Trend analysis of published open-access articles referring to climate comfort.

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Abstract. The aim of this study was to analyse trends in publications on the term "Climate Comfort" in the Science Direct and Scopus databases. For this, filters were applied for a more detailed analysis, with the same filters applied in both databases. First, keywords such as "Climate Comfort" were used, together with compositions that indicated the location of the study, such as "in", "on", among others. Then, restriction filters were applied so that the results came from "open publications", "articles" and in "English language". The results were significant and organized in tables during the methodology. The tables were composed of three columns: "reference and year", "thematic area" and "country/zone". As the Vancouver referencing system was used, the numbers in square brackets indicated the respective reference, while the year was kept in the table to facilitate reading and data analysis. The results showed that the Science Direct database presented only 4 results, while Scopus database presented 45. The country that stood out in the number of publications was China, and the absence of many countries in relation to studies related to the subject was noted. It is not clear whether the theme publishing trend is growing. It is expected that this study will help in the planning of further studies.

Keywords. Climate Comfort, Trends, Articles, Publications, Open Access.

1. Introduction

In this scientific research, it is speculated to investigate the trend of published articles referring to the term “climatic comfort” The objective is to identify what has been published on the subject.. As people have distinct physical, physiological and mental tastes and preferences, including for environmental issues, the American Society of Heating, Refrigerating and Air-Conditioning Engineers (“ASHRAE”), created methods through Standard 55 (1), to define thermal comfort through specific percentages, in steady state. The six main factors are: i. metabolic rate; ii. clothing insulation; iii. air temperature; iv. radiant temperature; and v. air velocity and humidity. It is worth remembering that this standard is aimed at people who normally work in offices, with a more sedentary profile and who do not practice, or almost do not practice physical activity. Thermal comfort is defined in the standard as “the mental condition that expresses satisfaction with the thermal environment”.Fanger's PMV (Predicted Mean Vote) model for thermal sensation is a well-known and widely used reference around the World. It is an index to predict the thermal sensation of the individual with the conditions of the thermal state. There is a combination of environmental variables, with two personal factors (clothing insulation and activity level) (2). As some factors can alter the behavior of models, for example, when the individual has just finished exercising and is sweaty, wind speed becomes a factor of greater importance. PET (Physiological Equivalent Temperature) is a model of human body heat balance in which the body's thermal balance is balanced with core and skin temperature under the external conditions to be evaluated (3), i.e, an index of human energy balance. For Matzarkis (4), PET has an advantage because its unit is in degrees °C, which sometimes makes it easier for those who are using it. However, both PMV and PET are universal indices for characterizing climate comfort, with PET for the biometeorological assessment of the thermal environment. The Commission of the International Society of Biometeorology (ISB) developed the Universal Thermal Climatic Index (UTCI) for evaluating the thermophysiological effects of the atmospheric environment. The ambient air temperature in the UTCI is defined as a reference, and is equivalent for each combination of variables (air temperature, humidity, radiation and wind). (5)

2. Research Methods

The study area of this research is a global analysis based on Science Direct and Scopus databases.

2.1 A systematic review

To identify trends in climate comfort studies from open access articles in the Science Direct(6) and Scopus(7) databases, the following methodology was established: First, in carrying out the searches, compositions of keywords were used that mandatorily contained the terms “climate comfort” together with the set of varied words for the terms “for”, “on”, “in”, and “of”. It was not limited to a scope referring to the place. Therefore, it is a global analysis. For both, refinement was applied for articles only, open access and language in English. Thus, the restrictions applied to the search were: a) article type document, b) English language, c) open access and d) search in Title, Abstract and Keywords of articles. No filter was used to select a specific period. All the remaining articles of the search were analyzed and used in this investigation through tables and explanations. The tables have the following columns: a) reference, b) thematic area and c) study location.

3. Results and Discussion

Considering the systematic review carried out in the Science Direct and Scopus databases, according to the methodology applied and described in item 2 of this article. The final results were: 04 articles from the Science Direct and 45 articles from the Scopus databases. The tables 1, 2 and 3 present the details of this research. The tables are composed of three columns: a) reference, which contains the authors and year of publication; b) the thematic area; and c) country/zone. The column is by country/zone, as the study area of the articles will be counted as a country or zone, that is, it is a global study referring to the trend of published articles on climate comfort, and for this research in question, only the country and/or zone, that's enough. Therefore, articles made in the provinces will be considered from the country. When demarcating zones, it is understood that the studies were carried out in more than one country however, on the same continent.

3.1 Science Direct

After applying the filters, the database showed 04 results. Of these, the thematic areas Environmental Science and Social Sciences were the most published, representing 57% of the thematic areas published by the theme, while Agricultural and Biological Sciences; Arts and Humanities and Earth and Planetary Sciences were the other subject areas published, with around 14% each. The results are shown in Table 1. The table is organized by publication year history. Through it, it is possible to gather important information, such as: (I) 75% of the analyzed articles come from the Asian continent, and 25% correspond to the European area; (ii) of the four studies, one is from 2015, two from 2016 and one from 2020, which demonstrates that the topic has not been explored in recent years.

Tab. 1 - Science Direct detailed analysis.

Reference and Year	Thematic Areas	Country/ Zone
(8), 2020	• Social Sciences.	Indonesia
(9), 2016	• Environmental Science; • Earth and Planetary Sciences.	Europe
(10), 2016	• Environmental Science; • Social Sciences;•Agricultural and Biological Sciences,	Singapore
(11), 2015	• Arts and Humanities.	Iran

3.2 Scopus

Of the 45 articles selected for this analysis, 32 of them address the thematic area of "Environmental Science". Evaluating this respective theme, according to table 2, it is possible to gather important information, such as: (a) despite being on the theme of environmental science, the same article can be found in more options of themes, where the minimum was just one theme , being environmental deficiency, with the majority of the results (34.25%) and the maximum of indexed themes reached five different ones, represented by the smallest part of the results (12.25%); (b) of the 32 articles on this topic of environmental science, 16 correspond to articles written in China and its provinces, which represents 50% of the articles published on this topic. In second place among the most published are Iran with 11%, Serbia and the European zone with 8% each, Russia with 5% and Spain, Austria, Greece, Pakistan, the arctic zone and a general article, with 3% each; (c) another interesting analysis refers to the years of publication, it is noted that in the period prior to 2020, 2016 was the year with the largest publication on the subject (15%), so 2017 had only 1 publication (3%), and 2018 and 2019 with 2 publications each (6%). As of 2020, the years 2020 and 2021 had the same number of publications for the topic, with 21% each, 2022 was the year of the entire period with the highest number of publications (25%) and 2023 with only 3%. However, it should be noted that this article was prepared in the first four months of 2023 and, therefore, 2023 should not be considered as a downward trend for the topic.

Tab. 2 - Detailed analysis of Scopus with the most published subject area: Environmental Science.

Reference and Year	Thematic Areas	Country/ Zone
(12), 2023	• Environmental S.	China
(13), 2022	• Environmental S.	Serbia
(14), 2022	• Environmental S; •Computer Science; •Energy; •Social S; •Engineering.	China
(15), 2022	• Environmental S; • Earth and Planetary Sciences.	China
(16), 2022	• Environmental S.	China
(17), 2022	• Environmental S.	China
(18), 2022	• Environmental S	Spain
(19), 2022	• Environmental S.	China
(20), 2022	• Environmental S.	Greece
(21), 2021	• Environmental S; •Energy; •Social S.	Artic
(22), 2021	• Environmental S.	Europe
(23), 2021	• Environmental S; • Energy; • Social S; • Engineering; • Computer Science.	General
(24), 2021	• Environmental S; • Computer Science; • Energy; • Social S; • Engineering.	China
(25), 2021	• Environmental S.	China
(26), 2021	• Environmental S; • Earth and Planetary Sciences.	Austria
(27), 2020	•Environmental S; •Earth and Planetary Sciences.	Iran
(28), 2020	• Environmental S; • Engineering.	Iran
(29), 2020	• Environmental S; • Energy; • Social S; • Engineering; • Computer Science.	China and Pakistan
(30), 2020	• Environmental S; • Energy; • Social S.	China and Russia
(31), 2020	• Environmental S; • Energy; • Social S.	China
(32), 2020	•Environmental S; •Earth and Planetary Sciences.	China
(33), 2020	• Environmental S; • Earth and Planetary Sciences.	China
(34), 2020	• Environmental S; •Earth and Planetary Sciences.	China
(35), 2019	• Environmental S; • Energy; • Medicine.	Russia
(36), 2019	• Environmental S; • Energy; • Social S.	Poland
(37), 2018	• Environmental S; • Energy; • Social S.	China
(38), 2018	• Environmental S.	Iran
(39), 2017	• Environmental S; • Social S; • Engineering.	Iran
(40), 2016	• Environmental S; • Energy; • Medicine.	China
(41), 2016	• Environmental S.	Serbia
(9), 2016	• Environmental S; •Earth and Planetary Sciences.	Europe
(10), 2016	• Environmental S; • Agricultural and Biological Sciences.	Singapore

a) The "Environmental Science" and "Social Science" word sets were reduced to "Environmental S" and "Social S" for better table formatting of the table.

Out of 45 selected articles, 32 are analyzed in Table 2, leaving 13 diverse thematic areas described in Table 3 using the same structure. Social Sciences is the most used thematic area with 30% and 4 results. Multidisciplinary has the lowest rate of use with 7%. 4 of the 13 articles in Table 3 are from China, representing 30%. General location articles represent 15%, while Iran, Mongolia, The Netherlands, Indonesia, Serbia, Czech Republic, and Jordan each represent 7%. The first publication was in 2014, and the next was in 2018, with a temporal spacing of publications. 2019 had three publications, 2020 had two, 2021 had four, and 2022 had two. The authors are using the subject area of Environmental Sciences, and the results are gradually increasing.

Tab. 3 - Detailed analysis of Scopus without the most published subject area.

Reference and Year	Thematic Areas	Country/ Zone
(42), 2022	•Social Sciences; •Arts and Humanities.	Jordan
(43), 2022	• Engineering.	General
(44), 2021	•Arts and Humanities; • Materials Science.	Iran
(45), 2021	• Engineering; • Energy; • Mathematics.	Czech Republic
(46), 2021	• Social Sciences; • Management and Accounting; •Earth and Planetary Sciences.	China
(47), 2021	• Social Sciences.	Serbia
(8), 2020	• Multidisciplinary.	Indonesia
(48), 2020	• Energy.	China
(49), 2019	• Earth and Planetary Sciences.	China
(50), 2019	• Computer Science.	The Netherlands
(51), 2019	• Computer Science; • Engineering; • Materials Science; • Mathematics.	Mongolia
(52), 2018	• Social Sciences; •Business Management and Accounting.	China
(53), 2014	• Computer Science.	General

4. Conclusion

After the analysis, it is possible to draw some conclusions: China leads the publication on climate comfort, according to applied filters, obtaining 20 articles out of the 49 analysed. Iran follows in second place with 6 publications. As for the number of results, the Science Direct database presented 4 results, while Scopus presented 45. The scarcity of publications from other countries and continents is evident in both. It is not clear if this is due to the type of application of the filters, lack of interest, or if the publication trend of the topic is not growing. Another analysis could be that the authors may be using the term "thermal comfort". However, the study did not evaluate the evaluation of this term. The analysis served to visualize how the theme has been explored. There is a growing increase in publications. However, little increase.

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