



Smart City Policy and SDGs: Case Study From Across Countries

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Abstract. Smart cities are vital in confronting urban challenges and driving progress on the Sustainable Development Goals (SDGs). By harnessing Information and Communication Technologies (ICTs), these cities unequivocally enhance sustainability, inclusivity, and resilience. This study robustly demonstrates their contributions to SDG 11 (Sustainable Cities and Communities) through effective resource optimization; SDG 3 (Good Health and Well-being) by spearheading healthcare innovations; and SDG 7 (Affordable and Clean Energy) via superior energy management. Moreover, this research highlights the imperative of citizen engagement in shaping policies that reflect community needs. Case studies from Italy, Saudi Arabia, and South Korea showcase diverse yet effective strategies for implementing smart city initiatives. While technological advancements present significant opportunities, we assert that equity, strong governance, and sustainable frameworks are essential to ensure smart cities not only ignite innovation but also champion inclusive urban development.

Keywords: Smart cities, Sustainable Development Goals (SDGs), ICT.

1 Introduction

It is a well-known fact that cities play a pivotal role in the life of a nation and that population movements concentrated in urban areas are difficult to manage. Thus, with the unstoppable flow of urbanization, metropolitan areas are currently prone to facing various problems related to climate change, crime, and others. The increasing monopolization, urbanization, and population in urban areas, will lead to phenomena such as increasing economic, demographic, social, and environmental problems in cities, so that it becomes a challenge for urban areas that need attention [1]. Therefore, in response to this, a development concept is needed that can overcome the acceleration of urbanization so that growth is not only centered on a region. Still, it can improve the quality of life for the community [2].

To promote sustainability, economic development, and enhance the quality of life for individuals, governments worldwide have embraced the concept of smart cities. Recently, smart cities have gained popularity in various countries [3]. They serve as a solution to foster sustainable development, improve welfare, and stimulate economic growth [4]. Additionally, the goals of smart cities align with the Sustainable Development Goals (SDGs), which aim to create cities and settlements that are more inclusive, safe, resilient to change, and sustainable. Therefore, integrating smart city

initiatives with the SDGs offers both opportunities and challenges for urban development. Smart cities can make significant contributions to many of the SDGs, particularly those focused on sustainable urban environments, health, and innovation.

The integration of the smart city concept and SDGs is a concept of sustainable smart city development that combines elements of the smart city and sustainable city concepts related to four main aspects, namely technology, environment, economy, and social [9]. Combining the implementation of the smart city concept with sustainable development can help address development challenges such as human development, pollution, climate change, disaster preparedness, and so on [5], [6], [10]. In addition, accommodating practices from sustainable development can help smart city implementation not only utilize information and communication technology resources but also address development challenges to bring a city to intelligence and sustainability [7], [8].

The integration of smart city initiatives with the Sustainable Development Goals (SDGs) presents both opportunities and challenges for urban development. Smart cities have the potential to significantly contribute to achieving various SDGs, particularly those related to sustainable urban environments, health, and innovation. However, the implementation of these technologies must be carefully managed to minimize potential trade-offs and ensure equitable benefits for all members of society. Therefore, this research emphasizes the need for a comprehensive analysis of how smart city development can contribute to the SDGs. The goal is to find a clear path that promotes smart city implementation, focusing not only on technological advancement but also on the realization of sustainable development goals.

2 Literature Review

a. Smart City

The term "Smart City" was first introduced by the Kyoto Protocol in 1990, with the aim of creating sustainable urban environments. The concept of a Smart City began to grow in the 1990s, coinciding with the rise of global internet connectivity. With advancements in information technology in the early 2000s, two-way real-time communication became more feasible, supported by improved infrastructure. This development enables governments to efficiently disseminate important information, making it easily accessible and more interactive. It also allows for the creation of comprehensive databases covering various aspects such as transportation, land use, urban planning, and taxation. As a result, residents can access necessary information without needing to visit government offices in person.

Smart city is a city concept that has good performance with a view to a strong future which is outlined in six characteristics, namely economy, people, governance, mobility, environment, and living which are also combined with smart and citizen activities to determine success [11]. On the other hand, 'Smart City' is an urban planning concept, assessing the long-term sustainability of urban growth rather than short-term expansion,

its focus includes 3Es starting from the evaluation dimensions, namely economic prosperity, social justice, and environmental sustainability, each consisting of several indicators that emphasize the heterogeneous aspects of the dimensions [12].

The development of smart cities is considered a general approach to fulfilling urban functions to the needs of society [13], [14]. In the development process, smart cities involve the construction of various infrastructures to improve city functions, such as transportation, electricity, and public facilities. This infrastructure is the basis for creating effective, easy-to-understand, and connected communication channels with the community [15], [16]. The implementation of smart cities is not just a relationship between technology and people but also involves interactive media and media arts. Through these two aspects, people can better understand the concept of smart cities. Art and media play an important role in driving behavioral change in smart cities. One example is the application of media technology in public spaces.

b. Sustainable Development Goals

What can be done to overcome the increasingly complex global challenges where problems are not only about social aspects but also the environment is to create a strategy for a more sustainable future through sustainable development. Sustainable development gradually began to develop after the Brundtland Commission report in 1987, the United Nations Millennium Development Goals in 2000, and the Johannesburg Summit in 2002, but has become more widespread since the universal agreement on sustainable development goals by the United Nations in 2015 [17].

In its development, the definition of sustainable development began to develop where sustainable development focused on three main pillars namely social, economic, and environmental. The social perspective emphasizes population stability; basic human needs, and socio-culture, while the economic perspective emphasizes economic growth as a solution to alleviate poverty, and the environmental perspective emphasizes ecosystems on earth to reduce ecological problems such as natural disasters; air pollution; and climate change [18].

Sustainable development is a call for all countries to improve welfare, and prosperity and protect the order of life [20]. The action plan must mainly get support from various components of society such as the government, private sector, industry, and individuals. In the element of 17 goals contained in the SDGs, the comparison between the MDGs and SDGs lies in the target goals, where the MDGs target developing countries while the SDGs cover all countries in the world ranging from high, middle, and low-income countries [19].

3 Methods

This research was conducted using the literature review method to see the contribution of smart cities in sustainable development from a policy point of view from various countries. Data collection uses the Scopus database with the use of AI assistance in the form of Typeset IO with the keywords “smart city policy” AND “SDGs”. Based on the search process, 70 top-tier articles were found, which were further selected using the inclusion criteria as listed in the table below.

Table 1. Literature Search Database Criteria

Search Keywords	“smart city policy” AND “SDGs”
Search Fields	Title, Abstract, and Keywords
Year Range	2022 - 2024
Language	English
Document Type	Journal Article
Keywords	smart city, policy, and sdgs

4 Result and discussion

4.1. The Contribution of Smart City to SDGs

Smart cities are essential in promoting the Sustainable Development Goals (SDGs) as they effectively utilize Information and Communication Technology (ICT) to address various urban challenges. By implementing advanced technologies and smart solutions, these cities can improve infrastructure, enhance public services, and foster economic development. In particular, Goal 11 of the SDGs, which aims to create Sustainable Cities and Communities, highlights the importance of smart cities in cultivating urban environments that are both livable and sustainable. One of the primary contributions of smart cities is their ability to optimize resource management. This involves the efficient use of water, energy, and other essential resources, which can lead to significant savings and reduced waste. Moreover, smart cities focus on minimizing environmental impacts. By implementing smart transportation systems, promoting clean energy sources, and enhancing waste management practices, these cities can lower their carbon footprint and contribute to a healthier planet.Ultimately,

the combined effect of these innovations is an improved quality of life for residents. Smart cities provide better access to essential services, foster inclusivity by ensuring that all community members benefit from technological advancements, and build resilience against environmental and economic challenges. Together, these efforts create urban environments that are not only more sustainable but also more vibrant and enjoyable to live in [21].

Another contribution lies in Sustainable Development Goal number 3 on good health and well-being. Smart city innovations lie in changing healthcare services and response mechanisms during a pandemic. Innovations such as telemedicine, IoT-enabled health monitoring devices, and AI-based diagnostic tools improve the accessibility and efficiency of healthcare services. By improving preventive care and reducing healthcare costs, such technologies contribute to a healthier and more resilient urban population [22].

Similarly, it contributes to supporting the development of smart energy, which is stated in the 7th SDGs goal on Affordable and Clean Energy. Smart cities facilitate technologies such as blockchain-based micro-grids and also help reduce carbon emissions while making clean energy more accessible and affordable to urban communities [23].

Tabel 2.Sample of Smart City Contribution for SDG’s

Point of SDG’s	Contribution of Smart City from Literature Review
03 Good Health and Wellbeing	Disruptive technologies in smart cities can improve healthcare delivery and pandemic response [22].
07 Affordable and Clean Energy	Innovations in Energy Management such as blockchain in micro-grids, optimize energy use and reduce costs [23].
11 Sustainable Cities and Communities	Smart cities leverage ICTs to enhance urban resilience and inclusiveness and promote sustainable urbanization [21].

Other findings indicate that in looking at the contribution of smart cities to the SDGs, citizen engagement plays an important role in ensuring that development policies meet the needs of the community. This is driven by the participatory approach, which encourages inclusiveness, ensuring that development initiatives are aligned with the reality of people's lives [24].

4.2. Case Studies of Smart City Implementation in Different Countries

The implementation of smart city initiatives in Italy, Saudi Arabia, and Suwon South Korea, reflects both similarities and differences in approaches, challenges, and

outcomes. These cases illustrate how the context of economic, social, and technological factors influences the alignment of smart city initiatives with the Sustainable Development Goals (SDGs).

One striking similarity across these three contexts is the recognition of smart cities as a critical mechanism for advancing SDGs. All three cases highlight the transformative potential of integrating advanced technologies to address urban challenges. For instance, Italy's northern cities leverage robust infrastructure and innovation to drive industrial growth and sustainable development, aligning closely with SDG 9 (Industry, Innovation, and Infrastructure). Similarly, Saudi Arabia focuses on using its solar energy resources to promote SDG 7 (Affordable and Clean Energy), while Suwon demonstrates a holistic integration of multiple SDGs, including SDG 6 (Clean Water and Sanitation) and SDG 16 (Peace, Justice, and Strong Institutions). These examples underscore a shared understanding that smart cities can significantly contribute to creating sustainable, inclusive, and resilient urban environments.

Another commonality lies in the emphasis on governance and policy frameworks as essential components of smart city development. While governance challenges vary in complexity and scope, all three cases demonstrate that effective policy design and implementation are critical for ensuring the success of smart city initiatives. For example, Italy's regional disparities highlight the need for policies that address unequal infrastructure and resource distribution. Saudi Arabia's focus on governance aims to tackle issues such as privacy, high costs, and workforce development. Suwon's participatory governance approach, which involves citizens in decision-making processes, ensures that its smart city initiatives reflect community needs and priorities. This shared reliance on governance frameworks underscores the importance of strategic planning and stakeholder engagement in smart city development.

Despite some similarities, significant differences arise in the specific challenges and opportunities faced by each country. Italy, for example, presents a dual narrative: while northern cities thrive due to advanced infrastructure and robust economic systems, southern cities struggle with inadequate resources and limited access to technology. This stark regional disparity emphasizes the uneven distribution of benefits from smart city initiatives within the same country, highlighting the need for targeted interventions to bridge these gaps. In contrast, Saudi Arabia confronts challenges that are more national in scope, such as the high costs associated with implementing smart city technologies and a shortage of skilled workers. These challenges reflect the broader transition from a resource-based economy to one driven by knowledge and innovation.

Suwon represents a comprehensive and balanced approach to smart city development by integrating multiple Sustainable Development Goals (SDGs) into its strategy. Unlike cities in Italy and Saudi Arabia, Suwon does not experience significant regional disparities or critical skill shortages. Instead, its challenges involve maintaining alignment between its initiatives and long-term sustainability goals while also addressing the immediate needs of its residents. This highlights the importance of

customizing smart city strategies to fit the unique socio-economic and technological contexts of each city or country.

The role of natural resources and technological capacity varies significantly among the three cases. Saudi Arabia benefits from abundant solar energy, which is a key component of its smart city initiatives, particularly in promoting renewable energy solutions. In contrast, northern cities in Italy rely more on industrial innovation and economic stability to drive their initiatives. Meanwhile, Suwon focuses on social and environmental sustainability through inclusive governance and citizen participation. These differences highlight how the availability of resources and technological readiness shape the priorities and execution of smart city initiatives.

Tabel 3. The Findings Literature Review of Smart City Implementations from Various Countries

Identity of the Literature	Country	The Findings
(Barbieri et al., 2024; Acceturo et al., 2022). [25], [26]	Italy	Italy illustrates the dual nature of smart city development, with northern cities outperforming their southern counterparts in adopting initiatives related to the Sustainable Development Goals (SDGs), particularly SDG 9 (Industry, Innovation, and Infrastructure). The strong economic structures in the north facilitate these advancements, while inadequate infrastructure in the south presents significant challenges. This disparity highlights the need for targeted policy interventions to bridge regional gaps and promote nationwide progress toward achieving the SDGs
(Malik & Ahmad, 2023) [27].	Saudi Arabia	Saudi Arabia's approach to smart city development presents both opportunities and challenges. The country capitalizes on its abundant solar energy resources and a digitally literate population to promote innovation. However, obstacles such as high implementation costs, skill shortages, and privacy concerns require robust governance and policy frameworks to ensure sustained progress
(Pinem et al., 2023) [28]	Suwon, South Korea	Suwon exemplifies a comprehensive integration of the SDGs into its smart city strategy. The Suwon Sustainable Development Goals encompass a variety of objectives, including SDG 1 (No Poverty), SDG 6 (Clean Water and Sanitation), and SDG 16 (Peace, Justice, and Strong Institutions). Suwon's holistic

		approach emphasizes the alignment of smart city initiatives with economic, social, and environmental sustainability, serving as a model for other urban areas
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5Conclusions

Integrating smart city initiatives with the Sustainable Development Goals (SDGs) presents a transformative opportunity for urban development, addressing pressing challenges such as climate change, economic disparity, and social inequity. As metropolitan areas continue to expand, the need for sustainable management of resources becomes increasingly critical. Smart cities leverage Information and Communication Technology (ICT) to enhance urban resilience, optimize resource management, and improve the quality of life for residents. This approach not only aligns with SDG 11, which focuses on sustainable cities and communities, but also contributes significantly to other goals such as SDG 3 on good health and well-being through innovations in healthcare delivery, and SDG 7 on affordable and clean energy by facilitating access to renewable energy sources. However, the successful implementation of smart city frameworks requires careful consideration of potential inequities that may arise from technological advancements. Ensuring that all community members benefit from these initiatives necessitates a participatory approach that engages citizens in the decision-making process. This inclusivity is vital for aligning smart city projects with the actual needs and realities of urban populations. The findings underscore the importance of a holistic strategy that combines technological innovation with sustainable development principles, ultimately fostering urban environments that are intelligent but also equitable and resilient against future challenges.

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