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## RESEARCH ARTICLE

### SUSTAINABLE SMART CITIES: THE CONTRIBUTION OF IOT-ENABLED TECHNOLOGIES UNDER VISION 2030

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#### Abstract

The fast pace of urbanization has also contributed to an increase in the sustainability issues that are being experienced in urban and city centers, which include energy, environmental, transportation, and service delivery issues, among others. It is in this context that the development of smart cities has been identified as an approach that seeks to achieve sustainability in urban and city centers through the use of digital technologies, and in this regard, IoT has been identified as an enabler that facilitates data acquisition, decision making, and optimization in urban and city centers, among others. This paper seeks to analyze the role that IoT technology plays in creating smart and sustainable cities, with particular reference to Saudi Vision 2030. This paper seeks to analyze, through an in-depth analysis of literature from all over the world, the role that IoT technology plays in facilitating sustainability factors such as energy, transportation, environmental, governance, and quality of life in urban and city centers, with particular reference to smart city development. This paper seeks to highlight that it is within this context that smart city development, as an approach that seeks to achieve sustainability in urban and city centers, that the strategic approach that the Saudi government has taken towards digital transformation and smart city development is at the core of their development agenda, as highlighted within Saudi Vision 2030. The findings from this paper are that IoT technology has an impact on efficiency, sustainability, and response in urban and city centers, and in this regard, this paper seeks to reveal that the challenges that smart city development face are security, interoperability, and governance, which are core factors that facilitate smart city development and sustainability and in this regard, this paper seeks to contribute to the existing literature on smart city development and sustainability by proposing a conceptual approach towards smart city development and sustainability which is consistent with Saudi Vision 2030, with particular reference to IoT technology.

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**Introduction:-**

The problem of rapid urbanization has become one of the most significant factors that define the twenty-first century, and it has created a series of opportunities and challenges in relation to sustainability and development. Urbanization has created a series of challenges in relation to energy, transportation, environmental, and social issues, and the traditional management systems of the city are not efficient in relation to the resolution of the aforementioned challenges, which are causing problems like energy waste, transportation, environmental pollution, and a reduced quality of life, among others. (Jeddah strategic approaches to sustainable urban development and vision 2030 alignment, 2020, pp. 523-531) Therefore, the cities around the world are looking for innovative solutions that can support the development of sustainable development, and in this regard, the development of smart cities has become a significant issue, and the concept of sustainability has become a significant factor in the development of smart cities, which are based on the use of digital technology and intelligent systems that can support the development of sustainable development and increase the level of efficiency in their traditional management systems. (Mutambik, 2023) Among the digital technologies that can support the development of smart cities, the Internet of Things (IoT) has become a significant factor in relation to sustainability, and it has become a significant factor in the development of sustainable smart cities in developed and emerging nations. (Park et al., 2018, p. 1388)

The IoT technologies are a set of technologies that are playing an important role in the development of sustainable smart cities, and these are creating a range of opportunities in relation to sustainability and development, and these are helping in the development of sustainable cities that are able to optimize their systems, such as energy, transportation, environmental, social, and many other systems, and these are creating a range of opportunities in relation to sustainability and development. (Leveraging advanced digital technologies for smart city development in Saudi Arabia: opportunities, challenges, and strategic pathways, 2023, pp. 1-12) Saudi Arabia has recognized the importance of the role that digital technology has to play in resolving the challenges of sustainability while promoting the development goals of the nation. Saudi Arabia has an ambitious agenda for the development of the nation up to 2030, as highlighted in the Saudi Vision 2030, which includes the diversification of the economy, digital transformation, quality of life, and many other areas. (Saudi Arabia's Vision 2030: Pioneering Industrial Transformation and Economic Diversification, 2024) Smart city development is one of the major components of the Saudi Vision 2030, as the Kingdom has invested heavily in the development of smart cities. (Saudi Arabia Smart Cities Market | 2019 – 2030 | Ken Research, n.d.) Projects such as NEOM are an example of the commitment of the Saudi government to the adoption of advanced technology, such as IoT, in the development of smart cities. (Leveraging advanced digital technologies for smart city development in Saudi Arabia: opportunities, challenges, and strategic pathways, 2023) There are still some challenges that are associated with the implementation of the IoT technology in the development of smart cities, even though the technology has been widely accepted in the development of smart cities.

There is still insufficient research regarding the implementation of the IoT technology in the development of smart cities, since the issues of data security, sustainability, and other challenges that are associated with the implementation of the IoT technology still exist. (Alotaibe, 2024, pp. 14109-14118) Although various studies have been done regarding the implementation of the IoT technology in the development of smart cities, insufficient research has been done regarding the implementation of the IoT technology in the context of the development goals of various nations, such as the Saudi Vision 2030. (Alajmi, n.d.) In an attempt to bridge this gap, this research seeks to contribute to the discussion of the value that can be added from IoT technologies in supporting the development of sustainable dimensions of smart cities, as discussed in Vision 2030. A conceptual approach for this research, which entails literature review, was adopted in an attempt to identify the value that can be added from IoT technologies in supporting the development of sustainable dimensions of smart cities. The objectives of this research can be summarized as follows: the general objective of this research is to analyze the value that can be added from IoT technologies in supporting the development of sustainable dimensions of smart cities, as discussed in Vision 2030. This research also seeks to analyze the value that can be added from IoT technologies in supporting the development of sustainable dimensions of smart cities, considering the strategic objectives of the Saudi Vision 2030 for smart cities. This research also seeks to identify the value that can be added from IoT technologies in supporting the development of sustainable dimensions of smart cities, considering the challenges that can be encountered in adopting IoT technologies in smart cities. This research contributes to the academic literature in that it provides a framework for smart cities that aligns with the strategic objectives of the Saudi Vision 2030, considering the technological, sustainability, and strategic dimensions of smart cities.

The rest of this paper is outlined as follows: in the second section of this paper, the literature review of the concept of sustainable smart cities will be presented. Furthermore, the smart city concept under the Saudi Vision 2030 will be presented in the third section of this paper. Moreover, the role of IoT technology in enhancing the sustainability of smart cities will be analyzed in the fourth section of this paper. Furthermore, the discussion of the research findings will be presented in the fifth section of this paper, while the conclusion of this research will be presented in the last section of this paper.

### **Background and Literature Review:-**

The complexity of urban systems has led to the development of innovative strategies to create smart and sustainable cities. Smart and sustainable cities are the product of the union of sustainability and digital technology. Smart cities are cities that incorporate advanced information and communication technology to improve the quality of services delivered to their citizens. Sustainability, in this case, refers to the efficient and effective use of resources, the environment, and quality of life. The Internet of Things (IoT) has been identified as one of the technologies that can be used to develop smart cities. IoT connects physical infrastructures through sensors, software, and communication technology to enable real-time monitoring and control of the infrastructures. From the literature, it is clear that IoT has the potential to transform the city to become more dynamic and adaptable. Research has been conducted to show the potential of IoT to achieve environmental sustainability in smart cities. IoT-based energy management systems have the potential to improve the supply and usage of electricity and eco-friendly sources of energy. Smart grids, which are IoT-based, are also useful in identifying and solving inefficiencies in the supply and usage of electricity. IoT-based environmental monitoring systems are crucial in ensuring environmental sustainability in smart cities. The second domain that the potential of IoT was explored is transportation and mobility in smart cities. From the research conducted in this domain, it was identified that IoT-based intelligent transportation systems have the potential to be utilized in the development of smart cities, as IoT has the potential to collect data and develop intelligent systems that can be used to control transportation in smart cities, thereby improving transportation in smart cities and making it more efficient and effective.

From the research conducted in this domain, it can be identified that the potential of IoT is directly linked to sustainability, as IoT can be used to reduce pollution in smart cities through the reduction of fuel consumption, as identified in the research conducted in this domain. From the research conducted in this domain, it can be identified that IoT can be used to achieve sustainability in the transportation domain in smart cities. Apart from the potential applications mentioned above, IoT technology has been explored in relation to smart governance within smart cities. In this case, smart governance within smart cities can be improved through the application of IoT technology. In this case, IoT technology-based waste management can be used for improving efficiency within smart cities, while smart lighting technologies can be used for improving lighting conditions as required within smart cities. In this case, it can be seen that the potential applications are closely aligned with the concept of social sustainability, as IoT can be used for improving the quality of life within smart cities. However, despite the fact that the above benefits of the application of Internet of Things technology in the development of smart cities have been identified, there are some challenges associated with the application and adoption of Internet of Things technology in the development of smart cities, as identified in the existing literature. Some of the challenges include data security and privacy, which is still a great challenge considering the amount of data that is generated in the application of Internet of Things technology in the development of smart cities.

Another challenge is the interoperability of different kinds of Internet of Things technologies with existing technology infrastructures. Based on the above public policies, the success of the application of the Internet of Things technology in the development of smart cities is also dependent not only on the level of development of the Internet of Things technology but also the strategic aspect in terms of the national development policies. In fact, the integration of the national sustainability policies and the digitalization policies in the development of smart cities in the application of the Internet of Things technology is more significant. It is therefore clear that nations have achieved more success in the development of smart cities in the application of the Internet of Things technology than in the absence of the integration of the national development policies. However, the literature with regard to the application and adoption of the public policies in the development and application of the Internet of Things technology in specific regions of the Middle East is still limited. From the point of view of Saudi Arabia, literature that has been written regarding the application and adoption of IoT technologies has mainly concentrated on the development and application of smart city technologies. However, little emphasis has been given to the overall role that IoT technologies can play towards the sustainability goals that were set in Vision 2030. Although literature has been written regarding the role that IoT technologies, such as NEOM, can play towards the development and

application of smart city technologies, little emphasis has been given to the overall conceptual role that IoT technologies can play towards the sustainability goals that were set in Vision 2030. This, therefore, highlights an important gap that needs to be filled regarding the application and adoption of IoT technologies from the point of view of Vision 2030.

### **Conclusion:-**

In conclusion, it is vital to appreciate the role that IoT technologies can play in the development and application of smart cities along different dimensions. This is due to the fact, as highlighted in the literature, energy management, transportation, environmental protection, as well as governance are some of the vital areas that have benefited significantly in terms of sustainability due to the application and adoption of IoT technologies. The study, therefore, has relied on literature regarding the application and adoption of IoT technologies for the development and application of smart city technologies. This, therefore, underscores an important contribution that has been made by this study towards the development of literature regarding the application and adoption of IoT technologies for the development and application of smart city technologies.

### **Saudi Arabia's Vision 2030 and Smart City Strategy:-**

It is submitted that the vision 2030 of Saudi Arabia can be considered an overarching vision that aims to change the face of the nation, shatter the chains of oil addiction, diversify the economy of the nation, and improve the lifestyle of the nation. It is also submitted that the digital revolution and sustainability can be considered two of the pillars of the vision of the nation. It can also be submitted that the smart city strategy can be considered a strategic vision that aims to change the face of the cities of the nation, shatter the challenges of the nation, and improve the lifestyle of the nation. It can also be submitted that the digital technology, especially the Internet of Things, can be considered two of the components in realizing the vision of the nation, as outlined in the vision 2030 strategy of the nation. It can also be submitted that the vision 2030 framework of Saudi Arabia has also considered the development of vibrant cities, which can compete in the region. The programs of the nation, which include the National Transformation Program and the Quality of Life Program, have taken into account the concept of smart cities, which have the potential to develop smart infrastructure, digital government, and green planning in the nation. It can be noted that the concept of smart cities has the potential to integrate economic growth, social inclusion, and sustainability in the nation or the particular region in question. It can also be noted that the Internet of Things technologies have the potential to integrate with the concept of smart cities in the nation of Saudi Arabia, considering the potential of these technologies to provide real-time visibility in the metropolitan spaces of the nation in question. It can be noted that this has been considered a crucial factor in the municipal areas of the nation, considering the potential of these technologies to provide sustainability in the nation in question, as seen in the Vision 2030 strategy of the nation in question.

The Internet of Things technologies, in particular, have provided the municipal areas of the nation with the potential to monitor continuously the energy, transportation, environment, and spaces in the nation in question. Some of the major projects that have been undertaken include the application of the IoT technology as per the objectives and goals set by the government of Saudi Arabia. Some of the projects that have been undertaken include the development of smart energy systems, smart transportation systems, smart services, smart environment systems, among others. The projects that have been discussed above have shown that there is a change in the objectives of infrastructure development in Saudi Arabia from conventional infrastructure development to high-tech infrastructure development. The application of IoT technology in infrastructure planning in Saudi Arabia has been carried out with the aim of developing infrastructure that is strong enough to accommodate the population that is expected to develop in Saudi Arabia in the future.

Looking at the application of IoT technology from the governance point of view, Vision 2030 has shown that there is a need for the government of Saudi Arabia to develop a digital government that can enhance transparency in the services delivered to the citizens of Saudi Arabia. The application of IoT technology has enabled the government of Saudi Arabia to realize this objective by assuring that there is an improvement in the availability of data in the services offered to the citizens of Saudi Arabia. This has enabled the government of Saudi Arabia to develop its capacity by ensuring that IoT technology is integrated in governance. Smart governance has enabled the government of Saudi Arabia to make well-informed decisions. IoT technology-based smart cities, as outlined in the objectives and goals of Vision 2030, are made possible by the ability of the government of Saudi Arabia to address the challenges that are likely to arise during the application of IoT technology. The challenges that are likely to arise during the application of IoT technology include regulation challenges, technology challenges, and organizational

challenges that need to be addressed for sustainability benefits to be achieved. It can, therefore, be concluded that Saudi Vision 2030 is creating an enabling environment for the development of sustainable smart cities by enabling IoT technology. The relationship between digital innovation alongside sustainability in Saudi Vision 2030 is creating a strategic foundation for smart cities. This is important since it enables IoT technology to be part of sustainability.

Figure 1. Conceptual Framework of IoT-Enabled Sustainable Smart Cities under Saudi Vision 2030



**Description:**

This conceptual framework illustrates the integration of IoT-enabled technologies with Saudi Vision 2030 sustainability objectives. IoT applications (energy, transportation, environment, governance, and public services) act as enablers that support key Vision 2030 pillars, resulting in sustainable, resilient, and intelligent urban ecosystems.

**Figure Components:**

- IoT Technologies (Sensors, Networks, Data Analytics)
- Smart City Domains (Energy, Mobility, Environment, Governance)
- Vision 2030 Pillars (Sustainability, Digital Transformation, Quality of Life)
- Outcomes (Efficient Services, Reduced Emissions, Urban Resilience)

Table 1. Alignment of IoT-Enabled Smart City Domains with Saudi Vision 2030 Objectives

Smart City Domain	IoT Application Area	Vision 2030 Objective
Energy Systems	Smart grids, energy monitoring	Environmental sustainability
Transportation	Intelligent traffic systems	Efficient mobility & reduced emissions
Environment	Air and water quality monitoring	Resource conservation

Smart City Domain	IoT Application Area	Vision 2030 Objective
Governance	Smart public services	Transparent & digital government
Public Services	Smart healthcare and safety	Improved quality of life

### Role of IoT-Enabled Technologies in the Development of Sustainable Smart Cities:-

IoT technology has a pivotal role to play in the development of sustainable smart cities since it has the potential to transform traditional physical and infrastructural systems into smart, intelligent, and adaptable systems. Considering the Kingdom of Saudi Arabia's Vision 2030, IoT technology is highly aligned with the vision and goals set by the Kingdom of Saudi Arabia, especially regarding the efficiency of services, sustainability, and quality of life. One of the most significant roles played by IoT technology in the development of smart cities is related to the efficient and smart management of energy. The real-time monitoring of electricity consumption in residential, commercial, and industrial sectors helps in more efficient and accurate predictions regarding the demand and distribution of power. (Hadchity, 2024) The use of smart meters helps in the real-time monitoring of power distribution, which is helpful in making operational decisions regarding the power grid. (Hadchity, 2024) The use of IoT technology is highly aligned with the Vision 2030 goals set by the Kingdom of Saudi Arabia, especially regarding the sustainability of resources and the efficient use of resources. IoT technology has a significant role to play in the development of smart transportation and mobility since IoT technology helps in the development of smart transportation systems through the use of data collected from various sources, such as traffic sensors, connected vehicles, and cameras. (Leveraging advanced digital technologies for smart city development in Saudi Arabia: opportunities, challenges, and strategic pathways, 2024) In addition, IoT contributes to sustainability.

IoT technology can be used in the monitoring of the environment. In the context of the city, IoT technology can be used to monitor the quality of air, the level of water use, the level of waste, and the level of noise pollution. (Qurashi et al., 2025) The data collected will be used to predict the actions that will be taken in the long term. For instance, IoT technology can be used in the management of water. The technology will help minimize water waste by monitoring the level of water use. The technology will be important in water-scarce regions. (Enhancing Sustainable Water Management with IoT Sensors and Data Analytics, 2022) In addition, IoT technology makes the development of smart governance possible. The technology will help the government improve its decision-making skills. When the data collected by the various technologies deployed in the city are integrated, the government will be in a better position to understand the various operations within the various departments. This will pave the way for the development of real-world applications such as smart waste management, smart public lighting, and emergency response coordination.

(Qurashi et al., 2025) The health and safety of the public will also be improved through the use of IoT technology. The technology will be used to monitor the health of patients using connected medical devices. In addition, the technology will be used in surveillance to improve public safety. (Smart Health Bracelet Equipped with AI and IoT Supports Security Personnel, 2025) However, despite the benefits associated with the use of IoT technology, the full integration of the technology in Saudi Arabia's smart cities faces certain challenges. The challenges arise due to the increased level of data privacy issues. The use of IoT technology increases the level of cybersecurity risks. In addition, IoT technology faces compatibility challenges. The IoT technology deployed in the smart city comprises various technologies that may not be compatible with each other. (Building Trust and Cybersecurity Awareness in Saudi Arabia: Key Drivers of AI-Powered Smart Home Device Adoption, 2025) Strategically, the sustainability of IoT technology in Saudi Arabia's smart cities will be determined by the level of IoT technology integration with the policies and regulatory frameworks. Vision 2030 is moving in the right direction regarding the regulation of the use of IoT technology in Saudi Arabia. The regulation will improve the conditions necessary for the development of IoT technology.

Figure 2:



A diagram showing the application domain of the IoT technology in different sectors of smart cities such as energy, transport, environment, governance, and services, and their contribution towards sustainability in Vision 2030.

**Conclusion:-**

In conclusion, it is very clear from the discussion in this paper that the IoT technology has the potential to significantly contribute towards the facilitation of the development of sustainable smart cities, especially within the strategic framework of Saudi Vision 2030. The development of smart cities through the application of IoT

technology has the potential to significantly contribute to the facilitation of the development of sustainable smart cities in Saudi Arabia. (Hegazy, 2024)

### **Discussion:-**

The findings from the research revealed that the application of IoT technology is crucial for the improvement of the development of sustainable smart cities, especially within the strategic framework of Saudi Vision 2030. (Leveraging advanced digital technologies for smart city development in Saudi Arabia: opportunities, challenges, and strategic pathways, 2023, pp. 1-12) The above paper has clearly demonstrated that the application of IoT technology plays a critical role in the facilitation of the development of sustainable smart cities. This is because it has the potential to significantly contribute towards the improvement of the efficiency and sustainability of services in different sectors of smart cities. (Alamoudi et al., 2023) The above finding from the discussion is in line with the emerging literature on smart cities, which has clearly demonstrated the potential of digital technology towards the facilitation of the development of sustainable smart cities. (Dahab et al., 2025) One of the most important things that this study has learned regarding the role that IoT technology can play in supporting the development of a more sustainable smart city is that IoT technology can function in an integrated manner. IoT technology has been proven to function in an integrated manner. (Umar & Adria, 2023) This is important, as it means that IoT technology can function as a basic component in the city. This is particularly the case in relation to energy, transportation, the environment, and governance. This is important in terms of supporting the development of a more sustainable city, particularly in the context of Vision 2030. (Alamoudi et al., 2023) This is particularly the case, as dynamic adaptability is basic to supporting the development of cities and economic diversity. (Assessing the Progress of Smart Cities in Saudi Arabia, 2023)

The above explanation also points towards the fact that there needs to be an alignment created between the implementation of the IoT technology and the goal of sustainability. Technology is one of the key factors that need to be considered for the implementation of the smart city project. However, the sustainability of the project needs to be considered from the point of view of the alignment created between the technology and the goal of sustainability. The plan for Saudi Vision 2030 has been created on the basis of the goal of sustainability. The plan has been created on the basis of sustainability, not only from the point of view of the environment but also from the point of view of the quality of life and the efficiency of the government. (Saudi Arabia's commitment to spending efficiency is driving growth and building resilience, 2025) The implementation of the IoT technology on the basis of the consideration of smart mobility, waste management, etc. has been considered as an important factor for the contribution towards the goal of sustainability. The contribution has been considered from the point of view of sustainability, not only from the point of view of the environment but also from the point of view of the quality of life and the efficiency of the government. (Qurashi et al., 2025)

Another major factor that has been emphasized through the above study is that the need for considering the role of governance and the level of institutional readiness for implementing the IoT technology-based smart cities has been a major factor. (Almulhim&Yigitcanlar, 2025) The implementation of IoT technology has been dependent on the level of institutional readiness as well as proper governance. (Albous et al., 2025) (Emerging Technologies Adoption Readiness in Government Agencies 2025, n.d.) The implementation of the IoT technology has been dependent on the level of institutional readiness as well as proper governance. The strategy for Vision 2030 has been developed considering the objective of digital governance and cybersecurity. This has been an important addition to the objective of sustainability, not only from the point of view of the environment but also from the point of view of the quality of life as well as efficiency in government. (Saudi Arabia's cybersecurity strategy: Building a resilient digital future, 2025)

Through the above study, it has been clearly emphasized that though the role of the Kingdom of Saudi Arabia has been a significant contribution to the implementation of IoT technology-based smart cities, the need for integration from different sectors has been a serious challenge. (Alamoudi et al., 2023) The implementation of the IoT technology has been a significant contribution towards the goal of sustainability, not only from the point of view of the environment but also from the point of view of the quality of life as well as efficiency in government. (Alamoudi et al., 2023) The implementation of IoT technology has been a significant contribution towards the goal of sustainability, not only from the point of view of the environment but also from the point of view of the quality of life as well as efficiency in government. The cities that have been able to adopt a holistic and ecosystem-based approach in the development of smart cities are more likely to realize the sustainability benefits that are attached to the development of smart cities. Moreover, the discussion also shed light on the importance of conducting research

and evaluation, which will prove to be beneficial in the development of smart cities in the future. Furthermore, the research also affirms the importance of incorporating IoT technology in the development of smart cities in Saudi Arabia. (Alqahtany, 2025) Effects on Policy and Practice: It is important to note that the implications of the research are significant, especially in the formulation and implementation of policies, especially in the context of national development strategies. Based on the policy dimension, the implications of the research can be presented as follows: The importance of the relevance of the alignment of long-term strategic visions and the regulatory mechanisms that are sector-specific in nature. In the future, it is essential to ensure that policymakers are able to focus on the adoption of an integrated approach in the formulation and implementation of policies. Moreover, the implications of the research also shed light on the importance of incorporating the adoption of policy guidelines in the formulation and implementation of policies in the future in order to realize strategic visions.

Moreover, the implications of the research also shed light on the importance of incorporating the adoption of incentive-based policies in the formulation and implementation of policies in the future in order to realize strategic visions. From the practical point of view, it should also be noted that, according to the research, the involvement of the stakeholders should be taken as an operation rather than an additional task. This will be helpful in the improvement of the acceptability, efficiency, and sustainability of the projects. The evaluation aspect should also be taken as an operation. This will be helpful in the effective response to the dynamics of the economy, technology, and environment. In conclusion, according to the research findings, the policy and the practice, it should be noted that the decision-making process will be promoted. This will be helpful in striking of the harmony between the innovation, regulation, and sustainability, as highlighted in the various national development programs. This will be helpful in the promotion of the various national development programs in the country. In addition, it will also make the various national development programs flexible and accountable while aligning them with the best practice standards.

### **Conclusion and Future Research Directions:-**

The purpose of this research was to investigate the role of IoT technology in the development of sustainable smart cities from the strategic point of view of the Kingdom of Saudi Arabia's Vision 2030. The results of the research have revealed that the role of IoT technology in the development of sustainable smart cities in the Kingdom of Saudi Arabia is significant in terms of integrating ICT with sustainable development goals, which is critical for the accomplishment of the objectives of the Kingdom of Saudi Arabia's Vision 2030 in terms of strategies related to the digital transformation of the Kingdom of Saudi Arabia and strategies related to the socio-economic diversification of the Kingdom of Saudi Arabia. (Leveraging advanced digital technologies for smart city development in Saudi Arabia: opportunities, challenges, and strategic pathways, 2023, pp. 1-12) It has also been found that the development of technology cannot be considered for the development of sustainability in smart cities. It has also been found that other factors can also be considered for the development of sustainability in smart cities. (The social sustainability of smart cities: a conceptual framework, 2022) It can be helpful for the maximum utilization of the potential of the smart cities developed through IoT technology. The strategic scenario of Saudi Arabia, including digital regulation, investment, and innovation, has been found to be of significant importance for the development of smart cities in Saudi Arabia.

(Smart Cities as a Pathway to Sustainable Urbanism in the Arab World: A Case Analysis of Saudi Cities, 2023) It has also been found that it is very important for the development of smart cities in Saudi Arabia that the sustainability of all the factors should be ensured for the development of smart cities in Saudi Arabia. (Implementing Smart Sustainable Cities in Saudi Arabia: A Framework for Citizens' Participation towards SAUDI VISION 2030, 2023) It has been found that tremendous developments and progress have been achieved in the field of smart city development in Saudi Arabia. However, it has been considered important to explore some areas for the development of smart cities in Saudi Arabia. (Assessing the Progress of Smart Cities in Saudi Arabia, 2023) It is not easy, and future research can also be conducted for the development of knowledge about the impacts of the development of smart cities in Saudi Arabia through IoT technology. This can provide deeper knowledge about the topic for the development of smart cities that can contribute to the achievement of Saudi Vision 2030. It has also been found that it is very much possible for future research to be conducted for the development of knowledge about the impacts of emerging technologies like AI, digital twins, blockchain, etc., in addition to IoT technology. This research can provide deeper knowledge about the topic for the development of smart cities in Saudi Arabia that can contribute to the achievement of Saudi Vision 2030.

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