smart cities

MDPI

Article

SDGs as One of the Drivers of Smart City Development: The Indicator Selection Process

Javier Parra-Domínguez [1,2,*], Andrea Gil-Egido [2] and Sara Rodríguez-González [2]

[1] E.T.S. de Ingeniería Industrial de Béjar, University of Salamanca, Avda. Fernando Ballesteros, 2, Béjar, 37700 Salamanca, Spain
[2] BISITE Research Group, University of Salamanca, Edificio I + D + I, C/Espejo S/N, 37007 Salamanca, Spain
* Correspondence: javierparra@usal.es

Abstract: The 2030 Agenda is a clear development milestone for humanity in its ambition to care for our future generations. Smart Cities play an essential role in this development, the development direction of which is based, among others factors, on the fulfilment of the criteria set by the various Sustainable Development Goals (SDGs). The purpose of the current research is to verify the current state of science concerning the development of the SDGs in Smart Cities to establish a theoretical framework for the development and integration of data specific to a Smart City to participate in homogeneous monitoring of these indicators and to compare with other Smart Cities. Once a robust bibliographic study has been carried out, we proceed to establish a theoretical study, the application methodology of which follows a process developed in various phases to obtain an integrated system for monitoring and linking of the development of Smart Cities according to the criteria set out in the applicable SDGs. The clear implication is establishing an objective and efficient process that covers collection to integrate and compare the obtained data. One of the limitations of this process is overcoming the technological barrier in specific less developed environments that may not have sufficient funding. With respect to future lines of research, the current study opens the door to studying the implications of this type of process on the management and elaboration of specific public policies, for example, concerning the time taken to establish and resolve them.

Keywords: SDGs; smart cities; monitoring indicators

Citation: Parra-Domínguez, J.; Gil-Egido, A.; Rodríguez-González, S. SDGs as One of the Drivers of Smart City Development: The Indicator Selection Process. *Smart Cities* **2022**, *5*, 1025–1038. https://doi.org/10.3390/smartcities5030051

Academic Editor: Pierluigi Siano

Received: 31 July 2022
Accepted: 16 August 2022
Published: 19 August 2022

1. Introduction

Sustainability is part of the cornerstone of any Smart City development [1,2]. Procedures such as rehabilitation, regeneration or refurbishment of buildings are clearly in line with the sustainable development of Smart Cities [3]. It is a new concept of urbanism that avoids demolition and rebuilds as a model of transition to more sustainable cities [4,5]. Processes such as these can be accompanied by sustainability criteria that also allow for the conservation of the environment if necessary [6]. In places like Europe, where almost everything is already built, real estate strategies should be aimed at the revaluation of this heritage based on corrections or punctual interventions that can update the value of existing buildings.

The dichotomy that arises in the opening paragraph concerning a fundamental issue such as the refurbishment of buildings suggests a link with the direction of the monitoring of the SDGs as a precursor of the sense be given to a process that results in an improvement of Smart Cities [7,8]. However, if the process described as an introductory example were to be built from scratch, it would be optimal to increase the number of shared spaces, from the street to the interior of buildings and even to rooftops. At all times, a high density would be maintained, making cities exciting and sustainable, with diverse housing for a socially, culturally and economically diverse population. High density with social cohesion would motivate the installation of renewable energy resources. All of the above, as well as the importance of the process, can be understood in the context of cities as social ecosystems [9].

The association between Smart Cities and SDGs is derived from the contemplation of the latter within the framework of the 2030 Agenda. The 2030 Agenda for Sustainable Development is an international agreement signed by the 193 countries that are part of the United Nations on 25 September 2015. The international community's support for this agreement ratified its commitment to sustainable development. Through it, Member States pledged to ensure sustained and inclusive economic growth, social inclusion and environmental protection and to do so within a framework of peace and cooperation [10]. This agenda is the culmination of more than four decades of dialogue and debate on how to respond to the environmental problems that scientists have warned about and that are primarily the result of human action.

The 2030 Agenda is a continuation of the Millennium Development Goals (2000–2015) and goes beyond rhetoric, urging us to take the energetic and transformative actions urgently needed to set the world on a new course [11]. In this way, the 2030 Agenda represents a multilateral consensus between governments and diverse actors capable of making national policies for employment that are compatible with rights and development, as well as with the expansion of international trade and conflict prevention, along with the overarching goal of moving together toward an equal society [12].

The new 2030 Agenda has clear principles and is based on five fundamental dimensions [13]:

- **People:** represented by the first 5 SDGs, focused on ending poverty and hunger in all forms and ensuring dignity and equality in a healthy environment;
- **Planet:** seeking to protect our planet's natural resources and to work on climate issues to ensure the well-being of current and future generations through sustainable consumption, production and management of natural resources, as represented by SDGs 6, 12, 13, 14 and 15;
- **Prosperity:** to ensure that all people can enjoy an entire life by promoting economic, social and technological progress compatible with due respect for nature, as represented by SDGs 7 to 11;
- **Peace:** this includes SDG 16, which seeks to achieve peaceful, just and inclusive societies with solid institutions; and
- **Collective participation:** shaped by SDG 17, the aims of this dimension is to implement the Agenda through a robust global partnership based on solidarity and focused on the needs of the most vulnerable, which will enable us to make progress in achieving the SDGs.

The 2030 Agenda, therefore, embodies the following fundamental principles [13]:

- Universality;
- Leaving no one behind;
- Interconnectedness;
- Indivisibility; and
- Inclusiveness and cooperation.

The motivation of this research is to scientifically deepen the need to accompany the development of a Smart City not only in a technological sense but also in the convergence between technology and compliance with the SDGs, generating a framework to link Smart Cities with the SDGs, especially those that configure or can configure more direct monitoring of the activity of a Smart City. Incorporating a theoretical framework enabling a Smart City to comply with the SDGs is an improvement in current research. We are going a step further by establishing criteria that allow a comparison to monitor the development of Smart Cities, main issue of which, to date, has been knowledge of the SDGs that affect them. With this addition, a further criterion is incorporated to allow for comparison in terms of development by the SDGs.

For the above reasons, which will reinforce other conclusions, it is considered appropriate to include a second section in which a bibliographical analysis will be carried out to understand the importance of current science in the conjunction of both currents of

knowledge. Subsequently, we will establish a procedure considered appropriate to mark the previous strategy of a Smart City to establish its convergence with the various SDGs. A discussion and conclusions will follow this.

2. SDGs and Smart Cities: A Bibliographical Review

As previously introduced, the aim of this article is to delve deeper into the process of selecting indicators linked to the current SDGs and thus elucidate their implications with respect to the development of any Smart City.

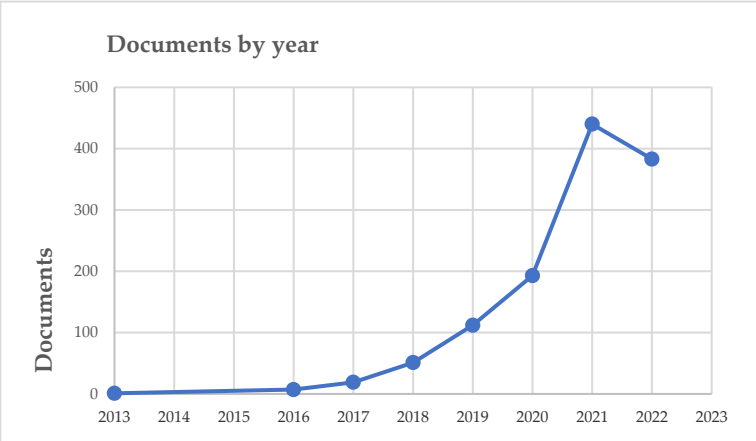
A review of previous literature in this regard can show how various studies have already worked on the convergence between SDGs and the development of Smart Cities.

To determine the evolution of the study of the SDGs applied to the Smart City concept, an analysis of bibliometric indicators was carried out using the Scopus platform. We decided to use this database due to its importance among the scientific community and the volume of results it could provide. Scopus was selected, for a first bibliographic analysis, because it is the largest and among the most prestigious international academic databases. It is produced by the ElSevier group, one of the essential scientific publishers in the world. In addition, Scopus features a user-centered interface and uses unified criteria and analysis tools for all its indices. Scopus employs suitable criteria, in particular for evaluation and selection of journals without differentiating by collections, as well as suitable tools for generation of its various impact indices. For the same reason, the search equation was formulated so that the platform's engine would return all publications in which the terms SDG and Smart City appeared.

The following equation was used:

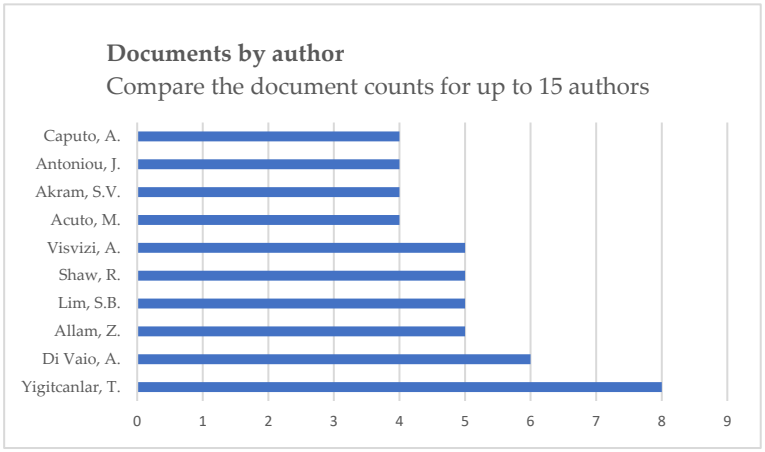
ALL "Smart City" AND ALL "SDGs"

As shown Scheme 1, the number of publications linking "Smart City" and "SDGs" has grown exponentially in recent years. Specifically, we highlight the number of publications expected for 2022; halfway through the year, there is practically the same number of publications as in 2021. In 2021, there were 440 publications; in 2022, halfway through the year, there are 383 publications.



Scheme 1. Documents by year.

Scheme 2 Principal authors publishing on the convergence between the Smart City concept and the SDGs. We highlight the following articles by the top three authors that give an idea of the current and growing concerns of the scientific community (three main articles ordered by relevance according to Google Scholar):



Scheme 2. Documents by author.

Yigitcanlar, T.

- Can cities become smart without being sustainable? A systematic review of the literature [14]
- Green artificial intelligence: Towards an efficient, sustainable and equitable technology for smart cites and futures [15]
- Understanding and acceptance of smart city policies: Practitioners' perspectives on the Malaysian smart city framework [16]

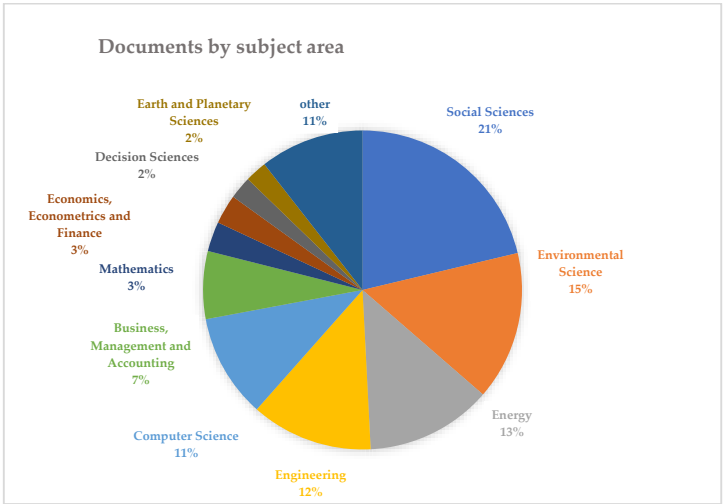
Di Vaio, A.

- Artificial intelligence and business models in the sustainable development goals perspective: A systematic literature review [17]
- Intellectual capital and sustainable development: A systematic literature review [18]
- SDGs and airport sustainable performance: Evidence from Italy on organizational, accounting and reporting practices through financial and non-financial disclosure [19]

Allam, Z.

- On big data, artificial intelligence and smart cities [20]
- Three decades of research on smart cities: Mapping knowledge structure and trends [21]
- Redefining the smart city: Culture, metabolism and governance [22]

Finally, Scheme 3 shows that the top five areas of knowledge account for 72% of publications, i.e.,



Scheme 3. Documents by subject area.

- Social science (21%);
- Environmental science (15%);
- Energy (13%);
- Engineering (12%); and
- Computer science (11%).

In addition to the deepening of the evolution of studies on Smart Cities and of each of the most relevant articles and authors identified in our literature review, it is worth noting that the sciences most concerned with the evolution of the conjunction between SDGs and Smart Cities are those linked to the social sciences and environmental sciences; however, in third and fourth place are incorporated branches of knowledge such as energy or engineering. This justifies the need to deepen strategic processes that unite all the knowledge streams described, as well as the fifth, computer sciences. This deepening will encourage the work developed in engineering to meet social criteria and environmental concerns, all of which are related to another driving force for the development of Smart Cities, which is compliance with the precepts of the SDGs.

A further step in the bibliometric analysis was taken by incorporating an analysis of terms in the most relevant texts included when we entered "Smart City" and "Sustainable Development Goals" in the Web of Science (WoS) database, specifically in the Web of Science Core Collection. WoS was incorporated out to gain access to the two large databases and to derive three essential aspects, i.e.,

- The intrinsic quality of two multidisciplinary databases that cover a large number of journals with the most rigorous standards for selection of the publications [23];
- Their strategic importance, as they are two most widely used databases for the process of analysis and evaluation of science; and
- They are the two academic databases that provide the best selection for the analysis of academic information through their metrics, indices and functionalities for such purposes.

The WoS analysis was carried out with WOSviewer software. As shown in Figure 1, we identified four clusters with links between them. For each of the clusters, we can highlight the following terms:

- Energy;
- Sustainable development goals;
- Sustainable city; and
- Government (and "measure").

In addition to the connection between them, the current scientific progress is in line with generation of a theoretical framework of Smart City development measures based on SDGs, as proposed in the literature.

In Figure 2 further elucidates the analysis of keywords found in the analyzed publications, showing the following relationships more clearly:

- Sustainable development goal–implementation–China;
- Sustainable development–case–impact;
- Framework–smart sustainable city–smart sustainable–future;
- Global burden–disease study; and
- Opportunity–challenge.

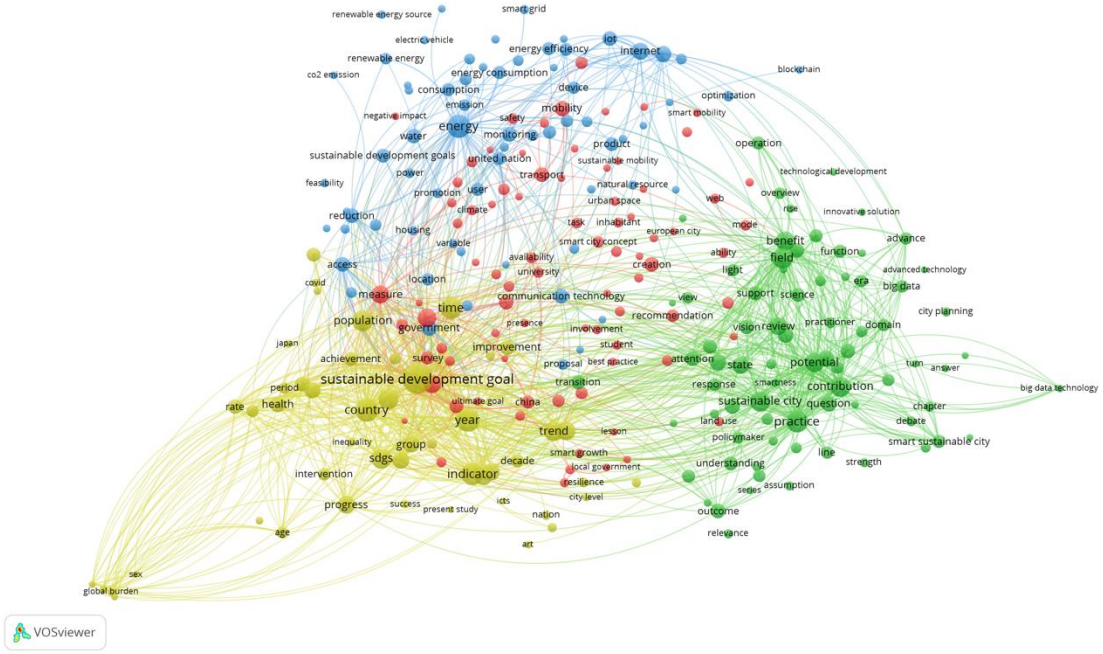


Figure 1. Analysis of key terms of scientific concern in publications linking the concept of Smart City and the Sustainable Development Goals.

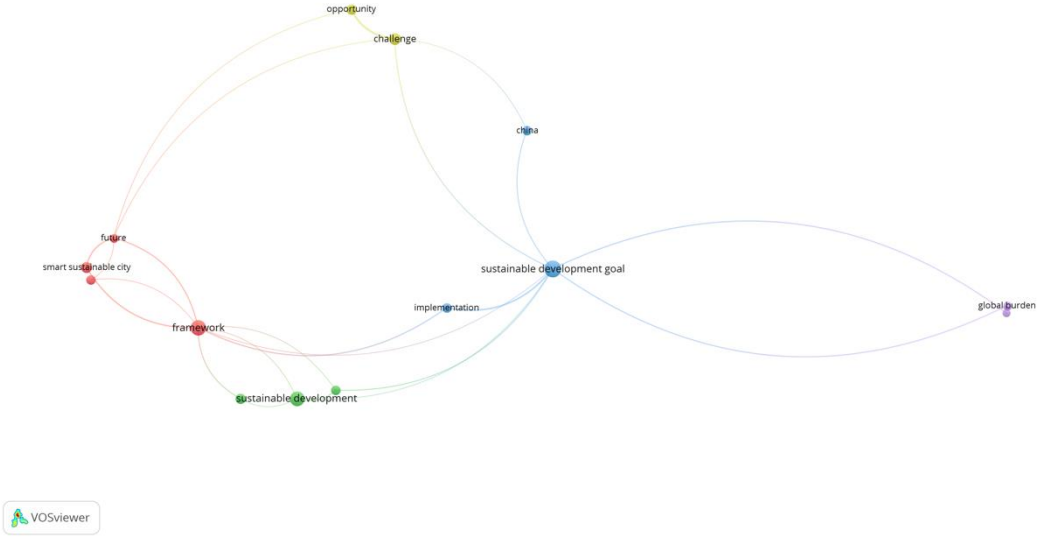


Figure 2. Analysis of keywords of scientific concern in publications linking the concept of Smart City and the Sustainable Development Goals.

Given the importance of these keywords, carrying out an analysis in Google Scholar, we identified prominent publications that link these keywords (except for the last two groups, as they are considered more generic) published since 2018:

Assessing progress towards sustainable development over space and time [24]

- Nature
- Cited by 222

Impact of knowledge management practices on green innovation and corporate sustainable development: A structural analysis [25]

- Journal of Cleaner Production
- Cited by 235

The IoT for smart sustainable cities of the future: An analytical framework for sensor-based big data applications for environmental sustainability [26]

- Sustainable cities and society
- Cited by 473

3. Methodology of the Strategic Process of Indicator Selection

As previously introduced, in this section, we will discuss the methodological proposal for data and information collection from the various sources to monitor Smart Cities.

First, from a strategic point of view, the SDGs most directly linked to the development of a system for measuring of Smart Cities with respect to the fulfilment of the 2030 agenda are established. These are:

Goal 3. Good health and well-being. Ensure healthy lives and promote well-being at all ages.

The COVID-19 syndemic revealed that additional efforts are required to eradicate many diseases and address various health problems. This goal focuses mainly on more efficient financing of health systems, improved sanitation and hygiene and increased access to medical personnel; the implementation or development of Smart Cities in these contexts can help immensely, as more advanced systems will be in place to treat people from the outset. The main objective of these cities is to increase social well-being and the surrounding environment, positively affecting people's physical and mental health [27].

Goal 6. Clean water and sanitation. Achieve universal and equitable access to safe and affordable drinking water.

Some data sources for the development and advancement of Smart Cities involve studying water, such as water retained by vegetation and other reservoirs. These studies on water treatments can help fulfil this goal [28].

Goal 7. Affordable and clean energy. Ensure access to affordable, secure, sustainable and modern energy and ensure the energy transition. Energy supply is among the essential services in Smart Cities. Energy management includes the generation, transport, distribution, storage and consumption or self-consumption of energy. Within Smart Cities, it is necessary to seek efficient, non-polluting, safe and resilient energy management. Examples of energy use within a city are transport, air conditioning, lighting, motorization and the various types of household appliances or consumer electronics, given the positivity of self-consumption and the profitability for citizens [29].

Goal 9. Industry, innovation and infrastructure. Develop sustainable, resilient and inclusive infrastructure; promote inclusive and sustainable industrialization; increase access to financial services and markets; upgrade all industries and infrastructure for sustainability; enhance research and upgrade industrial technologies. In addition to what was included in the introduction, which alluded to the link between the development of a Smart City and infrastructure, including buildings, it is vital for the Smart City concept to encompass essential industries related to transformation. In the fields of transport and waste, innovation concerning digitalization makes it possible to generate much more efficient forecasting models for the management of cities [30]. An example is healthcare, including the provision of universal coverage to citizens with improved tools in less time.

Goal 11. Sustainable cities and communities. Ensure access for all to adequate, safe, affordable housing and essential services, improving slums. The involvement of this objective will be explained below, in addition to the development of a theoretical study in two phases.

Goal 12. Responsible consumption and production. Ensure sustainable consumption and production patterns. In addition to reducing the environmental footprint of their activities and promoting sustainable consumption and production methods, Smart Cities must be nourished by tools and methodologies that revolve around technology to move toward a more equitable, secure, efficient and sustainable future [31]. An example of a practical solution for energy consumption is Smart Grids, which allow for a quick and efficient

response to energy demand and fluctuations in energy production thanks to distributed electricity generation.

Goal 13. Climate action. Take urgent action to combat climate change and its impacts. Within this specific objective, many verticals of Smart City development can be included [32], each of which we have clear examples in the form of cities such as Vancouver, which was the subject of a 2009 plan that sought to make it a green city within 4 years; Copenhagen, which was the subject of a plan to become a "carbon neutral" city by 2025; Singapore, with the clear motivation to meet the highest standards of sustainability by incorporating everything from efficient state-of-the-art buildings to the use of renewable energy or environmentally friendly transport; or Cape Town, as one of the first African cities to implement smart urban initiatives. In general, the need to assess the impact of climate change phenomena, such as floods, droughts or heat waves, to improve the resilience of cities already resides in every Smart City.

As illustrated above, objective number 11 is primarily linked to the development of sustainable cities and communities. We will create the theoretical framework in phases with respect to this objective.

Focusing on objective 11 and in the second phase of our theoretical strategic study, the targets of this objective have to be observed to understand and apply the process of integration of the indicators more efficiently. The goals of objective 11 are:

11.1 Safe and affordable housing;
11.2 Affordable and sustainable transport systems;
11.3 Inclusive and sustainable urbanization;
11.4 Protection of the world's cultural and natural heritage;
11.5 A reduction in the adverse effects of natural disasters;
11.6 A reduction in the environmental impact of cities;
11.7 Provision of access to safe and inclusive green and public spaces;
11.8 Strong national and regional development planning;
11.9 Policies for inclusion, resource efficiency and disaster risk reduction; and
11.9.a Support for the least developed countries with respect to sustainable and resilient building.

The real challenge comes in this stage of the process, as integrating the indicators of engineering and energy studies, as well as those of computation, requires attention to linking them, according to their nature, with each of the goals outlined above. In this article, we will focus on the integration process, for example, the various types of data capture sources. Sources, by their nature, can be direct or indirect [33]. Direct sources describe data arriving directly to the selected or implemented monitoring platform [34]. Data collection can be accomplished through sensors capable of collecting all the data necessary to obtain the variables that to be collected. In addition, these sources must have sufficient coverage to send the collected data to intermediate data processing centers and directly to the final manager. On the other hand, with respect to indirect sources, these come from some resource that needs to be consulted; therefore, an automatic process of uploading these data must be established, either through a programmed process that is repeated over time or through the intervention of an external human user who periodically updates the data [35].

The next phase of the process establishes the differentiation concerning the goals indicated above under objective number 11. To this end, once the sources have been identified, variables are included that most represent the following phenomena and fields. These phenomena affected by variables are linked to the objectives described above under SDG 11. The phenomena captured are those that are in line with, among others, what is indicated by Neumann et al. (2015) [36] and Bosch et al. (2017) [37], considering the efficient work on the available resources of Smart Cities, which include but are not limited to:

- Social capital;
- Cultural capital;
- Financial capital;

- Natural resources;
- Information; and
- Technology.

These phenomena reflected below are aligned with and satisfy the Smart City definition by improving the quality of life of inhabitants, commuting workers, students and other visitors; improving resource efficiency; building an innovation-driven and green economy; and fostering a well-developed local democracy. In particular, these phenomena are:

- Biodiversity: an example of a relationship between this phenomenon as a measurement variable with objective 11.6 is the generation of green spaces;
- Air quality: in this case and in relation to objective 11.6, an example is the number of air quality sensors implemented in a Smart City, as well as the monitoring of the metrics achieved by these sensors;
- Climate comfort: an example of monitoring this phenomenon is the number of eco-efficient buildings, also with respect to objective 11.6, which must employ healthy materials and products during their construction, as well as care with respect to the materials used for maintenance or the guarantee of thermal comfort;
- Culture and heritage: in this case, in relation to objective 11.4, an example is the number of monitoring systems for patrimonial buildings and the use of computer simulation tools with respect to the optimization of energy demand.
- Geology and soil: a a working example with respect to objective 11.6 is the number of underground water reservoirs to mitigate the "heat island" effect that occurs in cities due to the lack of subsoil humidity resulting from the low permeability of asphalt soil;
- Water and water overexploitation: with respect to objective 11.5, an example is the number of rainwater harvesting and accumulation systems, allowing improved use of water;
- Fires: also with respect to objective 11.5, and example the number of security systems in place in official public buildings related to fire detection;
- Meteorology. also with respect to objective 11.5, an example is the number of individualized alarm systems per department or neighborhood and the capture and reporting of extreme data by these systems;
- Noise: an example related to objective 11.6 is the variable covering the existence and number of schemes to promote recycled materials that offer improvements with respect to noise attenuation in cities;
- Health: also with respect to objective 11.6, an example is the number of CO_2 capture systems in cities;
- Socioeconomics: an example concerning objectives 11.8 and 11.9 is the number of systems for monitoring improvements in infrastructure connecting society with social infrastructure, such as hospitals, schools or libraries;
- Territory and urban planning: an example related to objective 11.1, 11.2, 11.3, 11.7 and 11.9a due to their cross-cutting nature is the number of multimodal nodes that ensure fast and easy interoperability between modes of transport for goods and people, avoiding all kinds of barriers;
- Vegetation: also related to objective 11.6, an example is the number of vegetation-based purification systems, which are more energy efficient than traditional purification systems.

Once identified, each city has to participate, together with local administrations, in the development of the indicators that will be attached to each of the phenomena and fields in such a way as to finalize the matching between these and the 11 SDG targets, as incorporated in the whole process shown in Figure 3.

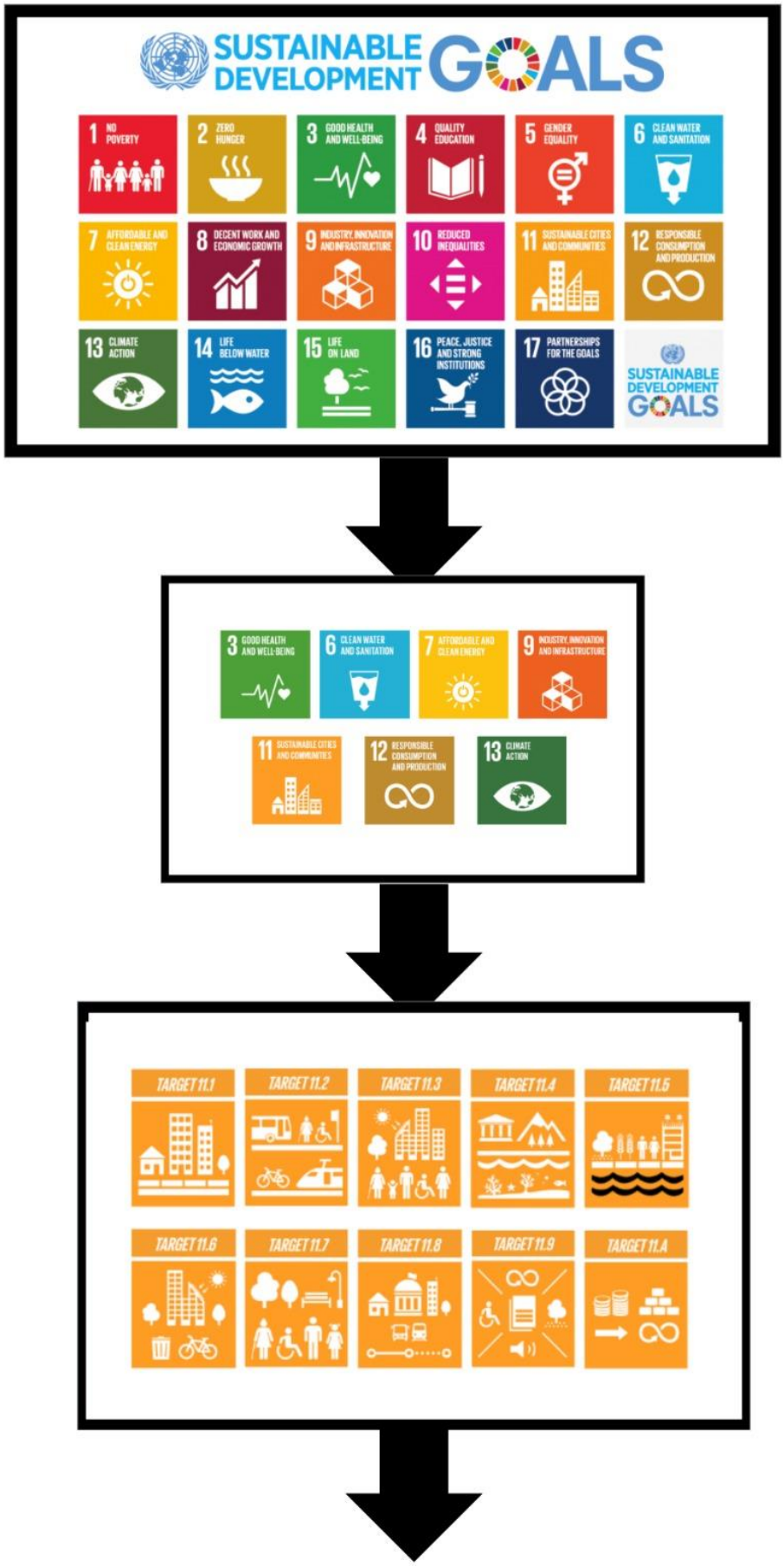


Figure 3. *Cont.*

Figure 3. Process of incorporating captured data in accordance with sustainability criteria.

4. Discussion

In this article, we highlight the need to incorporate principles similar to those set out in the SDGs as criteria for monitoring the development of Smart Cities.

The involvement of the SDGs in the strategy for the development of cities is widely known. Several studies were incorporated in our bibliometric analysis.

It is essential to highlight that the incorporation of the precepts set out in the SDGs in this article is considered part of the driving force that must guide the development of Smart Cities on the basis of the understanding that data sources from areas of knowledge such as engineering, energy or computing are diverse and not homogeneous. Therefore, the first point of discussion is the need to work in the future toward homogenization

once the operational part, which would follow the strategic part of this article, has been studied in depth. Secondly, homogenization is necessary to satisfy the need for comparison between cities, specifically in terms of whether the objectives are being met so that a form of benchmarking can be established.

As a result of this study, we also found that the future technical work resulting from the implementation of the strategically proposed process is arduous, as we have to take into account that essential factors come into play here, such as the technology available to capture data in real time or to capture data from sources that could generate some problems due to their environmental impact. Therefore, we propose collaboration between institutions to drive technological improvements that must take place in some countries to accompany a process of efficiently achieving sustainable development objectives.

This study is subject to limitations with respect to application based on the technology that may be available; clear examples are developing countries. Another limitation is the need for weighting of selected indicators (this has to be applied to specific city contexts and in the considered stage). The present study sheds light on a theoretical process for establishment of criteria for monitoring, follow-up and comparison of the development of Smart Cities. This must be agreed upon and protocolized by the relevant institutions. In future research, empirical studies on specific technological needs are proposed, as well as empirical research through questionnaires to work on the perception and possible contribution of public institutions that are key to its formal incorporation. Finally, work with the institutions will allow for research on the impact of the establishment of public policies based on the monitoring of sustainability indicators.

5. Conclusions

The motivations for establishing a Smart City are varied. Almost all of these motivations rest on the clear advantages for humanity. The main benefits are the effectiveness of data-driven decision making based on advances in big data and connected devices that have allowed cities to access information that has never before been available. A second advantage is the improvement of citizen engagement, considering that digital services offered by Smart Cities must be of quality and easy to use, with collaboration tools, modern and intuitive websites, mobile apps, self-service portals and online accounts. On the other hand, a third benefit is the creation of safer communities because, by definition, a Smart City is safer than traditional cities because it incorporates, for example, number plate awareness, connected crime centers or state-of-the-art 911. A fourth advantage is a clear improvement in the environment brought about by the fight to improve the environment as a critical point, as cities are fighting to reduce adverse effects on the environment, such as increased greenhouse gases or litter and waste on the streets, as well as an apparent involvement in energy-efficient buildings, air quality sensors and renewable energy sources that provide new tools for cities to reduce their ecological impact. Finally, with respect to the improvement in transport itself, known as enhanced transport, it is expected that investments in smart urban transport will increase sufficiently in the coming years, with smart technologies that enable cities to better serve citizens driven by basics such as smart traffic signals that optimize traffic flow, for example.

The above improvements demonstrate the need for technological incorporation and are in line with the SDGs set by the 2030 Agenda.

Motivated by the main conclusion of this study, which is to establish strategic follow-up and monitoring systems for effective implementation, a first conclusion is the already clear position of the technology incorporated in Smart Cities aligned with the fulfilment of premises such as the SDGs.

As we have observed from numerous previous works and the scientific community's concern, it is necessary to trace the development of Smart Cities based on the criteria set out in the SDGs within the 2030 Agenda. To develop this kind of traceability, it is necessary to establish a strategic process of convergence between the development of Smart Cities and

the fulfilment of one of the drivers of its growth, which is none other than the monitoring of the process from data capture to its alignment with the SDGs themselves.

It is also essential to clarify and conclude that the development of technology arises from the needs of a city in its ambition to be, for example, sustainable and thus, in an efficient way, provide and continue to provide services to citizens. Therefore, technology is incorporated according to criteria set by technologists, generally accompanied by financial premises for development in costs and investment in technology. Compliance with the technological criteria and economic precepts must be contemplated, in addition to alignment with social and human standards of the approach to the SDGs as objectives to be met by a Smart City in response to the new challenges set by the 2030 Agenda.

Author Contributions: Conceptualization, J.P.-D.; methodology, J.P.-D., A.G.-E. and S.R.-G.; software, A.G.-E. and S.R.-G.; validation, J.P.-D., A.G.-E. and S.R.-G.; formal analysis, J.P.-D., A.G.-E. and S.R.-G.; investigation, J.P.-D., A.G.-E. and S.R.-G.; resources, A.G.-E. and S.R.-G.; data curation, A.G.-E. and S.R.-G.; writing—original draft preparation, J.P.-D., A.G.-E. and S.R.-G.; writing—review and editing, J.P.-D.; visualization, A.G.-E. and S.R.-G.; supervision, J.P.-D.; project administration, J.P.-D.; funding acquisition, J.P.-D. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the project "XAI—XAI—Sistemas Inteligentes Auto Explicativos creados con Módulos de Mezcla de Expertos", ID SA082P20, financed by Junta Castilla y León, Consejería de Educación, and FEDER funds.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

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

References

1. Trindade, E.P.; Hinnig, M.P.F.; Moreira da Costa, E.; Marques, J.S.; Bastos, R.C.; Yigitcanlar, R. Sustainable development of smart cities: A systematic review of the literature. *J. Open Innov. Technol. Mark. Complex.* **2017**, *3*, 11. [CrossRef]
2. Ahvenniemi, H.; Huovila, A.; Pinto-Seppä, I.; Airksinen, M. What are the differences between sustainable and smart cities? *Cities* **2017**, *60*, 234–245. [CrossRef]
3. Ruá, M.J.; Huedo, P.; Cabeza, M.; Saez, B.; Agost-Felip, R. A model to prioritise sustainable urban regeneration in vulnerable areas using SWOT and CAME methologies. *J. Hous. Built Environ.* **2021**, *36*, 1603–1627. [CrossRef]
4. Ye, L.; Peng, X.; Aniche, L.Q.; Scholten, P.H.; Ensenado, E.M. Urban renewal as policy innovation in China: From growth stimulation to sustainable development. *Public Adm. Dev.* **2021**, *41*, 23–33. [CrossRef]
5. Parra-Domínguez, J.; Herrera-Santos, J.; Márquez-Sánchez, S.; González-Briones, A.; De la Prieta, F. Technological developments of mobility in smart cities. *Smart Cities* **2021**, *4*, 971–978. [CrossRef]
6. Sauermann, H.; Vohland, K.; Antoniou, V.; Balázs, B.; Göbel, C.; Karatzas, K.; Winter, S. Citizen science and sustainability transitions. *Res. Policy* **2020**, *49*, 103978. [CrossRef]
7. Blasi, S.; Ganzaroli, A.; De Noni, I. Smartening sustainable development in cities: Strengthening the theoretical linkage between smart cities and SDGs. *Sustain. Cities Soc.* **2022**, *80*, 103793. [CrossRef]
8. De Guimaraes, J.C.F.; Severo, E.A.; Júnior, L.A.F.; Da Costa, W.P.L.B.; Salmoria, F.T. Governance and quality of life in smart cities: Towards sustainable development goals. *J. Clean. Prod.* **2020**, *253*, 119926. [CrossRef]
9. Hatuka, T.; Zur, H. From smart cities to smart social urbanism: A framework for shapping the socio-technological ecosystem in cities. *Telemat. Inform.* **2020**, *55*, 101430. [CrossRef]
10. Gupta, J.; Vegelin, C. Sustainable development goals and inclusive development. *Int. Environ. Agreem. Politics Law Econ.* **2016**, *16*, 433–448. [CrossRef]
11. French, D.; Kotzé, L.J. *Sustainable Development Goals: Law, Theory and Implementation*; Edward Elgar Publishing: Cheltenham, UK, 2018.
12. Ladan, M.T. Achieving sustainable development goals through effective domestic laws and policies on environment and climate change. *Environ. Politics* **2018**, *48*, 42. [CrossRef]
13. Colglazier, W. Sustainable development agenda: 2030. *Science* **2015**, *349*, 1048–1050. [CrossRef] [PubMed]
14. Yigitcanlar, T.; Kamruzzaman, M.; Foth, M.; Sabatini-Marques, J.; da Costa, E.; Ioppolo, G. Can cities become smart without being sustainable? A systematic review of the literature. *Sustain. Cities Soc.* **2019**, *45*, 348–365. [CrossRef]
15. Yigitcanlar, T.; Mehmood, R.; Corchado, J.M. Green artificial intelligence: Towards and efficient, sustainable and equitable technology for smart cities and futures. *Sustainability* **2021**, *13*, 8952. [CrossRef]

16. Lim, S.B.; Malek, J.A.; Yussof, M.F.Y.M.; Yigitcanlar, T. Understanding and acceptance of smart city policies: Practitioners' perspectives on the Malaysian smart city framework. *Sustainability* **2021**, *13*, 9559. [CrossRef]
17. Di Vaio, A.; Palladino, R.; Hassan, R.; Escobar, O. Artifical intelligence and business models in the sustainable development goals perspective: A systematic literature review. *J. Bus. Res.* **2020**, *121*, 283–314. [CrossRef]
18. Alvino, F.; Di Vaio, A.; Hassan, R.; Palladino, R. Intellectual capital and sustainable development: A systematic literature review. *J. Intellect. Cap.* **2020**, *22*, 76–94. [CrossRef]
19. Di Vaio, A.; Varriale, L. SDGs and airport sustainable performance: Evidence from Italy on organisational, accounting and reporting practices through financial and non-financial disclosure. *J. Clean. Prod.* **2020**, *249*, 119431. [CrossRef]
20. Allam, Z.; Dhunny, Z.A. On big data, artificial intelligence and smart cities. *Cities* **2019**, *89*, 80–91. [CrossRef]
21. Sharifi, A.; Allam, Z.; Feizizadeh, B.; Ghamari, H. Three decades of research on smart cities: Mapping knowledge structure and trends. *Sustainability* **2021**, *13*, 7140. [CrossRef]
22. Allam, Z.; Newman, P. Redefining the smart city: Culture, metabolism and governance. *Smart Cities* **2018**, *1*, 4–25. [CrossRef]
23. Kousha, K.; Thelwall, M.; Rezaie, S. Using the web for research evaluation: The integrated online impact indicator. *J. Informetr.* **2010**, *4*, 124–135. [CrossRef]
24. Xu, Z.; Chau, S.N.; Chen, X.; Zhang, J.; Li, Y.; Dietz, T.; Liu, J. Assessing progress towards sustainable development over space and time. *Nature* **2020**, *577*, 74–78. [CrossRef]
25. Abbas, J.; Sagsan, M. Impact of knowledge management practices on green innovation and corporate sustainable development: A structural analysis. *J. Clean. Prod.* **2019**, *229*, 611–620. [CrossRef]
26. Bibri, S.E. The IoT for smart sustainable cities of the future: An analytical framework for sensor-based big data applications for environmental sustainability. *Sustain. Cities Soc.* **2018**, *38*, 230–253. [CrossRef]
27. Trencher, G.; Karvonen, A. Stretching "smart": Advancing health and well-being through the smart city agenda. *Local Environ.* **2019**, *24*, 610–627. [CrossRef]
28. Sukhwani, V.; Shaw, R.; Deshkar, S.; Mitra, B.K.; Yan, W. Role of smart cities in optimizing water-energy-food Nexus: Opportunities in Nagpur, India. *Smart Cities* **2020**, *3*, 1266–1292. [CrossRef]
29. Ordóñez, Á.; Sánchez, E.; Rozas, L.; García, R.; Parra-Domínguez, J. Net-metering and net-billing in photovoltaic self-consumption: The cases of Ecuador and Spain. *Sustain. Energy Technol. Assess.* **2022**, *53*, 102434. [CrossRef]
30. Wu, S.M.; Chen, T.C.; Wu, Y.J.; Lytras, M. Smart cities in Taiwan: A perspective on big data applications. *Sustainability* **2018**, *10*, 106. [CrossRef]
31. Gunawan, J.; Permatasari, P.; Tilt, C. Sustainable development goal disclosures: Do the support responsible consumption and production? *J. Clean. Prod.* **2020**, *246*, 118989. [CrossRef]
32. Huang-Lachmann, J.T. Systematic review of smart cities and climate change adaptation. *Sustain. Account. Manag. Policy J.* **2019**, *10*, 745–772. [CrossRef]
33. Li, Y.W.; Cao, K. Establishment and application of intelligent city building information model based on BP neural network model. *Comput. Commun.* **2020**, *153*, 382–389. [CrossRef]
34. Dobre, C.; Xhafa, F. Intelligent services for big data science. *Future Gener. Comput. Syst.* **2014**, *37*, 267–281. [CrossRef]
35. Kummitha, R.K.R.; Crutzen, N. How do we understand smart cities? An evolutionary perspective. *Cities* **2017**, *67*, 43–52. [CrossRef]
36. Neumann, H.M.; Jakutyte-Walangitang, D.; Vielguth, S.; Züger, J.; Airaksinen, M.; Huovila, A.; Pangerl, E. Overview of the Current State of the Art. CITYkeys Report 2015. Available online: https://nws.eurocities.eu/MediaShell/media/CITYkeys%20D1.2%20-%20Overview%20of%20the%20Current%20State%20of%20the%20Art.pdf (accessed on 7 August 2022).
37. Bosch, P.; Jongeneel, S.; Rovers, V.; Neumann, H.M.; Airaksinen, M.; Huovila, A. CITYkeys Indicators for Smart City Projects and Smart Cities. CITYkeys Report 2017. Available online: https://nws.eurocities.eu/MediaShell/media/CITYkeystheindicators.pdf (accessed on 8 August 2022).