

Renewable Energy Literature in Turkey: Mapping Analysis of the Field and Future Study Suggestions on Overlooked Issues

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Abstract- The fact that the fossil-based energy sources used until today are in danger of being depleted very shortly, the rapid increase in energy prices in the world, and the environmental problems that emerged, made it necessary for all humanity and our country to turn to renewable clean energy sources. Studies aiming to encourage and facilitate the transition of producers and consumers to renewable energy sources have made significant contributions to the literature. In this study, published articles on renewable energy sources in Turkey were analysed and academic studies on the subject were systematically organized with a holistic perspective. The bibliometric and thematic analysis of 7161 studies on renewable energy resources and 603 studies, in which the evaluation of renewable energy sources from a social standpoint is conducted and published in the Web of Science database from Turkey reveals the citation network of international and national co-authors. The thematic analysis makes it possible to draw attention to overlooked issues by allowing us to identify the focus of academic activities on renewable energy sources. Therefore, the results of the study can provide an interdisciplinary and research-oriented perspective on renewable energy sources. Focusing on green energy from a social perspective can be beneficial in terms of increasing awareness and accelerating the adoption process.

Keywords: Renewable Energy, Bibliometric Analysis, Social Benefits, Environmental Sustainability, Thematic Analysis

1. Introduction

Energy has become one of the most vital requirements of humanity in our present day. Every production activity requires energy. The first of the two important problem areas that come to the forefront in energy and threaten the future of our world is the irregular use of fossil fuels that cause global climate change, and the second is the problem of energy supply, which even leads to wars. The growing debate about the 21st century, climate change, and how society can and should adapt to its consequences in the UN Framework Convention on Climate Change Conference of the Parties (COP21) that was held in Paris in December 2015 and this conference brought the current issue to the present day. It has resulted in the most aggressive intergovernmental agreement made ever [1]. One of the issues at the centre of climate change discussions is energy efficiency. Energy efficiency can be defined as the reduction of energy consumption without causing a decrease in the living standard and service

quality in buildings and production quality and quantity in industrial enterprises, and Renewable Energy (RE) offers significant opportunities in terms of energy efficiency [2].

Renewable energy defines as a collection of energy technologies such as solar, wind, and geothermal, which are derived from renewable sources each time. Sustainable and environmentally friendly RE has recently become one of the main sources of energy production [3], [4]. Wind energy, geothermal energy, solar energy, hydroelectricity, biomass, tidal energy, hydrogen, and other renewable technologies are prioritized and promoted with the many advantages they bring in today's world where zero emissions are targeted [5]. In addition to these advantages, efforts are being made to increase the efficiency of equipment for renewable energy sources daily. There are significant efforts to cut the price and improve the performance of solar cells. In a number of these investigations, the authors propose that the solar panels

evaluated might be excellent candidates for the production of inexpensive and efficient solar cells. [6]-[10].

By adopting renewable energy sources, it will be possible to halt or at least slowdown climate change, as energy will be generated cleanly while satisfying demand [11], [12]. For these reasons, benefiting from RE resources as much as possible must be considered a necessity rather than a choice [13], [14]. In addition to filling a need, this opportunity has also provided investors with a motive to invest in renewable energy, especially in recent years due to increased energy demand [15]. According to the Renewable Energy Investment Tracker Report [16], in which it is stated that the global investment in renewable energy reached \$226 billion in the first half of 2022, setting a record for the first six months of the year, investments in new large and small-scale solar energy projects will reach the first half of 2021. It broke a record with an increase of 33 percent compared to the previous half of the year and reached 120 billion dollars. Wind project financing increased by 16 percent compared to the same period and reached 84 billion dollars. Venture capital and private equity investments in renewable energy and energy storage reached a record, reaching \$9.6 billion, an increase of 63 percent compared to the previous year.

However, it is not possible to say that the transition to renewable energy has taken place at the expected pace in all countries. Various economic, political, technological, and political barriers hinder using Renewable Energy with the awareness of being a world citizen. One of them is undoubtedly the low level of knowledge and awareness in this area, both at the individual and societal levels. Undoubtedly, the academic community has a great role in raising awareness in society and individuals about renewable energy, and in informing and raising awareness of the public correctly. Renewable energy is an area that needs to be handled multi-dimensionally with multidisciplinary methods, as it creates a healthy and sustainable environment for society by reducing carbon emissions, transforming the natural wealth of countries into economic development, meeting the increasing energy needs with technological transformations and even being a tool for political struggles. In this context, it is a necessity to deal with the social dimension of the issue. In this study, the bibliometric analysis of academic debates in the field of renewable energy in Turkey was handled with two different searches carried out in the WoS database, and a comparative analysis of the results was carried out. Academic studies on Turkey and renewable energy and academic publications on Turkey and the social dimension of renewable energy are examined and the course of developments in the field is revealed. Variables such as research keywords, abstracts, and researchers are evaluated with bibliometric identification. The potential research topics of the field are revealed by analysing the keywords thematically and periodically. The results of this study will be an important reference for renewable energy as it evaluates current research trends and potential future research directions in the field of renewable energy and will also form an important basis for future renewable energy research by revealing neglected research areas.

2. Importance of Renewable Energy

The shares of fossil fuels such as coal and oil, which are used as energy sources after wood, in the total energy consumption have increased gradually over time throughout the history of humanity, and after reaching a certain saturation level, they generally started to decrease at a rate close to the rate of increase. The production of new fuel (energy source) first starts in the most developed countries and then spreads to other countries at certain intervals. Although the economic dimension of the world energy sector constitutes only 3% of the total Gross National Product, a sustainable development model is not possible without continuous and cheap energy [17]. Economic growth, a key indicator of a country's level of development, is often achieved through the use of fossil fuels, which have significant environmental impacts [18]. Fossil fuels, which cover most of the energy needed worldwide, are significantly responsible for the emission of greenhouse gases and carbon dioxide, which are largely responsible for global warming, climate change, and deterioration of air quality. Natural resources are depleted and climate change is caused by the increase in CO₂ emissions [19]. According to the greenhouse gas inventory results, the total greenhouse gas emission shown in Figs. 1 and 2 were calculated as 506.1 million tons (Mt) CO₂ equivalent in 2019 [20]. The total greenhouse gas emission per capita, which was 4 tons of CO₂ eq. in 1990, was 6.1 tons of CO₂ eq. in 2019.

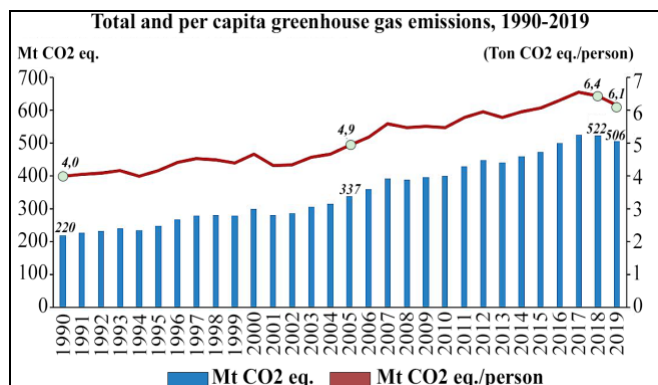


Fig. 1. The total and per capita GHG emissions (1990-2019).
 Source: <https://data.tuik.gov.tr/>

In total greenhouse gas emissions in 2019, as CO₂ eq., energy-related emissions had the largest share with 72%, followed by agriculture with 13.4%, industrial processes, and product use with 11.2%, and the waste sector with 3.4%. Energy sector emissions increased at a rate of 161% in 2019 when compared to 1990.

It is essential to utilize renewable energy sources while fostering economic growth. Utilizing self-renewing and infinite resource-based renewable energy sources minimizes energy consumption and has a good impact on the environment [21]. The use of RE is accepted as clean energy because it significantly reduces the dependence on fossil fuels as an energy source, not causing environmental and air pollution, and causing low or zero carbon and greenhouse gas emissions [22], [23]. Social media is also an important aspect in terms of helping to increase the popularity and

widespread use of renewable energy sources, as well as assisting in the sharing of information and ideas about their use. Social media platforms play a significant role in the promotion and support of projects related to renewable energy sources. Through this, information about the use of renewable energy sources is obtained and the widespread use of these sources is supported, making a significant contribution to climate change and environmental protection issues [24-26]. However, it is also true that renewable energy has some disadvantages. RE, which has low maintenance requirements, saves money, has many environmental benefits, reduces dependence on foreign energy sources, provides cleaner water and air, creates employment, and reduces waste. It also includes energy types with high installation costs relatively intermittent and limited storage capacity and geographical limitations [27].

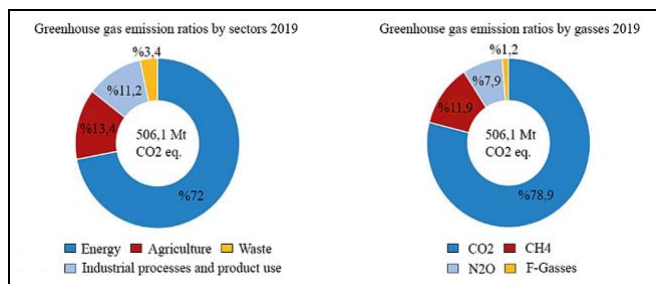


Fig. 2. The greenhouse gas emissions according to sectors.
 Source: <https://data.tuik.gov.tr/>

One of the biggest concerns in the renewable energy field is energy production based on natural resources that cannot be controlled by humans [28]. The uncertainties in the production of RE technologies make integration more complex. When compared to traditional forms of power generation such as fossil fuels, there are still difficulties in generating large amounts of power in RE technology, making it, at least today, impossible to rely on these sources alone for national energy supply. Especially in the age of Web 3.0 with Artificial Intelligence [29], where the communication networks based on electrical energy are so integrated, a power outage means that many services are interrupted globally.

Constant adherence to high standards of power quality is essential for ensuring the continued reliability and efficacy of the energy distribution network [30]. The quality of the power supply makes the system work well with high reliability and lower costs. However, poor power quality can have significant adverse effects on the power grid and industrial processes. RE, whose continuity is based on uncontrollable factors, is not in the capacity to meet the unconditional and total transition in this respect. Also, RE sources that are not available in different regions (i.e., areas that do not receive enough sun or wind, etc.) have high installation costs, and limited portability and storability. In addition to all these disadvantages, there is a lack of knowledge and awareness about the benefits of renewable energy and the incentives for its implementation [31].

Renewable energy releases little or no greenhouse gases or pollutants into the air, which means a smaller carbon footprint and an overall healthier atmosphere [32]. It can be

argued that the gas released to nature by the establishment or activities of RE plants causes relatively carbon emissions. However, some RE sources can even contribute to the reduction of current gas emissions in this field. For example, biomass energy obtained from biological wastes reduces the amount of waste going to landfills, while reducing the total amount of carbon released into the atmosphere.

In addition, to benefit from natural energy resources in different regions of the country, ensuring the sustainability of energy supply by evaluating different geographical conditions, and reducing transfer costs, it also supports regional developments [33]. The fact that the sector operates in a wide area, not in certain regions, contributes to the regional economic development and stability of renewable energy, reducing the country's dependence on foreign energy resources. In this respect, it has the power to reduce the possibility of using energy as a geo-political trump card.

Because of the Russian-Ukrainian War, which turned into the Russian occupation of Ukraine in February 2022, the gas and electricity prices, which rose rapidly with the interruptions in the gas flow, put the European heavy industry in crisis. In response to the economic and political sanctions imposed by the European Union (EU) on Russia, Russia's massive restriction of gas flow has directly affected the global energy market [34]. European natural gas prices reached historical peaks, exceeding 20 times two years ago, and the rapid increase in gas prices was reflected in electricity, resulting in an 8-fold increase in wholesale electricity prices in European countries when compared to the previous year. Because of the inability of European countries to take adequate measures against the energy crisis, price increases were reflected in producers and businesses, and strategic facilities in critical sectors began to experience difficulties in production with increasing energy costs and uncertainties [35], [36]. Although the oil-based energy crisis in the 1970s affected the USA and European countries, the fact that the share of low-carbon emission technologies in electricity generation increased from 21.5% to 39% in the last 45 years was not sufficient to avoid the new crisis because of the fully integrated energy architecture. It turned into a crisis that affected almost all regions of the world [37].

While the war in Ukraine threatens the energy security in Europe, the Europeans' turn to wood for heating increases demand, prices, and environmental concerns. According to a study published by the European Public Health Alliance in 2022, health-related costs of approximately 17 billion euros arise across Europe because the use of wood as fuel has a higher carbon pollutant emission level per unit than coal and wood stoves have a 28 percent effect on particulate pollution, and air pollution from burning wood causes a total of 27 billion euros per year in health expenses in societies in the European Union and the UK [38].

The increased use of renewable energy directly affects public healthcare. Total healthcare expenses in Turkey increased by 24.3% in 2020 when compared to the previous year and reached 249 billion 932 million TL [39]. No doubt, although the global COVID-19 pandemic had severe effects on this increase, the social dimension of renewable and clean energy studies should be underlined to achieve the goals of a

sustainable environment and healthy society in an environment where the general government health expenditure increased by 26.3% and reached 198 billion 62 million TL.

3. Renewable Energy and Turkey

To prevent climate change and reduce its effects, countries reduce fossil fuel consumption and accelerate the transition to low-carbon technologies. Renewable energy sources are critical in reducing emissions from conventional power generation techniques. Renewable energy sources such as solar, wind, and hydrogen are preferred because they are environmentally friendly and sustainable, although they are not as efficient as electricity produced from fossil fuels. In addition, the investments of companies operating in the energy sector in these technologies are increasing rapidly, and the transition to an environmentally friendly energy production system that reduces carbon footprints is accelerated.

Turkey, which has a wide variety of renewable energy sources including solar, wind, geothermal, hydro, and biomass, has made significant progress in increasing its renewable energy capacity and reducing its dependence on fossil fuels in recent years. According to data from the International Energy Agency (IEA), the share of renewable energy in Turkey's total primary energy mix reached approximately 13.5% in 2020, making it one of the leading countries in the region in terms of renewable energy adoption. According to the data of the Ministry of Energy and Natural Resources, Turkey's installed renewable energy capacity reached 60.6 GW in 2021, representing approximately 30% of the country's total installed power generation capacity. Solar energy is the dominant renewable resource in Turkey with a total installed power of 27.4 GW, followed by wind energy with 21.4 GW. Hydroelectric power plants also make a significant contribution to Turkey's renewable energy composition with an installed power of 10.8 GW. In addition, the country has a small but growing geothermal and biomass sector with an installed capacity of 1.3 GW and 1.2 GW respectively. In terms of changes over the years, Turkey's renewable energy capacity has been growing steadily, with an average annual growth rate of around 9% between 2010 and 2020. The country's rate of adoption of renewable energy is still below the global average, but it is making progress toward a sustainable and low-carbon energy system [40]. In 2021, 30.9% of Turkey's electricity production will come from coal, 33.2% from natural gas, 16.7% from hydraulic energy, 9.4% from wind, 4.2% from solar, 3.2% obtained from geothermal energy, and 2.4% from other sources. As of the end of November 2022, the country's installed power reached 103,541 MW. As of the end of November 2022, the distribution of the country's installed energy power by resources; is 30.5% hydraulic energy, 24.4% natural gas, 21.1% coal, 11.0% wind, 9.0% solar, 1.6% geothermal, and 2.4% other resources.

Within the framework of the policy of supporting renewable energy production to increase energy supply security, increasing the share of renewable resources in electricity generation from 32.5 in 2018 to 38.8 in 2023 has

been set as a target in the Republic of Turkey's Eleventh Development Plan (2019-2023) and "Electricity from renewable energy sources production will be increased, and the necessary planning and investments are made to ensure the safe integration of renewable energy production into the grid" has been included in the Development Plan. The Turkish government develops various incentives and policies such as tariff guarantees, tax exemptions, and grants to encourage the development of renewable energy projects. In 2021, the total investment in renewable energy reached approximately 11 billion dollars and much of the financing was obtained from domestic sources [41]. The government has also set ambitious targets to increase the share of renewable energy sources in the energy mix to 50% by 2030. Overall, Turkey's renewable energy sector is expected to continue to grow in the coming years with increased investments and the implementation of more ambitious targets [42].

4. Methodology

Studying the literature on a topic allows us to systematize and analyse all the information on the topic under consideration. Analysing by various methods helps researchers make clear and reliable reviews of scientific references [43]. Various scientific studies are carried out such as theme-based, framework-based, theory-based, theory development, hybrid type, and bibliometric analysis [44]. In the literature, bibliometric analysis and thematic analysis are generally used, which enable solid and regular research [45]. The authors work in this dual structure; thematic analysis can be made according to the selected studies by using parameters such as citations, keywords, and the countries in which they were published [46].

This study was carried out to analyse the studies on renewable energy sources in Turkey and academic studies accessed from the WoS database were used for this. Web of Science is a website that provides subscription-based access to multiple databases that provide comprehensive citation data for many different academic disciplines. The Web of Science Core Collection consists of six online databases: Science Citation Index Expanded (SCIE), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI or AHCI), Emerging Sources Citation Index (ESCI); Book Citation Index (BCI) and Conference Proceedings Citation Index (CPCI).

The analysis performed internationally with the logical operator includes "renewable*" AND "energy*" AND Turkey* OR "green*" AND "energy*" AND "Turkey*" publications containing the words were examined at Web of Science.

In the two-stage analysis with the logical operator, first, the publications containing the words "renewable*" AND "energy*" AND Turkey* OR "green*" AND "energy*" AND "Turkey*" were examined in the Web of Science. In the second search, the workspace has been narrowed by adding the search word "social".

There was no filtering for the study and the articles published from 1989 to the present were included in the

research. The studies published in peer-reviewed journals were scanned with the keywords and a total of 7161 documents were reached in the first acquisition. In the second search, with the addition of the word “social” to the search, the total number of publications accessed was 603. In this context, the methodology met the data refinement required in Fig. 3.

<p>Assembling</p> <ul style="list-style-type: none"> • Identification <p>Searching Domain: Renewable Energy in Turkey Research Questions: RQ1: In which areas do academic studies examining renewable energy in Turkey concentrate? RQ2: In which areas do academic studies examining the renewable energy issue with its social dimension concentrate in Turkey?</p> <ul style="list-style-type: none"> • Acquisition-1 <p>Searching mechanism and material acquisition : Web of Science Searching period : December 2022 Searching keywords : renewable energy* AND Turkey* OR green energy* AND Turkey* The number of articles found as a result of the research : 7161</p> <ul style="list-style-type: none"> • Acquisition-2 <p>Searching mechanism and material acquisition : Web of Science Searching period : December 2022 Searching keywords : renewable energy* AND Turkey* AND social* OR green energy* AND Turkey* AND social* The number of articles found as a result of the research : 603</p>
<p>Assesing</p> <ul style="list-style-type: none"> • Evaluation <p>Performance Evaluation : Bibliometric variables, co-citations network and geographical analysis under RQ1 and RQ2 Software : R-Studio, Bibliometrix</p>

Fig. 3. The structure of the systematic literature review

Additionally, Figs. 4 and 5 demonstrate how the search panel of the Web of Science platform is used with the desired keywords. In this direction, objectivity is maintained by using numerical information in the selection of main and identical articles by using the bibliometric technique [47].

The study’s research questions allow for answers for structured analysis. The research questions for the thematic analysis, whose algorithm and findings are presented below, were determined as follows.

- RQ1: In which areas do academic studies examining renewable energy in Turkey concentrate?
- RQ2: In which areas do academic studies examining the renewable energy issue with its social dimension concentrate in Turkey?

With the bibliometric analysis, answers were sought to the research questions of the study. Bibliometric analysis was carried out in different dimensions such as “keyword analysis” and “thematic analysis”. Geographical analysis and common citation analysis were not performed in the study because they did not produce meaningful findings for the research questions.

All obtained and categorized articles are applied as data input to create a map of their topics. The data is then processed via the Bibliometrix library written in R-Studio. Since it is programmed in the R language, it is flexible, can be developed rapidly, and can be used in integration with other R programs, open source Bibliometrix guides the researcher in the analysis processes [48]. The outputs use the weighted sum of the squares of the distances of correlations between all broadcast pairs concerning similarities [49], [50].

Fig. 4. The keywords and search panel of the Web of Science platform - Acquisition 1 (Acq-1)

Fig. 5. The keywords and search panel of the Web of Science platform - Acquisition 2 (Acq-2)

A keyword analysis is a bibliometric technique that analyses the main source content of leading publications and displays them in a search database with keywords. It also allows the identification of the most frequently used words in studies conducted over a certain period when used with analyses by year. It can also be used to track trends in scientific studies and show how a subject’s popularity has changed over time [51].

This analysis, which is highly preferred in data collection applications, allows for the systematic, one-sided, and regular examination of literature content. It is a form of ontological analysis used to research and analyse the meanings of sentences and words used at a study level by shifting them to the right or left. This analysis may also include metrics such as evaluating the impact factors, citation counts, and publication counts of research [52]. The qualitative analysis of a specific sample allows for scanning multiple sources, such as written texts. Qualitative analysis is a method that deeply examines the content of the samples and aims to extract meaning. This helps researchers discover similarities and differences among the samples and assists in drawing general conclusions [53], [54]. Researchers utilize various software based on artificial intelligence for this purpose. This software automates processes such as data collection, analysis, and result extraction, helping researchers save time [55]. In this study, R-studio was used to perform a thematic analysis with Biblioshiny. This software helps researchers collect, analyse, and extract results. Thematic analysis is a method that examines the content of the data and aims to extract meaning, helping researchers discover similarities and differences among the samples.

5. Results and Findings

This section simultaneously responds to RQ1 and RQ2 by discussing the findings on renewable energy publications in Turkey with and without the social dimension.

Renewable Energy is the subject of research by many different disciplines, and especially its technical and economic dimensions are examined. When the Web of Science (WoS) Core Collection database is searched with the keywords “renewable energy” and “green energy”, 253543 results are reached. When the same survey was carried out for Turkey, it is seen that 7161 studies were carried out. Two data sets obtained from the WoS database with the above-mentioned scanning method were analysed in the computer environment. The thematic analysis of the article series was also carried out using the Biblioshiny library.

Table 1 provides a general workspace to get an overview in the next section. This table shows that there was a total of 7161 articles published in journals in Web of Science indexes scanned by national and international researchers in Turkey between 1989 and 2022. The total number of keywords is 14450, meaning renewable energy studies consist of various thematic aspects. KeyWords Plus, which are words and phrases blended from the titles of cited articles, is about half of the keywords cited by the authors. While there were 13696 authors in the articles, the average number of citations for each article was calculated as 24.79. The same values for acquisition two are 603 articles, 1635 keywords, 3289 authors, and 28.8 which is the number of citations per article, respectively.

As can be seen in Fig. 6, 7161 publications are reached between the years 1989-2022 in the results of the searches carried out with the words “renewable energy” and “Turkey” in the WoS indexes. These publications concentrate on the subjects “Energy Fuels”, “Green Sustainable Science Technology”, “Engineering Electrical Electronic”, “Environmental Sciences”, “Thermodynamics”, “Engineering Chemical”, “Engineering Environmental”, “Chemistry Physical” and “Environmental Studies”. It turns out that most of the studies are carried out by engineering sciences and a small part of their deals with the economic dimension.

When the word “social” is added to the search words to get a general idea about how many of the studies touch on the social dimension of the issue, the number of publications drops to one-tenth. As can be seen in Fig. 7, 603 publications are reached between 1999-2022 in the results of the search carried out with the words “renewable energy”, “Turkey” and “social” in WoS indexes.

An important milestone is the adoption of the Paris Agreement in 2015. The Paris Agreement is an agreement that aims to reduce carbon emissions and use renewable energy sources to prevent global warming from exceeding 2 °C. This agreement was adopted under the United Nations Framework Convention on Climate Change and has been signed by 190 countries so far. Among the objectives of the Paris Agreement are to aim to reduce carbon emissions by 40% by 2030 and to try to limit global warming to a

maximum of 1.5 °C. [56], [57]. And since then, research on renewable energy sources has become more important and there has been an increase in academic studies based on this [58], [60]. The same momentum has been observed in Turkey since 2015.

Table 1. Main characteristics of the data

Description	Results	
	Acq.1	Acq.2
Main Information about the Data		
Timespan	1989:2022	1999:2022
Sources (Journals, Books, etc.)	1352	202
Documents (Doc)	7161	603
Annual Growth Rate %	30.29	24.04
Document Average Age	5.17	3.94
Average Citations per Doc	24.79	28.8
References	199337	24564
Document Contents		
KeyWords Plus (ID)	7378	1043
Author’s Keywords (DE)	14450	1635
Authors		
Authors	13696	3289
Authors of Single-Authored Docs	607	73
Authors Collaboration		
Single-Authored Docs	952	83
Co-Authors per Doc	3.57	6.75
International Co-authorships %	34.8	50.25
Document Types		
Article	7161	603

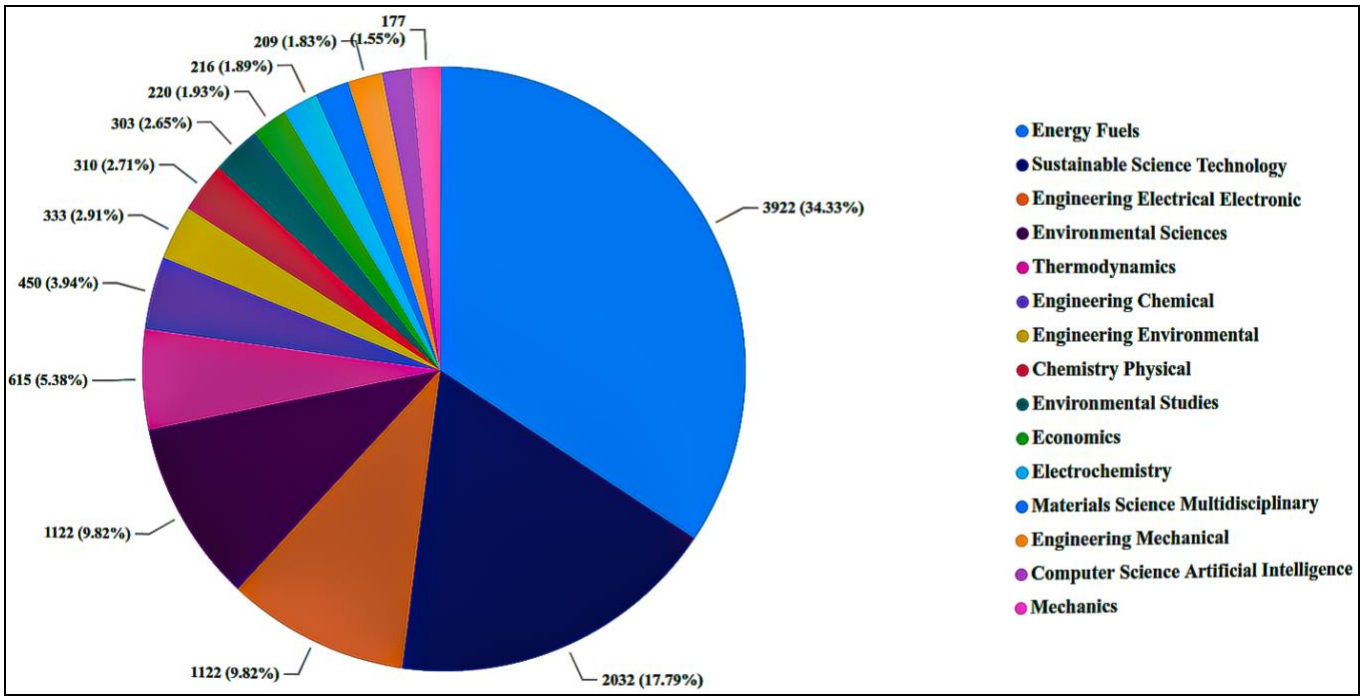


Fig. 6. Acquisition 1 - The results of the search were carried out with the words “renewable/green energy” and “Turkey” in the WoS indexes

According to this analysis, in addition to the technical issues, it is observed that, in addition to the studies on “Economics,” which are among the previous studies, studies on the themes of “Educational Research,” “Management,” and “Business” are presented. The term “Economics” refers

to the field of study that investigates the relationship between economics and other topics. When seen from this angle, it is possible to assert that renewable energy is deserving of investigation not just from an academic and business point of view, but also in terms of its impact on the economy.

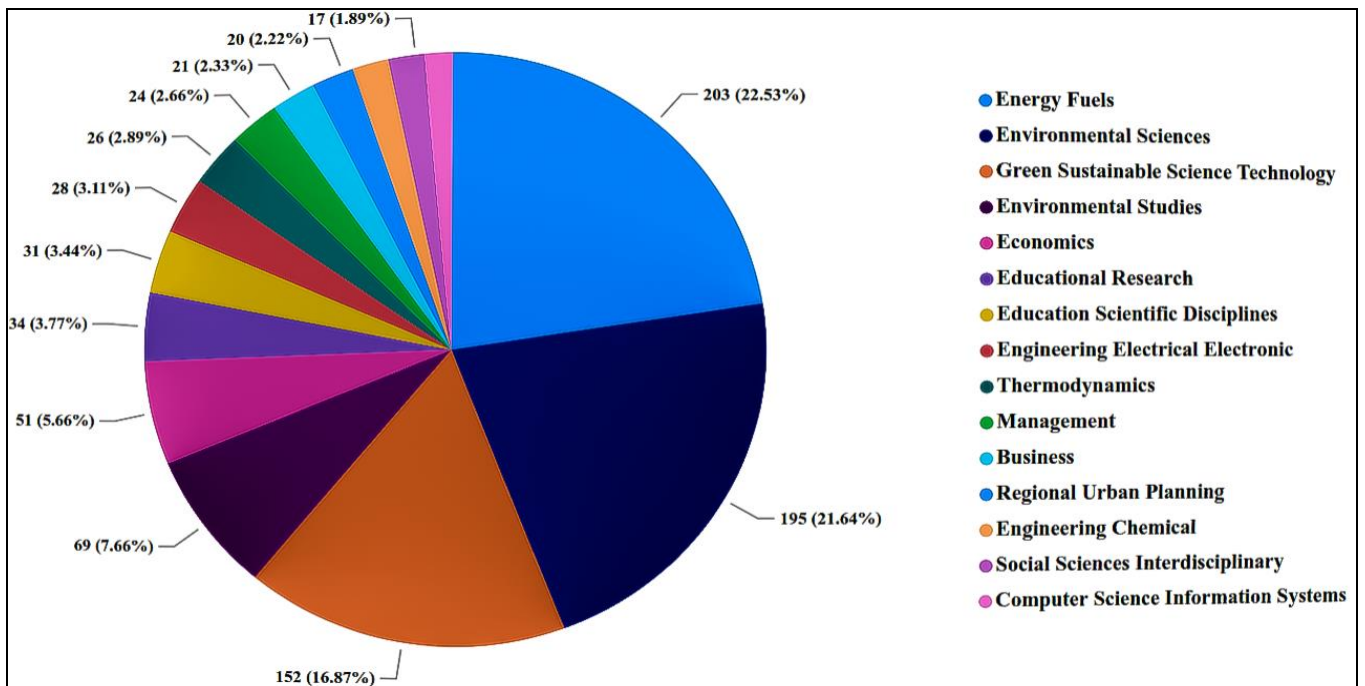


Fig. 7. Acquisition 2 - The results of the search carried out with the words “renewable/green energy”, “Turkey” and “social” in WoS indexes

7.

8. Conclusion

The application of RE technologies can offer a variety of positive socio-economic effects at both national and local levels, such as securing and diversifying energy supply, reducing external dependency, increasing regional development, and employment, and raising the standard of living by promoting a healthy environment. Investments in renewable energy resources, which aim to use natural resources efficiently to help reduce global warming, are increasing day by day. To reduce the amount of carbon dioxide released into the atmosphere as a greenhouse gas, studies are continuing to increase the performance and efficiency of renewable energy sources. Turkey also takes steps to support its economic growth with environmentally friendly renewable energy sources and implements policies in this direction. The low rate of consumer adoption of renewable energy sources can be seen as an obstacle to these efforts. Although the issue of renewable energy is a subject that is frequently examined by the academic community, it has been revealed by the research findings that the social dimension of the issue is handled at a low rate, and these studies are carried out within the framework of increasing the efficiency of renewable energy resources and ensuring optimization in the context of economic development and financial development. While determining the political measures to be implemented to increase the use of renewable energy by society, it is important to underline the importance of the issue in terms of a sustainable environment, to emphasize its social benefits, and to increase the level of awareness on this issue, as well as providing economic incentives for the use of renewable energy. In this context, starting an awareness movement in this direction in education programs at all levels will be an important step to be taken today in terms of leaving a liveable environment to the next generations.

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