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Savonius Hydrokinetic Turbine: A Bibliometric Analysis

Muhyiddin Mohammed[1,2], Shamsul Sarip[1,*], Sa'ardin Abdul Aziz[1], Wan Azani Mustafa[3], Ahmed Ali Ajmi[4]

1 Razak Faculty of Technology and Informatics, Universiti Teknologi Malaysia, 54100 Kuala Lumpur, Malaysia
2 Design Technology Department, Faculty of Applied Creative Arts, Universiti Malaysia Sarawak (UNIMAS), 94300 Kota Samarahan, Sarawak, Malaysia
3 Faculty of Electronic Engineering Technology, UniCITI Alam Campus, Universiti Malaysia Perlis, 02100 Padang Besar, Perlis, Malaysia
4 University of Technology, Ministry of Electricity GCEP/Middle Region Baghdad, Iraq

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ABSTRACT

The Savonius Hydrokinetic Turbine (SHT) exhibits promise as a viable option for a power extraction apparatus capable of harnessing energy from diverse water flow situations, such as tidal, river, wave, and open channel settings. The SHT is considered a simple and straightforward design, including convenient manufacturing and installation processes. This investigation's primary purpose is to ascertain the current trends as well as upcoming areas of research pertaining to the SHT, thereby enhancing its potential for environmental sustainability. Through bibliometric studies, this article discusses global research trends in SHT based on publication output and co-occurrence of author keywords. The data were examined using VOSviewer. Metadata was obtained from Scopus, which consisted of 76 articles published between 2019 and September 2023. The VOSviewer software reviewed four clusters. The most frequently used keywords were hydrokinetic turbines, turbine, power coefficients, Savonius turbine, turbomachine blade, and Computational Fluid Dynamics (CFD). The outcomes of the research initiated by SHT have provided significant findings, emphasizing the significance of comprehending blade profile design for the best use of this novel energy solution.

1. Introduction

The Savonius Hydrokinetic Turbine (SHT) was conceptualized and designed by Sigurd J. Savonius, a notable Finnish inventor [1,2], and is a highly potential renewable energy solution. Derived from the technology of wind turbines, this system effectively captures the kinetic energy present in water by utilizing drag-based methods. Despite its inherent simplicity and ease of maintenance, the capacity to function optimally under conditions of reduced flow velocities is also a notable attribute. Moreover, this technology proves to be very suitable for small-scale energy generation in areas characterized by fluctuating water currents [3,4]. SHTs represent a kind of hydrokinetic turbine that facilitates the process of transforming kinetic energy derived from the motion of water into

* *Corresponding author.*
E-mail address: shamsuls.kl@utm.my

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mechanical power [5,6]. Other than that, SHTs are relatively simple in design and can be manufactured from a variety of materials, making them a cost-effective and versatile option for generating renewable energy from water resources [7-10]. In recent years, SHTs have become the subject of extensive research.

The objective of this bibliometric analysis is to offer a thorough examination of the research landscape within the scope of SHT. This will be achieved by identifying the articles, authors, and institutions that have had the most impact, as well as highlighting the main research trends in this area. A dataset of SHT research papers published in peer-reviewed journals between 2019 and 2023 will serve as the basis for the analysis. The dataset will be analyzed using a variety of bibliometric tools and techniques, including citation analysis, keyword analysis, and co-authorship analysis. The results of this analysis will be given in a scholarly article that aims to offer a comprehensive survey of the present status of SHT research, which includes the most significant institutions, publications, as well as authors. Hence, this bibliometric analysis is anticipated to impact the SHT research field by providing a detailed and current summary of the latest advancements in the field.

The results obtained from the analysis will be of interest to researchers, practitioners, and policymakers working in the field of hydrokinetic energy. This research investigates the development and patterns of the SHT from 2019 to September 2023 through the application of known bibliometric analysis methods in order to address existing knowledge gaps. Within the scope of this particular context, the present research endeavors to investigate the study topics as given below.

i. RQ1: What are the research trends in Savonius Hydrokinetic Turbine (SHT) according to the year of publication?
ii. RQ2: What are the top influential countries for the topic of SHT?
iii. RQ3: What are the top contributing institutions in SHT?
iv. RQ4: Who are the top contributing authors for SHT?
v. RQ5: What are the most cited articles?

The next sections of the paper are structured in a subsequent manner. Section 2 pertaining to this research is dedicated to conducting a thorough analysis of the existing literature. In this study, Section 3 delves into the technique employed, while Section 4 summarises the findings obtained. Section 5 serves as the study’s final conclusion.

2. Literature Review

The Savonius turbine, a design historically employed in wind energy conversion systems, is experiencing an increase in popularity owing to its cost-effectiveness and versatility, which were investigated by Doso and Sarsing [11]. Nevertheless, according to Al-Gburi *et al.,* [12] the system encounters operational inefficiencies and challenges related to torque. There is a current endeavor to enhance the design of the rotor with the objective of increasing output efficiency, minimizing negative torques, and reducing maintenance costs [12]. This underscores the importance of pursuing a sustainable energy future. Khan *et al.,* [13] conducted Computational Fluid Dynamics (CFD) simulations via unsteady Reynolds-Averaged Navier-Stokes (RANS) to evaluate the hydrokinetic turbines being studied. The objective of this study by Patel and Vimal [14]. Patel is to enhance efficiency and power generation through the use of a unique blade profile derived from the S1048 airfoil section. The analysis additionally examines the advantages of an upstream curtain configuration and identifies efficacious design alterations to achieve substantial enhancements in power generation [14].

In this study, a comprehensive investigation of SHT performance by Satrio *et al.,* [15] is undertaken. The introduction of a flow deflector is explored to enhance the advancing blade flow by diverting water flow, influencing flow dynamics [15]. Zhang *et al.,* [16] conducted an investigation that examined the relationship between blade design and torque coefficient, with a particular focus on the influential function of the elongated straight edge of the blade in attaining a high maximum power coefficient. This study underscores the importance of understanding the connection between blade design and torque coefficient [16]. In addition, Alipour *et al.,* [17] did research on how changing the shape factor of the blade affected the expansion of the high-pressure area next to the curved side of the moving blade. These findings underscore the significance of blade geometry in turbine performance [17].

Significantly, in separate research, Shashikumar and Vasudeva [18] examined the research underlines the practical significance of specific blade profiles, particularly the parabolic shape, showcasing substantial improvements in maximum power coefficient compared to alternative profiles. The numerical analysis, focusing on an 80° V-angle rotor blade profile, provides essential insights for engineers seeking to optimize Savonius turbine performance [18]. Maldar *et al.,* [19] highlighted under-researched areas such as aspect ratio, gap ratio, and blade count, which are vital for optimizing hydrokinetic turbine performance. In summary, this study intricately intertwines concepts of flow deflection, blade design, and numerical analysis, offering a holistic approach to advancing SHT performance with practical implications for renewable energy applications.

Khani *et al.,* [20] indicated that the power coefficient of a SHT is a measure of its efficient process of harnessing the water flow's kinetic energy and transforming it into mechanical energy. Moreover, it depends on a number of factors, incorporating the quantity of turbine blades. Enhancing the turbine's performance can be achieved by increasing the total amount of blades [21]. The study conducted by Kamal and Saini examined the potential effects of this phenomenon on the power coefficient reduction and the increase in instantaneous torque pulsation level [22]. One potential approach for enhancing the power coefficient pertaining to a Savonius wind turbine is to employ an optimization technique known as evolution strategy in conjunction with a developed meta-model such as the works of Hashem and Baoshan [7]. This technique can be used to identify the optimal combination of CP-influencing factors for a given set of operating conditions.

Previous research by Chen *et al.,* [23] has demonstrated that the power coefficient with regard to the two-blade arrangement outperformed the coefficient for the three-blade configuration by nearly 1.5 times. Another study from Kumar & Saini describes that modifying the blade shape of the SHT can enhance its performance. This can be achieved by taking into account geometric characteristics, such as the blade arc angle as well as the blade shape factor [24]. With the same objective, in the opinion of Talukdar *et al.,* [25] an SHT's design features, such as its blade profile, aspect ratio, as well as overlap ratio, have a significant impact on its performance despite considerable studies and research conducted on the subject. The enhanced Savonius turbine, when equipped with a higher number of blades, such as 5 or more, exhibits an initial increase in efficiency, subsequently followed by a decline investigated by Payambarpour *et al.,* [26]. The Savonius turbine, an innovative design, demonstrates outstanding performance characteristics, exhibiting a substantial enhancement in the performance of self-adjusting blade turbines compared to fixed blade turbines, which is analyzed by Behrouzi *et al.,* [27].

3. Methodology

Bibliometric studies provide readers with a comprehensive perspective on the selected study topic during a designated timeframe [28]. The integration, organization, as well as analysis of bibliographic data obtained from academic publications are known as bibliometrics [29]. In addition to traditional descriptive statistics, for instance, the examination of published articles and year of publications, as well as the categorization of significant authors [30]. Furthermore, it encompasses intricate methodologies, and one example of a research method that can be employed is document co-citation analysis. To do a comprehensive literature review, it is necessary to follow an iterative process that involves identifying appropriate keywords, conducting a thorough literature search, and analyzing the gathered information [29]. This approach is crucial for constructing a reliable bibliography and obtaining accurate and trustworthy results [31]. A bibliometric methodology was utilized in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) criteria [32], known as a well-recognized and acknowledged standard for carrying out reviews. Studies were retrieved from the Scopus database.

3.1 Data Sources

Scopus is a widely recognized investigation tool that enhances the efficiency of the research process by providing an extensive database and facilitating the exploration, evaluation, and dissemination of scholarly information [33]. The Scopus database is commonly employed for doing bibliometric analysis in the field of sciences. It offers a complete search functionality that allows researchers to utilize certain keywords in order to conduct a thorough study of prominent journals. A search was conducted on the Scopus database website. Initial database queries for article research are shown in Table 1. The search keywords selected were “hydrokinetic,” “turbine,” and “savonius.” Subsequently, certain limitations, such as language constraints, were implemented. In the end, the subsequent search keyword was employed.

Table 1
Initial search string

Scopus	TITLE-ABS-KEY (hydrokinetic OR hydro OR hydro-kinetic) AND (LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2023)) Access Date: September 2023

Subsequently, the query string was modified to prioritize the search phrases “turbine” and “savonius.” A total of 107 outcomes were obtained using this procedure, then subject to further examination to incorporate research publications written in English exclusively. Additionally, articles categorized as reviews were deliberately removed from the analysis. Further narrowing of the search phrase resulted in the inclusion of a total of 76 articles, which were subsequently utilized for conducting bibliometric analysis. The analysis incorporated all publications pertaining to hydrokinetic turbine Savonius from the Scopus database up through September 2023. This study conducts a bibliometric analysis of contemporary research on hydrokinetic turbines, focusing on Savonius turbines. This analysis aims to offer a comprehensive picture of the achievements and trends within this field. The research undertaken from 2019 to 2023 seeks to offer a contemporary comprehension of the data landscape within the realm of renewable energy and turbine technology. This analysis facilitates well-informed decision-making and the identification of developing areas of interest in the aforementioned domains.

3.2 Data Analysis

Bibliometric analysis typically comprises two primary components. The initial topic under consideration pertains to the field of descriptive and performance measurement. This analysis provided a comprehensive overview of sources and document styles. Furthermore, statistical data pertaining to the yearly and cumulative quantities of research studies and citations was computed. Subsequently, the studies garnering the greatest number of citations were presented, with particular emphasis on the ten most highly cited research studies. In the end, the authors, sources, institutions, or counties that exhibited the highest levels of productivity were afterward presented. The subsequent analyses were conducted using scientific mapping and network analytics methodologies. The analysis focused on clusters formed by document coupling, with a particular emphasis on the terms used by writers. This study presents thematic maps depicting the distribution of the SHT. The analysis employed a network technique to examine the co-citations network, co-occurrences network, as well as country participation.

The analysis of publication data in Excel format, including article title, author name, journal, citation, and keyword, was conducted using the VOSviewer software. The data was acquired from the Scopus platform throughout the timeframe spanning from 2019 to 2023. VOSviewer serves as a viable alternative to the Multidimensional Scaling (MDS) technique [34], and the approach under consideration bears a resemblance to the MDS methodology in its objective. The focus of this approach is the organization of objects into a space of reduced dimensions, with the goal of accurately depicting the interconnectedness and likeness between each pair of items based on the distances that separate them [35]. In contrast to MDS, which primarily focuses on calculating similarity measures, for instance, Jaccard indices and cosine similarities, the VOSviewer method utilizes an ideal approach for standardizing co-occurrence frequencies. This technique involves the utilization of association strength (ASij), which is determined as follows:

$$AS\mathrm{ij} = \frac{C\mathrm{ij}}{wiw\mathrm{j}} \tag{1}$$

The relationship between variables i and j can be characterized as exhibiting direct proportionality to the ratio of observed co-occurrences to expected co-occurrences under the assumption of statistical independence between the co-occurrences of i and j [34]. Hence, by applying this index, VOSviewer applies a mapping technique that aims to minimize the weighted sum of squared distances between pairs of items, thereby representing them geographically on a map. According to [36], the implementation of LinLog/modularity normalization was carried out. The data set underwent analysis using VOSviewer, which facilitated the identification of patterns through mathematical linkages.

Several studies were conducted, which comprised citation analysis, co-citation analysis, as well as keyword co-occurrence. The assessment of the development of a certain academic discipline within a defined temporal scope can be accomplished by employing the keyword co-occurrence analysis technique [37]. Moreover, it effectively discerns prevalent subjects across several disciplines [38]. Citation analysis serves as a valuable tool for finding significant research topics, trends, and methodologies, as well as investigating the historical significance of a discipline's primary area of concentration [39]. The bibliometric technique of the analysis of document co-citation is commonly employed [31,36,40]. The result of this procedure entails the development of a map that utilizes network theory to ascertain the relevant structure of the subject matter data [40].

The flowchart illustrates the organizational structure of a research paper that examines the bibliometric study of SHTs (Figure 1). The analysis begins with an introduction that provides a brief summary of the issue and the goal of the study. Subsequently, a comprehensive examination of existing literature is conducted, after which a thorough explanation of the methods utilized in data collection and analysis is provided. The subsequent section presents the outcomes and discoveries, encompassing trends in publications, contributions from different geographic locations and institutions, authorship patterns, thematic trends, as well as emerging research areas and areas that require further investigation. The paper concludes by summarising the main findings and discussing the research's significance, thus bringing the study to a close.

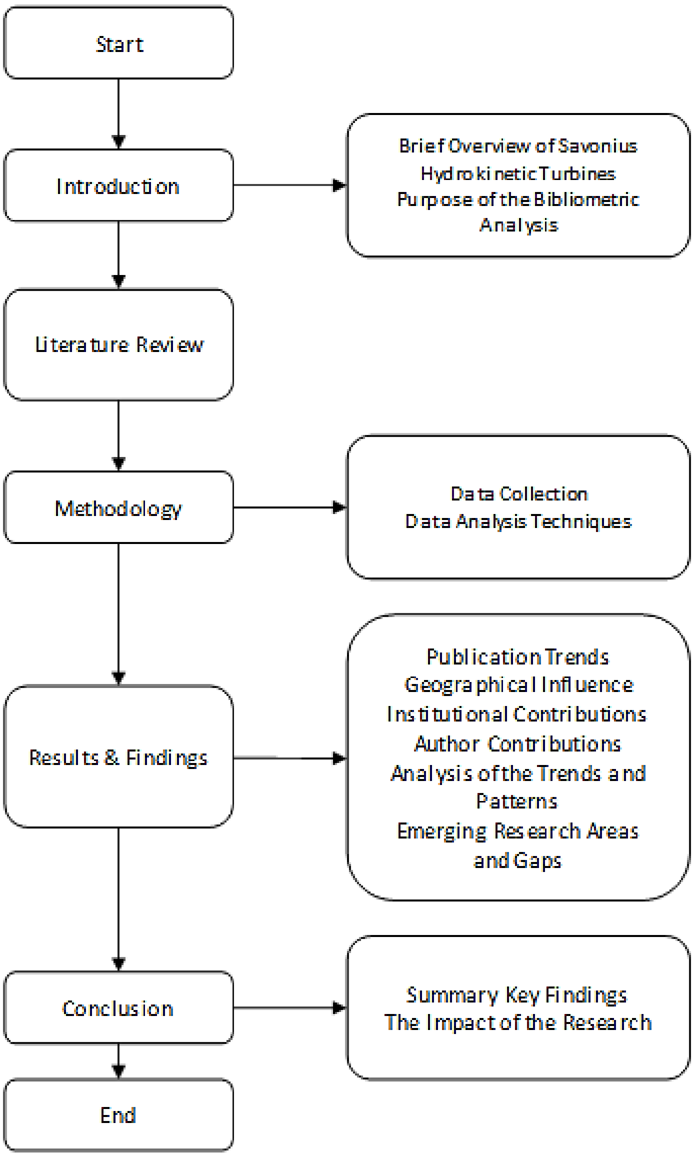

Fig. 1. Flowchart for bibliometric analysis

4. Results and Findings

In this part, the authors present the outcomes and discoveries of the systematic review., which focuses on the extensive landscape of CFD modeling and simulation techniques applied to Vertical Axis Hydrokinetic Turbines (VAHKTs). Our investigation has traversed a comprehensive array of research studies, encompassing various facets of VAHT performance, numerical methods, and design parameters. The significance of VAHTs in harnessing the kinetic energy of water currents and generating renewable energy has garnered growing attention in recent years. As such, understanding the intricacies of their hydrodynamic behavior is pivotal for optimizing their performance and contributing to sustainable energy solutions. Research conducted through systematic analysis has made valuable contributions to the growing body of knowledge, guiding future efforts toward more efficient and sustainable hydrokinetic turbine systems.

4.1 RQ1: What are the Research Trends in Savonius Hydrokinetic Turbine (SHT) According to the Year of Publication?

Figure 2 and Table 2 depicts the distribution of publication years for the SHT. The data presented illustrates the annual publication count of SHT research articles from 2019 to 2023. Consequently, the data represents the notable and consistent level of research conducted on the SHT, with values ranging from 13 in 2020 to 15 in 2021. In 2019, 9 articles, or 12% of the total publications, were published. The subsequent year, 2020, witnessed the publication of 13 pieces, representing 17% of the total. In 2021, the number of publications increased to 15, constituting 20% of the total. The year 2022 saw a further rise in publications, having 20 articles published in all, making up 26% of the total publications.

Finally, in 2023, a total of 19 articles were published, representing 25% of the total publications. It is observed that there was an increase in 2022 pertaining to the number of articles published. The analysis demonstrates an escalating pattern in the investigation of SHTs from 2019 to 2023, with the number of published works rising steadily from 9 to 20 per year. The continuous upward trend, reaching its highest point in 2022, demonstrates an increased and enduring interest in this particular domain.

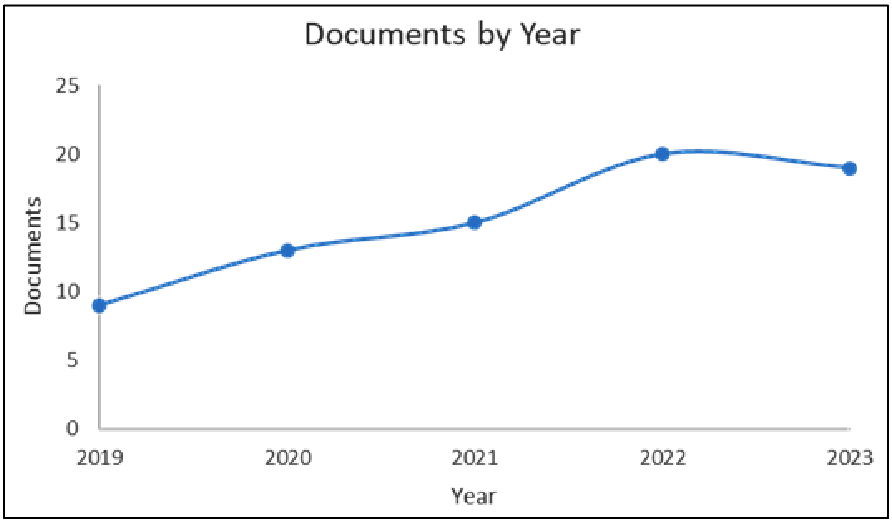

Fig. 2. The Growth of publications between 2019 and 2023

Table 2
List of publications published each year between 2019 and 2023

Year	Documents
2023	19
2022	20
2021	15
2020	13
2019	9

4.2 RQ2: What are the Top Influential Countries for the Topic of SHTs?

The countries with the highest influence in the field of research, as indicated by the ten most often cited publications, are associated with ten different nations. These nations include India, Malaysia, Iran, and China, which are the most commonly represented countries (refer to Figure 3 and Table 3). The dataset comprises 29 documents from India, accounting for 33% of the total. Here, 14 papers from Malaysia represent 16% of the total. Meanwhile, 9 documents from Iran represent 10% of the total. On the other hand, 8 documents from China represent 9% of the total, while 7 documents from Indonesia represent 8% of the total. The investigation identifies India, Malaysia, Iran, and China as the primary contributors to SHT research, with India being the most productive. These countries combined constitute a substantial proportion of notable publications, signifying their pivotal role in promoting this topic on a global scale.

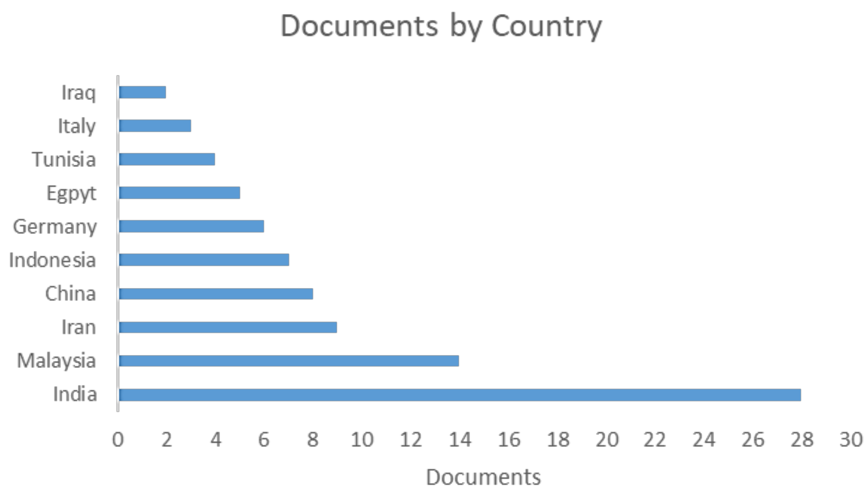

Fig. 3. The countries associated with a particular affiliation

Table 3
Ten most active publications country

India	28
Malaysia	14
Iran	9
China	8
Indonesia	7
Germany	6
Egpyt	5
Tunisia	4
Italy	3
Iraq	2

4.3 RQ3: What are the Top Contributing Institutions in SHTs?

In terms of entities that excel in the development of SHTs, the primary focus lies on organizations, institutions, and universities. The “Universiti Sains Malaysia” with 11 publications, i.e., 21%; “University of Tehran” with 5 publications, i.e., 10%; “S. V. National Institute of Technology” 5 publications, i.e., 10%; “Indian Institute of Technology Roorkee” with 5 publications, i.e., 10%; “Department of Hydro and Renewable Energy” with 5 publications, i.e., 10% (see Figure 4 and Table 4). Universiti Sains Malaysia, the University of Tehran, S.V. National Institute of Technology, the

Indian Institute of Technology Roorkee, as well as the Department of Hydro and Renewable Energy, are actively promoting the advancement of SHTs, a promising technology for renewable energy.

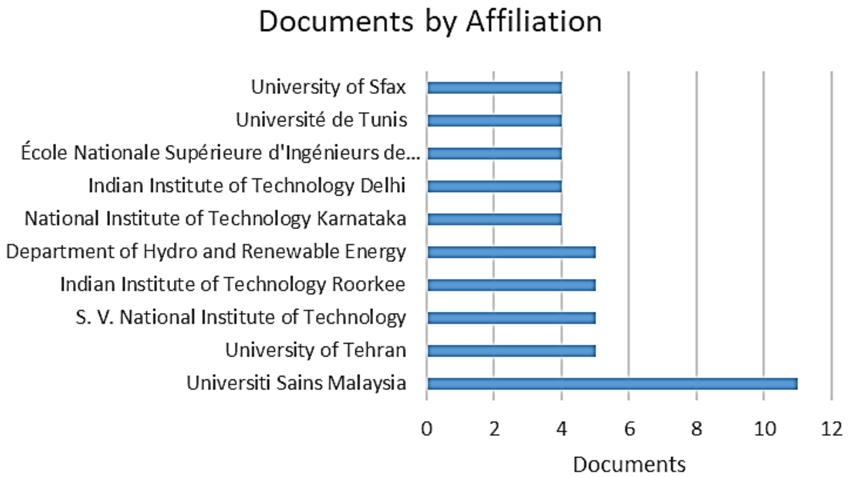

Fig. 4. The most pertinent affiliations

Table 4
The most pertinent affiliations

Universiti Sains Malaysia	11
University of Tehran	5
S. V. National Institute of Technology	5
Indian Institute of Technology Roorkee	5
Department of Hydro and Renewable Energy	5
National Institute of Technology Karnataka	4
Indian Institute of Technology Delhi	4
École Nationale Supérieure d'Ingénieurs de Tunis	4
Université de Tunis	4
University of Sfax	4

4.4 RQ4: Who are the Top Contributing Authors on SHTs?

Kamaruddin, N.M. published 11 publications (21%), Mohamed-Kassim, Z. with 6 publications (11%), Patel, V. with 5 publications (10%), Saini, R.P. with 5 publications (10%), Driss, Z. with 4 publications (8%), Mosbahi, M. with 4 publications (8%), Najafi, A.F. with 4 publications (8%), Prabowoputra, D.M. with 4 publications (8%), Saini, G. with 4 publications, i.e., 8% (Figure 5 and Table 5). The current research on SHTs demonstrates a focused build-up of information from a specific set of experts, indicating a solid basis of expertise. This indicates the possibility of working together to broaden and enhance investigation, influencing the future course of research.

Fig. 5. Top contributing author

Table 5
Top contributing author

Kamaruddin, N.M.	11
Mohamed-Kassim, Z.	6
Patel, V.	5
Saini, R.P.	5
Driss, Z.	4
Mosbahi, M.	4
Najafi, A.F.	4
Prabowoputra, D.M.	4
Saini, G.	4
Salleh, M.B.	4

4.5 RQ5: What are the Most Cited Articles?

Scholars have referenced a work that has garnered a substantial number of citations, thereby signifying its influence and significance within the scholarly realm. The provided citations serve to substantiate the usefulness and reliability of the study, emphasizing its innovative ideas and transformative impact on the field's knowledge. The analysis of highly referenced literature aids in the identification of important works and their enduring significance, as indicated in Table 6. The academic community has made substantial contributions to research, showcasing the value of these investigations. The examination of literature containing substantial references substantiates the enduring significance and impact of the work.

Table 6
Most cited articles

Title	Year	Cited by
Optimal shape of thick blades for a hydraulic Savonius turbine [41].	2019	85
Performance study of a Helical Savonius hydrokinetic turbine with a new deflector system design [42].	2019	72
Savonius hydrokinetic turbines for a sustainable river-based energy extraction: A review of the technology and potential applications in Malaysia [43].	2019	56
CFD-based improvement of Savonius type hydrokinetic turbine using optimized barrier at the low-speed flows [44].	2020	52
A computational investigation to analyze the effects of different rotor parameters on hybrid hydrokinetic turbine performance [45].	2020	43
The effects of deflector longitudinal position and height on the power performance of a conventional Savonius turbine [46].	2020	34
Velocity and performance correction methodology for hydrokinetic turbines experimented with different geometry of the channel [47].	2019	34
Investigation of deflector geometry and turbine aspect ratio effect on 3D modified in-pipe hydro Savonius turbine: Parametric study [48].	2020	32
CFD analysis of performance improvement of the Savonius water turbine by using an impinging jet duct design [49].	2019	30
Numerical investigation of conventional and tapered Savonius hydrokinetic turbines for low-velocity hydropower application in an irrigation channel [50].	2021	27
Performance enhancement of a twisted Savonius hydrokinetic turbine with an upstream deflector [51].	2021	25
Performance improvement of a new proposed Savonius hydrokinetic turbine: a numerical investigation [17].	2020	24
Effect of number of stages on the performance characteristics of modified Savonius hydrokinetic turbine [52].	2020	23
Performance investigation of the Savonius horizontal water turbine accounting for stage rotor design [53].	2020	21
Assessment of turbine stages and blade numbers on modified 3D Savonius hydrokinetic turbine performance using CFD analysis [54].	2021	19
Parameter analysis of Savonius hydraulic turbine considering the effect of reducing flow velocity [55].	2019	19
Performance investigation of self-adjusting blades turbine through experimental study [27].	2019	18
Integration of hydrokinetic turbine-PV-battery standalone system for tropical climate condition [56].	2020	17
Techno-economic analysis of a micro-hydropower plant consists of hydrokinetic turbines arranged in different array formations for rural power supply [57].	2021	17
Experimental and numerical study on the performance and flow pattern of different Savonius hydrokinetic turbines with varying duct angle [58].	2020	17

The analysis was conducted on a dataset consisting of 76 publications, with a total of 691 keywords being utilized. The specified criterion was satisfied by a total of 55 thresholds, which were seen to form four clearly identifiable clusters. The use of visual representations to depict keyword clusters within a network facilitates the comprehension of the interconnections between various topics explored in research investigations, hence augmenting the overall understanding of the research subject matter. The VOSviewer software is utilized for the examination of the co-occurrence potency of keywords, resulting in the formation of clusters based on their degree of association, as shown in Figure 6.

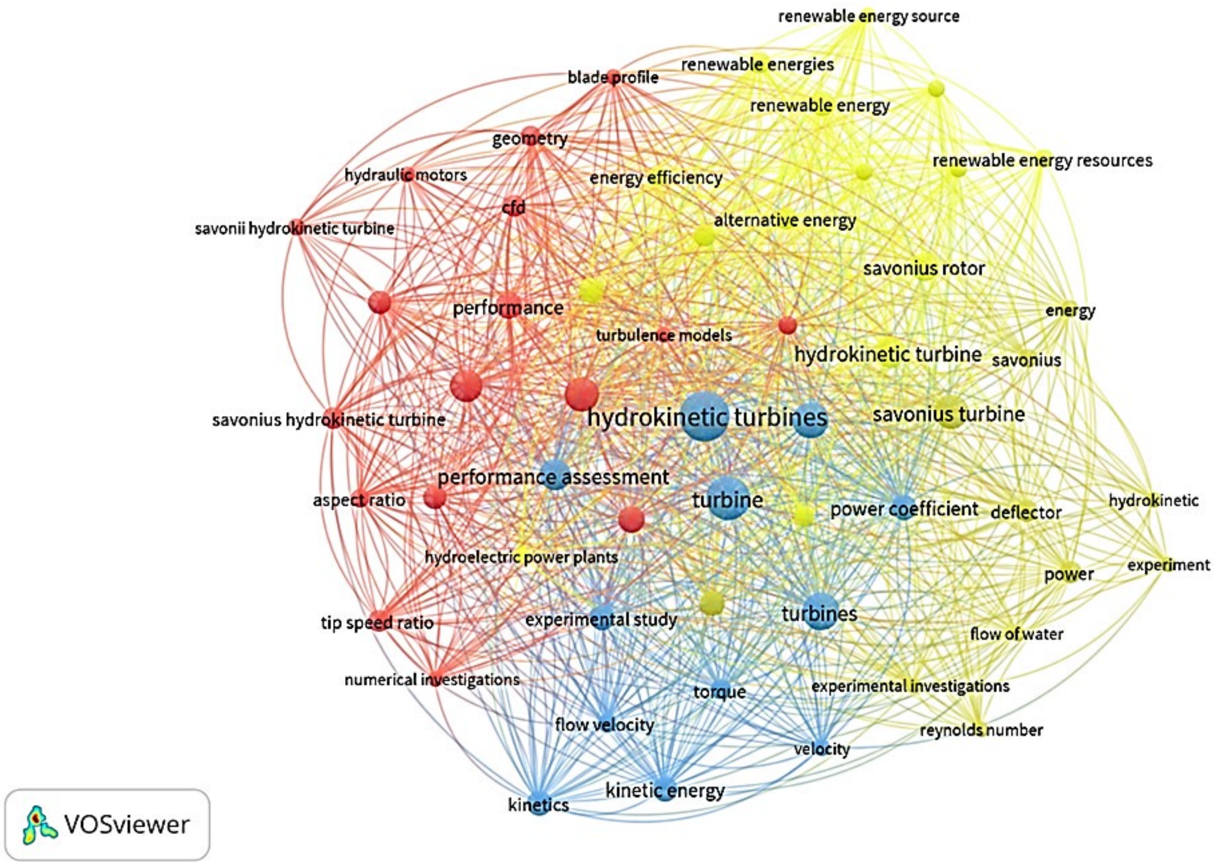

Fig. 6. The visualization map, utilizing keywords related to the co-occurrence

The largest cluster (red colored consisting of 17 items) comprises CFD, turbine components, performance, Tip Speed Ratio (TSR), turbomachine blade, performance, turbine components, power generation, and hydraulic turbines as the most repeated term. Next, in the second yellow cluster (15 items), the most repeated keywords are hydrokinetic turbine, Savonius rotor, renewable energy, and hydroelectric power. The third blue cluster (12 items) has the words hydrokinetic turbines, turbine, turbines, power coefficients, performance assessment, power coefficient, kinetic energy, kinetics, and experimental study as the most continually repeated keywords. Savonius turbines and coefficient of power are the most used words in the fourth cluster (orange) and are some of the most repeated keywords. The findings have been presented in a tabular format, as seen in Table 7.

Table 7
The cluster contains keywords used to categorize data

Cluster	Focus	Top of terms and their frequency of appearance (n>10)
Cluster 1	Technical aspects (design modeling, performance evaluation, component analysis).	Turbomachine blade (21), computational fluid dynamics (19), performance (13), turbine components (13), power generation (10), hydraulic turbines (10).
Cluster 2	Technology, design, and application.	Hydrokinetic turbine (18), Savonius rotor (15), renewable energy (11), hydroelectric power (11).
Cluster 3	Performance and efficiency evaluation.	Hydrokinetic turbines (46), turbine (34), turbines (25), power coefficients (23), performance assessment (18), power coefficient (12), kinetic energy (12), kinetics (11), experimental study (11).
Cluster 4	Analyzing the coefficient of power in Savonius turbines.	Savonius turbines (22), coefficient of power (12).

The current focus of research in Savonius hydrokinetics is increasingly centered on energy harvesting, performance optimization, blade profile design, and the integration of hydrokinetic and renewable energy systems. This trend is supported by findings from a visualization study in Figure 7. The overlay visually displays the progression of significant themes within the field of Savonius hydrokinetic technology. It underscores the significance of employing keywords that are determined by the mean publication year.

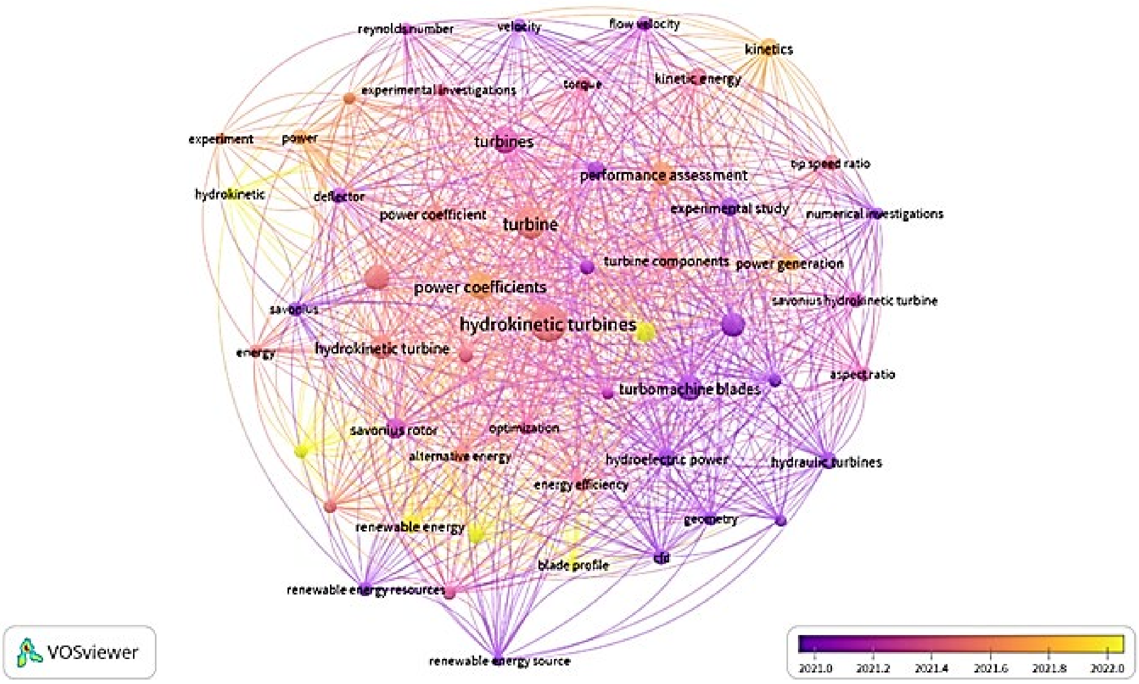

Fig. 7. The overlay visualization, utilizing keywords related to co-occurrence

4. Conclusions

The study was conducted on a total of 76 papers pertaining to the SHT, spanning from 2019 to September 2023. This dataset accounts for a mere 0.41% of the whole research output on the SHT published in Scopus during the specified time frame, specifically 76 out of 18,542 publications. Initially, a quantitative analysis of the metadata was conducted to ascertain the distribution of outputs based on several factors such as years, institutions, nations, authors, journals, and research topics.

Recent advancements in Savonius hydrokinetics have marked a significant pivot towards sustainable and efficient energy solutions. The industry is focusing on energy harvesting and performance optimization of turbines to reduce dependence on non-renewable resources. Researchers are exploring blade profile design to optimize turbine performance, ensuring peak efficiency under diverse water flow conditions. Moreover, the integration of Savonius hydrokinetic systems into the renewable energy ecosystem is also gaining momentum, promoting a seamless and sustainable energy supply. This research demonstrates the potential of Savonius hydrokinetics in a sustainable future.

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