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Review Article

A Scoping Review of the Smart Irrigation Literature Using Scientometric Analysis

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Background. Smart irrigation is a research field which grows very fast. It facilitates the contribution of technologies on smart agriculture. Smart irrigation is a broad topic with overwhelming literature published and available semantic ambiguity, so covering such a vast topic is not easy without scoping reviews. To enable researchers to gain a deep knowledge of structure of the field, a scientometric-based scoping review was conducted. *Methods*. The bibliometric data focused on smart irrigation from databases such as Scopus, Web of Science, and Google Scholar were downloaded, thoroughly merged, and cleaned to meet the inclusion criteria. These data were analyzed and clustered using K-means from VOSviewer. VOSviewer is used to create coauthor and coword occurrence network graphs from keywords, titles, and abstracts. *Results*. The findings highlight the broad scope of the research field, the ambiguity of the terminology, the lack of collaboration, and the absence of research into the impact of smart irrigation on agriculture. The leading institutions and researchers in the field and geographical distribution are from China, Israel, Australia, and Egypt. The leading main topics addressed in the field are IOT, smart irrigation, irrigation, water stress, energy, deep learning, soil moisture, and relations in the network. *Conclusion*. Smart irrigation (drip irrigation + IoT) in agriculture increases crop yield, increases water use efficiency, and decreases costs. In future work, large studies need to be conducted to establish and investigate the scope of smart irrigation research to reveal the knowledge structure, current state of practice, and key actors in the field.

1. Introduction

Irrigation is artificially watering agricultural plants to help them grow in dry areas during periods of inadequate rainfall. In addition, when it rains, the smart management of freshwater for smart irrigation in agriculture is essential for increasing crop yield and water use efficiency and decreasing costs while contributing to environmental sustainability [1, 2]. The intense use of technologies offers a means for providing the exact amount of water needed by plants based on conditions on the ground.

There are different irrigation methods. Which irrigation system you choose depends on several factors such as plant types, soil types, area (not arable or arable) land, the precipitation amount in your geographical region, and sources of water supply. There are the four most common types of precision irrigation, depending on your watering needs.

Surface irrigation has been the most common method of using water for thousands of years. Land navigation does not require modern techniques. It relies on water and gravity. The use of groundwater is generally not good for sandy soils and results in excessive and inefficient irrigation.

Rainwater is obtained through sprinkler irrigation and can be used for small and large areas. Pressure causes water to gush out of the air, and small drops (like rain) fall on the ground and crops. Pipes carry water to rivers.

We can adjust the nozzle to spray forward or backward. The amount of water they release and the water release height can be adjusted.

The operation of the pulverizer is automatic and can operate seasonally or year-round depending on the type of crop.

Although fountains are a great way to use water, they are not suitable for every application for many reasons. The amount and pressure of water are not suitable for every plant, which will damage seedlings during the flowering period and prevent pollination.

Drip irrigation can reduce water use by 40–70%, making it one of the most efficient irrigation methods. With a drip irrigation system, water reaches the roots of your plants exactly where it needs to go. The surrounding soil is still dry, and the growth of plants is not rapid. This provides double benefits. You save on pesticides while preventing improper use of soil.

Generally [3], drip irrigation has several advantages, including requiring little water, lower evaporation losses, the fastest plant growth rates, and the shortest time required to wet the soil surface, reducing the incidence of moisture-related diseases or conditions. There is no need to level the ground. There is no soil erosion, which requires less labor.

An underground (subsurface) irrigation system is the same as drip irrigation, and only water is pumped into the ground. The dripper is located below the soil surface, and water is delivered directly to the roots. In least developed countries such as Ethiopia, where this study is conducted, the issue of food self-sufficiency and food security for its burgeoning population is a critical policy and management issue. Among other interventions, managing scarce water resources is critical to boosting agricultural productivity. In current rain-fed agriculture where the majority of agricultural practices are happening, it is difficult to attain food security [4]. Therefore, the introduction of large-scale irrigation agriculture, especially one supported by technology, that is, smart irrigation, is of paramount importance for sub-Saharan Africa, including Ethiopia [5].

The Internet of things (IoT) is the natural choice for smart water management applications, even though the integration of different technologies required to make it work seamlessly in practice is still not fully accomplished [1, 5]. When implementing such a solution, several challenges have to be faced, especially in aggrotech, fintech green energy, and biodiversity and biotechnology in which the solution is implemented. Beyond these limitations, there are numerous efforts underway that indicate increasingly more farms will invest heavily to develop intelligence into system and that advanced deep-learning algorithms have shown promise to solve many of the current agricultural problems. Applying modern agricultural "Internet +" [5] to food systems can improve crop yield, food safety, and water use efficiency and reduce the environmental impact.

The number of papers and vague terminology make it difficult to cover such a broad topic. This scoping review is augmented by using scientometrics to help researchers better understand the knowledge structure of the field of smart irrigation. Because smart irrigation brings together technical as well as agricultural and biological sciences together, mapping this new emerging field of study using scientometrics will have a huge practical implication. Scientometrics is a subfield of informatics that concerns itself with measuring and analyzing scholarly literature [6]. Major research issues include the measurement of the impact of research papers and academic journals, the understanding of scientific citations, and the use of such measurements in policy and management contexts [6].

Scientometrics is also applied in different related information science topics such as industry 4.0 [7], digital innovation [8], and financial technology models [9]. A few more specific studies [1, 10, 11] have been conducted on Agriculture 4.0. Similar studies in digital transformation, for example, have performed a keyword and quantitative analysis [12] and organized the literature based on techniques and their impact [13], including cocitation analysis [14]. The field of intelligent irrigation systems is of particular interest to scientometric research [15] because of its rapid expansion and scale as described in Figure 1, its wide reach and influence, and the ambiguity of terminology. Network graphs, which can represent an entire field of study at a glance, help us understand the scale, scope, and nature of phenomena [15]. For these reasons, scoping reviews are enhanced by scientometrics. Scoping reviews deal with the contextualization of knowledge to identify the current state of understanding [12].

While a scoping review allows the study to determine the inclusion criteria in the field of smart irrigation, scientometrics better presents the landscape of the field to provide researchers and policymakers in the field understanding of actors, emerging technologies, and current practices in the field of smart irrigation [16]. As the quantitative analysis of science, measuring the field of smart irrigation in terms of identifying key authors, key research institutions, key emerging subjects, and themes, for example in agriculture, is critical [15, 17].

The research answers different questions such as who are the leading institutions and researchers in the field and its geographical distribution? What are the main topics addressed in the field? What are the leading countries that produce more knowledge in the field of smart irrigation?

The objectives of this scoping review were to measure, analyze, and map the smart irrigation literature using scientometric analysis. To attain this objective, this work includes the following:

(1) Contribute to highlighting the breadth and depth of the smart irrigation system literature

(2) Address breadth and depth and the most impactful research institutes and countries and review the arrangement of study areas

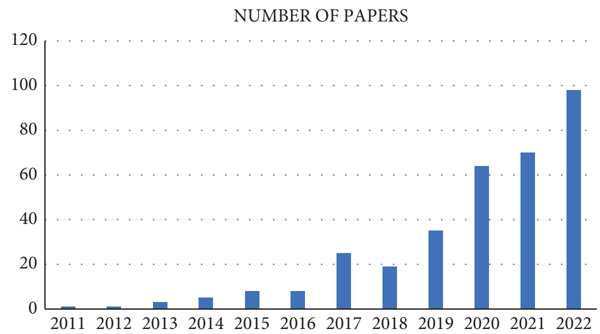

FIGURE 1: Graph of the number of papers sorted by publication years.

(3) Build title, abstract, and keyword co-occurrence graphs. These graphs help researchers to better understand their research areas easily or without expertise
(4) Analyze, discuss, and report contribution of the findings of smart irrigation systems, by providing clear discussion points and research questions. Issues contribute to scientific community move forward in the smart irrigation system research field

2. Methodology

A scoping review of the literature on smart irrigation using scientometrics was conducted. So the methodology proposed by [18, 19] is built, the recommended flowchart is used in mapping studies using bibliographic tools, and an oriented scoping review is conducted [20].

2.1. Search Strategy. All the bibliographic data are downloaded for these articles in the .ris file extension. This includes authors, document types, the number of citations, references, abstracts, titles, keywords, and source titles. The Rayyan online platform is used for removing duplicates.

Broadly, peer-reviewed journal articles and conference proceedings in the English language between the period 2011 and 2022 from the Web of Science, Scopus, and Google Scholar databases were admitted for further analysis. Search criteria included Boolean operators with the following key terms—"smart irrigation," "IoT," and "agriculture."

Searching for items using smart irrigation as a keyword has proven to be a great strategy. The data obtained in this way have a very low false-positive rate (i.e., articles not related to smart irrigation). This results in a slightly higher false-positive rate and requires more manual reviews, but it solves some of the problems of just searching for keywords while keeping the data relatively clean and manageable. The following is the query syntax:

(1) Scopus: ("smart Irrigation IoT") OR TITLE ("intelligent irrigation IoT") AND PUB YEAR >2011 AND (LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))
(2) WoS: "Smart Irrigation IoT" OR TI = "intelligent irrigation IoT" AND LANGUAGES: (English) refined by: DOCUMENT TYPES: (ARTICLE OR PROCEEDINGS PAPER) AND PERIOD = 2011–2022

During the search, the following strategy was used in addition to the above inclusion and exclusion criteria:

(1) Scientific quality: peer-reviewed literature in academic journals, peer-reviewed conference proceedings, and highly cited gray literature reports from government agencies and international and national nongovernmental organizations
(2) Relevancy: the record must address or review causal pathways in which DATs impact or enhance specific ES
(3) Parsimony: Google Scholar has a high number of irrelevant results, so our evaluation of Google Scholar results focused on the first 100 highly ranked records

The query ran in December 2022 and retrieved 657 articles.

2.2. Inclusion and Exclusion Criteria. The inclusion and exclusion criteria for the retrieved items are shown in Figure 2. The resulting records ($n = 337$) were screened by the quality ways of the inclusion/exclusion criteria listed as follows:

(a) From 2011 for consecutive 3 years, only one paper was there, so it is excluded based on irrelevance
(b) All articles with a particular focus on irrigation systems with the technologies considered in the search equations were included
(c) Articles by year of publication were not excluded, given the novelty of using these technologies for irrigation systems
(d) Articles referring to the technologies of interest but applied to processes other than irrigation control or modeling were excluded
(e) The Rayyan online platform is used for excluding/including duplicates

2.3. Data Processing. Five stages of data preprocessing have been performed:

(1) A custom Python script is used to merge the data. This step is essential for broad literature coverage, but it is often overlooked in scientometric research [11, 14, 21]. Merging these records is not particularly trivial as each record has a different format. Therefore, the script standardizes all formatting differences, such as setting punctuation between author names and initials and merging column names.
(2) The papers were reviewed to identify irrelevant papers and data errors. Inclusion criteria for assessing relevance were based on whether the

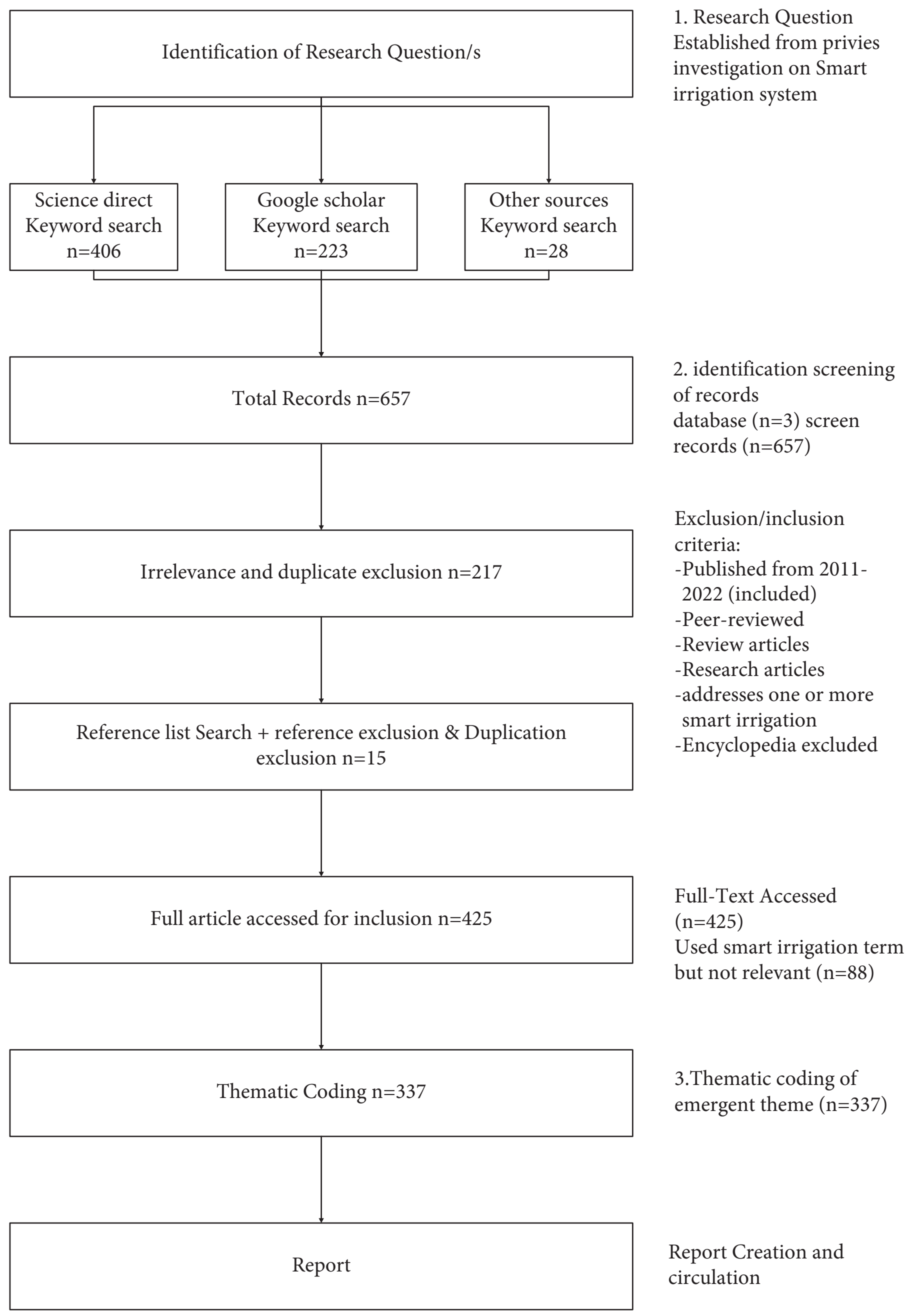

Figure 2: Scoping review process.

abstract was consistent with changes in one or more aspects of his enterprise, society, or industry due to digital technology. Also, we removed some articles that were incorrectly categorized as conference or journal articles. A total of 189 irrelevant and not related articles and 43 data errors such as incorrectly imported articles and non-English articles were removed. Additionally, a total of 88 related but irrelevant articles are also excluded.

(3) Some manual data cleansing on the title, summary, and keyword variables was performed, and spelling errors found in multiple papers were fixed. Synonyms for the Fifth Industrial Revolution, Industry 5.0, and more are compiled. Also, some words have been converted to acronyms, for example, "ICT (information and communication technology), ML (machine learning), and IoT (Internet of things)." Missing values such as release year are also fixed.

(4) The words in the title, abstract, and keywords are cleaned up by building a Python-based text processor using the Natural Language Toolkit (NLTK) package. The processor scans the entire text corpus and creates a dictionary from all acronyms such as IT, IS, and AI. Then, all words except acronyms are

changed to lowercase. Next, all English stop words and nonalphabetic words that are not in the generated dictionary are removed.

(5) The Python processor changed each word to the most common lemma in its stem. A lemma is the normalized form of the processed word. For example, "transforms," "transforming," and "transformed" are all forms of the lemma "transform." To do this, the script runs the corpus several times. The first iteration built a dictionary of all words, their headwords, and their total frequency counts. For the lemma, we used the WordNet Lemmatizer. We then used the Porter stemmer package to generate a second dictionary containing each root and its lemma. A stem is the root of a word. "Connect" is the root of "connects," "connecting," and "connected," but it is also the root of "connection." The lemmas for this dictionary are selected from the most popular lemmas of this tribal first dictionary and represent the entire tribal group. For example, if the first dictionary has two lemmas for the stem "strategy," "strategy," and "strategic," the lemma with the most occurrences is chosen as the lemma for the stem "strategy" for the entire corpus. In the final iteration, the script uses the generated dictionary of stems and their lemmas to replace words with their respective lemmas based on their stem values. Some exceptions have been made to avoid cases where the lemma reduces the meaning of the original word. For example, digitization was added as an exception, so its lemma cannot be changed to digital. Converting a corpus to lemmas based on stem values ensures that all words are real words (which is not always true for stems).

In addition to the steps taken above to address the stemmatization and lemmatization of keywords, the effort was also made to include phrases and chunks as text segmentation, for example, "Internet of things," "smart irrigation," or "soil moisture." This helped address multiword key terms, and we also used TF-IDF as the selection method for frequently co-occurring text segments. Stemmatization and lemmatization of keywords were performed using natural language toolkits from Anaconda using the Python programming language.

Finally, this method reduces the quantity of headwords in the literature although remaining close to the original text.

Python is used for data cleaning, exploration, clustering, and visualization. Coword and coauthor network graphs from the bibliometric pf literature was created using VOSviewer [22]. To cluster formation, this study passes through three steps. First, the data are vectorized with TF-IDF. Next, principal component analysis (PCA) was conducted to reduce the feature size of the vectorized data applied. Only the top features were used to remove noise. Finally, K-means is used to group the articles based on their abstract and keywords. The latent Dirichlet allocation (LDA) is used to describe the topic. Visualization was performed using Python package Bokeh.

3. Data Used

The papers published in the research field are quickly increasing even during COVID-19 except in 2018. From 2019 to 2022, the number of publications doubled annually (Figure 1). This has a direct relationship with smart irrigation as a keyword in the title. We can explain this growth from two major perspective factors. First, there is an increased interest in the area both in agriculture and academics. In agriculture, the importance of smart irrigation is more crucial than ever.

Second, related terminologies used to describe this research area in past studies, such as smart cities, agricultural technology, agricultural digitalization, or agricultural transformation, have started to consolidate into smart irrigation. Therefore, it seems this evolution will continue in upcoming years. Table 1 shows the number of papers published per year from 2011 to 2022.

As presented in Figure 3, the dataset of articles types such as review articles, research articles, and encyclopedias is exported from Science Direct which is the Elsevier database.

The purpose of this review is to explore, map, and report the scope of smart irrigation. To do so, we conduct analysis of co-occurrence of words. Words that occur together in the title, keyword, or abstract of the work are represented as linked nodes. Full counting is used, so how often it occurs in the paper is irrelevant. Nodes and link sizes correspond to the number of publications in different newspapers. VOSviewer also deploys hosts into clusters by default. A cluster is a collection of closely related nodes. Clusters strong minded by relationships are displayed in a similar color. Each node in the network belongs to exactly one cluster. The number of clusters is determined by the resolution setting. Synonym analysis of titles, abstracts, and keywords was performed using VOSviewer. The threshold of the number of occurrences of variables required for a term to be included was adjusted. So the amount of information is contained as much as possible without being overloaded. Less frequently used terms in the title and keywords than in the abstract were found. Therefore, the term frequency threshold in the document was selected at least 5 times for the title and keywords, and it was selected 60 times in the abstract. This implies that all keywords which occur y or more times are included in the graph. Larger nodes that will occur are also y or more times.

4. Result

As mentioned in the first quadrant of Figure 4, China is the leading country when it comes to institutions and researchers in the field of smart irrigation, and its geographical distribution is also from the same country which is almost 45.1%. Papers from Israel are also 23.9%. 31% of the papers are from other countries around the world. Second, most collaborated authors are from China. They were barely mentioned in Figure 5. Even though it is not visible in Figure 5 water scarcity victims in Africa, countries like Morocco and Egypt have collaborated on 8/337 papers.

Table 1: Number of papers refined by years.

Year	Number of papers
2011	1
2012	1
2013	3
2014	5
2015	8
2016	8
2017	25
2018	19
2019	35
2020	64
2021	70
2022	98

A keyword co-occurrence network is used to show the main topics stated in the field as shown in Figure 6. Keywords are used to summarize the whole work in a few phrases. In Figure 6, it is shown that smart irrigation has a wide range of applications with different aspects. The diagram shows that the Internet of things and deep learning are often used in conjunction with smart irrigation, demonstrating the overlap in terminology.

Other buzzwords that are strongly networked are water conservation, water use efficiency, smart agriculture, and irrigation. Many aggrotech and digital technologies are mentioned many times are deep learning, Android applications, and the Internet of things. Again, you can see some research centers. Clockwise from the top, you can identify the following hubs: irrigation: water conversation, sustainable development, consumption, soil moisture, water scarcity, irrigation management, Hydrus modeling, corn, soil senility, cooked beef, drip irrigation, monitoring, and water irrigation; and Internet of things: Android application, smart agriculture, deep learning, prediction, industry 4.0, and intelligent irrigation.

Figure 7 shows analysis of the title coword occurrence. Analyzing the title helps identify the typical focus or research area of the work. This network underscores the focus of smart irrigation research primarily on agricultural industries, specifically, how the organizations use and manage aggrotech to innovate and transform their agriculture. Clockwise, some typical title structures can be identified: drip irrigation, precision irrigation, soil moisture, irrigation management, water use efficiency, water stress, and irrigation scheduling [23, 24].

A network graph of coauthors was created using software called VOSviewer. This visualization shows collaborations within the field by representing researchers as nodes, and links between the nodes show coauthored papers or their collaborations [23, 24]. Figure 5 shows the coauthor network. This graph shows the state of joint research at a peek. Default VOSviewer coauthorship network is limited to 1000 researchers. We used the default setting. In addition, when an author specifies his one as the minimum number of papers to be included in the analysis, the network is further reduced to 20 authors. This is low result as collaboration is higher in related and similar fields. This implies that most smart irrigation studies are housed in small internal research groups. This analysis identified over 100 research teams. But as you can see from Figure 5, only 6/100 or 6% is collaborated. Many important research teams need to be accredited. To name a few, the research group with the most publications consists of Shi, Jianchu, Ben-gal, Alon Wu, Xun, Zuo, Qiang, Lu, Anxiang, Wang Jihua, and Wang Xiaoguang.

The significance of agriculture in the economy [25, 26], the increase in the world population [27, 28], the great demand for food [28], increasing global water demand [29], and the lack of rain-fed agriculture [30] have increased the role of water in agriculture by increases in food production demand and reduction in amounts of water used for agriculture [31]. Fresh water is essential for plants' water use [32, 33]. Globally, agriculture uses about 70% of available freshwater [32], and even though effective water use is a matter for irrigation, Ethiopia has used 93% percent of its water for irrigation and drinking particularly [33]. This shows the advantage of precision irrigation systems using smart irrigation Aqua Technologies [32]. So, based on Figure 4, the terms that we can see are water conservation, water scarcity, water use efficiency irrigation, irrigation management, IoT, deep learning, and prediction in the research area.

5. Discussion

The Internet of things (IoT) devices contain different parts (i.e., sensors, connectivity, active engagement, and actuators). They are used to collect data from environments using sensors, and it can be analyzed for further improvement of farming. A sensor-based intelligent irrigation control system using the Internet of things for smart agriculture collects data from the environment and incorporates an automatic irrigation system [10].

Agriculture 4.0, as the future of farming technology, includes several key enabling technologies towards sustainable agriculture [11]. The use of the state-of-the-art technologies, such as the Internet of things and machine learning, transforms traditional cultivation practices, such as irrigation, to modern solutions of precision agriculture.

The Internet of things promises applications on a commercial scale, and to do so, integrated Internet of things platforms are required, but the key challenge is to make the solution flexible enough to fulfill the demands of specific applications. So it allows developers to quickly link the Internet of things and machine-learning components to create application solutions [20]. This machine learning-based prediction model helps in reducing traditional irrigation methods, thereby conserving water, reducing labor, and increasing yield [21].

This paper result gives opportunity to have a new insight into the current research and to further advance the understanding of future direction of smart irrigation.

Many authors mention that smart irrigation is used in smart agriculture and also within smart cities, even though it is not stated in the results. For instance, the smart city is sparsely stated in the coword title network in Figure 7. With

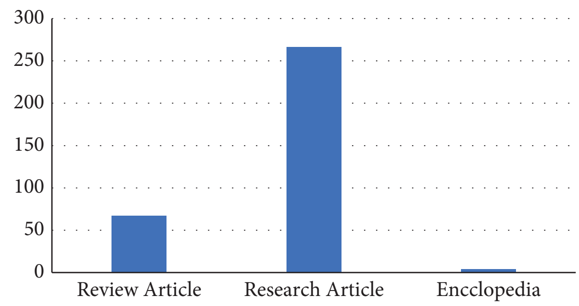

Figure 3: Article types and the number of articles.

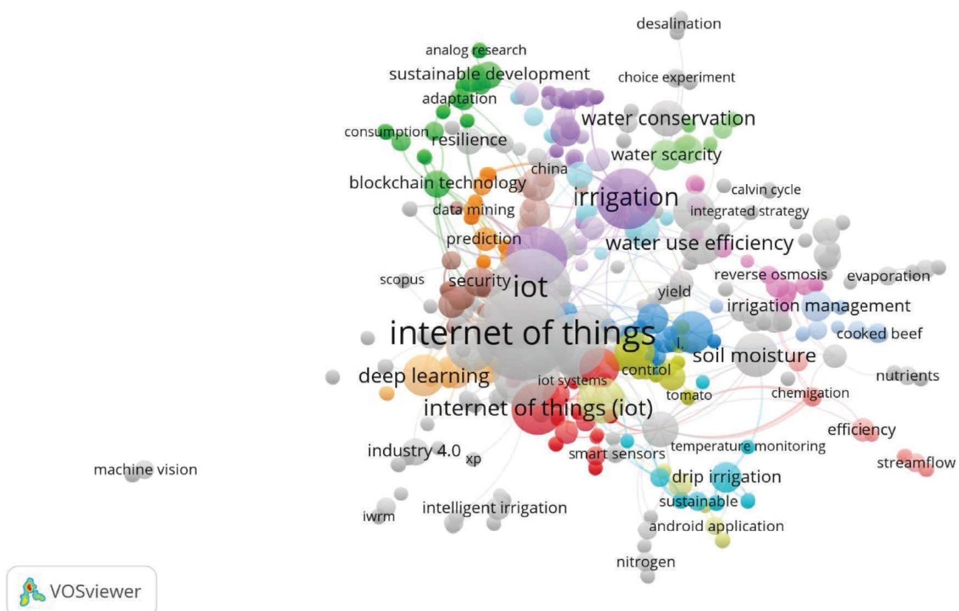

Figure 4: Before normalizing abstract.

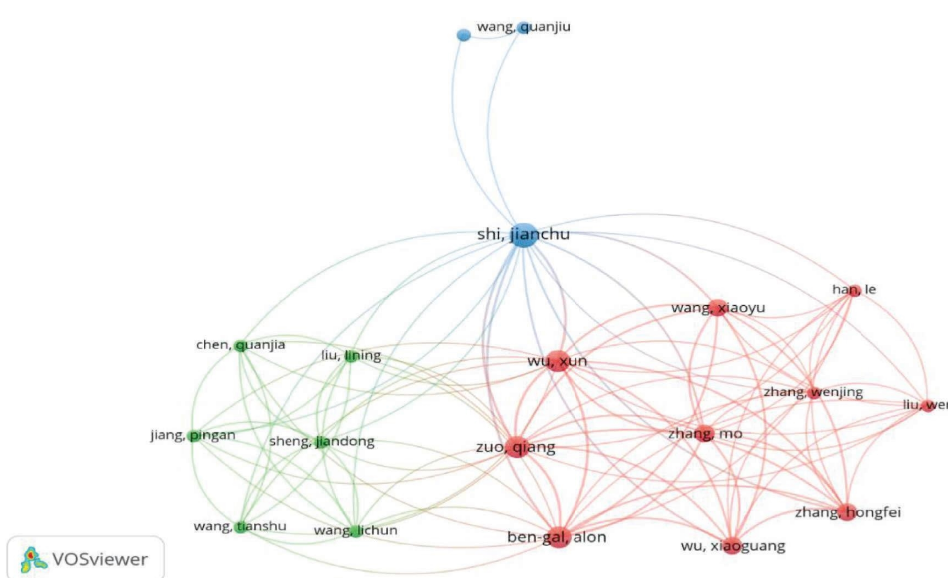

Figure 5: The largest coauthorship network.

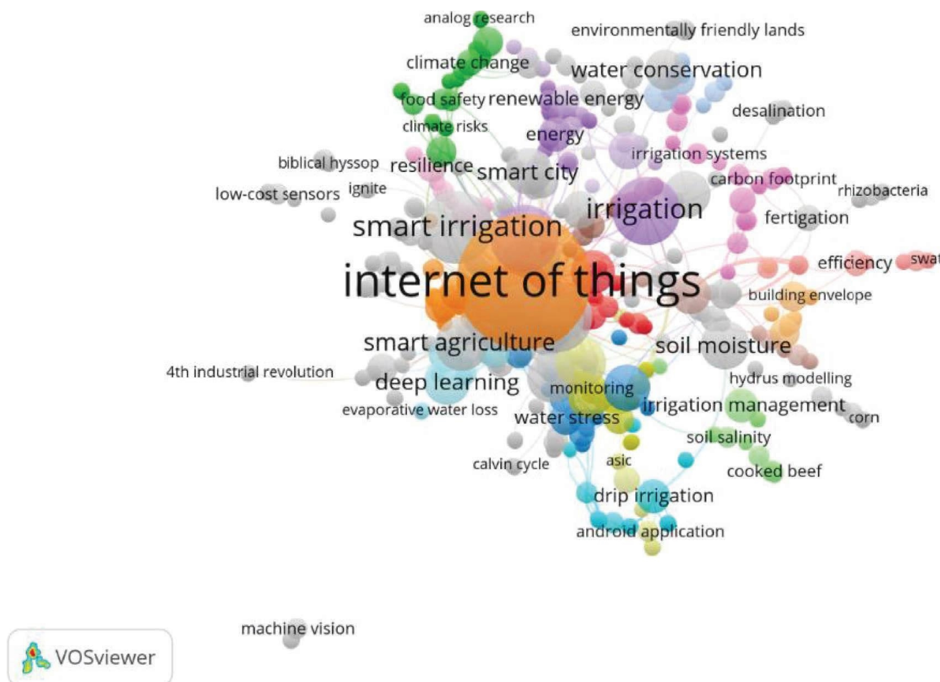

Figure 6: Network of keyword co-occurrence.

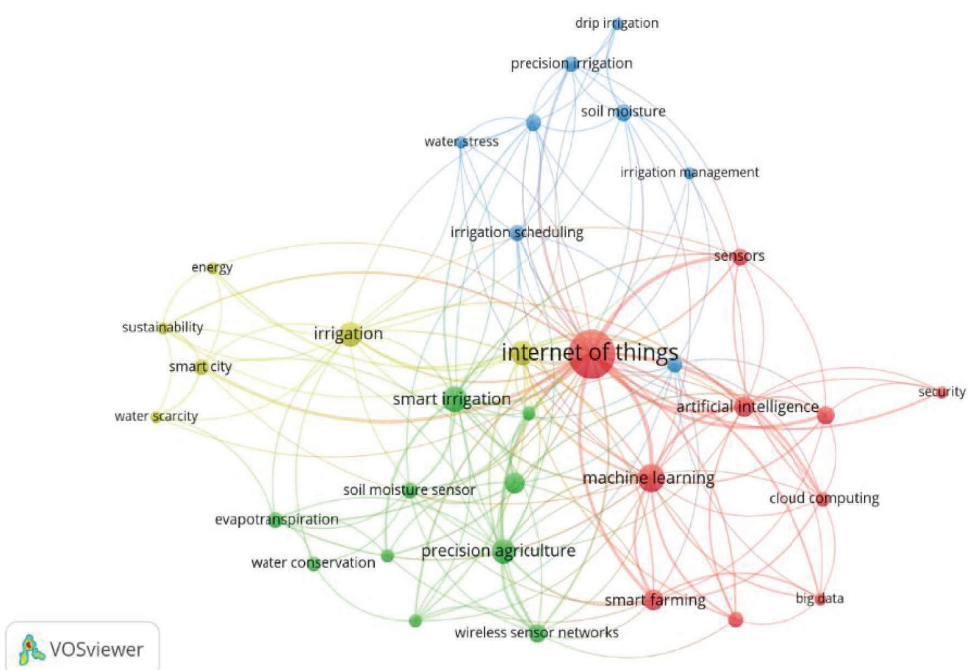

Figure 7: Network of title coword occurrence.

increasing concern about climate change and including water scarcity in urban areas, it could be the case that there is a connection between "smart cities" and "smart irrigation." For example, cities often limit water use for household lawns and yards, and the use of smart water sprinkling systems could be tied to all of these discussions. However, further research needs to be conducted.

Second, in Figure 5 to show most collaborated authors, China was barely mentioned, and as shown in Figure 5, most of the authors are from China; some who have not collaborated are from sub-Saharan countries such as Morocco and Egypt that are victims of water scarcity. The involvement of countries such as Ethiopia in this area is not visible. So there should be a collaboration of authors to enhance coauthorship. In addition, further research is needed for countries such as Ethiopia.

In addition, smart irrigation is a broad concept that covers aggrotech and technological changes brought to agriculture, and it does not necessarily mean that smart irrigation should be used for all changes that need to be made. This is a big problem for future research. The scope of the research area shown in Figure 6 and 7 will be large. On the other hand, many concepts related to smart water use seem too narrow compared to our results. Based on this argument and the initial discussion, we believe that smart water use is in a special position to receive attention in education by combining agriculture, technology, and IoT research to examine the impact of increasing smart water use. Going forward, researchers and practitioners are advised to continue their efforts to make water use information relevant and effective.

Overall looking at the title and abstract key term co-occurrence map, it is easy to see that smart irrigation is found at the confluence of the Internet of things, machine learning, deep learning, artificial intelligence, precision agriculture, smart agriculture, and the practical practices of agriculture, including soil, moisture, water conservation, irrigation, irrigation scheduling, water use, evaporation, and the overall task of irrigation management.

Future work could investigate the methodology and level of analysis of each article in smart irrigation. This would provide a more accurate depiction of the current state of smart irrigation research in each aspect. Another research avenue is to investigate the outlets and their quality in more detail and how this influences citations and collaboration. In addition, more research is needed to contribute to and integrate various aspects of smart water into a unified theoretical framework in order to advance smart water research in the future. International recognition of smart water use could facilitate collaboration between researchers by linking similar studies through common recommendations. The specific characteristics, scope, and impact of smart water use should be investigated in more detail and defined in a way that brings together practitioners and scientists. Doing so will help support the professionalism of the media and researchers, which will be a welcome contribution.

6. Limitation

Searching the literature was limited to titles and abstracts in English. Articles that used the term "smart irrigation" in non-English languages would not have been captured, potentially biasing the study.

We believe that titles, abstracts, and keywords provide a correct representation of the papers analyzed. Reading throughout the paper by downloading and from the corpus would provide additional acumen.

The search strategy has some limitations. First, titles, abstracts, and author-supplied keywords widely vary in the language they use to refer to the same concept such as "smart irrigation," which leads to disambiguation difficulty. Second, compared to titles, keywords indexed by databases have a higher probability of data quality errors. Third, some articles use synonym terms to describe smart irrigation. Searching using various synonyms creates overwhelming data. So it was decided to include papers that have intelligent farming in their title.

We strongly recommend that papers published on smart irrigation in agriculture should be in effect to increase the impact of smart irrigation on agriculture.

We strongly recommend that there should be coauthor collaborations on smart irrigation research for future works. In addition, countries with strong irrigation technologies, such as Israel, should publish papers and collaborate with other countries to share their knowledge worldwide.

7. Conclusion

This research aimed to map the literature on smart irrigation using scientometric analysis to provide a recommendation based on the gap identified and the result obtained. We provide detailed information on data preparation for scientometric research. The results analyze the overall content of this research, including the change in content as well as the change in the number of publications each year. Discussion articles also appear for topics, terms, and definitions. According to the findings of this study, smart water use has not been fully researched in terms of its benefits. The evolution of articles published every year shows that the field of smart water research will continue to expand, making theoretical work more important.

Additional work is needed to establish collaboration between researchers and practitioners from across countries that are vulnerable to drought and water scarcity. For example, developing countries such as the ones in sub-Saharan African countries, including Ethiopia, need more research on "smart irrigation," to achieve food self-sufficiency. While most of the literature is from China, it is not clear from our study why Israel did not show up in the results of our analysis, because that country is one of the leading innovators in irrigation-based farming. It is needed to establish collaboration between researchers and practitioners from across countries such as Ethiopia.

In the future, more research should be conducted to define the frontier of research on smart irrigation systems and to examine the role of society in this phenomenon.

Data Availability

The data used to support the findings of this study are available from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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