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SMART CITIES AND COMPONENTS: A BIBLIOMETRIC LITERATURE REVIEW

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ABSTRACT

The world's population is increasing and becoming concentrated in cities. Factors such as population growth, diminishing natural resources, migration, urbanization, environmental pollution, the increasingly apparent effects of climate change, and the diversification of human needs driven by technology are placing pressure on cities. In this context, cities must produce effective solutions to the problems they face and the needs that arise. Smart cities, which produce innovative and sustainable solutions to urban problems and needs using information and communication technologies, are emerging as a solution partner for city administrations. The aim of this study is to examine studies on smart cities using bibliometric analysis, one of the quantitative research methods. The scan conducted on smart city components yielded numerous findings, including the annual growth rate in the field, the journals and organisations with the most publications, frequently used concepts in the field, concept clusters, trending concepts in the field, and future trends. The findings obtained in the study provide an overview of the course of studies in the field of smart cities and constitute an important source of information for future studies. It is anticipated that this resource will serve as a guide for future studies and contribute to smart city literature.

KEYWORDS: Smart Cities, Components, Bibliometric Analysis, Web of Science (WoS), Biblioshiny.

1. INTRODUCTION

The world's population is increasing and becoming concentrated in cities. Alongside the growing population in cities, many factors are increasing the pressure on cities, such as the negative effects of climate change becoming apparent, migration, natural disasters, and changing human needs due to technological developments. Moreover, in this context of diminishing natural resources and population growth, it is inevitable that city administrations develop sustainable methods while producing solutions to the problems and needs of cities. It is at this point that the smart city, which uses information and communication technologies as a method to produce innovative and sustainable solutions to the problems and needs of cities, has emerged as a solution partner for city administrations. Smart solutions produced in urban service areas have increased the potential of city administrations to intervene instantly and continuously in problems and needs. Solutions produced in the components of Smart Economy, Smart Environment, Smart Government, Smart Living, Smart Mobility, and Smart People have also had a positive impact on the resilience and sustainability of cities. Smart city applications using technologies such as artificial intelligence, digital twins, the Internet of Things (IoT), and the metaverse have produced visible solutions in the areas where cities provide services, as well as playing a role in strengthening cities' infrastructure and managing infrastructure services. The concept of smart cities, which has recently entered the literature as a new concept, has become an important focus of study for many sciences and disciplines. The smart city literature has developed rapidly as a result, and is currently open to development both in the scientific world and in practice by local governments. Considering that cities, which have historically been large areas where people meet their common needs together, have now reached populations exceeding millions, smart cities, which are the solution partners that city administrations turn to, are predicted to maintain their importance in the future as they do today.

The aim of this study is to examine research on smart cities using bibliometric analysis methods. This examination was carried out by filtering the components of smart cities, namely "Smart Economy, Smart Environment, Smart Government, Smart Living, Smart Mobility, and Smart People". In this study, conducted using bibliometric methods, a performance analysis was first carried out. This analysis includes findings such as the number of articles published on smart cities, the number of citations, the annual growth rate in the field, the countries, journals and authors with the most citations, and the number of interactions between countries in terms of collaboration. The concept analysis section of the " " analysis yielded findings such as the concepts frequently used in the field of smart cities, the themes under which the concepts were clustered, and the usage status of the concepts. It is anticipated that the findings obtained in the study will facilitate the understanding of studies related to smart cities, the course of the field, and the acquisition of information about the field by researchers who will work in this area in the future.

2. METHODOLOGY

Bibliometric analysis is a method that performs statistical and quantitative analysis of scientific publications on a specific subject. This analysis considers both a subject and a journal as a sample. The bibliometric method enables the mapping of the knowledge structure in a field through research, presents developments, reveals trends, and predicts the thematic evolution in a specific field (Gu et al, 2023, Põder, 2022, Ji et al, 2023). In this study, the bibliometric analysis method, one of the quantitative analysis methods, was used. The reason for choosing the bibliometric analysis method is that it allows for the systematic examination of large volumes of data. In this respect, bibliometric analysis performs statistical analysis of publications (Chen et al., 2016, p.1052). Another motivation for selecting the bibliometric method is that it increases the reliability of the results in determining, defining, and evaluating studies with a quantitative approach (Agnusdei & Coluccia, 2022). In summary, bibliometric analysis provides an understanding of the contributions of keywords, authors, institutions, journals, and countries to a field, the frequency of use of concepts, and the networks of co-occurrence in studies produced in a given field (Liu et al, 2022). Bibliometric studies are conducted using data sets found in numerous databases. Some of these databases include PubMed, Google Scholar, Scopus, and Web of Science (WoS). Web of Science (WoS), which has a significant volume of literature, was used in this study (Pranckutė, 2021, pp. 1–4; Birkle, 2020, pp. 363–364). This database also forms the sample of the study. Based on this, studies related to smart cities in the Web of Science (WoS) database were searched using the keywords "Smart Economy, Smart Environment, Smart Government, Smart Living, Smart Mobility, and Smart People," which are components of smart cities. The dataset consisting of

986 articles resulting from this filtering was analysed using Biblioshiny, a web interface of the R programme.

Figure 1: Web of Science (WoS) Search Criteria.

3. FINDINGS

3.1. Performance Analysis

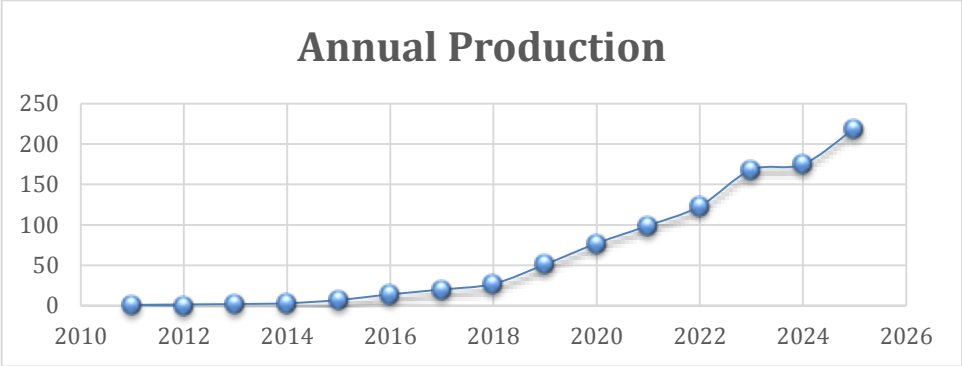
Performance analysis examines the contributions of the components of a study to the field in which the study was conducted. This examination includes many criteria, primarily productivity indicators such as the number of publications, number of citations, and number of authors (Ramos Rodrígue & Ruíz-Navarro, 2004). In addition, country interactions, citations per author, and journal and country statistics are also evaluated in the performance measurement of research components. Therefore, within the scope of this study, the annual growth rate of publications on smart cities, authors and publications with high citation counts, the number of publications by universities and journals, and the number of publications, citations, and collaborations by countries are determined and evaluated through performance analysis.

Descriptive analysis includes information such as the time period in which the studies in a dataset were published, the number of authors, the number of articles, the annual growth rate, the number of co-authored and single-authored articles, and international author collaboration. Accordingly, the descriptive analysis of the dataset used in the study, which analyses studies conducted on smart cities, is presented in Table 1. This information reflects a general overview of the scope of the study. This overview indicates how the current study differs from other studies. In other words, descriptive analysis constitutes the distinguishing feature of bibliometric studies (Donthu et al., 2020).

Table 1: Descriptive Analysis.

Descriptive Analysis	
Time Period	2011–2025
Number of Authors	3884
International Author Collaboration %	40.47
Sources (journals, books, etc.)	435
Average Citations per Article	22.47
Number of Studies	986
Co-authors per article	4.72
Number of Single-Authored Studies	72
Average Age of Articles	2.66
Growth Rate in the Field (Annual) %	44.62

As seen in the table regarding the descriptive analysis, studies on smart cities, which began in 2011, have currently reached an annual growth rate of 42.62%. The progression of studies by year is shown in Graph 1 below. The growth rate in the field is significant, reflecting the topicality of the smart city concept. In addition, the average age of studies in the smart city field being 2.66 indicates the novelty of this field. This finding was determined based on the annual trend of the 986 articles examined in the study. Other findings related to the descriptive analysis, as shown in Table 1, indicate that there are 3,884 authors in the field of smart cities, 72 of whom have authored their studies individually. In contrast, 40.47% of the studies in this field involve international collaboration. This statistic on international author collaboration indicates that the field of smart cities is conducive to collaboration. In addition, the average number of co-authors per article in the field of smart cities is 4.72.



Graph 1: Annual Increase in the Number of Articles.

Graph.1 show that there were 219 articles in 2025, 175 articles in 2024, 169 articles in 2023, 123 articles in 2022, 99 articles in 2021, 77 articles in 2020, 51 articles in 2019, 27 articles in 2018, 20 articles in 2017, 14 articles in 2016, 7 articles in 2015, 3 articles in 2014, 2 articles in 2013, and 1 article published in 2012, indicating the annual increase in the number of studies conducted on smart cities. As can be seen from the graph, the number of studies in the field of smart cities has increased significantly over the years. This increase indicates that smart cities are currently a popular topic of study and that the volume of literature on smart cities is growing.

3.1.1. University Analysis

Statistics on the number of publications by universities publishing in the field of smart cities are presented in Table 2. This table shows which universities stand out in terms of research in the field of smart cities.

Table 2: Number Of Publications by Universities.

Universities	Number of Publications
Chongqing University	178
Shenzhen University	93
Hiroshima University	71
University of Macau	47
City University of Hong Kong	46
South China University of Technology	44
Seoul National University	32
Hong Kong Polytechnic University	28
Sungkyunkwan University	26
University of New South Wales	24

As can be seen in Table 2, which contains numerical data on the number of publications by universities, Chongqing University has the most publications on smart cities, with 178 publications. As can be seen from this table, which lists the top 10 universities with the most publications on smart cities, Shenzhen University has 93 articles, Hiroshima University has 71 articles, the University of Macau in has 47 articles, City University of Hong Kong has 46 articles, South China University of Technology has 44 articles, Seoul National University with 32 articles, Hong Kong Polytechnic University with 28 articles, Sungkyunkwan University with 26 articles, and the University of New South Wales with 24 articles. The number of publications by universities can be linked to their contribution to the smart city literature.

3.1.2. Journal Analysis

Statistics on the number of publications by journals publishing in the field of smart cities are presented in Table 2. This table shows which journals stand out in terms of smart city research.

Table 3: Number Of Publications by Journals.

Journals	Number of Publications
Sustainability	66
Sustainable Cities and Society	54
Smart Cities	36
IEEE Access	30
Cities	28
Energies	24
Sensors	16
Journal of Cleaner Production	15

Applied Sciences-Basel	12
Buildings	10

As can be seen in Table 3, which contains numerical data on the number of publications in journals, the journal with the most publications on smart cities is Sustainability, with 66 issues. As can be seen from the table listing the 10 journals with the most publications on smart cities, the Sustainable Cities And Society journal has 54 articles, Smart Cities with 36 articles, IEEE Access with 30 articles, Cities with 28 articles, Energies with 24 articles, Sensors with 16 articles, Journal of Cleaner Production with 15 articles, Applied Sciences-Basel with 12 articles, and Buildings with 10 articles. Although these journals have different scopes and fields of study, their publication of articles on smart cities can be attributed to the fact that smart cities are a common field of study for many sciences and disciplines.

3.1.3. Publication Analysis

Statistics based on the number of citations of articles published on smart cities are presented in Table 4 as the number of citations per publication. The number of citations these articles have received indicates the impact of the studies on the literature.

Table 4: Number of Citations of Publications.

Publications	DOI	Number of Citations
MORENO C, 2021, SMART CITIES	10.3390/smartcities4010006	788
DE JONG M, 2015, J. Clean. Prod.	10.1016/j.jclepro.2015.02.004	664
SHARIFI A, 2020, SCIENCE Total. ENVIRONMENT	10.1016/j.scitotenv.2020.142391	657
DIRO AA, 2018, Future Generations of Computing Systems - THE INTERNATIONAL JOURNAL OF E-SCIENCE	10.1016/j.future.2017.08.043	540
BARBER RM, 2017, LANCET	10.1016/S0140-6736(17)30818-8	481
SHAFIQUE M, 2018, Renewable & Sustainable Energy Reviews	10.1016/j.rser.2018.04.006	429
KLOPP JM, 2017, CITIES	10.1016/j.cities.2016.12.019	313
XU Y, 2018, IEEE Transactions on Smart Grid	10.1109/TSG.2016.2591531	310
KAIKA M, 2017, ENVIRONMENT URBANISATION	10.1177/0956247816684763	308
VIITANEN J, 2014, Environment Planning A-Economic Space	10.1068/a46242	283

The 10 most cited articles on smart cities are listed in Table 4. Looking at the citation counts of the studies; it can be seen that the article with the highest number of citations has 788 citations. The fact that the citation counts of the following studies range from 283 to 664 shows that studies in the field of smart cities have significant citation statistics.

3.1.4. Author Analysis

The citation counts of authors who have authored studies on smart cities are presented in Table 5. This table shows the position of authors working on smart cities within the literature and the trend in their works.

Table 5: Number of Citations by Authors.

Authors	Number of Citations
SHARIFI A	1443
ALLAM Z	1212
HE BJ	936
WANG J	491
OZBAY K	315
LIU X	282
WANG Y	271
YANG H	206
XIE K	194
KIM J	137

Numerical data on the 10 authors working on smart cities and receiving the most citations are presented in Table 5. Looking at the number of citations, the author with the highest number of citations is SHARIFI A with 1443 citations. This is followed by ALLAM Z with 1212 citations, HE BJ with 936 citations, WANG J with 491 citations, OZBAY K with 315 citations, LIU X with 282 citations, WANG Y with 271 citations, YANG H with 206 citations, XIE K with 194 citations, and KIM J with 137 citations. The number of citations these authors have received indicates the richness of the smart city literature.

3.1.5. Geographical Analysis: Country-Publication-Citation Relationship

The results of the geographical analysis, conducted to determine the spatial production,

collaboration and dissemination dynamics of studies in a field, reveal the contribution levels, citation counts and interaction statuses of countries. These are presented and examined in the tables below. The contribution levels of countries in the field of smart cities are presented in Table 6.

Table 6: Countries' Levels of Contribution.

Countries	Freq
CHINA	1196
USA	567
ITALY	269
UK	249
AUSTRALIA	228
INDIA	221
SOUTH KOREA	165
JAPAN	152
SAUDI ARABIA	151
GERMANY	119

As can be seen in Table 6, which shows the level of contribution of countries to the smart city field, China is the leading country with Freq=1196. In the table showing the top 10 countries in terms of their contribution to the smart city field, China is followed by the United States with Freq=567, Italy with Freq=269, the United Kingdom with Freq=249, Australia with Freq=228, India, South Korea with Freq=165, Japan with Freq=152, Saudi Arabia with Freq=151, and Germany with Freq=119. It should be noted that it is expected that the contribution of countries to the smart city field will be similar to their citation counts and interaction status.

Numerical data on the number of citations for each country is presented in Table 7. It should be noted that the number of citations received for countries' work in the field of smart cities is decisive in terms of their contribution to the field.

Table 7: Number Of Citations by Country.

Countries	Number of Citations
CHINA	4559
USA	3633
UNITED KINGDOM	1824
AUSTRALIA	1505
JAPAN	1296
ITALY	1105
FRANCE	881
KOREA	869
NETHERLANDS	742
SPAIN	581

As can be seen in Table 7, which examines references to smart city studies spatially, China is the leading country with 4,559 citations. As can be seen from this table, which lists the top 10 countries with the most citations, China is followed by the United States with 3,633 citations, the United Kingdom with 1,824 citations, Australia with 1,505 citations, Japan with 1,296 citations, Italy with 1,105 citations, France with 881 citations, South Korea with 869 citations, the Netherlands with 742 citations, and Spain with 581 citations.

This section, which examines the spatial situation of studies in the field of smart cities, concludes by discussing the interaction status of countries. With reference to the data in the descriptive analysis of the study, which shows that 40.47% of studies on smart cities were carried out through international cooperation, Table 8 examines the interaction status of countries.

Table 8: Countries' Interaction Status.

Countries	Other Countries with Interaction	Number of Interactions
CHINA	UNITED KINGDOM	35
CHINA	AUSTRALIA	31
CHINA	USA	26
CHINA	JAPAN	22
CHINA	SINGAPORE	16
USA	UNITED KINGDOM	15
USA	CANADA	14
AUSTRALIA	JAPAN	11
CHINA	CANADA	11
INDIA	SAUDI ARABIA	11

As can be seen in Table 8, which shows the interactions in the formation of articles on smart

cities, the interaction counts of 35 between China and the United Kingdom represents the highest interaction at this point. This is followed by 31 interactions between China and Australia, 26 interactions between China and the United States, 22 interactions between China and Japan, 16 interactions between China and Singapore, 15 interactions between the United States and the United Kingdom, 14 interactions between the United States-Canada 14 interactions, Australia-Japan 11 interactions, China-Canada 11 interactions, and India-Saudi Arabia 11 interactions. Cooperation between countries in the field of smart cities indicates that smart cities are an important topic being worked on around the world.

3.2.1. Concept Analysis: Word Tree, Word Cloud, Co-Occurrence Network, Trending Topics, And Thematic Map

In this section, where the conceptual analysis of the study is carried out, Word Tree, Word Cloud, Co-occurrence Network, Trending Topics and Thematic Map analyses will be performed to determine the thematic relationships between concepts. The analyses conducted will enable conclusions to be drawn about the concepts used in studies on smart cities and will present findings on the evolutionary process, particularly thematic clusters in the field. In addition, concepts that are used together and clustered in the smart city literature will be identified. The findings obtained from the conceptual analyses will provide guidance to researchers working in the field by facilitating a better understanding of the existing literature on smart cities. In this context, the keywords in the 986 articles examined within the scope of the study were analysed, and a word tree analysis was first performed. As one of the text mining methods, word tree analysis is essentially performed to identify the most frequently used words in a text and to visualise large hierarchical data (Bederson, 2002, pp. 833-834; Shneiderman, 1992, pp. 92-94). A word tree analysis was performed to determine which concepts were most frequently used in studies on smart cities. The findings obtained from the analysis are presented in Figure 2.

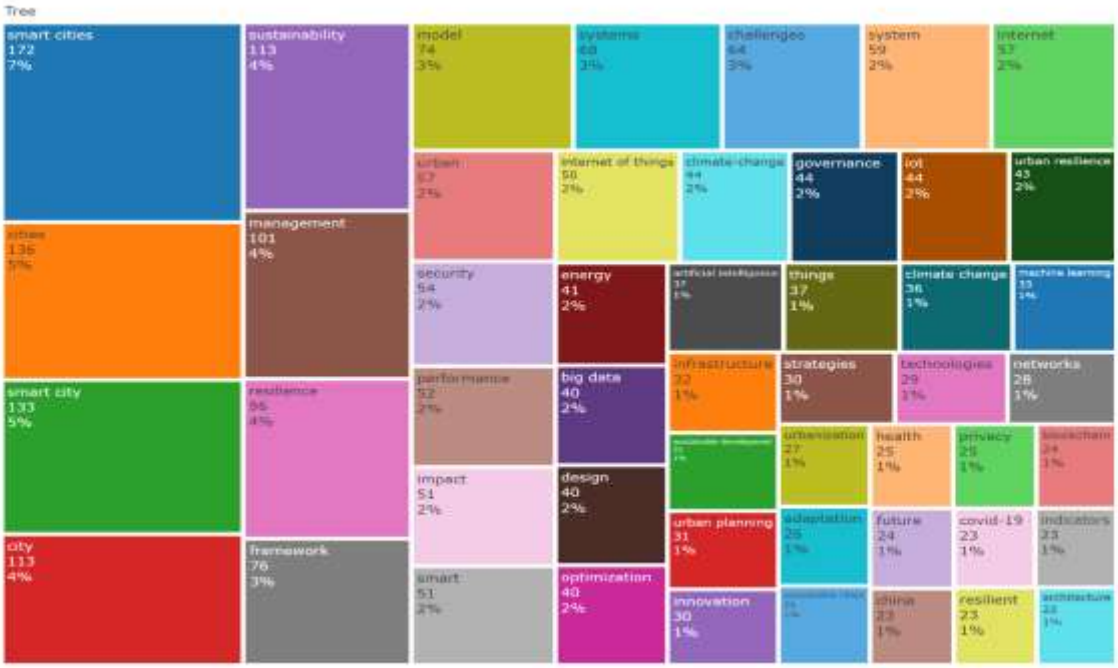


Figure 2: Word Tree Analysis.

The word tree, created based on the frequency of use of keywords, contains the fifteen keywords with the highest weight in studies in the field of smart cities. As seen in Figure 2, the concept with the highest weight in the smart city field is (172) smart cities. This is followed by the other concepts with the highest weight, respectively: cities (136), smart city (133), city (113), sustainability (113), management (101), resilience (96), framework (76), model (74), systems (68), challenges (64), system (59), internet (57), urban (57) and security (54).

Word cloud analysis aims to create a visual representation of the frequency of words obtained from a written text. In the analysis, the frequency

with which words appear in the text determines how large they appear in the word cloud image (Atenstaedt, 2017, p.231). In this context, a word cloud analysis was conducted to identify the most frequently used words in the study on smart cities, and the prominent words are presented in Figure 3.

Figure 3: Word Cloud Analysis.

As seen in Figure 3, which presents a word cloud analysis of concepts frequently appearing in the abstracts and keywords of articles on smart cities, the prominent concept is "cities". This is followed by concepts such as "city", "management", "system", "challenges", and "climate-change". As can be understood from the relatively high-font words in the word cloud, the concepts frequently used in the smart city literature contain concepts related to innovative and sustainable solutions to the problems and needs of cities.

A co-occurrence network analysis was conducted to reveal the themes that stand out in articles on smart cities, the frequency with which concepts appear together, and the relationships between themes related to smart cities. Co-occurrence network analysis creates a clustering of concepts that frequently appear in articles (Lim et al, 2024, p.7). Findings related to co-occurrence network analysis are presented in Figure 4.

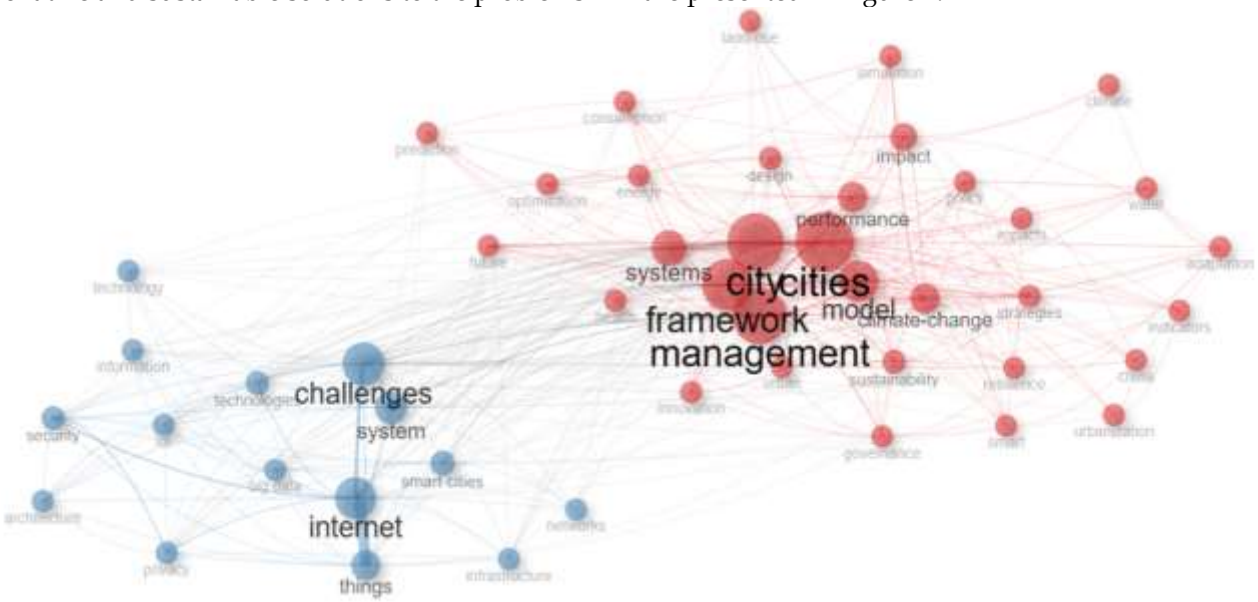


Figure 4: Co-Occurrence Network Analysis.

Figure 4 shows the most frequently used concepts based on the co-occurrence frequency of concepts in

the summaries and keywords of studies in the field of smart cities, the relationships between these concepts, and the co-occurrence frequency of concepts, represented by a co-occurrence network. The co-occurrence network analysis findings reveal the frequency with which the concepts of "cities", "management", "framework", "challenges" and "internet" are studied and their relationships with other concepts. In addition, it shows that the concepts of "adaptation", "architecture" and "land-use" have been studied relatively less and are less related to other concepts. The findings reveal that the co-occurrence analysis findings are similar to the findings of other conceptual analyses (word tree, word cloud, thematic map analysis).

Trend Topic Analysis was conducted to determine which concepts were used in which periods in studies in the field of smart cities. This analysis is conducted to determine which concepts were among the trending topics in the relevant field during which periods (Abuhay et al, 2018, p.305). The findings obtained as a result of the analysis are presented in Figure 5.

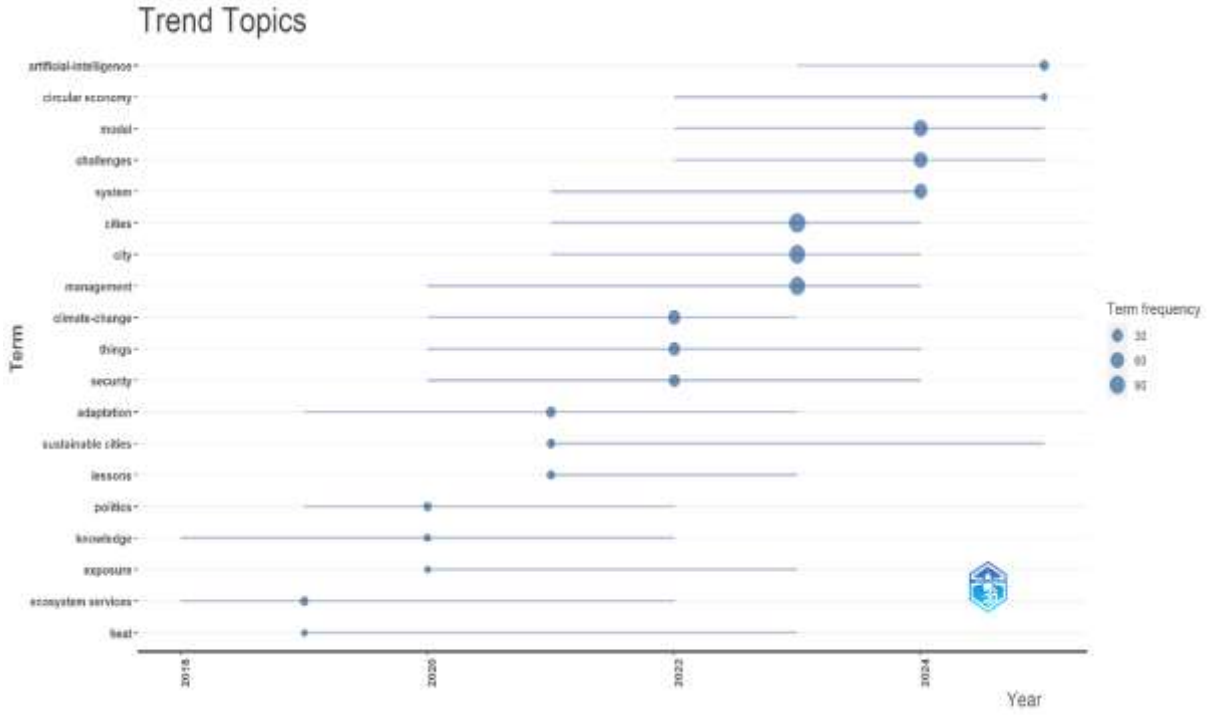


Figure 5: Trend Topic Analysis.

The findings of the trend topics analysis identify trend concepts based on the correlation between concepts and periods. As seen in Figure 5, the concepts of "knowledge", "ecosystem services", "politics" and "exposure" were found to be prominent in studies on smart cities in the 2018-2020 period. This period can be explained by the fact that the concept of smart cities was already under development and was included in policy-making processes. In the 2020-2022 period, the concepts that stand out are "adaptation," "lessons," and "sustainable cities." It can be interpreted that during this period, the focus was more on the environmental gains of smart cities and their sustainability. The concepts that stood out in 2022-2024 were "climate change," "security," "things," "cities," "system," and "management." It is thought that during this period, the literature was shaped by the solutions offered by smart city applications in areas such as climate, security, and management for the resilience of cities. In the post-2024 period, the concepts that stand out in smart city studies are "model," "challenges," "system," "circular economy," and "artificial intelligence." Depending on the circumstances of this period, the challenges faced by cities and the constantly intersecting process of smart cities with artificial intelligence, which is present in all areas, come to the fore. It is also seen that the relationship between some of the sustainable solutions offered by smart city applications and the circular economy is reflected in the concepts. Therefore, the events and developments that occur during these periods also affect the smart city literature in terms of concepts. In summary, the changes and transformations caused by conjunctural developments are also reflected in the concepts found in the literature.

The conceptual structure map related to smart city studies is explained in Figure 6 based on the findings

obtained from the factor analysis performed according to the clustering of keywords used in the studies.

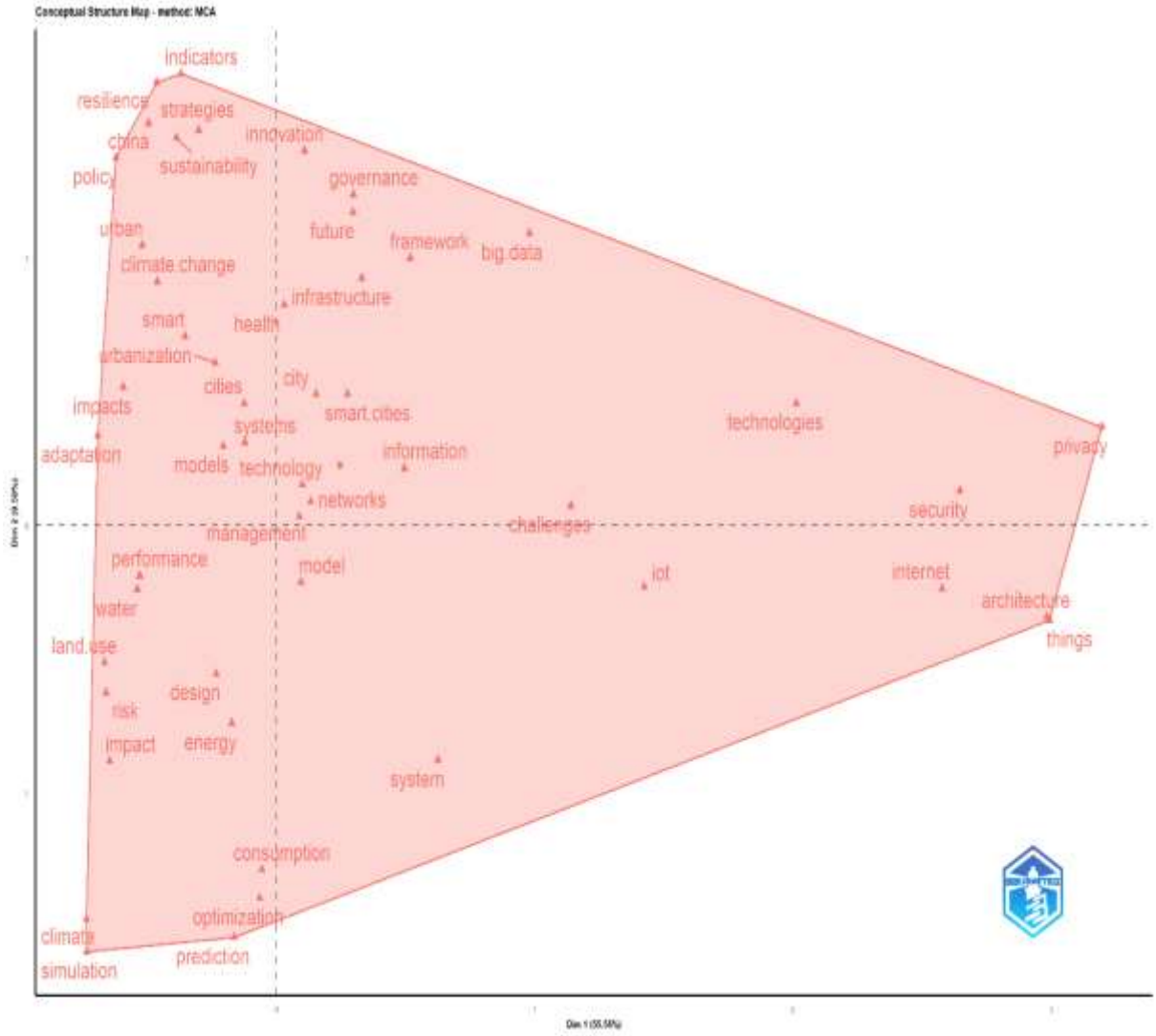


Figure 6: Factor Analysis.

The conceptual structure map emerging from the factor analysis reveals the co-occurrence patterns of key concepts used in the smart city literature, their thematic clusters, and the themes around which the concepts are grouped. The map shows the relationships between concepts in a two-dimensional space, explaining a significant portion of the total variance with Dim 1: Horizontal Axis (55.56%) and Dim 2: Vertical Axis (9.59%). In other words, the factor analysis identifies concepts with high factor loadings by examining the keywords of articles related to smart cities. The findings answer the question posed in the study: "What are the main themes around which studies in the field of smart cities are actually grouped?" The concepts clustered on the left side of the horizontal axis, namely "sustainability, resilience, climate change, urbanisation, policy, adaptation," point to the environmental dimension of smart cities. The concepts clustered on the right side, namely "privacy, security, internet, IoT, technologies, architecture, things," point to the technological infrastructure of smart cities. The concepts located in the upper region of the vertical axis, namely "governance, strategies, indicators, innovation, framework, future," draw attention to the governance dimension of smart cities. The concepts in the lower region, "energy, water, land use, consumption, optimisation, simulation, prediction," emphasise a climate-focused sustainable strategy. These conceptual distinctions and clustering tendencies in smart city studies show that the smart city has a managerial dimension as well as a technology-focused application dimension related to infrastructure. In summary, the factor analysis

findings show that the literature on smart cities is essentially clustered around two main axes. The first of these can be described as sustainability and the environment, while the other is digital technology and infrastructure.

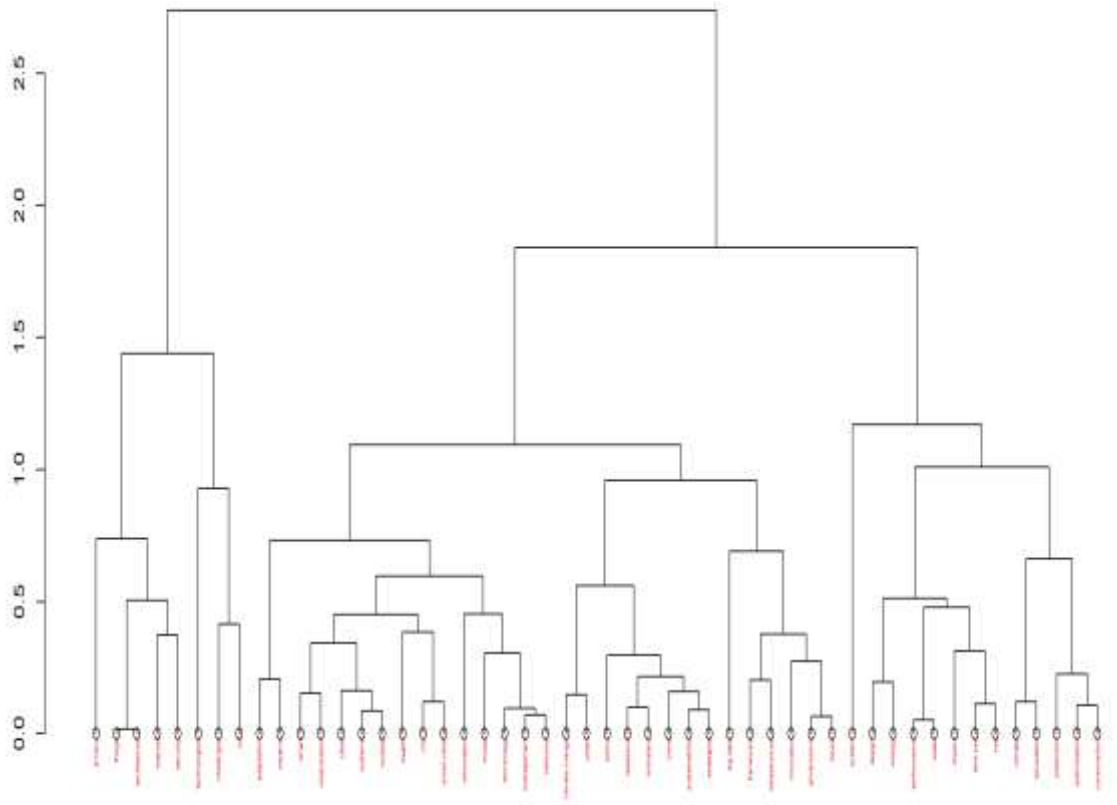


Figure 7: Hierarchical Cluster Analysis (Dendogram).

The dendrogram in Figure 7 shows that the key concepts used in the smart city studies literature are clustered hierarchically according to their frequency of co-occurrence. As can be seen in the dendrogram, there are several clusters based on the co-occurrence of concepts. The most prominent of these clusters are:

The technology, security, and digital infrastructure cluster, which includes the concepts of "privacy, security, internet, things, architecture, IoT (internet of things)",

The smart cities and management cluster, which includes the concepts "smart cities, systems, technology, networks, information, management, model",

The sustainability and resilience cluster, which includes the concepts of "sustainability, resilience, climate change, adaptation, policy, urbanisation".

The concepts of "energy, water, land use, consumption, optimisation, simulation, prediction" can be summarised as a monitoring and management cluster. The resulting clusters demonstrate that the smart city field is rapidly diversifying at both conceptual and practical levels and exhibiting an interdisciplinary orientation.

The thematic map is applied to understand the current situation and analyse the future development direction of research within the defined area. The resulting map visually presents the relationships between words, topics, or keywords used in the literature where the research was conducted (García-Lillo et al., 2023, p.13-14). This map, divided into four quadrants, shows the connectivity, density and centrality of the studies (Bagdi et al, 2023). In this context, the thematic map of studies on smart cities is

presented in Figure 8.

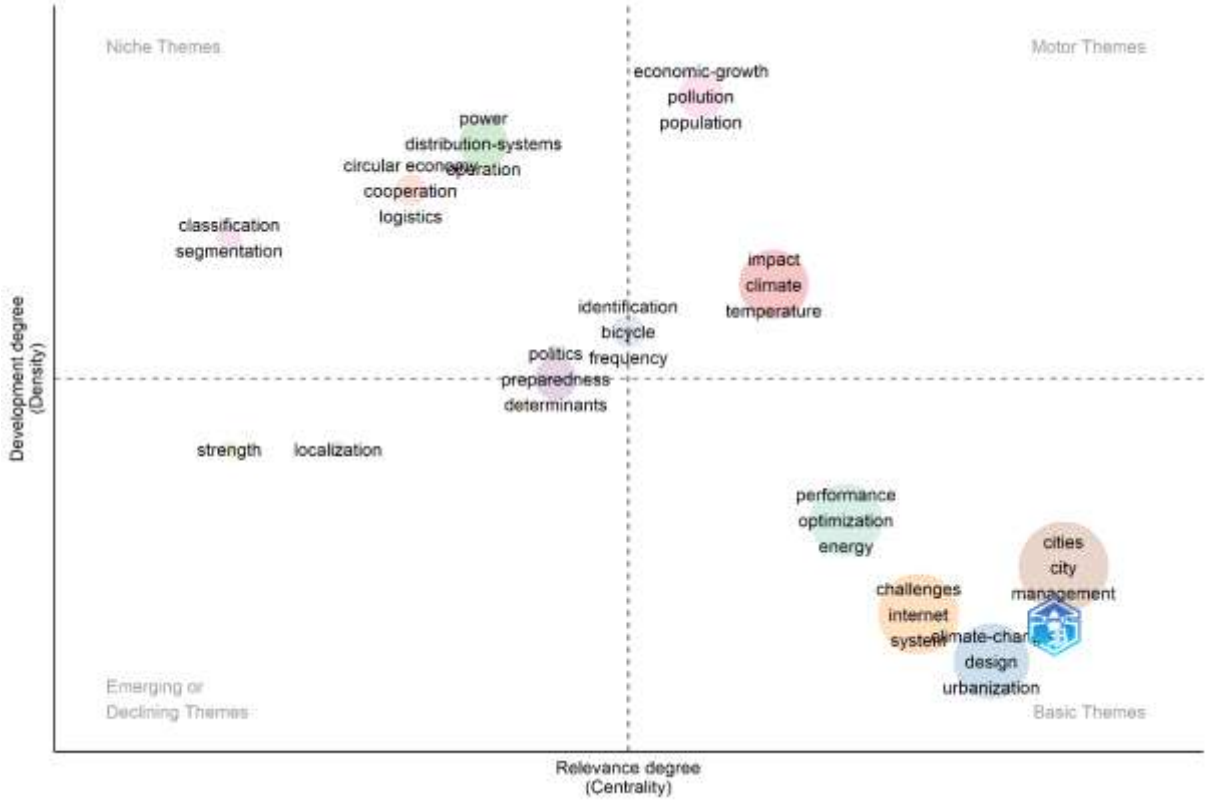


Figure 8: Thematic Map Analysis.

The thematic map related to studies on smart cities is shown in Figure 8. As can be seen in this map, the basic themes section includes the concepts of cities, city, management, climate change, design, urbanisation, challenges, internet, system, performance, optimisation, and energy. The findings obtained from the analysis are presented in the motor themes section, which includes the concepts of economic growth, pollution, population, impact, climate, and temperature. The concepts in this section are known for their guiding role in the literature. The niche themes section, which covers more specific areas related to smart cities, includes the concepts of power, distribution system, operation, circular economy, cooperation, logistics, classification, and segmentation. Finally, the emerging or declining themes section includes the concepts of strength and localisation. To understand which are the main topics in the field of smart cities, one should focus on the concepts included in the basic themes and motor themes sections of the diagram. It should be noted that some concepts are located in the intersection of themes.

4. CONCLUSION

Smart cities are urban systems that produce innovative and sustainable solutions to urban problems and needs. These systems are an important stakeholder for city administrations in a context where the world's population is becoming increasingly concentrated in cities, the negative effects of climate change are being felt, and human needs are changing in line with technological developments. In addition to the needs arising from developments in cities, it is also important to solve problems caused by factors such as migration and disasters. At this point, smart cities stand out with the solutions they produce. In relation to urban service areas, the components of smart cities, namely Smart Economy, Smart Environment, Smart Government, Smart Living, Smart Mobility, and Smart People, are the main areas where smart city applications produce solutions. In this context, smart cities form the subject of this study. Although smart cities are a relatively recent concept, they already have a significant body of literature. Within the scope of the study, a bibliometric analysis of 986 articles published on the Web of Science (WoS) on the subject of smart cities was conducted. Some of the descriptive findings obtained in the study indicate that the smart city literature, which did not exist in 2011, has currently reached an annual growth rate of 44.62%, with 3,844 authors producing studies in this field. The performance analysis findings indicate that the

university with the most publications on smart cities is Chongqing University with 178 articles, the journal with the most publications is Sustainability with 66 articles, and the most cited work is Introducing the "15-Minute City": Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities by Moreno et al. in 2021 with 788 citations. Resilience and Place Identity in Future Post-Pandemic Cities, published in 2021 by Moreno et al. with 788 citations. The author with the most citations is Sharifi A. with 1,443 citations. The country contributing most to the field is China with Freq=1,196. The country with the most citations is China with 4,559 citations. The countries with the most interaction in terms of international collaboration are China and the United Kingdom with 35 interactions. The findings obtained in the concept analysis section show that concepts such as smart city, system, management, and challenges are predominantly used in studies on smart cities. In the smart city literature, the concepts of "sustainability, resilience, climate change, urbanisation, policy, adaptation" appear in relation to the environment; the concepts of "privacy, security, internet, IoT, technologies, architecture, things" appear in relation to infrastructure; and the concepts of "governance, strategies, indicators, innovation, framework, future" in the management aspect, and "energy, water, land use, consumption, optimisation, simulation, prediction" in the operational aspect, reveal the multidimensional structure of smart cities. The concepts of "economic growth, pollution, population, impact, climate, and temperature" in the motor themes section of the smart city literature indicate that the smart city is an actor in the process of economic development and combating climate change. Although this study was conducted in a detailed and meticulous manner, it has limitations like other studies. The findings were obtained solely from searches conducted through the Web of Science database. Including other databases, such as Scopus, in the sampling would have enabled the production of more information. Nevertheless, the findings and results obtained in this study constitute an important source of information for recognising the field of smart cities and for potential researchers who will conduct work in this field.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, M.M.A. and M.M.A.; methodology, M.M.A.; software, M.M.A.; validation, M.M.A., M.M.A. and M.M.A.; formal analysis, M.M.A.; investigation, M.M.A.; resources, M.M.A.; data curation, M.M.A.; writing—original draft preparation, M.M.A.; writing—review and editing, M.M.A.; visualization, M.M.A.; supervision, M.M.A.; project administration, M.M.A.; funding acquisition, M.M.A. All authors have read and agreed to the published version of the manuscript."

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