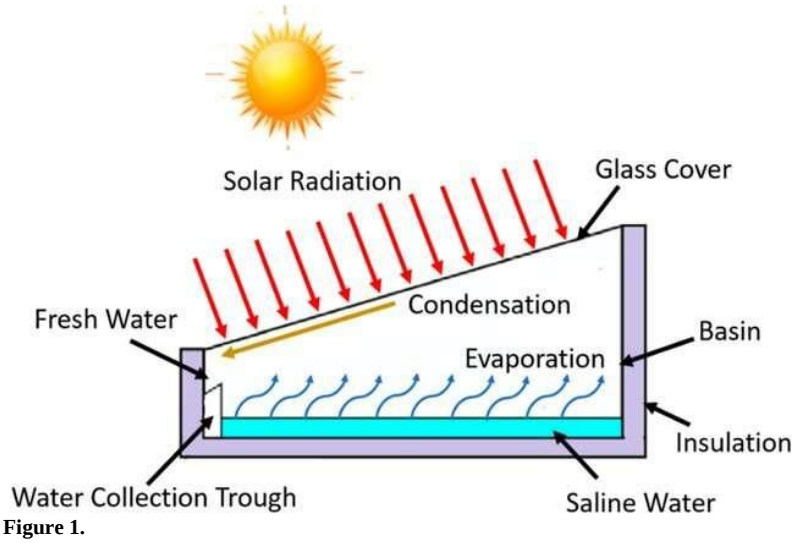

Figure 1.
Passive solar still Mohiuddin, et al. [8].

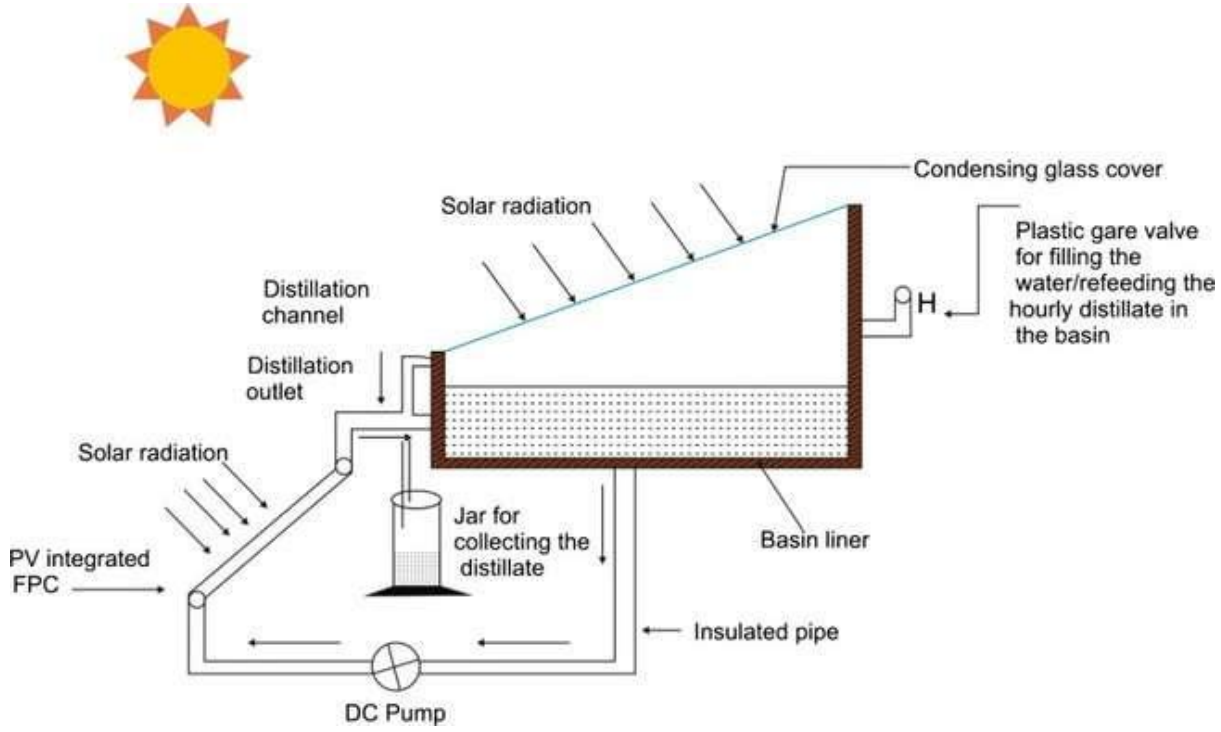

Figure 2.
Active solar still Edalatpour, et al. [9].

Even today, many researchers are starting research on the development of solar stills so that solar stills can be brought out from the laboratory to the communities. The first step in beginning any research work is a literature review. Literature evaluations avoid redundancy with other scholars in our discipline, enabling us to develop an original and distinctive perspective on our subject matter. Literature reviews provide a comprehensive understanding of the existing knowledge on our subject, allowing us to assess the importance of our study.

For newly entering researchers, it isn't easy to know where to start since more than 2895 peer-reviewed research articles have been available in the Scopus database since 1964. Table 1 illustrates the number of articles published on solar stills in the Scopus database.

Table 1.
Peer-reviewed research articles published to date on solar still.

Year	No. of publications
1964-1975	24
1976-1985	100
1986-1995	153
1996-2005	142
2006-2015	491
2016-2025	1985
Total	2895

1.1. Motivation Behind the Present Research Work

To help the newly entering researchers to start the literature review, the present research work deals with the following research questions:

a) Who wrote the first research paper on solar stills?
b) Which is the top-cited article on solar stills?
c) Who is the most cited author in the field of solar stills?
d) What are the other top contributing authors in solar stills?
e) What are the ten initially published papers on solar stills?
f) Which country has the most work on solar stills being done?
g) What are the leading journals in which most of the articles on solar stills have been published?
h) Which are the top five cited papers on solar stills?
i) What are the critical keywords and index terms for the search on solar stills?

This research will provide precise information to start the research on the solar stills.

1.2. Specific Objectives of the Present Research Work

The specific objectives of this research endeavour are to provide a foundation for commencing new research activity and stimulate novel ideas in the development of solar still.

1.3. Novelty of Present Research Work

According to the author, no peer-reviewed research has been published yet that analyses the bibliography of literature on solar stills. This article presents a bibliometric analysis of peer-reviewed research publications published on solar stills up to the present, aiming to guide new researchers in starting their research work efficiently by providing a structured literature review.

The following section discusses the methodology used for this bibliometric analysis of published work solar stills.

2. Methodology

A bibliometric analysis of Scopus-indexed publications was conducted to investigate the answers to the above research questions. For this, the following steps have been used:

a) Solar stills and solar distillation systems are two keywords that have been identified.
b) Based on these selected keywords, the search for articles was done in Scopus.
c) A total of 2865 articles were found, and their details have been downloaded.
d) An Excel sheet was prepared based on the details of the downloaded articles.
e) To identify specific articles, analysis was done based on authors, tiles of research articles, names of journals, DOI, and citations.
f) Table 2 defines the criterion used to get the specific results.
g) Using a set of criteria given in Table 2, answers to defined research questions were obtained.
h) Finally, conclusions were compiled based on answers to defined research questions.

Table 2.
Criteria, applicable circumstances, and predicted outcomes for bibliometric analysis.

Sn	Criteria	Condition(s) applied	Expected results
1	Year-wise study of downloaded articles	• Nil	• To know the first published article and its year of publication.
2	No. of citations secured per article	• Minimum no. of citations per research article= 500	• To know the top five most cited publications
3	No. of citations per journal which are publishing research articles on solar still	• The total no. of journals found in the Scopus database publishing articles on solar stills= 517 • Minimum no. of citations per research paper published in that journal= 80 • Minimum no. of citations per journal=05	• To identify the top five journals publishing papers on solar stills • To determine the top twenty-five journals publishing articles on solar stills.
4	No. of citations per author	• Minimum no. of publication per author= 65 • Minimum no. of citations per author= 1000	• To know the top five authors presently doing significant work on solar stills.
5	No. of citations per country	• Total no. of countries found: 112 • Minimum no. of research publications per country= 150 • Minimum no. of citations per country= 150	• To identify the top five countries where significant work on solar stills is going on
6	No. of co-author and co-authorship	• 5781 authors have been found who are working on solar stills • Minimum no. of publications per authors= 65 • No. of citations per authors= 1000	• To know the top five connecting authors collaboratively working on solar stills.
7	No. of Co-authorship and countries	• The total no. of countries found was 150 • Minimum no. of citations per country 1000	• To identify the top five countries where significant work on solar stills is going on
8	No. of co-occurrences and keywords	• Total no. of keywords found = 11,112 • Minimum no. of co-occurrences of keywords= 1000	• To know the top five keywords related to solar stills.
9	No. of co-occurrences and author's keywords	• A total of 4090 keywords are found • Minimum no. of occurrences of keyword= 1000	• To identify the top five author's keywords
10	No. of co-	• The total no. of index keywords found	• To know the five top-most Index

	occurrences and index keywords	was 9146 • Minimum no. of occurrence per index keywords= 700	terms
11	No. of co-occurrences and index keywords	• The total no. of index keywords found was 9146 • Minimum no. of occurrence per index keywords= 350	• To know the ten top-most Index terms
12	No. of co-occurrences and index keywords	• The total no. of index keywords found was 9146 • Minimum no. of occurrence per index keywords= 230	• To know the 25 top-most Index terms

The next forthcoming section is the bibliographic review of research papers published on solar stills from 1964 to 2024 (almost past 260 years).

3. Methodical Review

3.1. Identification of Early Published Articles

Every scholar finds it fascinating to learn which was the first paper on solar stills to be published and who the original authors were. The actual literature review starts with this publication. What research papers were consulted while producing the first research paper is another fascinating component. Fig. 3 demonstrates how Selçuk [10] used references from four distinct articles, Andrassy [11],Hottel [12], Wheeler and Archibald [13], to write the first paper on solar stills. As illustrated in Figure 4, numerous further articles written by other scientists have been produced by referencing the initial articles. Recall that these individuals were among the first to conduct research on solar stills and publish their findings in journals. It shows that literature on solar stills is available from 1955 either in books or research papers.

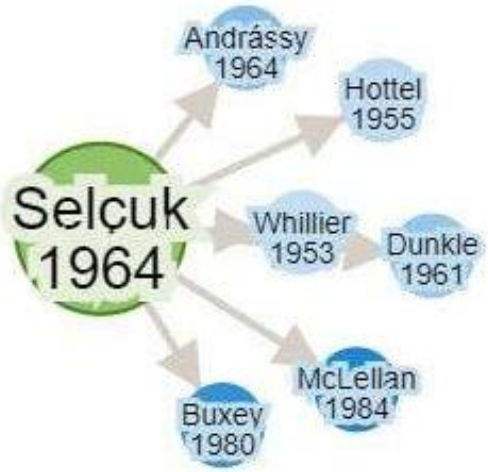

Figure 3.
References of the first paper.
Source: Andrassy [11],Hottel [12], Wheeler and Archibald [13],Buxey [14] and McLellan, et al. [15].

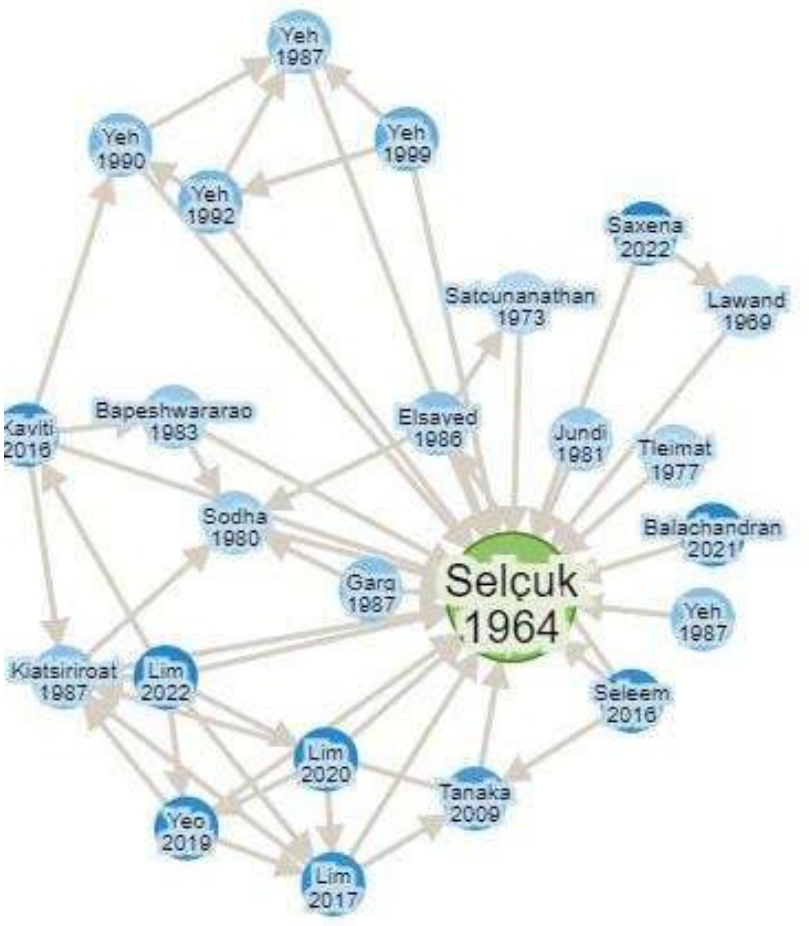

Figure 4.
Cited work to first publication.
Source: Selçuk [10],Satcunanathan and Deonarine [16],Tleimat and Howe [17],Sodha, et al. [18],el Jundi, et al. [19],Bapeshwararao, et al. [20],Elsayed and Johnsen [21],Garg and Garg [22],Yeh [23],Kiatsiriroat, et al. [24],Yeh and Ma [25],Yeh [26],Yeh, et al. [27],Tanaka, et al. [28],Kaviti [29],Seleem, et al. [30],Lim, et al. [31],Yeo, et al. [32],Lim, et al. [33],Lim, et al. [34],Saxena, et al. [35] and Balachandran [36].

Learning about the first five papers published in journals indexed in Scopus and subjected to peer review is interesting. The title of the first paper, which was published in 1964 in the Journal of Solar Energy and was titled "Design and performance evaluation of a multiple-effect tilted solar distillation unit," is presented in Table 3.

It is possible for researchers who are just beginning their careers to read these five papers to understand the beginning stages of research on solar stills.

Table 3.
The first five papers published on solar still.

Sn	Name of authors	Title of paper	Year of publication	Name of journal	Citation	DOI
1	Kudret [37]	Design and performance evaluation of a multiple-effect tilted solar distillation unit	1964	Solar Energy	10	10.1016/0038-092X(64)90007-6
2	Elnesr and Soliman [38]	Experimental studies on solar stills and their performance characteristics	1964	Pure and Applied Geophysics PAGEOPH	2	10.1007/BF00880527
3	Bloemer, et al. [39]	A practical basin-type solar still	1965	Solar Energy	41	10.1016/0038-092X(65)90048-4
4	Jackson and Van Bavel [40]	Solar distillation of water from soil and plant materials: A simple desert survival technique	1965	Science	29	10.1126/science.149.3690.1377

5	Howe [41]	Pacific Island water systems using a combined solar still and rainfall collector	1966	Solar Energy	5	10.1016/0038-092X(66)90005-3

3.2. Top Five Most Cited Research Publications

As indicated, 2895 research articles published on solar stills have been subjected to peer review. When all 2895 research publications are considered, human beings can't read and comprehend all. If someone can identify the study work that has received the most citations, obtaining the most essential information regarding solar stills will be simple. Therefore, to meet this, cut-off criteria were considered as the minimum number of citations that must be credited to each article, which must be more than 500. Consequently, the top five publications on solar stills that received the most citations were found. A list of the authors of these top five most cited works is presented in Figure 5. Additionally, the specifics of these papers are illustrated in Table 4.

There is a correlation between the diameter of the circle in Figure 2 and the number of citations attributed to that particular work. To this day, the research study on nanoparticle use in solar systems, including solar stills, that was written by Mahian, et al. [42] has been cited more than one thousand times.

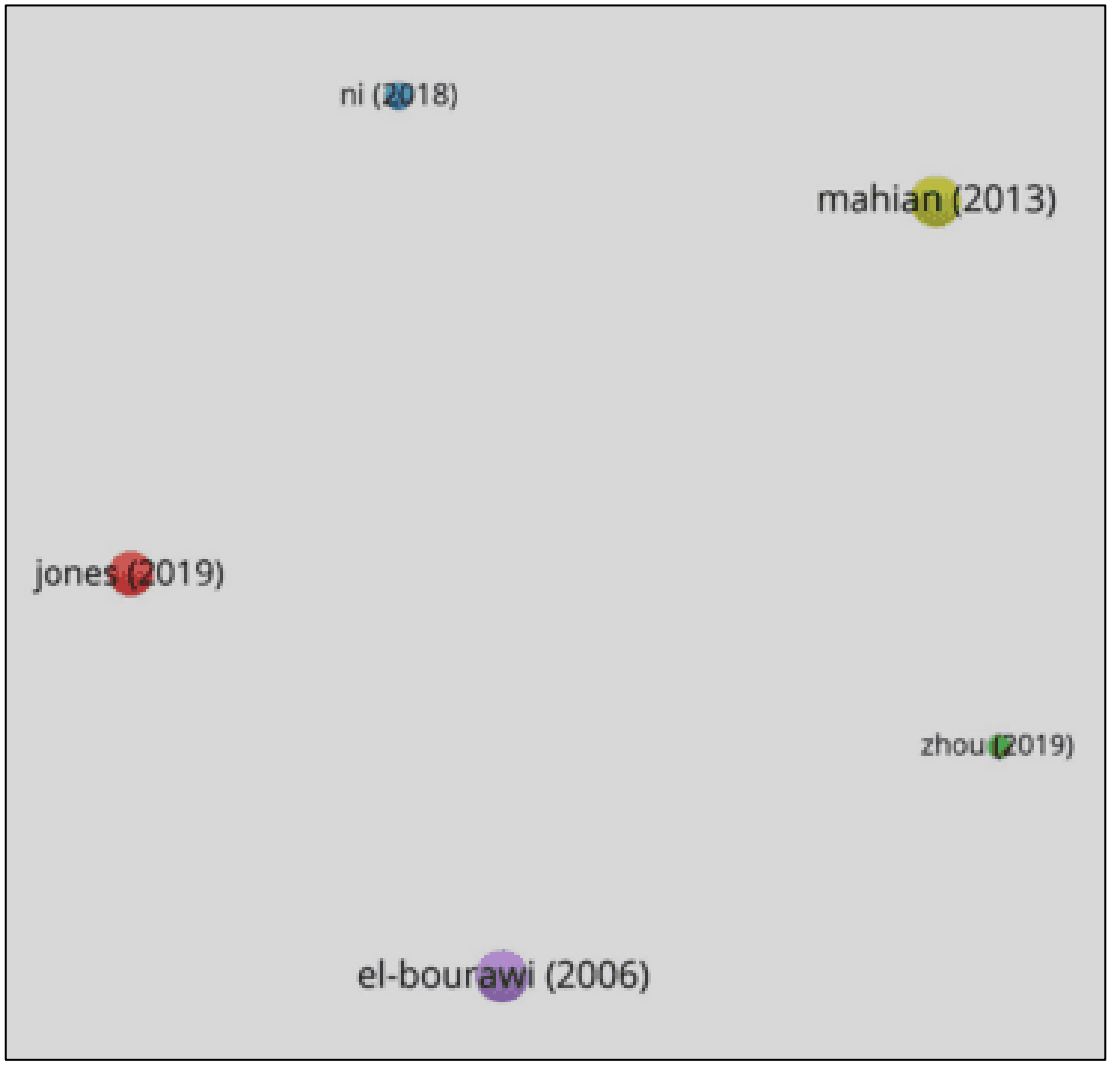

Figure 5.
Citations versus documents (top 5).
Source: Mahian, et al. [42], Jones, et al. [43],Ni, et al. [44],Zhou, et al. [45].

Table 4.
Top 5 most cited articles.

Sn	Names of authors	Title of paper	Year of publication	Name of journal	No. of citation	DOI
1	Mahian, et al. [42]	A review of the applications of nanofluids in solar energy	2013	International Journal of Heat and Mass Transfer	1075	10.1016/j.ijheatmasstransfer.2012.10.037
2	Jones, et al. [43]	The state of desalination and brine production: A global outlook	2019	Science of the Total Environment	954	10.1016/j.scitotenv.2018.12.076
3	Ni, et al. [44]	A salt-rejecting floating solar still for low-cost Desalination	2018	Energy and Environmental Science	593	10.1039/c8ee00220g
4	Zhou, et al. [45]	Architecting highly hydratable polymer networks to tune the water state for solar water purification	2019	Science Advances	514	10.1126/sciadv.aaw5484
5	Elsheikh, et al. [46]	Modelling of solar energy systems using artificial neural network: A comprehensive review	2019	Solar Energy	412	10.1016/j.solener.2019.01.037

3.3. Top Peer-Reviewed Journals

There are 517 journals indexed by Scopus that publish articles about solar stills. Identifying the top five journals that publish the most research papers on solar stills is highly intriguing.

To select the top five journals, the established parameters were as follows: the minimum number of papers published in each journal was 80, and the minimum number of citations for each article was 5. It led to the identification of the five most prestigious journals, which are depicted in Figure 6. To date, the Journal of Desalination has published the most significant number of articles out of any other publication (411).

Several more reputable journals are also releasing research papers on solar stills. One can find a list of them in Table 3. Solar Energy (168), Materials Today: Proceedings (120), Energy Conversion and Management (114), Desalination and Water Treatment (94), Renewable Energy (74), International Journal of Ambient Energy (73), Applied Thermal Engineering (65), Journal of Cleaner Production (58), Journal of Energy Storage (56) and Renewable and Sustainable Energy Reviews (53) are the some of the leading journals publishing research on solar stills.

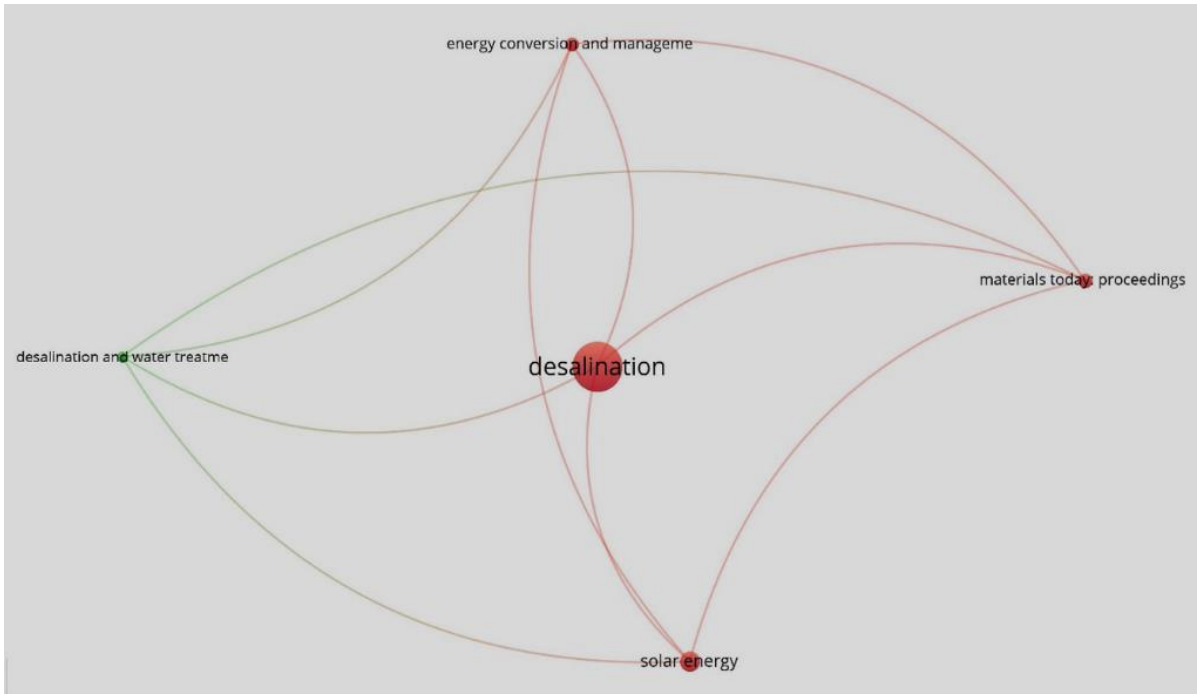

Figure 6.
Citation versus sources.

Table 5.
Top twenty-five Journals with their no. of publications.

Sn	Source title	No. of publications
1	Desalination	411
2	Solar Energy	168
3	Materials Today: Proceedings	120
4	Energy Conversion and Management	114
5	Desalination and Water Treatment	94
6	Renewable Energy	74
7	International Journal of Ambient Energy	73
8	Applied Thermal Engineering	65
9	Journal of Cleaner Production	58
10	Journal of Energy Storage	56
11	Renewable and Sustainable Energy Reviews	53
12	Energy Sources, Part A: Recovery, Utilisation and Environmental Effects	44
13	Energy	42
14	Lecture Notes in Mechanical Engineering	41
15	Case Studies in Thermal Engineering	40
16	Sustainable Energy Technologies and Assessments	39
17	Applied Energy	36
18	Environmental Science and Pollution Research	36
19	Journal of Thermal Analysis and Calorimetry	32
20	Process Safety and Environmental Protection	31
21	Green Energy and Technology	30
22	International Journal of Energy Research	29
23	Journal of Solar Energy Engineering, Transactions of the ASME	26
24	Energies	24
25	Applied Solar Energy	23

3.4. Top Cited Authors

Research on solar stills has been conducted by more than 5781 authors to date, according to published research. It will be challenging to refer to all the articles written by these authors. Consequently, if someone is aware of the top five authors who have received the most citations, then the task of reading the work that has been published on solar stills or working with them to develop a fresh idea for improving the performance of solar stills will be an easy one to accomplish. To achieve this objective, the parameters were established: the minimum number of documents per author was 65, and the minimum number of citations per author was 1000. After that, the most frequently referenced writers are highlighted, as depicted in Figure 7. Tiwari and Tiwari [47], Kabeel, et al. [48], Sathyamurthy [49], Panchal and Shah [50], and Omera [51] are the individuals represented here.

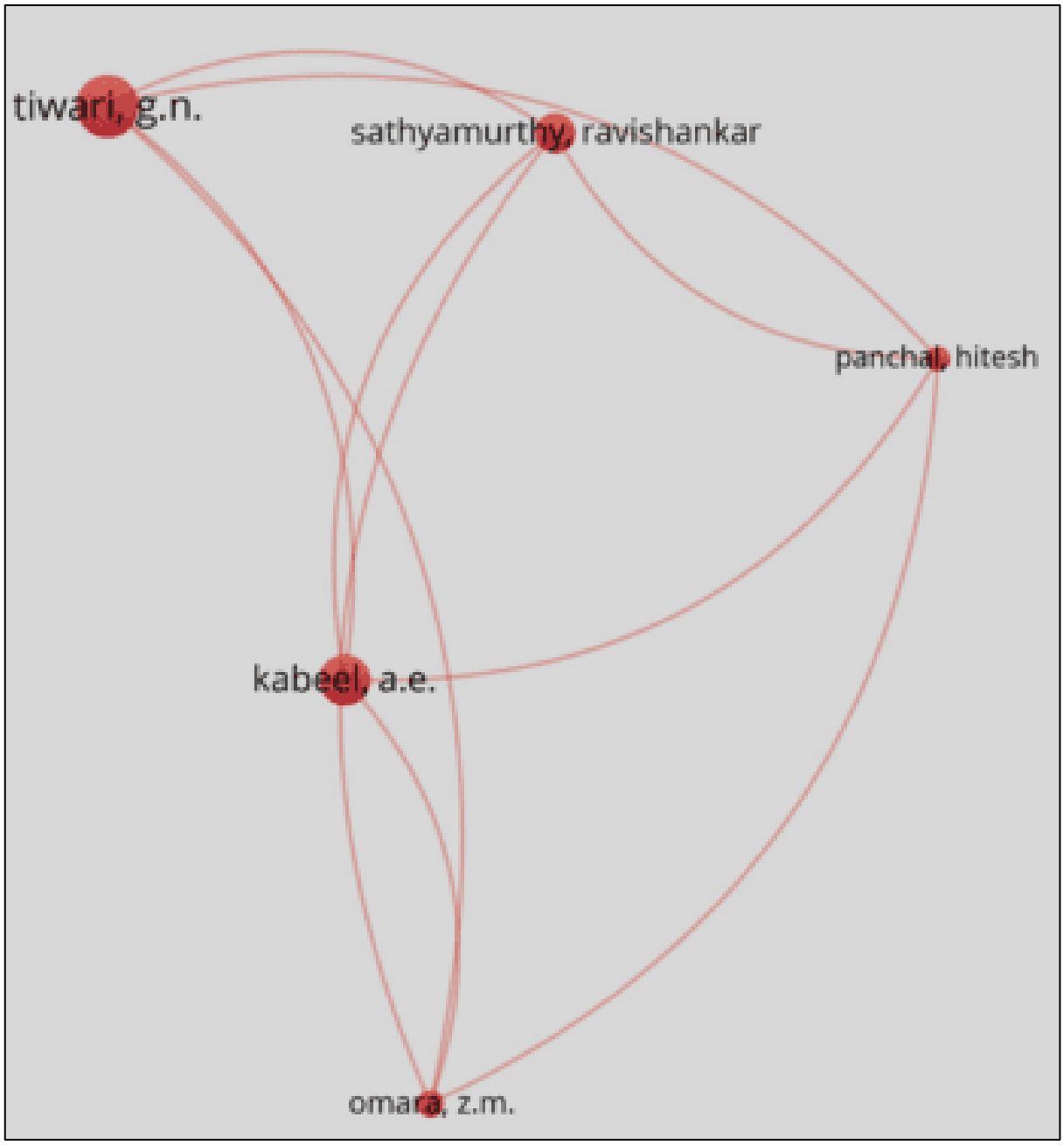

Figure 7.
Citations versus authors.
Source: Tiwari and Tiwari [47], Kabeel, et al. [48], Sathyamurthy [49], Panchal and Shah [50], and Omera [51].

3.5. Countries With the Most Research on Solar Still

The research on solar stills is currently being conducted in more than 112 countries, according to the publication of relevant literature. One of the most significant things that needs to be done is determining the top five countries where most of the work on solar stills is being done. It is done to facilitate the visitation of these countries and the study and utilisation of research infrastructures by fresh researchers to develop their innovative ideas regarding solar stills. The minimum number of research papers per country was set at 150, and the minimum number of citations per publication was also set at 150. These requirements were established to achieve this goal. As can be seen in Figure 8, the top five countries working on solar stills development are India, Egypt, Saudi Arabia, Iran, and China.

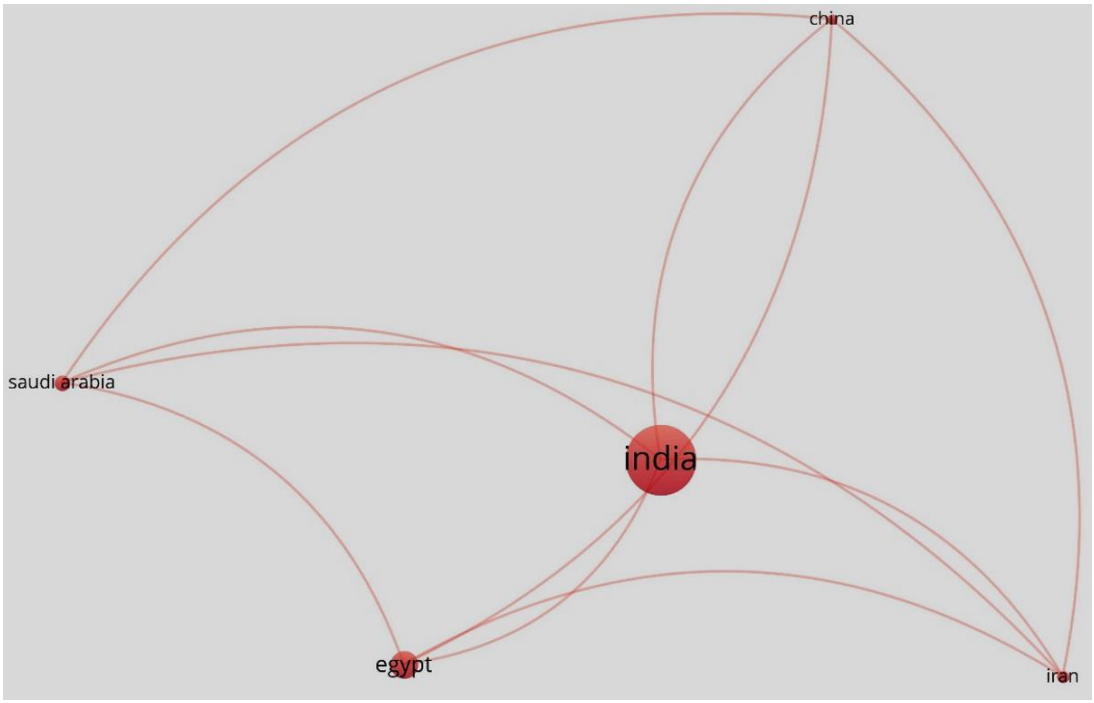

Figure 8.
Citation versus countries.

3.6. Co-Authorship and Connecting Prominent Authors

To discover the most accomplished researchers working together, thoroughly understanding the identifying linkage of authors and co-authors is necessary. There are 5781 authors found. The goal is to determine the top five authors who connect the dots. To accomplish this goal, the requirements that have been established are as follows: the minimum number of documents per author is 60, and the minimum number of citations per author is 1000. The top five authors have been identified; however, out of the top five authors, it has been discovered that four of them are working together. Figure 9 displays the authors who collaborated the most frequently with one another.

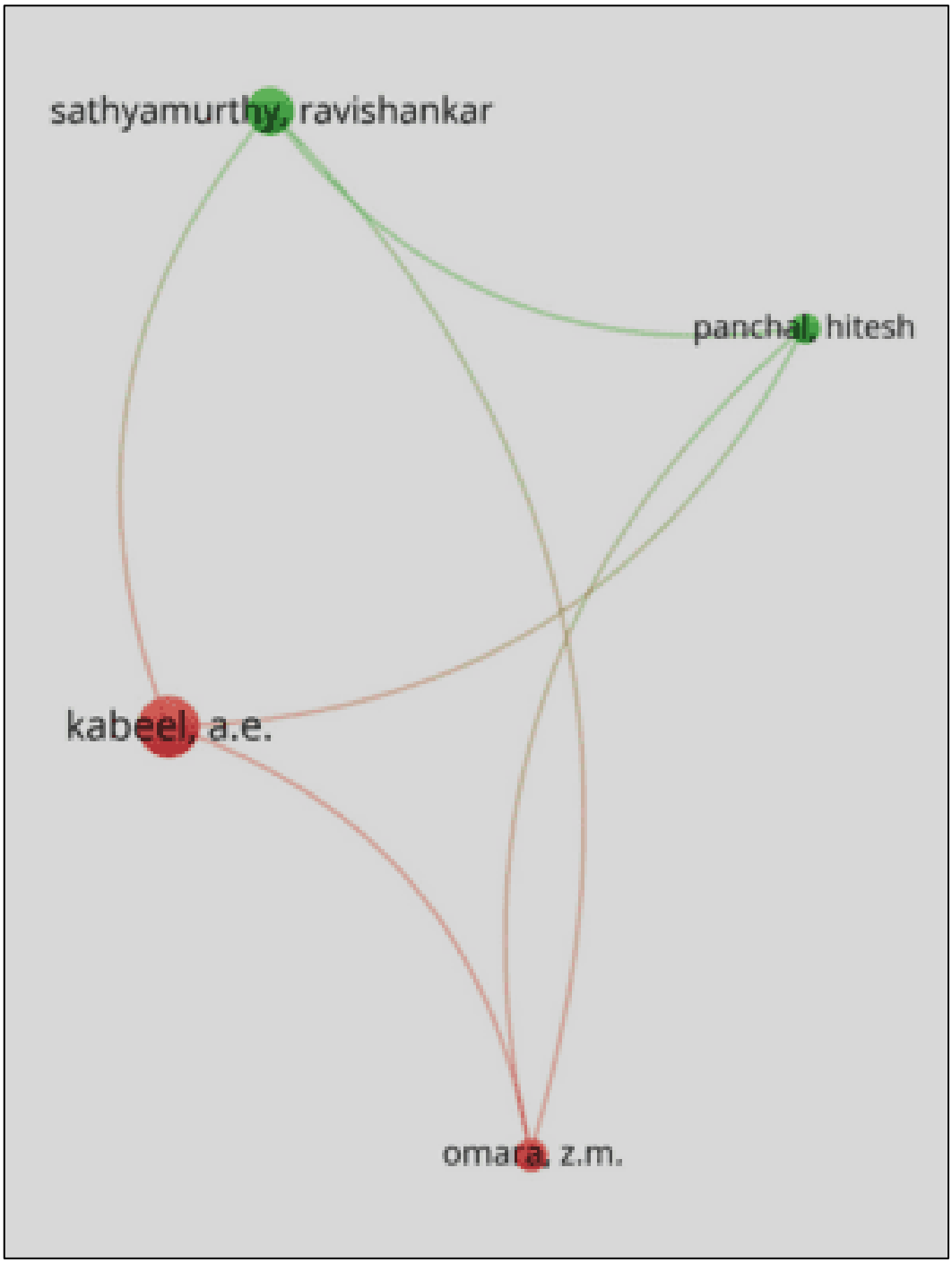

Figure 9.
Co-authorship versus authors.
Source: Tiwari and Tiwari [47], Kabeel, et al. [48], Sathyamurthy [49], Panchal and Shah [50], and Omera [51].

3.7. Co-Authorship and Countries

There are a total of 112 nations whose researchers are working together with researchers from other countries. To investigate co-authorship and countries, the identification criteria required that the minimum number of citations per nation be at least 1000 and the minimum number of research publications per country be at least 150. India, Egypt, Saudi Arabia, Iran, and China were identified as the nations with the highest performance levels in researching solar stills, as seen in Figure 10.

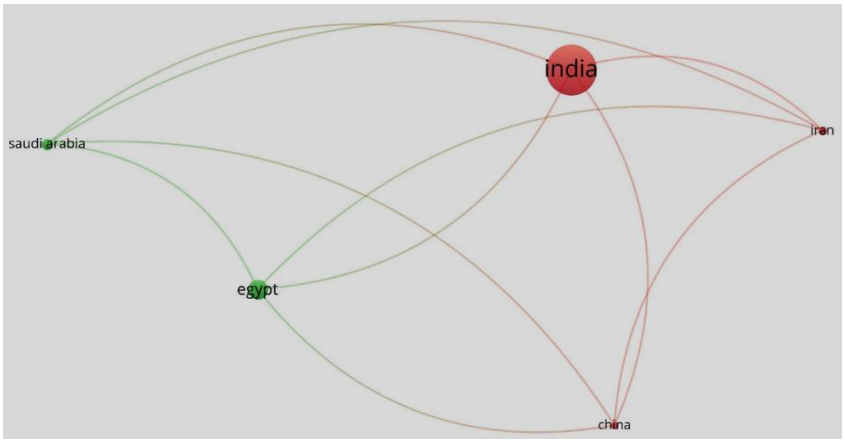

Figure 1.
Co-authorship versus countries.

3.8. Co-Occurrence of Keywords

When identifying any piece of writing, keywords have significant weight. Similarly, everybody interested in solar stills must be curious about the subject's top five most essential keywords. It has been discovered that the literature published on solar stills has more than 11,112 keywords. The criteria used to determine the top five keywords was that each keyword must have a minimum number of occurrences of 1000. A list of the top five keywords in the area of solar still is shown in Figure 11 and Figure 12. Distillation, Solar heating, Solar still, Solar stills, and desalination are the keywords that fall under this category.

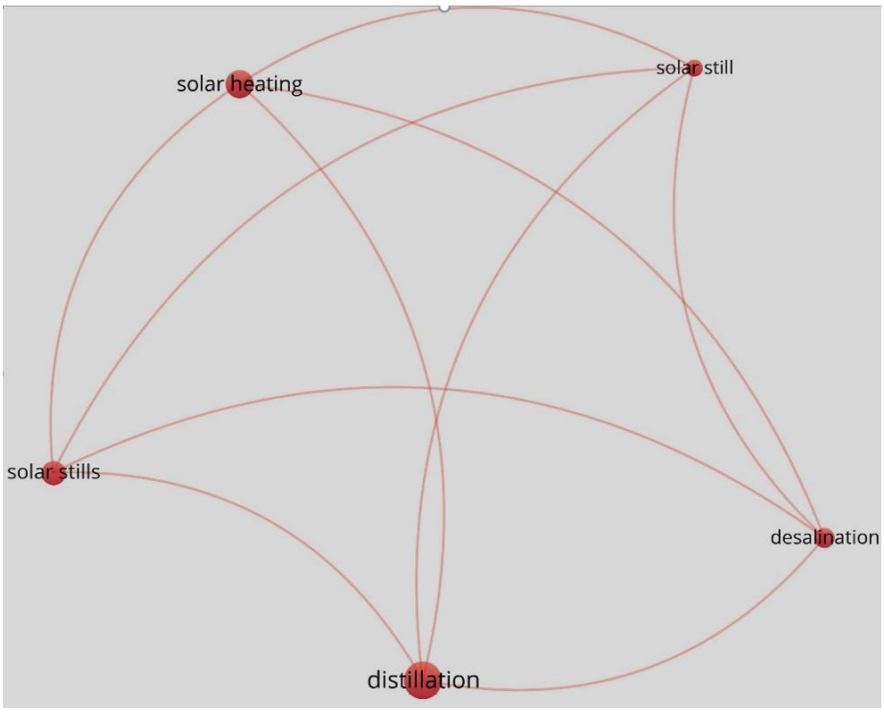

Figure 11.
Co-occurrences versus all keywords.

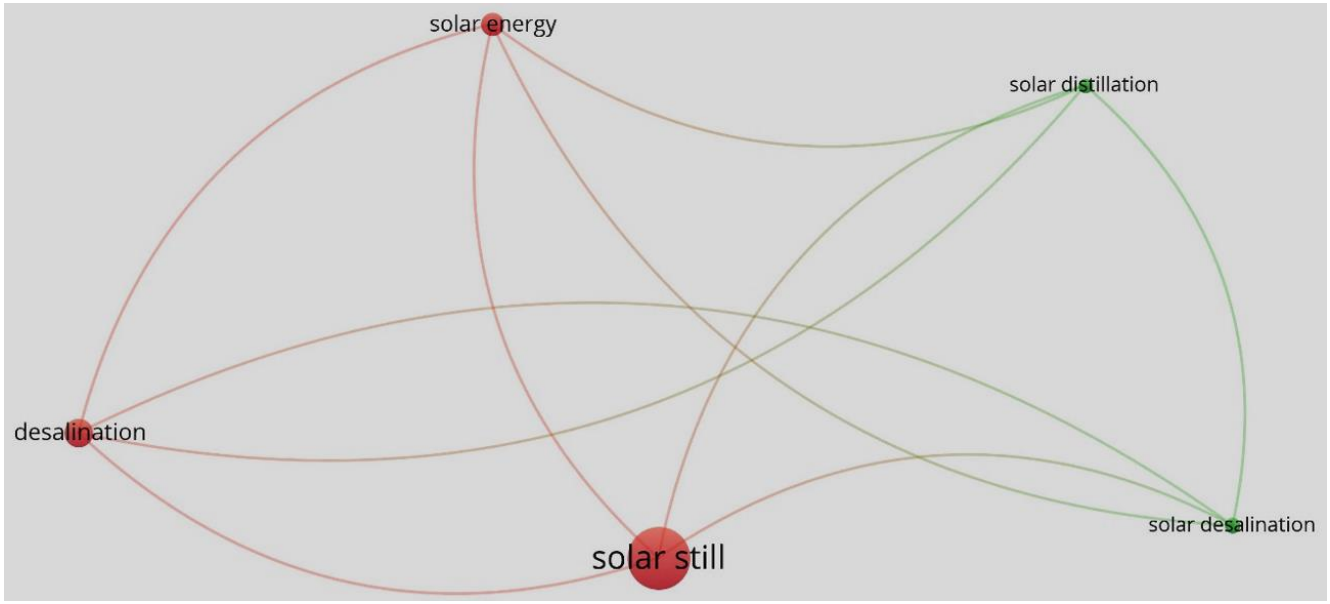

Figure 12.
Co-occurrences versus author's keywords.

3.9. Co-Occurrence of Index Keywords

The search for keywords is conducted using natural language, and they help understand both fresh ideas and recent research. The dictionary tool contains index terms, which are sometimes referred to as subject headings. These terms assist the researcher in rapidly locating all the records pertaining to a specific notion.

Over 9146 index words may be found in the published literature. Figure 13 shows the top five index terms, Figure 14 represents the top 10 index words, and Figure 15 illustrates the top 25 index terms. The top index terms are distillation, solar heating, solar stills, desalination, solar power, solar energy, and distillation equipment.

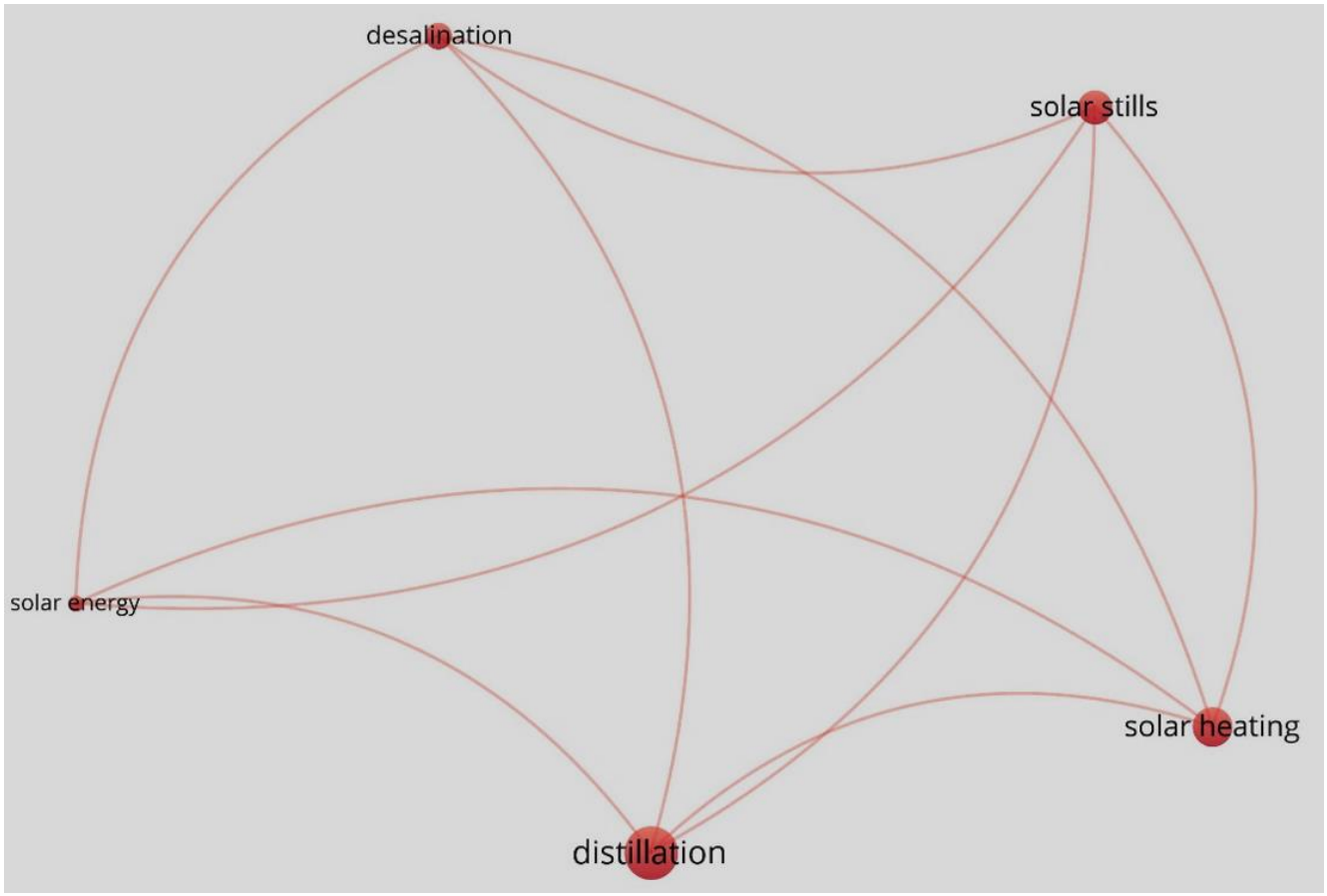

Figure 13.
Co-occurrences versus index terms.

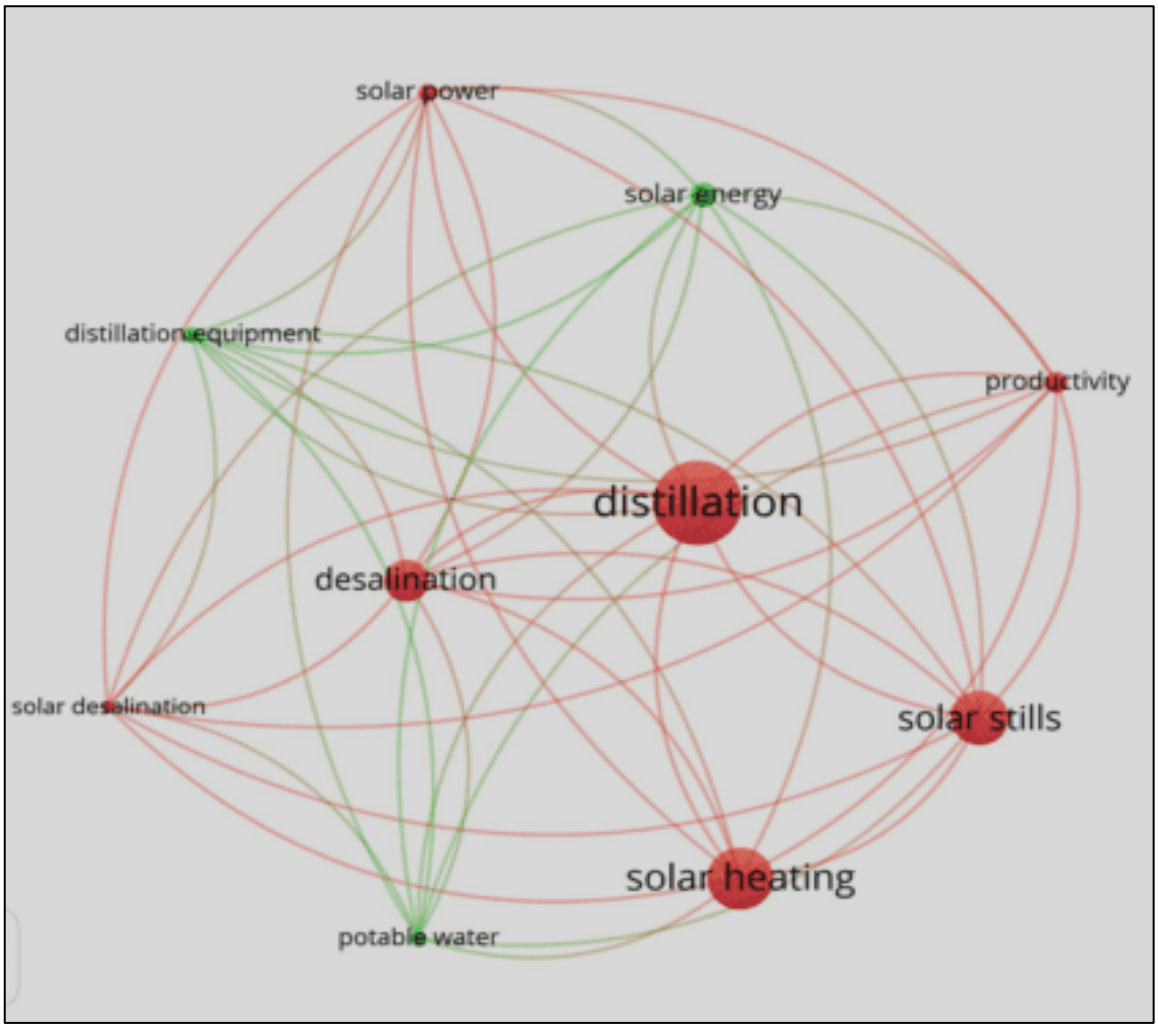

Figure 14.
Co-occurrences versus index keywords (top 10).

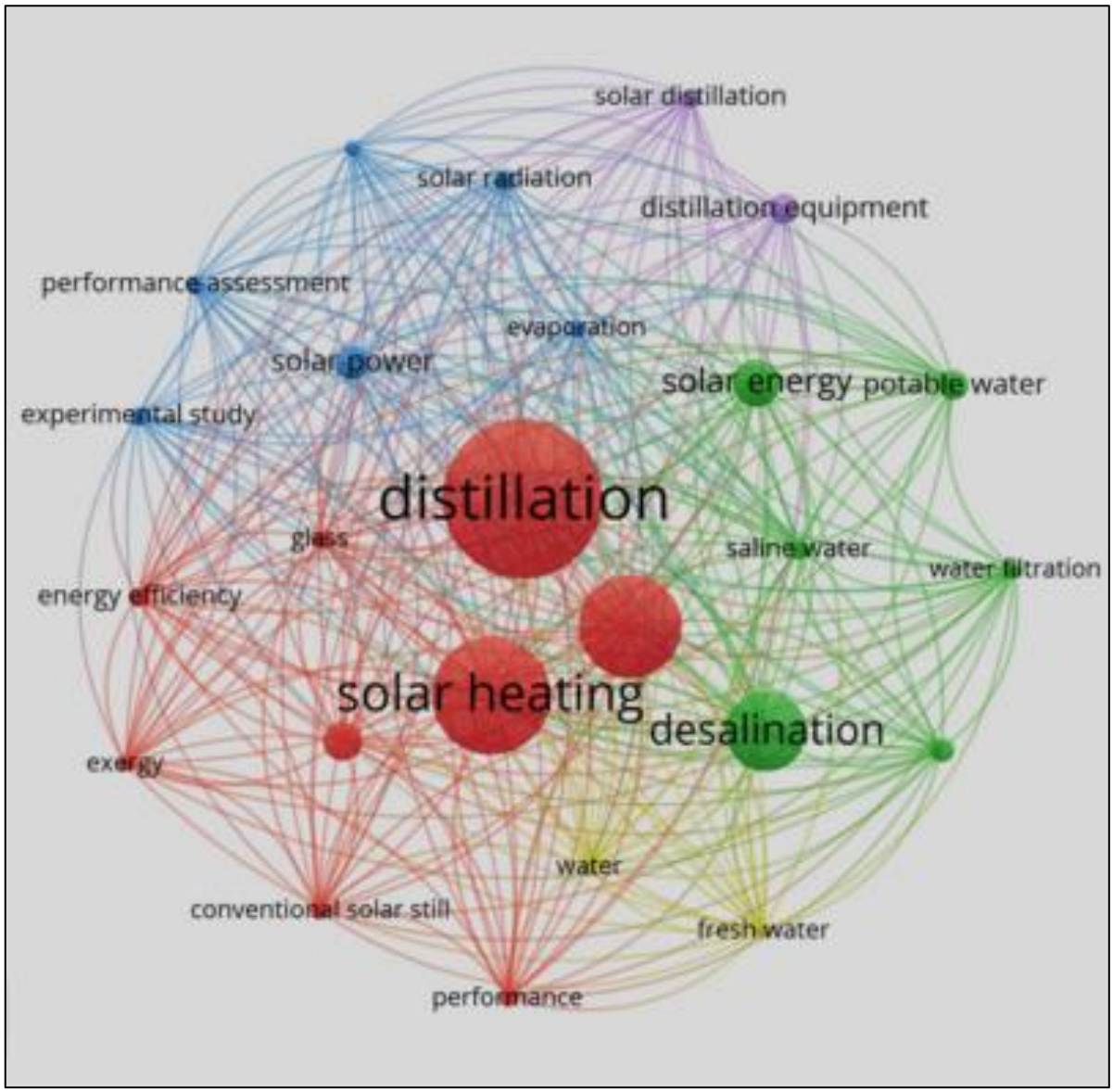

Figure 15.
Co-occurrences versus index keywords (top 25).

4. Conclusions

This study endeavours to systematically examine research publications on solar stills and subject them to peer review. The current study is intended to serve as a roadmap for new researchers to follow when reviewing the literature on where to start.

Concerning the development of solar stills, the particular goals of this research endeavour are to provide the groundwork for the beginning of new research activity and to promote the generation of unique concepts. Based on the findings of this bibliometric investigation, the following conclusions have been achieved:

- For the first study on solar stills, which was written by Selçuk [10] references were taken from four different articles: Andrassy [11],Hottel [12], Wheeler and Archibald [13].
- The title of the first article, which was published in 1964 in the Journal of Solar Energy, was "Design and performance evaluation of a multiple-effect tilted solar distillation unit".
- Despite the passage of time, the research report on nanoparticle utilisation in solar systems, including solar stills, that was authored by Mahian, et al. [42] has been mentioned more than one thousand times.
- To this day, the Journal of Desalination surpasses all other publications in terms of the quantity of papers that it has published.
- The writers who have received the most citations are Professor Tiwari and Tiwari [47], Kabeel, et al. [48], Sathyamurthy [49], Panchal and Shah [50], and Omera [51] To date, it has been determined that India, Egypt, Saudi Arabia, Iran, and China are the countries that have the most incredible amounts of work done on solar stills.
- Distillation, solar heating, solar stills, and desalination are the keywords most often used in publications on solar stills.

- The top index terms are distillation, solar heating, solar stills, desalination, solar desalination, solar power, solar energy, and distillation equipment.

Fresh scholars can begin their research logically and expediently with the assistance of these bibliographic literature evaluations.

References

[1] H. Ait Lahoussine Ouali, M. Iqbal Soomro, S. Touili, and A. Alami Merrouni, "Assessment of direct contact membrane distillation system driven by parabolic trough collector plant technology for electricity and freshwater production: Feasibility and benchmark under different Moroccan climates," *Sustainable Materials and Technologies*, vol. 39, p. e00818, 2024. https://doi.org/10.1016/j.susmat.2023.e00818

[2] United Nations, *Transforming our world: The 2030 agenda for sustainable development*. New York: United Nations, 2016.

[3] D. Mevada, H. Panchal, and K. K. Sadasivuni, "Investigation on evacuated tubes coupled solar still with condenser and fins: Experimental, exergo-economic and exergo-environment analysis," *Case Studies in Thermal Engineering*, vol. 27, p. 101217, 2021. https://doi.org/10.1016/j.csite.2021.101217

[4] H. Panchal, N. Patel, and H. Thakkar, "Various techniques for improvement in distillate output from active solar still: A review," *International Journal of Ambient Energy*, vol. 38, no. 2, pp. 209-222, 2017. https://doi.org/10.1080/01430750.2015.1076518

[5] C. Ramesh *et al.*, "Performance enhancement of selective layer coated on solar absorber panel with reflector for water heater by response surface method: A case study," *Case Studies in Thermal Engineering*, vol. 36, p. 102093, 2022. https://doi.org/10.1016/j.csite.2022.102093

[6] G. Angappan *et al.*, "Investigation on solar still with integration of solar cooker to enhance productivity: Experimental, exergy, and economic analysis," *Journal of Water Process Engineering*, vol. 51, p. 103470, 2023. https://doi.org/10.1016/j.jwpe.2022.103470

[7] Y. D. Khimsuriya *et al.*, "Artificially roughened solar air heating technology – A comprehensive review," *Applied Thermal Engineering*, vol. 214, p. 118817, 2022. https://doi.org/10.1016/j.applthermaleng.2022.118817

[8] S. A. Mohiuddin, A. K. Kaviti, T. S. Rao, and V. S. Sikarwar, "Historic review and recent progress in internal design modification in solar stills," *Environmental Science and Pollution Research*, vol. 29, no. 26, pp. 38825-38878, 2022. https://doi.org/10.1007/s11356-022-19527-x

[9] M. Edalatpour, K. Aryana, A. Kianifar, G. N. Tiwari, O. Mahian, and S. Wongwises, "Solar stills: A review of the latest developments in numerical simulations," *Solar Energy*, vol. 135, pp. 897-922, 2016. https://doi.org/10.1016/j.solener.2016.03.005

[10] M. K. Selçuk, "Design and performance evaluation of a multiple-effect, tilted solar distillation unit," *Solar Energy*, vol. 8, no. 1, pp. 23-30, 1964.

[11] I. Andrassy, "The genus boreolaimus gen. n. and its six species (Dorylaimida: Qudsianematidae), nematodes from the European Arctic," *Fundamental and applied Nematology*, vol. 21, no. 5, pp. 553-568, 1964.

[12] H. C. Hottel, "A simple model for estimating the transmittance of direct solar radiation through clear atmospheres," *Solar energy*, vol. 18, no. 2, pp. 129-134, 1955.

[13] H. D. L. Wheeler and J. Archibald, "Nuclear constitution and the interpretation of fission phenomena," *Physical Review*, vol. 89, no. 5, p. 1102, 1953.

[14] G. Buxey, "Production management research: A review and bibliography," *International Journal of Production Research*, vol. 18, no. 3, pp. 321–343, 1980.

[15] M. R. McLellan, L. R. Lind, and R. W. Kime, "Determination of soluble solids in fruit juices using refractometry," *Journal of Food Science*, vol. 49, no. 2, pp. 429–431, 1984.

[16] S. Satcunanathan and S. Deonarine, "A two-pass solar air heater," *Solar Energy*, vol. 15, no. 1, pp. 41-49, 1973.

[17] B. Tleimat and E. Howe, "Solar-assisted distillation of sea water," *NWSIA J.*, vol. 4, no. 1, 1977.

[18] M. Sodha, N. Kaushik, and S. Rao, "Thermal analysis of three zone solar pond," *International Journal of Energy Research*, vol. 5, no. 4, pp. 321-340, 1981.

[19] B. el Jundi *et al.*, "Neural coding underlying the cue preference for celestial orientation," *Proceedings of the National Academy of Sciences*, vol. 112, no. 36, pp. 11395-11400, 2015.

[20] V. Bapeshwararao, U. Singh, and G. Tiwari, "Transient analysis of double basin solar still," *Energy Conversion and Management*, vol. 23, no. 2, pp. 83-90, 1983.

[21] S. Elsayed and G. Johnsen, "Antigenic and allergenic determinants of ovalbumin—III. MHC Ia-binding peptide (OA 323–339) interacts with human and rabbit specific antibodies," *Molecular Immunology*, vol. 27, no. 9, pp. 821-827, 1990.

[22] H. Garg and S. Garg, "Improved correlation of daily and hourly diffuse radiation with global radiation for Indian stations," *Solar & Wind Technology*, vol. 4, no. 2, pp. 113-126, 1987.

[23] H.-M. Yeh, "Energy balances for upward-type baffled solar air heaters," *Energy*, vol. 19, no. 9, pp. 919-924, 1994.

[24] T. Kiatsiriroat, S. Bhattacharya, and P. Wibulswas, "Performance analysis of multiple effect vertical still with a flat plate solar collector," *Solar & Wind Technology*, vol. 4, no. 4, pp. 451-457, 1987.

[25] H.-M. Yeh and N.-T. Ma, "Energy balances for upward-type, double-effect solar stills," *Energy*, vol. 15, no. 12, pp. 1161-1169, 1990.

[26] C. H. Yeh, "A problem-based selection of multi-attribute decision-making methods," *International Transactions in Operational Research*, vol. 9, no. 2, pp. 169-181, 1992.

[27] H.-M. Yeh, C.-D. Ho, and J.-Z. Hou, "The improvement of collector efficiency in solar air heaters by simultaneously air flow over and under the absorbing plate," *Energy*, vol. 24, no. 10, pp. 857-871, 1999.

[28] M. Tanaka *et al.*, "Early phase observations of extremely luminous Type Ia Supernova 2009dc," *The Astrophysical Journal*, vol. 707, no. 2, p. L118, 2009.

[29] L. Kaviti, "The New Curriculum of Education in Kenya: A Linguistic and Education Paradigm Shift." Nairobi: University of Nairobi, 2018.

[30] M. N. Seleem *et al.*, "Antibacterial activity and mechanism of action of auranofin against multi-drug resistant bacterial pathogens," *Scientific Reports*, vol. 6, no. 1, p. 22571, 2016.
[31] C. G. Lim, H. Loh, V. Renjan, J. Tan, and D. Fung, "Child community mental health services in Asia Pacific and Singapore's REACH model," *Brain Sciences* vol. 7, no. 10, p. 126, 2017.
[32] Y. H. Yeo *et al.*, "Prevalence, incidence, and outcome of non-alcoholic fatty liver disease in Asia, 1999–2019: A systematic review and meta-analysis," *The lancet Gastroenterology & hepatology*, vol. 4, no. 5, pp. 389-398, 2019.
[33] C.-H. Lim, J. Ryu, Y. Choi, S. W. Jeon, and W.-K. Lee, "Understanding global PM2. 5 concentrations and their drivers in recent decades " *Environment International*, vol. 144, p. 106011, 2020.
[34] C.-H. Lim, C. Wu, N. Corrigan, W. Liu, G. Miyake, and C. Boyer, "Rational design of photocatalysts for controlled polymerization: Effect of structures on photocatalytic activities," *Chemical Reviews*, vol. 122, no. 6, pp. 5476-5518, 2022.
[35] S. K. Saxena *et al.*, "Characterization of the novel SARS-CoV-2 Omicron (B. 1.1. 529) variant of concern and its global perspective," *Journal of Medical Virology*, vol. 94, no. 4, pp. 1738-1744, 2022.
[36] K. R. Balachandran, "Incentives and regulation in queues," in *In M. J. Beckmann, M. N. Gopalan, & R. Subramanian (Eds.), Stochastic processes and their applications*, Berlin, Heidelberg, 1991: Springer Berlin Heidelberg, doi: https://doi.org/10.1007/978-3-642-58201-1_14.
[37] S. M. Kudret, "Design and performance evaluation of a multiple-effect, tilted solar distillation unit," *Solar Energy*, vol. 8, no. 1, pp. 23-30, 1964.
[38] M. Elnesr and S. Soliman, "Experimental studies on solar stills and their performance characteristics," *Pure and Applied Geophysics*, vol. 59, no. 1, pp. 261-266, 1964.
[39] J. Bloemer, J. Eibling, J. Irwin, and G. O. Löf, "A practical basin-type solar still," *Solar Energy*, vol. 9, no. 4, pp. 197-200, 1965.
[40] R. D. Jackson and C. Van Bavel, "Solar distillation of water from soil and plant materials: A simple desert survival technique," *Science*, vol. 149, no. 3690, pp. 1377-1379, 1965.
[41] R. Howe, "Very basic Lie theory," *The American Mathematical Monthly*, vol. 90, no. 9, pp. 600-623, 1983.
[42] O. Mahian, A. Kianifar, S. A. Kalogirou, I. Pop, and S. Wongwises, "A review of the applications of nanofluids in solar energy," *International Journal of Heat and Mass Transfer*, vol. 57, no. 2, pp. 582-594, 2013.
[43] E. R. Jones, M. T. Van Vliet, M. Qadir, and M. F. Bierkens, "Country-level and gridded estimates of wastewater production, collection, treatment and reuse," *Earth System Science Data*, vol. 13, no. 2, pp. 237-254, 2019.
[44] G. Ni, S. H. Zandavi, S. M. Javid, S. V. Boriskina, T. A. Cooper, and G. Chen, "A salt-rejecting floating solar still for low-cost desalination," *Energy & Environmental Science*, vol. 11, no. 6, pp. 1510-1519, 2018.
[45] X. Zhou, F. Zhao, Y. Guo, B. Rosenberger, and G. Yu, "Architecting highly hydratable polymer networks to tune the water state for solar water purification," *Science Advances*, vol. 5, no. 6, p. eaaw5484, 2019.
[46] A. H. Elsheikh, S. W. Sharshir, M. Abd Elaziz, A. E. Kabeel, W. Guilan, and Z. Haiou, "Modeling of solar energy systems using artificial neural network: A comprehensive review," *Solar Energy*, vol. 180, pp. 622-639, 2019.
[47] G. Tiwari and A. Tiwari, "Handbook of solar energy," in Singapore: Springer, 2016.
[48] A. Kabeel, Z. Omara, and F. Essa, "Enhancement of modified solar still integrated with external condenser using nanofluids: An experimental approach," *Energy Conversion and Management*, vol. 78, pp. 493-498, 2014.
[49] R. Sathyamurthy, *Professor of mechanical engineering, King Fahd University of petroleum & minerals* (King Fahd University of Petroleum & Minerals). Dhahran, Saudi Arabia, 2016.
[50] H. D. Panchal and H. B. Shah, "Multi-level passive video forgery detection based on temporal information and structural similarity index," in *2023 Seventh International Conference on Image Information Processing (ICIIP)*, 2023: IEEE.
[51] Z. M. Omera, "Latent morbidity after abortion," *British Medical Journal*, vol. 2, no. 5866, p. 611, 1973.