sustainability

Review

Exploring the Differences and Similarities between Smart Cities and Sustainable Cities through an Integrative Review

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Abstract: This study adopts an integrative review approach to explore the differences and similarities between smart cities and sustainable cities. The research starts by performing two systematic literature reviews about both paradigms and, after that, employs a thematic analysis to identify key themes, definitions, and characteristics that differentiate and connect these two urban development concepts. The findings reveal more similarities than differences between the two paradigms. Despite this, some key differences are identified. Smart cities are characterized by their use of advanced information and communication technologies to enhance urban infrastructure, improve public services, and optimize resource management. In contrast, sustainable cities focus on environmental conservation, social equity, and economic viability to ensure long-term urban resilience and quality of life. This study is important because it clarifies both concepts and highlights the potential for integrating smart and sustainable city strategies to address contemporary urban challenges more holistically. The findings also suggest a convergence towards the concept of 'smart sustainable cities', which leverage technology to achieve sustainability goals. Finally, this study concludes by identifying research gaps and proposing a future research agenda to further understand and optimize the synergy between smart and sustainable urban development paradigms.

Keywords: smart cities; sustainable cities; urban sustainability; sustainable development

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Citation: Almeida, F.; Guimarães, C.M.; Amorim, V. Exploring the Differences and Similarities between Smart Cities and Sustainable Cities through an Integrative Review. *Sustainability* **2024**, *16*, 8890. https://doi.org/10.3390/su16208890

Academic Editor: Antonio J. Jara

Received: 18 September 2024
Revised: 8 October 2024
Accepted: 10 October 2024
Published: 14 October 2024

1. Introduction

Smart cities leverage advanced technologies and data analytics to enhance the quality of urban life, promote sustainability, and improve economic efficiency. They integrate information and communication technologies (ICTs) with infrastructure and services to optimize resources, reduce waste, and decrease costs. The adoption of smart grids, intelligent transportation systems, and connected public services allows cities to address challenges such as traffic congestion, energy consumption, and environmental pollution [1–3]. These initiatives lead to more efficient urban management and enhanced public safety, with real-time monitoring and responsive systems. Moreover, as reported by Abutabenjeh et al. [4], smart cities foster economic growth by attracting tech-savvy businesses and skilled professionals. The focus on sustainability and resilience ensures that cities can adapt to and mitigate the impacts of climate change, promoting a healthier environment for residents. Additionally, Caputo et al. [5] point out that smart city technologies enhance citizen engagement by providing platforms for greater public participation and transparency in governance. This connectivity enables residents to access services more conveniently and participate in the decision-making process, fostering a sense of community and shared responsibility. Accordingly, smart cities represent a forward-thinking approach to urban development, prioritizing efficiency, sustainability, and the well-being of their inhabitants.

In recent years, the concept of sustainable cities emerged in response to the rapid urbanization and the environmental, social, and economic challenges it brought. Rooted in the broader sustainability movement that gained prominence in the late 20th century, sustainable cities aim to balance growth with environmental stewardship, social equity, and economic viability [6,7]. Key events, such as the 1992 Earth Summit and the adoption of the United Nations' Sustainable Development Goals in 2015, significantly propelled this concept, emphasizing the need for cities to minimize their ecological footprint while enhancing residents' quality of life. The connection to smart cities lies in their shared goal of improving urban living. Smart cities leverage technology and data to optimize urban systems and services, enhancing efficiency, convenience, and resilience. This technological integration supports sustainability by enabling better resource management, reducing waste, and lowering carbon emissions. Thus, while sustainable cities focus on long-term ecological and social health, smart cities provide the tools and innovations to achieve these goals more effectively, creating a synergistic relationship between the two concepts.

Current systematic literature reviews (SLRs) about smart cities aim to capture their dimensions and systematize the strategies and challenges of their implementation [8–11]. Other SLRs look at how smart cities seek to respond to the challenges of sustainable development and how they help to improve citizens' quality of life [12,13]. SLRs about sustainable cities are scarcer and typically include both the concepts of smart and sustainable cities without making a distinction between the two concepts [14,15]. As Yigitcanlar et al. point out [16], both concepts are intertwined, and these authors advocate that cities cannot be truly smart without being sustainable in the first place. Consequently, there is a research gap in identifying the differences and similarities between the two concepts. Furthermore, SLRs have significant limitations in terms of their scope and flexibility, and typically emphasize quantitative data which may not adequately incorporate qualitative insights or theoretical perspectives. This narrower focus can restrict the ability to comprehensively understand complex, multifaceted issues. Another alternative is the adoption of an integrative review, which is especially valuable when dealing with complex or multidimensional topics, as it provides a more holistic understanding by integrating findings from different research methodologies and perspectives. Additionally, it can highlight gaps in the literature and suggest new areas for exploration, offering richer insights and broader implications than a more narrowly focused systematic review. Accordingly, this study responds to this challenge by employing an integrative review approach. In the first phase, an attempt is made to identify the dimensions inherent in the smart city and sustainable city paradigms. In the second phase, a qualitative approach is applied using a thematic analysis to capture the similar and different aspects that can be found between the two concepts. By drawing on multiple sources, this integrative review generates new insights, builds upon existing knowledge, and suggests directions for future research. The focus of this study is to identify the integral dimensions of the smart city and sustainable city paradigms and to explore the differences that emerge between these two paradigms. Furthermore, it highlights how smart cities leverage technology to enhance urban living, while sustainable cities focus on ecological balance and resource efficiency. The research underscores the potential for integration, where technology in smart cities can support sustainability goals, creating a framework for urban development that is both technologically advanced and environmentally conscious.

The rest of this manuscript is organized as follows. Initially, the research methods applied in this study are presented, emphasizing the research design, inclusion and exclusion criteria, and research questions. After that, the results of the study are presented according to the previously established research questions. The results are then discussed and an agenda for future research in the area is established. Finally, conclusions are drawn, exploring the main contributions of the work and its limitations.

2. Materials and Methods

2.1. Research Design

An integrative review approach is adopted to provide a comprehensive understanding of smart city and sustainable city topics by combining findings from a diverse range of studies. Unlike systematic reviews, which focus on specific research questions and often involve a stringent selection process for including studies, Oermann and Knafl [17] indicate that integrative reviews have a broader scope and seek to encompass various research designs and methodologies. They integrate both qualitative and quantitative research, offering a more holistic perspective on the subject. This approach helps to identify overarching themes, patterns, and gaps in the literature. By drawing on multiple sources, this integrative review generates new insights, builds upon existing knowledge, and suggests directions for future research. Therefore, this approach is particularly useful for exploring complex or multidimensional issues where a single study or narrow focus might not provide a complete picture. In the context of this study, this integrative review is composed of two phases, as depicted in Figure 1. In the first phase, two systematic reviews are carried out in parallel, and a comparative analysis of their quantitative results is carried out, while in the second phase, a thematic analysis is carried out to identify the dimensions that may be associated with each paradigm.

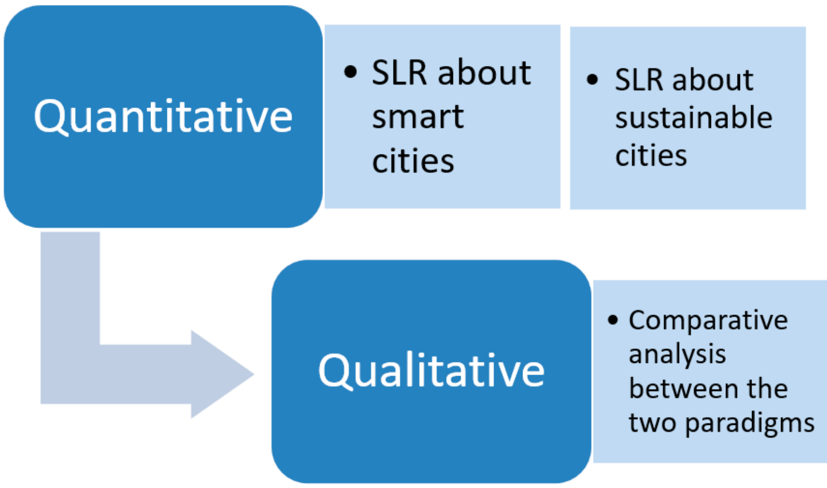

Figure 1. Research phases.

Xiao and Watson [18] state that an SLR is a methodical and comprehensive approach to identifying, evaluating, and synthesizing research on a specific topic. It involves clearly defining a research question, developing a protocol, and using rigorous methods to search for, select, and appraise relevant studies. The process includes multiple stages: defining inclusion and exclusion criteria, searching databases, screening studies, extracting data, and assessing the quality of the included studies. The goal is to minimize bias and provide a reliable summary of the existing evidence.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Supplementary Materials) was adopted in this SLR. PRISMA 2020 is an updated guideline designed to improve the reporting quality of systematic reviews and meta-analyses. It provides a comprehensive checklist and flow diagram to ensure transparency, reproducibility, rigor, and clarity in research. According to Page et al. [19], this protocol helps minimize bias, ensuring comprehensive literature coverage, and improving the clarity and completeness of reporting, ultimately contributing to the reliability and validity of the review's conclusions.

We followed the recommendations of Bramer et al. [20] and Heck et al. [21] to adopt two scientific databases with high credibility and international reputation: Web of Science (WoS) and Scopus. When PRISMA was first carried out, we were careful to identify and remove published articles by their DOI. Other scientific databases associated with commercial publishers (e.g., ERIC, ACM, PubMed, PsycINFO, and ScienceDirect) were not considered because these databases are not as complete and, in most cases, they include articles previously indexed in WoS or Scopus. Google Scholar was not considered because it may include gray studies [22]. Additionally, this study did not employ registers and, therefore, the entire data search process was performed directly in the WoS and Scopus databases.

A preliminary exploratory analysis of the keywords associated with the most cited articles published in the field was carried out to identify relevant keywords. "Smart cities" and "Sustainable cities" were two common phrases found in this research. The identification of dimensions was performed using multiple words that typically correspond to synonyms, including the three words "dimensions", "elements", and "aspects". The combination of these two sets of terms was considered: "smart cities OR sustainable cities" AND "dimensions" OR "elements" OR "aspects".

Figure 2 presents the various phases of the SLR for the "smart cities" topic, while Figure 3 presents the same approach for the "sustainable cities" topic. Initially, the process removed duplicate records. The abstract of each article was then considered to eliminate studies that did not fit the theme. In a third phase, the studies had to be read in full, and those that did not allow the dimensions and characteristics associated with each paradigm to be identified were removed. At the end of this systematic process, 29 studies regarding the "smart city" topic were identified, and 35 studies about the "sustainable city" topic were mapped.

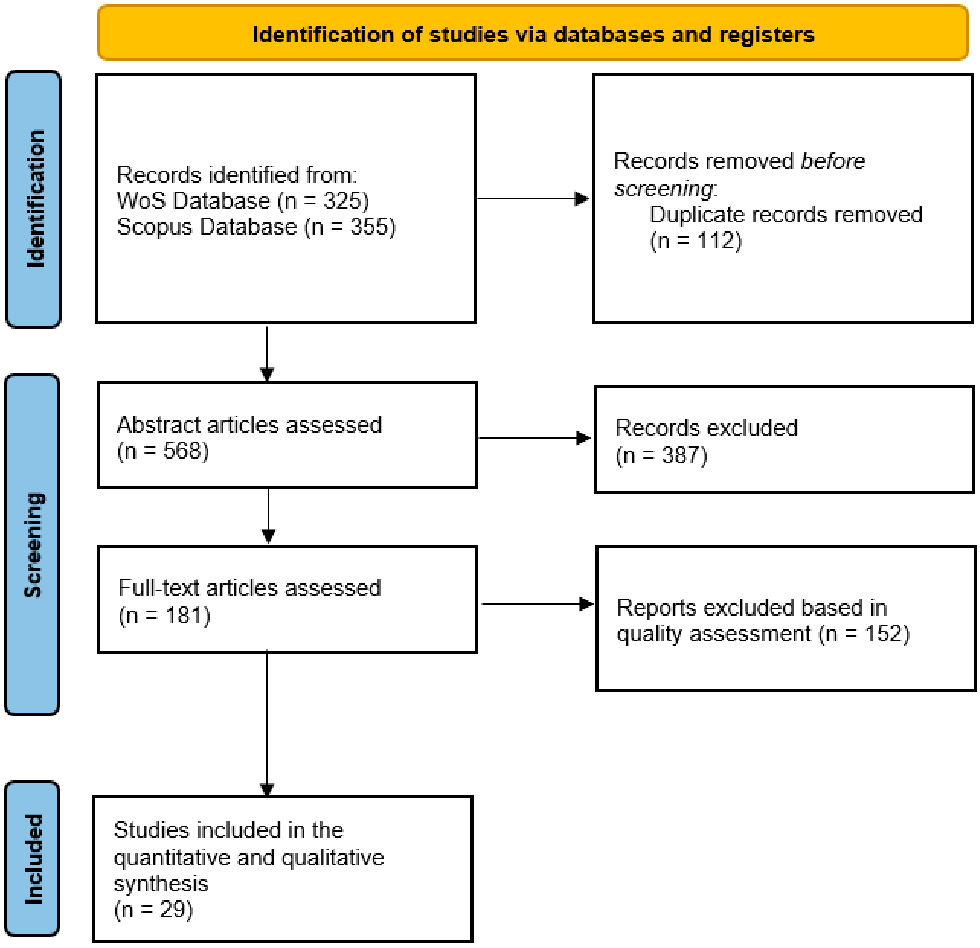

Figure 2. PRISMA diagram for the "smart cities" topic.

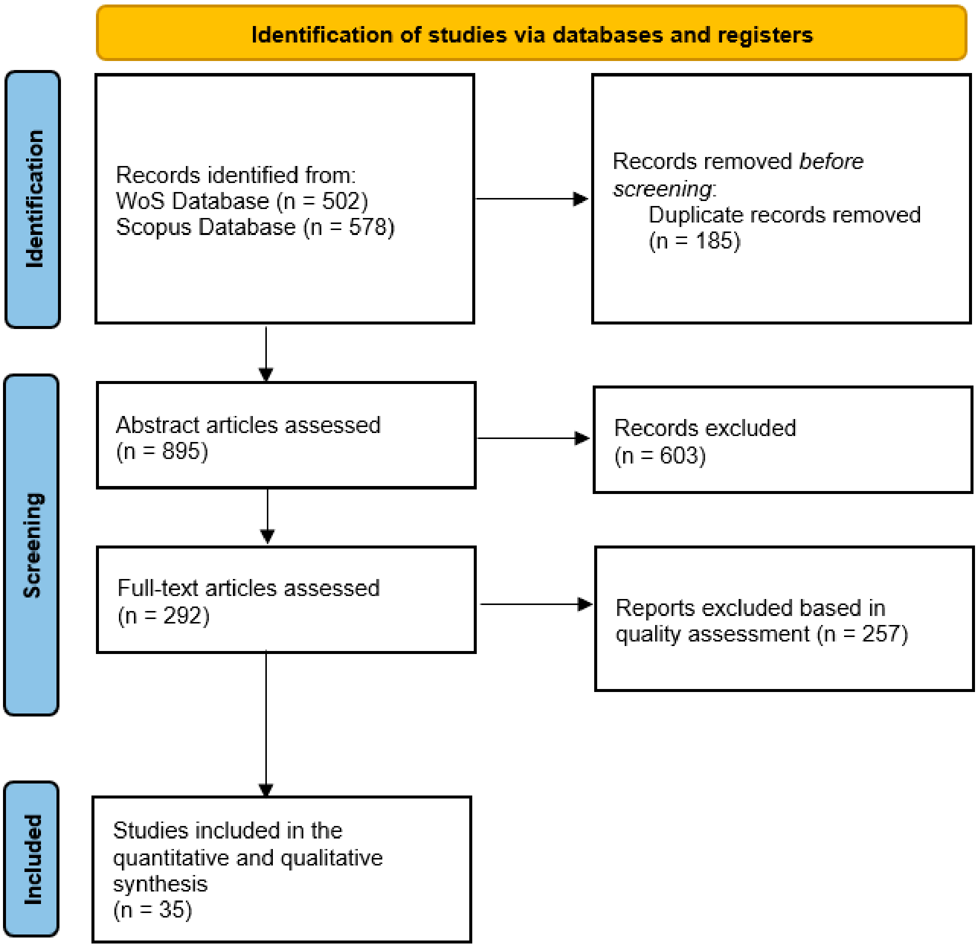

Figure 3. PRISMA diagram for the "sustainable cities" topic.

2.2. Inclusion and Exclusion Criteria

Review articles published up to the end of June 2024 were considered. A review article is a scholarly paper that synthesizes and summarizes existing research on a particular topic. It provides an overview of the current understanding, identifies gaps in knowledge, and often suggests directions for future research [23,24]. Unlike original research articles, which present new experimental data or findings, review articles analyze and interpret the body of existing literature to offer a comprehensive perspective on a subject. The first review article identified about one of the topics was published in 2015. Thus, the total analysis period is around ten years. We also only included articles in English whose full text was accessible.

Articles written in another language were excluded from the SLR, even in situations where the abstract was translated twice. Publications at national or international conferences, books, and book chapters were excluded. Editorial notes were also removed because they typically do not undergo a solid peer-reviewed process. Dissertations and theses were also disregarded regardless of the teaching institution and academic program.

2.3. Research Questions

Common research questions for an SLR typically explore various aspects of existing research on a specific topic. These questions often include descriptive inquiries about the current state of research, such as what the key concepts, theories, and methodologies used in studies on the topic are, and what the major findings and conclusions are [25–27]. Therefore, we established a research question that intends to give a comparative overview about the evolution of studies in this field:

RQ1. *What is the distribution of studies, journals, research methods, and citations throughout the years*?

SLRs have increasingly benefited from the adoption of specialized software, which enhances the efficiency and accuracy of the review process. These software tools aid researchers in various stages, from search and data extraction to synthesis and reporting. Advanced functionalities like text mining, machine learning, and natural language processing further streamline the identification and analysis of pertinent information, which make it possible to establish a connection between the studies and research teams. To explore these connections, this study adopted VosViewer software (version 1.6.20) and established an additional research question:

RQ2. *What is the network of connections between the studies and journals published in this field*?

Finally, this study employed a thematic analysis in the context of smart and sustainable cities. This approach provides flexibility, which is suitable to adapt the process to various theoretical frameworks and research questions. This method is particularly effective for identifying, analyzing, and reporting patterns within data, which helps in generating rich and detailed insights [28,29]. It also contributes to manage and synthesize large volumes of data, offering a clear, structured approach to capturing complexities. Initially, the data source was composed of 64 articles included in the SLR. The full text of these studies was uploaded in NVivo v1.5.1. After data collection, the next step was to transcribe and organize the data systematically, ensuring that it was ready for detailed analysis and the generation of initial codes that were subsequently improved. The final phase involved writing up the analysis to present the findings in a coherent narrative, also supported by quotes or examples from the data. The use of this approach enabled the emergence of three additional research questions:

RQ3. *What are the dimensions of smart cities*?

RQ4. *What are the dimensions of sustainable cities*?

RQ5. *What are the differences between the dimensions of smart cities and those of sustainable cities*?

3. Results

3.1. Phase I—Systematic Literature Review

Figure 4 shows the distribution of studies throughout the years. Publications from 2024 only relate to the end of June. The first study on the dimensions of smart cities was published in 2015 by Albino et al. [30]. This article aimed to elucidate the concept of "smart" within the context of cities by conducting an in-depth literature review of pertinent studies and official documents from international institutions. Additionally, it identified the primary dimensions and elements that characterize a smart city. Various metrics of urban smartness were examined to highlight the necessity for a unified definition of what constitutes a smart city, its features, and its performance relative to traditional cities. After that, and in the span of four years, there was only one more study published by Lara et al. [31], which sought to characterize the role of citizens in smart cities. In the past three years, 16 articles were published, which represents more than 55% of the scientific production on the subject. This shows that the subject of smart cities and the characterization of their dimensions has attracted a great deal of attention and is not closed.

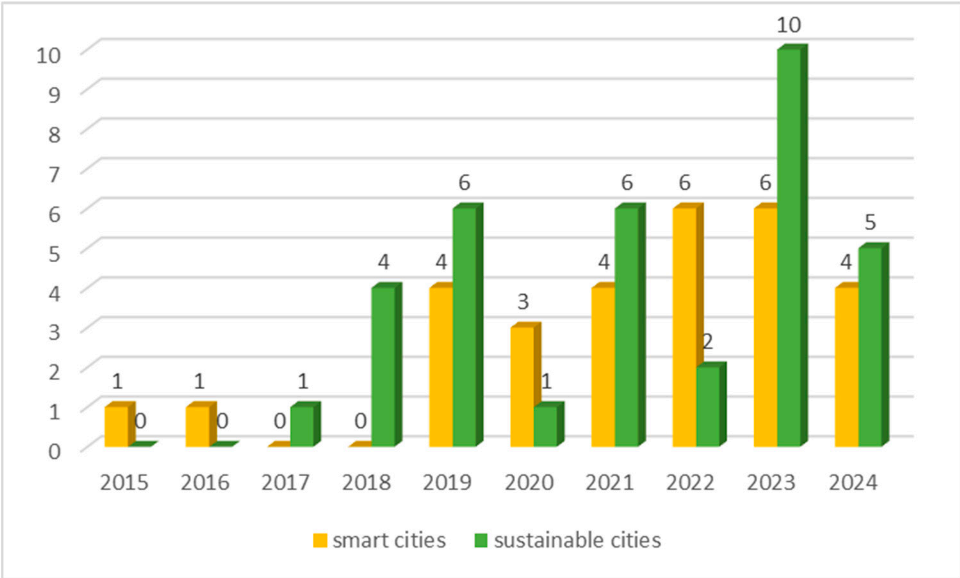

Figure 4. Distribution of studies throughout the years.

On the sustainable cities side, we find similar behavior with some oscillations. Firstly, the first publication on the dimensions of sustainable cities only appeared in 2017 with the article published by Bibri and Krogstie [32]. This study examined the nature, practice, and impact of ICT in the context of the new wave of computing for urban sustainability, specifically within the framework of smart sustainable cities. It investigated how this form has emerged from various perspectives, its institutionalization and integration with politics and policy, urban dissemination, and the associated risks to environmental sustainability. It is the first study that extended the original idea of a smart city to a sustainable approach and revealed that smart sustainable cities are discursively constructed and materially produced through socially constructed understandings and institutionalized practices related to ICT for urban sustainability. The authors concluded that these cities are thus embedded within ecologically and technologically advanced societies. The data from this SLR indicate that this initial vision of sustainable cities attracted more attention than smart cities, but that since 2019, both concepts have been reviewed and worked on together. In the past three years, 17 studies were published on sustainable cities, which is a similar number to those on smart cities. Therefore, the search for a characterization of their dimensions has attracted a great deal of attention from the international community, especially when we look at the provisional data for 2024.

Table 1 exhibits the number of publications by journal. We found some significant differences in the profile of the journals that have been published in this field. Regarding smart cities, we discovered journals with a more technical and technological profile related to the area of energy and technological innovation. The journal *Energies* stands out with three publications, which reflects the importance of the topic of energy efficiency in smart cities. Within the "others" category, more than 80% of scientific production is found in journals such as *Technovation*, *Journal of Urban Technology*, and *Smart Cities*, among others. Regarding sustainable cities, there is a higher incidence of publications in *Sustainability*. More than 30% of publications are in this journal. This journal focuses on the multifaceted dimensions of sustainability, encompassing a broad range of environmental, economic, social, and cultural aspects. Its scope includes topics such as sustainable development, environmental sustainability, renewable energy, green technologies, and sustainable resource management. It aims to provide a platform for interdisciplinary research that contributes to the understanding and advancement of sustainable practices across various sectors. Therefore, we can conclude that this journal's broad and interdisciplinary approach provides a comprehensive framework for addressing the challenges and opportunities associated with making cities more sustainable. In the second, third, and fourth positions, we find journals with a similar scope, which indicate that publications around the topic of sustainable cities tend to be published in journals with more interdisciplinary approaches that explore the three dimensions of sustainability (i.e., environmental, economic, and social). In the "others" category appear around 45% of journals such as *Frontiers in Sustainable Cities* and *Discover Sustainability*, among others.

Table 1. Number of publications by journal.

Smart Cities			Sustainable Cities		
Journal	**N**	**%**	**Journal**	**N**	**%**
Energies	3	10.34	*Sustainability*	11	31.43
Sustainability	2	6.90	*Sustainable Cities and Society*	4	11.43
Others	24	82.76	*Journal of Cleaner Production*	2	5.71
			Sustainable Development	2	5.71
			Others	16	45.72

Table 2 shows the research methods employed in these review studies. Most reviews on smart cities are systematic reviews, followed by integrative reviews. Systematic reviews use a structured approach to search for, select, and critically appraise relevant studies, while integrative reviews combine both quantitative and qualitative research to provide a comprehensive understanding of complex phenomena [33,34]. In the case of sustainable cities appear mainly meta-syntheses and integrative reviews. Systematic reviews have less importance. As pointed out by Lachal et al. [35], meta-syntheses have the main characteristic of integrating findings from qualitative research, emphasizing the interpretation and reinterpretation of the data. This method is particularly useful when we aim to generate new insights, theories, or frameworks based on the synthesis of qualitative data from multiple studies. Meta-synthesis is appropriate in the field of sustainable cities because the goal is to go beyond a mere aggregation of findings and instead provide a deeper understanding of the phenomena being studied, considering the nuances and contexts presented in the original qualitative studies. In the sustainable cities field, the research questions tend to be more exploratory in nature and seek to build a more comprehensive and nuanced picture of the topic through the reinterpretation of existing qualitative evidence.

Table 2. Number of publications by research method.

Smart Cities			Sustainable Cities		
Method	**N**	**%**	**Method**	**N**	**%**
Systematic reviews	12	41.38	Meta-syntheses	13	37.14
Integrative reviews	8	27.59	Integrative reviews	11	31.43
Meta-syntheses	5	17.24	Systematic reviews	8	22.86
Narrative reviews	3	10.34	Scoping reviews	2	5.71
Scoping reviews	1	3.45	Narrative reviews	1	2.86
Meta-analyses	0	0	Meta-analyses	0	0

Table 3 shows the top 10 articles with most citations. It shows the title of each publication, the journal, the year the study was published, the category (smart cities (SMC) or sustainable cities (STC)), the total number of citations (NTC), and the number of citations per year (NCY). The article with the highest number of publications is on SMC and was published in 2015. It has been a fundamental article in defining the concept and its dimensions, and has subsequently been used in other studies, receiving an annual average of more than 200 citations. The next five positions are occupied by publications on STC. This indicates that the topic of STC is more diverse and has captured a great deal of attention in recent years. The two articles published in 2019 in this area received an annual average of more than 30 citations.

Table 3. Number of citations.

Title	Journal	Year	Cat.	NTC	NCY
Smart Cities: Definitions, Dimensions, Performance, and Initiatives	*Journal of Urban Technology*	2015	SMC	2087	208.7
The future of waste management in smart and sustainable cities: A review and concept paper	*Waste Manag.*	2018	STC	290	41.43
Smart sustainable cities of the future: An extensive interdisciplinary literature review	*Sustainable Cities and Society*	2017	STC	210	26.25
Towards modern sustainable cities: Review of sustainability principles and trends	*Journal of Cleaner Production*	2019	STC	207	34.5
Urban greening through nature-based solutions—Key characteristics of an emerging concept	*Sustainable Cities and Society*	2019	STC	199	33.17
Application of life cycle thinking towards sustainable cities: A review	*Journal of Cleaner Production*	2017	STC	197	24.63
The Concept of Sustainability in Smart City Definitions	*Frontiers in Built Environment*	2020	SMC	149	29.8
Smartness that matters: towards a comprehensive and human-centred characterisation of smart cities	*Journal of Open Innovation: Technology, Market, and Complexity*	2016	SMC	98	10.89
Data-driven smart sustainable cities of the future: An evidence synthesis approach to a comprehensive state-of-the-art literature review	*Sustainable Futures*	2021	SMC	82	20.5
A collaborative approach for urban underground space development toward sustainable development goals: Critical dimensions and future directions	*Frontiers of Structural and Civil Engineering*	2021	STC	73	18.25

Figures 5 and 6 aim to respond to RQ2 considering the topics of smart cities and sustainable cities, respectively. To perform this analysis, we conducted bibliographic coupling. This is a method used in bibliometric analysis to measure the relatedness of documents based on the number of shared references. Two documents are bibliographically coupled if they cite one or more documents in common. The strength of the coupling is determined by the number of shared references: the more references two documents share, the more strongly they are coupled [36]. Only three clusters were identified for smart cities, while five clusters were identified for sustainable cities. The number of documents in each cluster can indicate the prominence of a particular research theme. Larger clusters emerging in sustainable cities suggest more extensive research activity. Moreover, the density of connections within a cluster reflects how closely related the documents are. High density indicates a well-defined research area with many interrelated studies, as is the case in the smart cities topic.

A similar analysis was performed for the journals. The network of connections among journals is depicted in Figures 7 and 8. Sources are considered bibliographically coupled if they cite the same references. This type of analysis helps in understanding how different sources are related in terms of the literature they cite, revealing patterns in the dissemination of knowledge across various publication venues. Considering the topic of smart cities, there is a high dispersion of connections. The journals with the highest total link strength are *Energies*, *Technological Forecasting and Social Change*, and *Technovation*. When a similar analysis was performed for sustainable cities, the role of the journal *Sustainability* emerged. This journal has the highest number of documents and the highest total link strength. In general, the total link strength is significantly lower than for smart cities publications. It can be concluded that smart cities have a high density which indicates closely related research topics and a well-defined area of study. Furthermore, stronger edges mean more shared references in the case of smart cities.

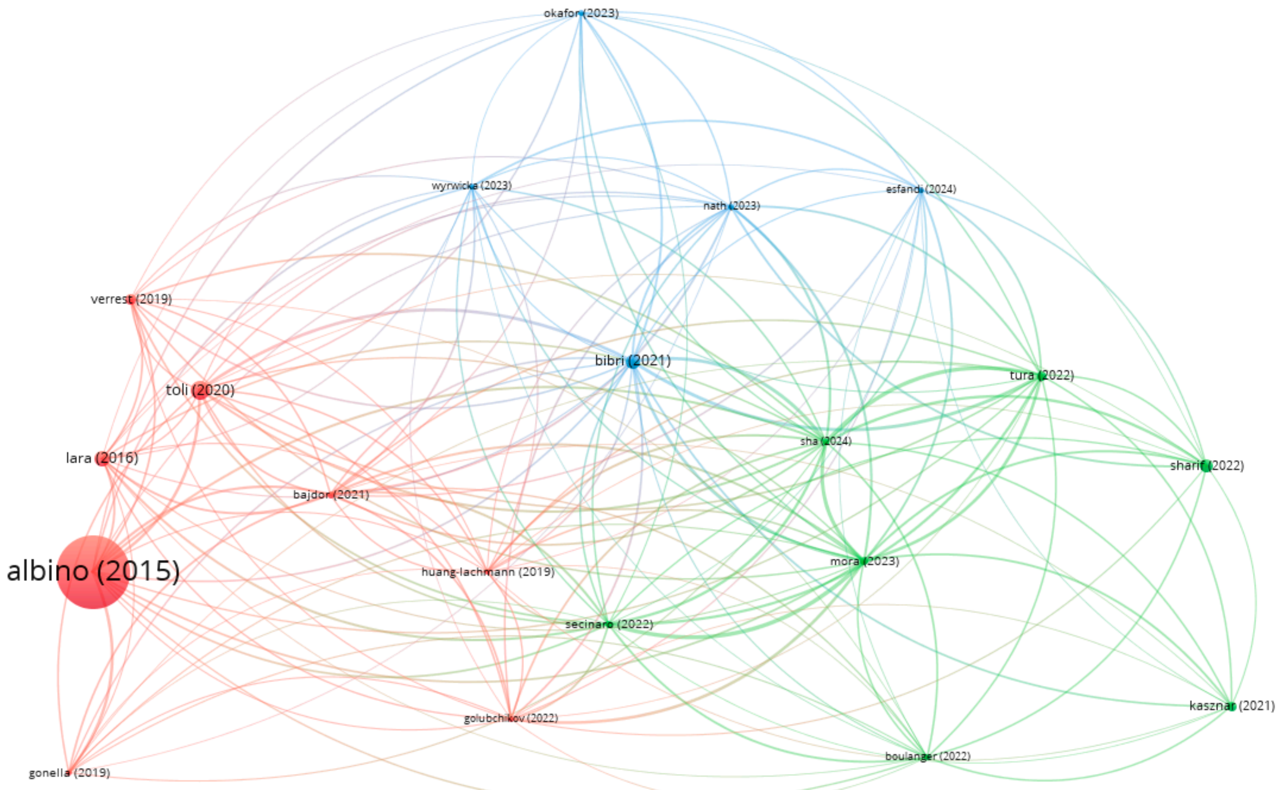

Figure 5. Network of connections among studies on smart cities. Albino (2015) is Albino et al. [30]. Lara (2016) is Lara et al. [31]. Bibri (2021) is Bibri & Krogstie [32].

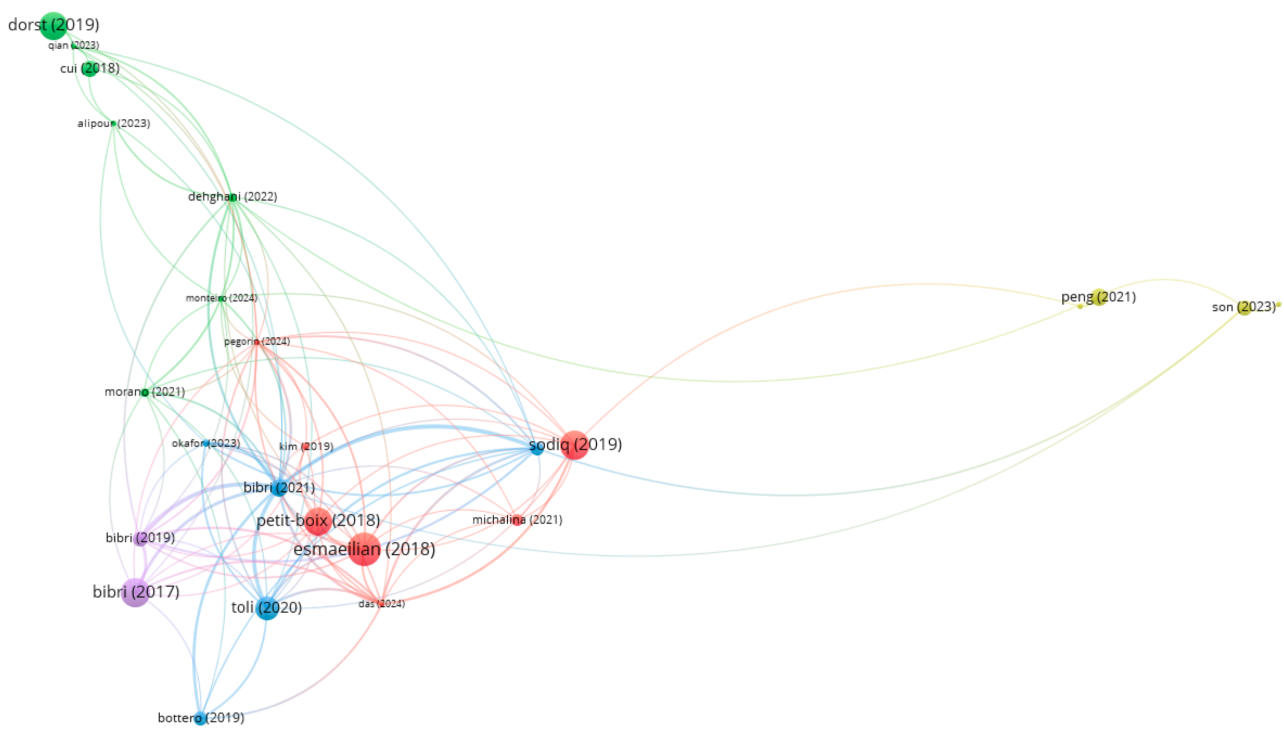

Figure 6. Network of connections among studies on sustainable cities. Bibri (2021) is Bibri & Krogstie [32]. Dorst (2019) is Dorst et al. [37].

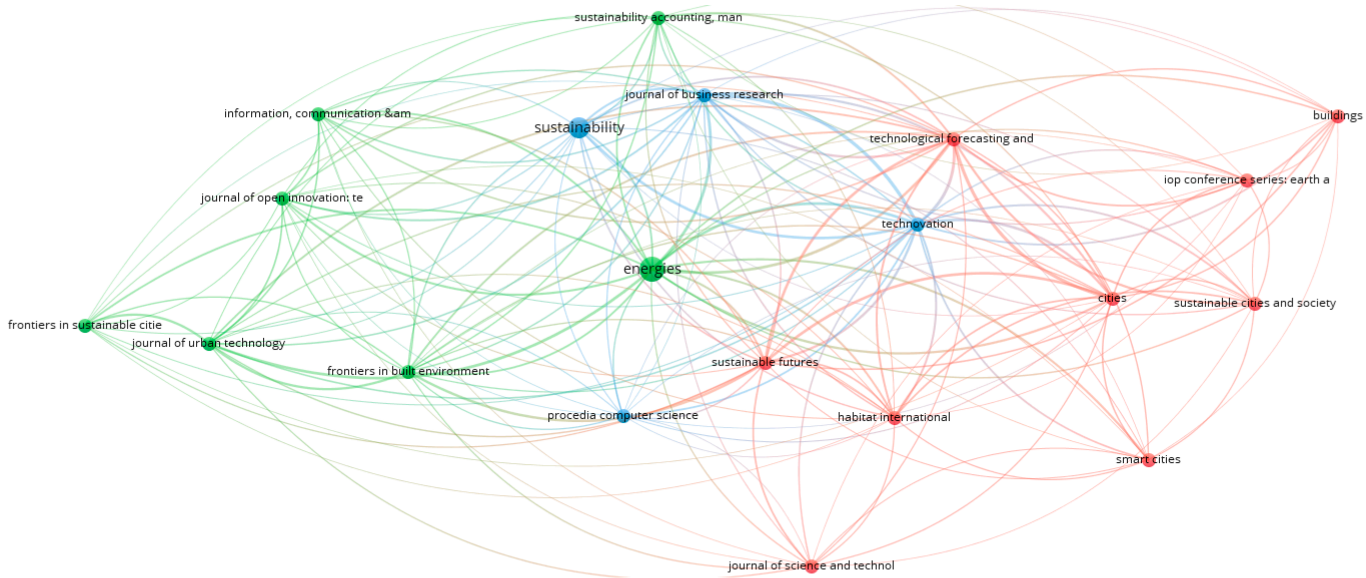

Figure 7. Network of connections among journals on smart cities.

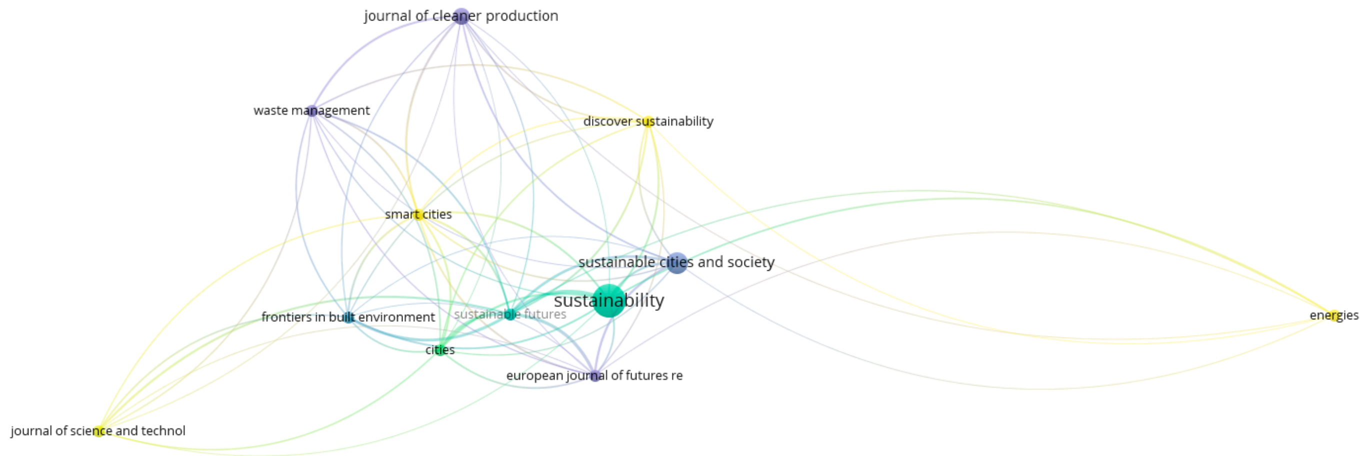

Figure 8. Network of connections among journals on sustainable cities.

3.2. Phase II—Thematic Analysis

Table 4 captures the dimensions and subdimensions of smart cities. A total of 7 dimensions and 36 subdimensions were identified in responding to RQ3. The number of items that support each subdimension is also accounted for. The technological dimension of smart cities is the one with the greatest number of subdimensions, followed by the economic dimension. The first dimension highlights the role of technological infrastructure and digital intelligence. Furthermore, the dimensions of smart cities are interconnected and often overlap in ways that enhance the overall functionality and livability of urban environments. Results indicate that Smart Economy and Smart Technology play crucial roles in shaping urban environments into sustainable, efficient, and inclusive spaces. Smart Economy refers to the integration of digital technologies and data analytics to enhance economic activities and promote growth. Simultaneously, Smart Technology integrates advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), and cloud computing into urban infrastructure.

Table 4. Themes identified for smart cities.

Dimension	Subdimension	No. of Items
Smart Economy	Innovative spirit	27
	Entrepreneurship	23
	Competitivity	16
	Knowledge society	12
Smart Mobility	Local accessibility	24
	International accessibility	22
	Logistics performance	13
Smart Environment	Attractivity of natural conditions	21
	Pollution	18
	Environmental protection	17
	Biodiversity	12
	Sustainable resource management	10
Smart People	Level of qualification	16
	Affinity to lifelong learning	12
	Social and ethnic plurality	11
	Participation in public life	11
	Flexibility	9
	Creativity	7
	Cosmopolitanism/Open-mindedness	3
Smart Living	Health conditions	18
	Individual safety	15
	Housing quality	15
	Education facilities	12
	Touristic attractivity	7
	Cultural facilities	5
Smart Governance	Participation in decision-making	16
	Public and social services	15
	Transparent governance	12
	Political strategies and perspectives	4
Smart Technology	ICT infrastructure	38
	Digital Intelligence	31
	Data-driven	27
	Automation and robotics	25
	Internet of Things	21
	Cloud computing	19
	Smart grids	12
	Cybersecurity	11

Table 5 shows the dimensions and subdimensions of sustainable cities. A total of 10 dimensions and 40 subdimensions were identified in responding to RQ4. Although more studies were identified on the topic of sustainable cities, the number of items supporting each dimension is lower. These dimensions and subdimensions collectively address various aspects of sustainability in urban contexts. The results indicate that sustainable cities are multifaceted because they involve addressing a wide range of interconnected challenges and opportunities across various dimensions of urban life. The high number of items denotes that sustainable cities need to consider that urban challenges and opportunities are dynamic and constantly evolving due to factors such as population growth, technological innovation, changes in governance and policy frameworks, and shifts in societal values and expectations.

Table 5. Themes identified for sustainable cities.

Dimension	Subdimension	No. of Items
Environmental Sustainability	Energy Efficiency	14
	Renewable Energy Adoption	11
	Waste Management	10
	Air Quality	8
	Climate Change Mitigation	6
Social Inclusivity	Equitable Access	12
	Community Engagement	11
	Social Cohesion	9
	Safety and Security	4
Economic Prosperity	Innovation and Entrepreneurship	18
	Digital Economy	18
	Local Business Support and Development	11
	Job Creation	8
	Affordable Housing	3
Urban Mobility	Public Transportation	15
	Active Transportation	14
	Traffic Management	6
	Integrated Transport Networks	2
Governance and Policy	Sustainable Urban Planning and Design	10
	Transparent and Accountable Governance	5
	Participatory Decision-making	5
	Resilient and Adaptive Policies	3
Resilience and Disaster Management	Climate Change Adaptation Strategies	8
	Disaster Risk Reduction and Preparedness	5
	Emergency Response and Recovery Planning	4
Health and Well-being	Access to Healthcare Services	13
	Active and Healthy Lifestyles	10
	Green Spaces and Recreation Areas	8
	Mental Health Support and Services	5
	Food Security and Nutrition	3
Education and Knowledge	Education for Sustainable Development	7
	Lifelong Learning Opportunities	5
	Knowledge Sharing and Capacity Building	5
	Human Rights Protection	3
	Digital Literacy and Access to Information	2
	Cultural and Heritage Preservation	2
Digitalization and Technology	Digital Connectivity	15
	Open Data Initiatives	7
	Digital Governance and Service Delivery	6
	Cybersecurity and Data Privacy Measures	3

Finally, the dimensions and subdimensions identified in both paradigms were exported to a JSON (JavaScript Object Notation) file. This is a lightweight data interchange format that is easy for humans to read and write and easy for machines to parse and generate. It represents data as structured text using key–value pairs and ordered lists [38]. JSON is highly structured, with a predictable format. This consistency makes it easier to automate the comparison process across different datasets. Furthermore, Fosci and Psaila [39] point out that JSON does not require a fixed scheme, allowing for more flexible data structures. An example of the JSON produced in smart cities is given in Figure 9.

```
{
  "SmartCityDimensions": {
    "SmartEconomy": {
      "SubDimensions": [
        "Innovative spirit",
        "Entrepreneurship",
        "Competitivity",
        "Knowledge Society"
      ]
    },
    "SmartMobility": {
      "SubDimensions": [
        "Local accessibility",
        "International accessibility",
        "Logistics performance"
      ]
    },
    "SmartEnvironment": {
      "SubDimensions": [
        "Attractivity of natural conditions",
        "Pollution",
        "Environmental protection",
        "Biodiversity",
        "Sustainable resource management"
      ]
    },
    ...
```


Figure 9. Example of JSON file applied to smart cities.

After that, Table 6 synthetizes a comparative analysis of the dimensions offered by smart cities and sustainable cities. The following notation is used: "Dim"—these themes appear as dimensions; "SubDim"—these themes are found as subdimensions; and "not incorporated"—these themes do not appear in the context of the smart city and sustainable city paradigms. The data allow us to answer RQ5 and suggest that there are more similarities between the two paradigms than differences. Of the 10 dimensions considered, 7 appear as dimensions in both paradigms. Despite this, some dimensions appear to be identified in slightly different ways, such as Smart People in smart cities, which generally corresponds to the Social Inclusivity dimension in sustainable cities. It should be noted that all 10 dimensions identified are mapped in both models, although 3 of them only appear as subdimensions in the context of smart cities (i.e., Resilience and Disaster Management, Health and Well-being, and Education and Knowledge). Finally, the greater number of subdimensions that appeared in the context of sustainable cities suggests that the greatest differences are to be found in the ramification of the subdimensions, with a greater breadth and depth of the themes addressed by sustainable cities.

Table 6. Comparative overview between smart cities and sustainable cities.

Themes	Smart Cities	Sustainable Cities
Economic	Dim	Dim
Environment	Dim	Dim
Social	Dim	Dim
Mobility	Dim	Dim
Living	Dim	Dim
Governance	Dim	Dim
Technology	Dim	Dim
Resilience and Disaster Management	SubDim	Dim
Health and Well-being	SubDim	Dim
Education and Knowledge	SubDim	Dim

4. Discussion

This SLR reveals that sustainability in urban environments is a crucial topic because cities are the epicenters of economic, social, and environmental interactions. A key reason why sustainability is crucial for researchers is its potential to significantly reduce the environmental impact of cities [40–42]. It is evident that urban areas are major contributors to carbon emissions, waste generation, and energy consumption. Therefore, by focusing on sustainability, researchers can devise methods to reduce these impacts through advancements in green technologies, renewable energy sources, and efficient resource management. Furthermore, sustainability research in urban environments can lead to improvements in public health and quality of life [43,44]. Sustainability research also addresses social equity by exploring ways to make cities more inclusive and accessible. Researchers such as Dsouza et al. [45], Meerow et al. [46], and Trudeau [47] have examined the distribution of resources, housing, and services to ensure that all urban residents, regardless of socioeconomic status, have access to a safe and healthy environment. Accordingly, this can lead to more equitable urban development and reduced disparities.

The concepts of smart cities and sustainable cities have more similarities than differences. Nevertheless, the present SLR identified some relevant differences. Smart cities are intrinsically linked to technological advancements, focusing primarily on leveraging ICT to enhance urban living. The core of smart cities revolves around the integration of digital solutions and data analytics to manage urban infrastructure and services more efficiently. Studies such as D'Amico et al. [48], Nguyen et al. [49], Pastor et al. [50], and Zeng et al. [51] have explored this topic through the deployment of sensors, IoT devices, and advanced software platforms to monitor and control various aspects of city life, such as traffic management, energy distribution, public safety, and waste management. This SLR identified that the primary objective of smart cities is to create a more interconnected and responsive urban environment. Different empirical studies can confirm this vision. For instance, smart traffic systems can reduce congestion by dynamically adjusting traffic signals based on real-time traffic flow data [52]. Similarly, smart grids optimize energy usage by balancing supply and demand, reducing energy waste, and integrating renewable energy sources more effectively [53]. In all these examples, it is reported that these technological solutions aim to improve the quality of life of residents by providing more efficient services, reducing costs, and enhancing overall urban functionality.

In contrast, sustainable cities emphasize environmental stewardship, social equity, and long-term ecological balance. While technology plays a role in sustainable cities, the focus is broader, encompassing a wide range of practices aimed at reducing the environmental impact of urban living and promoting social well-being. The distinction lies in the primary goals and methods: smart cities prioritize technological innovation to optimize urban operations, whereas sustainable cities focus on holistic approaches to ensure environmental and social sustainability. However, these concepts are not mutually exclusive and often intersect. The intersection of the smart and sustainable city concepts can lead to innovative solutions that simultaneously address multiple urban challenges. For example, Kumar and

Tewary [54] point out that the use of smart technologies can contribute to sustainability by improving energy efficiency and reducing emissions. Conversely, sustainable practices can enhance the resilience and adaptability of smart cities. Another example is given by Szpilko et al. [55]. For instance, the use of smart technology in waste management systems not only improves efficiency but also supports sustainability by enhancing recycling and reducing landfill use. Similarly, energy-efficient smart buildings contribute to both technological advancement and environmental sustainability by reducing energy consumption and greenhouse gas emissions. Furthermore, the integration of smart and sustainable city initiatives can enhance resilience against climate change and other urban stresses. This synergy creates urban environments that are better equipped to anticipate, respond to, and recover from various challenges, thereby ensuring long-term sustainability and quality of life for residents [56,57].

Studies such as Ribeiro and Gonçalves [58] and Wu et al. [59] characterize a resilient city as one that possesses the capacity to absorb, recover from, and adapt to various shocks and stresses, such as natural disasters, economic downturns, and social disruptions. Following this vision, resilient cities must anticipate potential threats, minimize their impacts, and swiftly bounce back to normalcy while adapting to new conditions. The concept of resilience is intrinsically linked to sustainable development and emerges as an autonomous dimension. A resilient city contributes to the sustainable cities' goals by ensuring that urban development does not jeopardize environmental integrity, social equity, or economic viability. Moreover, resilient cities incorporate principles of sustainability in their planning and policy frameworks [60,61]. They enforce strict building codes to ensure structures can withstand extreme weather events, promote energy efficiency, and reduce carbon footprints. This alignment with sustainability reduces the long-term risks associated with climate change and resource depletion.

Health and Well-being is another identified dimension and emerges as a critical component of the sustainable city paradigm, as it directly impacts the quality of life of urban residents and the overall sustainability of urban environments. Therefore, it can be concluded that sustainable cities prioritize the physical, mental, and social health of their inhabitants. Equitable access to healthcare services is a cornerstone of health and well-being in sustainable cities. Ensuring that all residents, regardless of socioeconomic status, have access to high-quality healthcare is essential for addressing health disparities and promoting overall community health [62]. Zijlema et al. [63] add that mental health is another crucial aspect of well-being in sustainable cities through an empirical analysis performed in the city of Barcelona. This vision is also presented in our results since it emerges as a subdimension of the sustainable development paradigm. Accordingly, the integration of health and well-being into urban planning and policymaking also involves addressing the social determinants of health. Sustainable cities work to eliminate poverty, improve education, and create economic opportunities, as these factors profoundly influence health outcomes.

A third difference between the two paradigms appears in the Education and Knowledge dimension. This is considered a pillar of the sustainable city paradigm because it empowers individuals and communities to actively participate in and contribute to sustainable development. It is assumed that a well-educated populace is better equipped to make informed decisions, adopt sustainable practices, and innovate solutions that address urban challenges. The role of education in sustainable cities extends beyond traditional schooling. Hirju and Georgescu [64] mention that it encompasses lifelong learning opportunities that adapt to the evolving needs of society and the environment. The idea is to integrate sustainability into curricula at all levels, from primary education to higher learning. Following this approach, cities can cultivate a generation of environmentally conscious citizens who understand the importance of sustainable living. Moreover, education and knowledge foster innovation and economic development [65,66]. Cities that invest in educational infrastructure and research institutions can create environments conducive to technological advancements and entrepreneurial endeavors.

5. Research Agenda

The smart city and sustainable city paradigms have evolved significantly over time, driven by advancements in technology, societal challenges, and shifts in priorities toward sustainability and inclusivity. Smart cities were seen primarily as technology-driven urban spaces, with a strong focus on digital infrastructure. The focus was on efficiency [67]. However, there is a growing focus on resilience, inclusivity, and sustainability. Smart cities are now often viewed through the lens of adaptation to climate change [68]. Similarly, the concept of sustainable cities emerged from the environmental movement, but with the rise of global initiatives like the SDGs, sustainable cities are increasingly viewed through the lens of SDG 11: Sustainable Cities and Communities [69]. Accordingly, a central point of research progress in this field is the convergence of smart cities and sustainable cities, which represents a holistic approach to urban development where technology and environmental stewardship intersect to create more efficient, resilient, and livable urban spaces. When these two concepts converge, they create a synergy that amplifies their individual benefits. This convergence also fosters innovative solutions to complex challenges, such as climate change and resource scarcity. An example of this scenario is provided by Mishra and Singh [70] when looking to the future of energy management systems in cities. It is pointed out that smart grids and renewable energy integration enhance the sustainability of energy systems, while real-time data on environmental conditions can drive more responsive and adaptive management strategies. Another example is provided by Oberascher et al. [71] when exploring the usage of water management systems. They employ sensors and data analytics to monitor and control water usage across urban areas. These systems help detect leaks, optimize irrigation, and reduce water waste, thereby conserving this vital resource and supporting sustainable urban development. Ultimately, the integration of smart and sustainable principles supports the development of cities that are not only technologically advanced but also environmentally responsible and resilient.

One key area of research is the optimization of smart grids to support renewable energy integration. Studies should focus on how smart grids can manage and balance intermittent renewable energy sources, such as wind and solar, while maintaining grid stability and efficiency. Additionally, research should explore how smart grid technologies can be scaled to different urban contexts and the potential trade-offs involved in their deployment. Addressing these challenges requires the leverage of advanced technologies and strategies. Ramli et al. [72] highlight that real-time data collection and analysis, enabled by IoT sensors and smart meters, play a pivotal role in monitoring energy production and consumption patterns. These data allow for the precise forecasting of renewable energy availability and the adjustment of grid operations accordingly. Another study, conducted by Otay et al. [73], suggests that predictive analytics can anticipate fluctuations in solar and wind energy generation, enabling preemptive adjustments to the grid to accommodate these variations. Grid flexibility and resilience are also critical considerations. Therefore, smart grids should be capable of quickly responding to disruptions and integrating diverse renewable energy sources. This involves developing advanced grid management systems that can dynamically reconfigure the grid in response to changes in energy supply or demand [74–76].

Urban planning research that explores the integration of smart technologies with green infrastructure is becoming crucial for enhancing urban resilience and sustainability. Research in this field aims to understand how advanced technologies can complement and amplify the benefits of green infrastructure, such as parks, green roofs, and urban forests, to create more resilient and livable cities. Hui et al. [77] highlight that smart technologies can enhance the functionality of urban green spaces by integrating them with digital platforms and applications. For instance, apps that provide real-time information on the availability and condition of park facilities or track the growth and health of urban trees can engage residents and encourage the use of these spaces. Additionally, data collected from these platforms can inform future planning and maintenance practices, ensuring that green infrastructure meets the evolving needs of urban populations. Addas [78] adds that the integration of smart technologies with green infrastructure can also support climate adaptation and resilience strategies. For example, advanced modeling and simulation tools can be used to predict how green infrastructure will perform under various climate scenarios, such as increased rainfall or higher temperatures. This information can guide the design and placement of green spaces to maximize their effectiveness in mitigating climate impacts and enhancing urban resilience.

The significant convergence of smart and sustainable cities is continuously encouraging the creation of multifunctional and flexible urban spaces. Associated with this trend, this convergence is fostering greater community engagement and participation by leveraging smart technologies to enhance interaction between residents and urban planners. It is reported by Senior et al. [79] that smart city platforms and applications allow residents to provide feedback, report issues, and participate in decision-making processes more easily. An example of this scenario is given by Balakrishnan et al. [80]. Interactive digital platforms can enable residents to access real-time information about their neighborhoods. This increased transparency and accessibility also empower citizens to be more involved in their community's development and management, leading to more responsive and inclusive urban planning. Smart and sustainable cities facilitate greater community engagement by providing platforms for residents to participate in decision-making processes. Digital tools and applications allow for more interactive and democratic forms of civic engagement [81,82]. Residents can report issues, provide feedback, and even vote on community projects or policies through online platforms. This direct involvement is important to ensure that urban development aligns with the needs and preferences of the community, making the planning and management processes more inclusive and representative.

6. Conclusions

6.1. Final Remarks

The topics of smart cities and sustainable cities has attracted a great deal of attention from the international scientific community. The scientific reviews carried out in the area indicate that the topic of smart cities was the one that initially received the most attention, with the first two reviews published in 2015 and 2016. However, in the past two years, the topic of sustainable cities has attracted the most attention, with reviews in this area accounting for around 42.86% of the publications on the subject. The profile of the journals where articles on sustainable cities are published essentially covers interdisciplinary areas resulting from the intersection of environmental, economic, and social issues, while articles on smart cities are mainly published in journals with a more technical profile related to energy and ICT issues. There are also differences in the type of reviews published. In smart cities, SLRs predominate with 41.38%, while meta-syntheses stand out in sustainable cities with 37.14%. In terms of citations, five of the six most cited publications deal with the topic of sustainable cities, but the first position in the ranking is occupied by a study on smart cities, which has received more than 200 citations per year, giving a total of more than 2000 citations. The network of connections between the studies published on both topics shows that the topic of smart cities is better defined by the identification of just three clusters. There is strong coupling between the studies, which indicates that the topics covered have a high degree of similarity. On the other hand, sustainable cities have five clusters, which indicates a greater dispersion of the topics covered, as well as a weaker relationship between the studies, which indicates a greater breadth of the topics investigated.

The complementary thematic analysis carried out in this study showed that the common dimensions between the two paradigms are quite significant. In total, 7 of the 10 dimensions considered are common. Therefore, it can be concluded that sustainable cities and smart cities, while overlapping in their goals to improve urban living, diverge significantly in their focus areas. The three distinct dimensions found in sustainable cities emerge only as subdimensions in the smart city paradigm. Resilience and Disaster Management is central to sustainable cities, emphasizing the ability to withstand and recover from environmental shocks and stresses. These cities prioritize sustainable infrastructure and community planning to mitigate risks and enhance long-term survival. In contrast, smart cities leverage advanced technologies and data analytics to optimize urban services. Health and Well-being is pivotal in sustainable cities, where the emphasis is on creating green spaces and promoting active lifestyles to enhance residents' quality of life. Smart cities, on the other hand, use technology to improve healthcare delivery and monitor public health trends, aiming for efficient and accessible health services. In Education and Knowledge, sustainable cities invest in educational systems that foster environmental stewardship and community engagement, preparing citizens to contribute to a sustainable future. Smart cities prioritize innovative services, integrating technology into education to create a skilled workforce adept at navigating and advancing a technology-driven world. These differing emphases underscore the broader environmental and social ethos of sustainable cities compared to the technology-centric approach of smart cities.

6.2. Theoretical and Practical Contributions

This article offers both theoretical and practical contributions. Theoretically, this study adopts an integrative review approach to provide a comprehensive framework for understanding the distinct and overlapping characteristics of smart and sustainable cities. It delineates the conceptual boundaries, emphasizing that while both concepts aim to enhance urban living, they prioritize different aspects. Smart cities focus on leveraging technology and data to improve efficiency and quality of life, whereas sustainable cities emphasize environmental stewardship, social equity, and economic viability. This theoretical clarity helps urban scholars and policymakers discern the nuanced approaches and methodologies applicable to each concept, fostering a more targeted and effective urban development discourse. Practically, the study's findings are instrumental for city planners and researchers in this field. By highlighting the complementary nature of smart and sustainable city strategies, this study suggests integrated planning approaches that harness the strengths of both paradigms. This study also reveals and discusses empirical studies about these two paradigms, offering actionable insights for cities aiming to balance technological advancement with sustainability goals. Furthermore, the comparative analysis helps in identifying potential pitfalls and challenges, guiding cities in avoiding a one-size-fits-all approach and instead tailoring their strategies to their unique contexts and needs.

6.3. Limitations and Future Research Directions

It is also important to realize that this study has some limitations, which also suggests some paths for future research directions. Firstly, it is important that the analysis of the studies published in 2024 can be reviewed at the end of the year, since the data collected only make this count until the end of June of that year. Another limitation of this study is that the frequency of the themes identified corresponds to the entire analysis period of the past decade. This does not make it possible to trace an evolution in the frequency of themes over this period. This type of analysis would reveal rich new insights that would enable us to shape the evolution of the topic in the coming years. Another area to explore is the long-term impacts of integrating smart city technologies with sustainable urban planning. This involves assessing how the convergence of these two paradigms affects urban resilience, resource management, and quality of life over extended periods. Longitudinal studies could provide valuable insights into the durability and adaptability of these integrated strategies. Finally, another vital direction is the examination of case studies across diverse geographical and socioeconomic contexts. Comparative analyses between cities in developed and developing countries can reveal how different environments and resource availabilities influence the implementation and success of smart and sustainable initiatives. This approach would help us to highlight best practices and find adaptable models that can be tailored to various urban settings.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su16208890/s1.

Author Contributions: Conceptualization, F.A.; methodology, F.A.; validation, C.M.G. and V.A.; formal analysis, F.A.; investigation, F.A., C.M.G. and V.A.; writing—original draft preparation, F.A.; writing—review and editing, C.M.G. and V.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data are available in the Mendeley Data Repository through the https://doi.org/10.17632/wz972cfz62.1, accessed on 17 September 2024.

Conflicts of Interest: The authors declare no conflicts of interest.

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