

Describing the relationship between smart cities and sustainability by focusing on the characteristics of smart cities to help progress that is more effective

Gehad Sheriff Sabry

Gehad_sabry@yahoo.com

CIC- School of Business at Sheikh Zayed Campus

I. Abstract

Many types of research have been undertaken on smart cities, including their principles, components, technologies, and how to construct a smart city. However, we attempted in this paper to promote the smart city strategy by recognizing the notion of a sustainable urban development approach. That Smart city is a natural amalgamation of systems, IT infrastructure, physical infrastructure, and social and business infrastructure that the technologies collaborate to provide decision-makers with intelligent and actionable data.

Where, the sustainability of smart cities through the information technology revolution become has the ability to can finding novel solutions to current and future problems, make use of existing and planned infrastructure investments to improve people's quality of life, provide a favorable investment climate for businesses, and increase government resource efficiency and transparency. Therefore, we can be viewed the concept of sustainability of smart city as a framework for realizing an advanced and modern vision of urbanization.

Keywords: relationship –between- smart cities – sustainability- focusing characteristics -to -help progress - more -effective

II. Introduction

Many major industrialized countries embrace smart city construction as a key approach for boosting economic growth and retaining long-term competitive advantages, which, the globe was now discovering new paradigms and trends in urban development.

Therefore, major industrialized countries are vigorously implementing smart construction, constantly launching smart development strategies that are appropriate for their national circumstances, focusing on smart manufacturing to continue to improve strategic planning, encouraging using the Internet of Things (IoT) to promote social application development, and promotion information development in all areas of society.

Our future will be shaped by the next generations of technology, specifically built for urban development, and the first significant sector on it is the deployment of new connected infrastructures, which is a massive investment giving big chance for growth. Artificial Intelligence and automation will have a tremendous impact on a city's potential “from autonomous vehicles to surveillance cameras and cyber security” the convergence of automated processes with AI will be obvious across practically all sectors, particularly in urban economics sectors.

Therefore, the system architecture of a smart city is based on safe big data technology that a set of applications covers such as smart economics, smart manufacturing, smart community, smart government, smart transportation, and smart medical care.

Because information technologies played such a significant role in dealing with the global COVID-19 pandemic, leveraging the benefits of smart cities will be vital in assisting towns and countries in managing and recovering from this one-of-a-kind global calamity. Where digital technologies allow the continuity of important public services during a time of physical separation and lockdown, such as through distance schooling, could help people overcome social isolation.

III. The Problem: The sustainability of smart cities and applications can be a significant instrument when well aligned with inclusive growth goals. Also can be a powerful tool for supporting the shift from in-person to remote service delivery, mitigating the impact of the crisis on the household sector and businesses, In addition to empower new forms of local governance, particularly the most vulnerable.

- IV. **Objective:** This study tackles a major issue, namely the sustainability of smart cities, by focusing on the characteristics of smart cities as one of the information technology era's inventions and linked them to sustainable cities to clear whether smart cities are sustainable.
- V. **Research Methodology:** In this article, we have adopted the inductive technique, and descriptive approach where all smart city terms, as well as sustainable development, will be discussed through the prior literature review.
- VI. **The hypothesis:** The research hypothesis is that there is a link between promoting smart city strategies and achieving sustainable urban development by recognizing a new concept called the sustainability of smart city.

First section: Basic Terminology

All of the terms associated with technology and smart cities will be covered by this section.

VII. What do smart cities entail?

The term "smart city" was created in the last decade from 21 century. The word was coined by American IT businesses to describe programs that leverage digital and ICT-based innovation to characterize new ICT solutions targeted at tackling challenges in huge metropolises, such as trash disposal, the efficiency of energy and water distribution networks, and citizen safety and health, Also to improve the efficiency of city services and provide new economic opportunities.

Smart cities are often defined by projects that use digital innovation to improve service delivery efficiency and quality, while boosting the competitiveness of a city. On the other hand, depending on the geopolitical environment and the specific issues at hand, definitions differ between world countries and institutions. Smart cities can also be characterized as places where people create innovative solutions to solve everyday challenges or cities that adapt to the needs of their citizens in ways that improve the quality of life for all residents. We will initially focus on smart city concepts and their characteristics in this area of the study,

where theoretical definitions and concepts of smart cities, as well as their components, **will be shown at the following:-**

- A-** Smart cities are Regions that provide local communities with innovative Systems of ITs. That is, it brings together the intellect of individuals and organizations to foster learning, innovation, and digital environments, allowing for creativity and knowledge management. This is according to Smart Community Forum.
- B-** According to the European Commission, a smart city is "a site where conventional networks and services are made more effective via the use of digital and communications technologies, for the benefit of its people and businesses."
- C-** According to the United Nations, A smart city is an approach that makes use of digitalization and technology opportunities, as well as clean energy and innovative transportation technologies, to provide residents with options for more environmentally friendly services, boost sustainable economic growth, and enable cities to improve service delivery.

Smart cities, as defined by the **OECD 2020**, are "initiatives or approaches that effectively utilize digitization to increase citizen well-being and offer more efficient, sustainable, and inclusive urban services and environments as part of a collaborative, multi-stakeholder process.

Therefore, the Smart city can be defined as a product of current tech development that is primarily based on the continual advancement of scientific research and technology, which has resulted in the rapid development of all forms of living conditions. The Smart city not only has most of the characteristics of a digital city, but it also uses modern information and communication technology to integrate and analyze various key factors in the urban development process and then adopts intelligent solutions to achieve development and progress. Therefore, the new urban development trend is in line with the

¹¹ OECD 2020, Smart Cities and Inclusive, Growth Building on the outcomes of the 1st OECD

Smart city trend, which is beneficial to the high-level growth of society.

The overall smart city design and structure system are highly complex, including a variety of cross-data from various areas, regions, and cities. To ensure that a smart city is designed to meet the needs of its residents, its architecture must be based on high technology, with big data technology incorporated into the urban framework. Therefore, it needs big data in business, vast traffic data, environmental data, medical, government, education, and public security data. All of this data needs to be evaluated, collected, stored, processed, and mined at a high-system level.

Therefore, the smart city is being built with the specific goal of connecting everything to everything else using cutting-edge technology. As a result, we must understand and appreciate the technological breakthroughs related to the construction of smart cities.

1- The fifth generation of wireless networks (5G)

5G is the fifth generation of wireless networks, intending to accelerate all internet-dependent activities. This kind of wireless network ensures that you may efficiently transport large amounts of data in less time. After four generations of the network, it is a new wireless standard in the G series that is designed for innovation. 5G networks can transmit data about 40 times quicker than present 4G networks. With 5G technology, other new technologies, such as the Internet of Things (IoT), and others, will benefit from these wireless networks. This generation of wireless networks is a necessary innovation in a smart city for interconnecting everything.

VIII. The Internet of Things (IoT)

The Internet of Things (IoT), which keeps inhabitants and gadgets in the smart city connected, is the key to smart city transformation. Practically all cities will use the Internet of Things (IoT). The smart city framework will become available through the Internet of Things (IoT). Smart structures, smart devices, connected vehicles, home machines and services, and smart public mobility are all examples of smart public transformation. Everything in a smart city should be linked together so that it can

communicate with itself as a whole, and this task is completed by the Internet of Things, which consists of a ²collection of communicating devices that provide continuous communication and intelligent responses to a variety of situations and problems. AI-generated data will have quadrupled in utilization and the use of predictive data, which is already being used by several cities, will grow in popularity, as will the use of geographic and behavioral data. Cities now have access to previously unobtainable data because of advancements in big data and related technology. Where it enables them to quickly access and analyze massive amounts of data to give relevant and actionable insights, which is critical in high-risk situations. Also, big data and the Internet of Things (IoT) in particular offer limitless opportunities for better decision-making, which helps citizens by lowering costs and enhancing services. Smart service support based on cloud computing and the Internet of Things' big data cloud platform can improve smart city technologies and make them more integrated with their social characteristics.

IX. The devices of sensor:

Sensors might be mechanical, chemical, or electrical. Each sensor's operation is based on the transduction principle, which is the conversion of energy from one form to another. The robot's sensors allow it to react to its surroundings flexibly. Where, Robots can see and feel with the use of sensors, which allows them to do more complex jobs. Robotic sensors are modeled after the functions of human sensory organs, to function properly, robots require a lot of information about their surroundings.

Sensors can help to detect direction, light, sound, frequency, temperature, physical orientation, and position, as well as magnetic and electric fields, such as Drones, self-driving cars, advanced surveillance.

X. Artificial Intelligence

Artificial Intelligence (AI) is required to process the data generated by the sensors and generate meaningful data; otherwise,

² Cohen, B., & Amorós, J. E. (2014).

the sensors would be useless. Artificial intelligence is used to create and analyze data related to smart cities. It also allows for a better understanding of how the city operates. For example, by providing clever traffic executives, open transport course arranging, and control framework the board, artificial intelligence can assist in reducing accidents.

XI. Smart cities characteristics

Smart cities are characterized³ as cities that rely on modern technologies developed during the information technology era, beginning with the digital city, progressing to the electronic city, and finally to the virtual city until we arrived in the city of knowledge, is the most comprehensive framework for data and information. All of these cities rely on the digital technologies made possible by the Information age. Where, they all provide interactive services to individuals and virtual spaces through information networks and various applications.

Knowledge of different types of cities is essential for identifying and comprehending smart cities. Where, each city has its qualities, such as size, physical surroundings, financial resources, and many other elements.

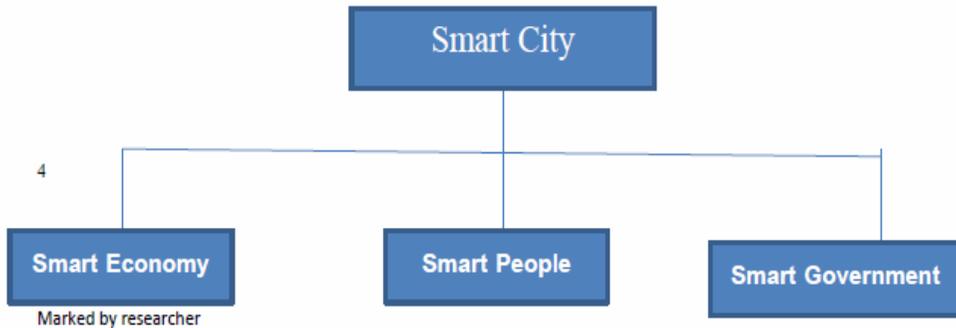
The three aspects of smart cities are technology, people, and institutions. As a result, investments in technology, population, and institutions aimed at realizing the smart city concept produce long-term development and improved quality of life while also promoting responsible natural resource management and allowing institutions to contribute with innovation and better services for citizens.

A smart city can be characterized by these attributes: smart economy, smart people, and smart governance. Wherein, the smart economy, Innovation, entrepreneurship, trademarks, productivity, labor market flexibility, and global integration are all aspects that contribute to economic competitiveness. While, in the Smart people are defined not only by their level of education or certification, but also by the quality of their social connections

³ Cocchia, A. (2014)

4- Cosgrave, E., & Tryfonas, T. (2012).

in terms of integration and participation in public life. as well as their willingness to explore the outside world, and Smart governance are defined by political participation and citizen services. as well as the functioning of the administration. Look to the shape No (1)



The OECD has determined some keys to classification of the smart cities. One of these attributes was the level of economic growth as follows:

XII. The level of economic growth

Smart cities were divided into four categories based on two dimensions: legacy cities vs. new cities, and developed cities vs. emerging economies as follows:-

1. Historic city and advanced economy:

Smart city technology will need to integrate with existing physical infrastructure, such as roads and buildings. as well as embedded service firms, or dismantle in certain cases. Low population growth is a common occurrence in advanced countries, and it can lead to a zero-sum situation in many circumstances.

2. Historic city and Emerging economy:

The majority of physical buildings are already in place in these cities, but the fundamental distinction is that they have a rapidly rising population and frequently severe congestion, which increases the potential to add value by enhancing efficiency and livability. Also, private funds could be used to improve and better utilize existing infrastructure.

3. New city and Emerging economy:

This type of economy is characterized by rapid economic and demographic growth, resulting in substantial returns on investment. Existing physical or social structures in these cities are not very difficult to dismantle, and Investors can gain a higher return by gathering money from an increasing group of new users. Infrastructure development has the potential to have a substantial impact on future economic competitiveness and quality of life.

4. New city and advanced economy:

The vast majority of cities in this category are follower cities of larger cities; they compete with adjacent cities for job prospects and economic growth. So, these communities must concentrate on hard infrastructure to cut costs for businesses, as well as soft infrastructure to provide citizens with a high quality of life.

According to the majority of authors, smart cities have the following main characteristics: Smart Economy, Smart community, smart people, smart environment, smart lifestyle, and smart governance are just necessary ingredients for the composition of a smart city.

The important feature of smart cities is the use of information technology, so, there have been many different techniques to classifying smart cities, and **we determine some of these methods as follows:**

A. Improved administrative and economic efficiency, allowing culture and society to develop as a result of improved infrastructure and communication.

B. An unwavering commitment to business-oriented urban development.

C. The relevance of high-tech and innovation in urban development is emphasized.

D. A major emphasis on fostering social inclusion of various types of urban residents in public services.

E. A vision for smart city development that places a premium on social and environmental sustainability.

Second section: Smart cities and their relevance to sustainability

Intelligent cities arise as a result of long-term development and the smart use of digital data in areas including human health, mobility, energy consumption, education, knowledge transfer, and urban administration, supporting responsible natural resource management while also allowing institutions to innovate and do better serve. The term "smart city" refers to a collection of subjects that include sustainable development, smart economy, smart community, and ⁴smart Government, smart environment, smart energy, smart mobility, smart health, and so on. As a result, it is a conceptual paradigm in which, sustainable development is achieved by the widespread use of information technology.

XIII. sustainable urban development

Urban development and sustainable development become important themes in the domains of environment, economics, technology and science, urban planning development, and management over the previous few decades. To better comprehend the term sustainability, it is necessary to consider the definition of urban development. This, in turn, can be viewed as a change process in which resource exploitation, investment strategy, technology advancement, and institutional change are all in line with current and future requirements.

Since the mid-twentieth century, the phrase "sustainable city" was used to describe the relationship between economic, social, and environmental sustainability as measured by a mix of indicators for each of these components. Where, the consciousness of sustainability and sustainable urban development concepts are generated by the production and use of resources required for residential, industrial, transit, commercial, or recreational processes.

As a result, investments in technology, population, and institutions are used to achieve long-term development and improved quality of life. In addition, metropolitan areas have been

⁴ Bayulken, B., & Huisingh, D. (2015)

participating in urban infrastructure and service development initiatives to enhance the ecological, social, and economic circumstances, as well as increase city competitiveness.

That Sustainable Development is a set of indicators aimed at making the world a better place. The United Nations formed the Sustainable Development Solution Network to generate defined indicators as part of its goals to encourage all countries to repair our planet" and move the world toward a more sustainable path.

The Sustainable Development Goals are designed to guarantee that all stakeholders have the same goals and understandings. Thus, Sustainability can be measured at bigger scales using Life Cycle Assessment indicators, but there will be a lot of uncertainty. Therefore, it will need some more effort to apply this indicator on the least scale.

In addition, the methodologies for Sustainable Development Solution indicators have been updated and added new information ⁵and the UNEP has published recommendations to supplement Solution indicators. For example, integrated environmental indicators have been presented as a way to support various goals and targets, to encourage Sustainable Consumption and Production.

Furthermore, several of the metrics contained in the Sustainable Consumption report, such as groundwater depletion rates, food waste at the point of consumption, and metal recycling rates, have yet to be incorporated into the Sustainable Development goals

When the Sustainable Development Solution enters the operational stage, further guidelines and concepts are expected to construct operational measures methodology for targets, as well as a set of significant indicators.

XIV. The smart economy

The significant changes that have occurred in technology through digital technology are allowed massive economic revolutions to occur; smart cities are not a stand-alone phenomenon but are part of a larger shift toward a digital

⁵ Ahvenniemi, H., Huovila, A., Pinto-Seppä, I., & Airaksinen, M. (2017).

economy. It is crucial to remember, that Smart Cities are not a one-off occurrence, but to have a thorough comprehension of the subject and to pay close attention to the fundamental changes that occurred. Where Continuous technological advancements are propelling the digital economy, which has seen a dramatic increase in capacity and price, performance, such as in internet bandwidth and traffic, processing speed, and storage capacity, and this rate of development outperforms that of any other technology.

In addition, smart cities are becoming the growth engines of the new smart economy of the future, tightly tied to new technology-driven paradigms, also accounting for an ever-increasing share of economic output. Other businesses models are possible in the digital economy than the classic one, in which consumers buy a product and then swap ownership in exchange for payment, in the digital era, the four most frequent business models are:

- **Based on advertising:** Provide free information or services in exchange for viewing commercials.
- **Subscription:** Users pay a monthly fee to get unlimited access to digital material and services. Netflix is a good example
- **Pay-per-Utility:** Users consume digital content or services and pay a price for each item consumed. Gaming is a common example.
- **Data conversion:** Digital businesses collect many data on their clients and utilize it for a variety of purposes. Where the digital economy allows:-
 - decrease the Costs of dealing
 - Lower the costs of coordination
 - Higher productivity and asset employed

Smart city policies that are scalable, efficient, and realistically achievable require a thorough grasp of the strengths, weaknesses, opportunities, and threats that smart cities face. Where smart cities have the potential to improve public cities and lower the costs. Depending on whatever perspective you look at smart cities from, the Data can play numerous roles in the smart economy. Where, Data is one example of the resources that can be used as an opportunity or threat. Data is frequently recognized as one of

the world's most valuable assets nowadays. In addition, Data is potential for smart cities to utilize in the future. However, it can also be a weakness in cities, which are less competent in using data as well as a threat when privacy concerns arise from the vast amount of data.

In addition, there are some examples of how smart cities are adopting the smart economy through including blockchain-enabled smart contracts for e-Trade and e-Freight, as well as a crowd-funded distributed renewable energy.

In the Cryptocurrency sector, for example, Blockchain Technology is the most sophisticated in Information Technology advancement. Where, Artificial intelligence has many properties that can be used to administer decentralized monetary systems. Cryptocurrency value may be predicted using AI algorithms, which can aid traders in managing trades. Therefore, we need technology that can provide the required security and trust, as it has been thought that blockchain could be that technology.

Where, Blockchain technology was a core concept that is most commonly associated with e-money (Bitcoin), but subsequent advances have begun to investigate the possibility of employing it for financial transactions, logistics, and contract security. Because blockchain technology⁶ has the potential to universally, correct the problems that have arisen because of the current financial industry. For example, Smart contracts are short programs recorded on a blockchain that implement a transaction in a controlled manner. Thus, a smart contract is typically a declaration that a transaction will take place between two people if conditions (X) are met. A smart contract is self-executing, which means that once the instructions are written to a blockchain, the transaction will take place automatically when the right circumstances are satisfied, with no more action by the parties to the transaction or other parties. So, the blockchain revolution becomes widely recognized as having the ability to

⁶ Andrade, J. B. S. O., Ribeiro, J. M. P., Fernandez, F., Bailey, C., Barbosa, S. B., & da Silva Neiva, S. (2016).

redefine the concept of trust in both digital and local communities.

Therefore, Customers will benefit from having quick access to comparative data, and investors will be better informed before making judgments about their financial goals. Artificial intelligence will be beneficial when used in conjunction with smart networks in a variety of smart city sectors to improve efficiency and effectiveness in the delivery of various services.

Where, anyone can bank, start a business, and receive payments with a smartphone and an internet connection, both of which are widely available. So, the city becomes smart when its investment in, (I): Technology advancement to power long-term economic growth and high quality of life while also managing natural resources wisely. (ii): Human capital, and (iii): infrastructure.

XV. Smart community:

It refers to the degree to which the city uses information technology applications and technologies, as well as the ability to transform it from an ordinary society, which uses technology to an innovative society capable of finding novel solutions to current and future problems. As well as the ability to live in the information city and carry out its technology activities. (E-Services).

- For example, advanced censoring and health care robotics enable people who require assistance to remain in their own homes for longer periods. Where Artificial intelligence allows for better diagnostics and individualized treatment through vast amounts of patient data.
- Artificial intelligence helps Reduce traffic congestion and pollution by making the best use of transportation infrastructure Also, ⁷Real-time processing of sensor and security camera video data allows for a faster response to public safety risks.

⁷ Cohen, B., & Amorós, J. E. (2014).

- Household intelligence devices that adjust energy demand to supply in response to dynamic energy costs, as well as real-time energy usage knowledge.
- Build ecosystems by bringing together parties who would not ordinarily collaborate to deliver innovative new ideas that neither party could have imagined on their own.

XVI. E-Government:

That smart technology can have a significant impact on the government budget, resulting in more revenue and lower expenses, improved public services, optimized domestic management through providing online services to citizens, and the discovery of new revenue streams to strengthen their investment capacities. Where, Information technology like "Blockchain" can be used to help governments meet the needs of citizens and stakeholders. There is an unspoken link between blockchain technology and e-government, which is utilizing a set of startup blocks, that technology will be able to give targeted government services.

It is vital to study trends and opportunities in existing technological solutions that are now available to cities, as well as risks, challenges, and lessons learned, to evolve the government's work system can use Blockchain technology. The government's work system to offer information and services includes the most important e-government applications in the following categories:

- Electronic transactions in the sense of offering services electronically, particularly those who require personalized identity.
- The ability to exchange information and engage with the public and government.
- Access to all events and information about the city's people. For example, in the education domain, student records, faculty records, educational certificates, and so on are valuable assets. Such records must share with a variety of stakeholders, and it is critical to ensure that they are reliable. The provenance of these records also needs to be determined accurately. So, Blockchain technology can be

used to keep track of student records, faculty records, and educational certificates.

- Smart government can provide Digital smart solutions such as:
 - Encourage smarter payment systems and e-procurement and e-money
 - Increase revenue through better tax collection.
 - As well as local economic development promotion through improving cost-efficiency in the management of three main services: transportation, waste, and water.

XVII. Smart environment:

The smart city's smart environment refers to the natural city, which is where all smart activities take place. In this environment, the typical smart city benefits are already visible, with each sector contributing to the smart city's overall success through its distinctive inventions.

The city's challenge is to seize the potential benefits from all main sectors. When citizens form dynamic organizations to work on common goals based on big data, it leads to more focused interventions and verifiable evidence of efficacy Data-driven policymaking. Emerging forms of digital democracy and participatory government are good examples of decision-making co-creation.

XVIII. The Connected Citizens:

Many aspects of life have become standard, and Collaboration tools, modern and intuitive websites, mobile applications, self-service portals, and convenient online accounts have become the standard in many aspects of life, and citizens expect no less from this. Where Digital service expansion in communities makes smart cities more appealing to people and encourages a linked city experience. Also, these sophisticated technologies, when combined with a bottom-up planning strategy, assist boost civic involvement and trust in municipal leaders

⁸ Cosgrave, E., & Tryfonas, T. (2012).

A significant number of the new plans of action are linked to the use of citizen-related devices, which primarily refer to the use of modern mobile phones, where plenty number of consumer devices are being linked and used in innovative city applications. Which are currently beginning to be associate⁹d and utilized in city applications (such as GPS Models, and cameras included in these models). Furthermore, new programming and equipment are continually being integrated into customer devices.

For example, "perceptual figuring" programming development packs (SDKs) that allow devices to "read" their clients' outer appearances are on the rise and are beginning to be incorporated into cell phones. These advancements take into account new plans of action for smart urban communities; for example, an associated camera could be used to send pictures of an inadequately repaired street in a nearby neighborhood, or an application could "read" end users' enthusiastic reactions when they are in specific zones of the city.

Advanced cells can demonstrate applications that do not require the involvement of humans, such as messages or apps that report or serve remote places. So, to synchronize data or keep firewalls open, systems should adapt to apps that connect to the system frequently. Where, end-user systems have traditionally played a role in making good use of a cell phone through SMS, phone calls, and web browsing.

XIX. Sustainability indicators

To evaluate the smart city, prior experiences of environmentally friendly and livable cities should be taken into account, as well as technological characteristics, which should reflect a technological community that is interconnected, sustainable, comfortable, appealing, and secure.

Third section: spotlight on some of the world's smart cities:

XX. Curitiba (Brazil) is one of the most beautiful cities in the world. Curitiba has been chosen as Brazil's most connected

⁹ Dhingra, M., & Chattopadhyay, S. (2016).

and intelligent city. Curitiba is the capital of Parana and has a crucial location in Mercosur, adjacent to So Paulo and the Paranagua Port (the second largest in Brazil). Curitiba pioneered the first Bus Rapid Transit (BRT) system in 1974, a network of bus routes that altered how residents traveled about the city. In addition, the city offered free internet access in public locations to its people. Curitiba is supporting a "smart city movement" to promote smart solutions that are compatible¹⁰ with the achievement of the Sustainable Development Goals, as well as ensuring that technology benefits all citizens and that the impact of its policies can be quantified.

XXI. Korea has made a name for itself in the field of smart cities by spearheading large-scale projects. The Korean smart city plan is built on four pillars:

- Research and development.
- The Smart Solutions, which allows private businesses to develop smart city initiatives worth up to \$20 million.
- The removal of regulations or restrictions.
- A nationwide smart city pilot program.

In the digital age, the national government is reconsidering how to "live smart." Where The Korean smart city effort has been a huge success, given to strong smartphone adoption (95% of Koreans own the smartphone), compact urban development, and the growth of the IT industry ecosystem. Furthermore, the expansion of local government efforts, the establishment of dedicated smart city teams within local administrations, citizen participation, and rapid corporate growth have all contributed to the smart city initiative's success.

¹⁰ Yigitcanlar, T., & Lee, S. H. (2014).

12-

[https://www.scirp.org/\(S\(351jmbntvnsjt1aadkpozje\)\)/reference/ReferencesPapers.aspx?ReferenceID=2431502](https://www.scirp.org/(S(351jmbntvnsjt1aadkpozje))/reference/ReferencesPapers.aspx?ReferenceID=2431502)>

13- OECD 2020,

XXII. The city of Dijon (France): Because of its street lighting control, smart traffic management, and high-quality Wi-Fi services, the city of Dijon (France) is frequently referred to as France's first smart city. This demonstrates how digitalized services are not automatically synonymous with smart, and proposes that public services should be restructured. Additionally, this project aims to significantly reduce costs, such as¹¹ the energy bill associated with street lighting, as well as upgrade and better manage urban equipment (such as street lighting, planning repair and renewal, road network maintenance, and waste collection and improvement public safety).

XXIII. (Canada),The Smart Cities competition in Canada is a competition open to municipal and regional governments as well as indigenous communities that aims to enable communities to use innovation, data, and connected technology to improve the lives of their citizens. This competition was created to involve all cities, especially those in rural and distant areas with limited or no internet connectivity, the program provides four rewards ranging from CAD 50 million to all cities, regardless of population size. To ensure that all communities could take part, the government established a set of incentives to assist small cities in developing their capability and developing their economies.

The government received 130 contributions on a variety of issues, including food security, migrant integration, and accessibility for people with disabilities. All ideas must be shared and transferable to other groups, which is one of the competition's main elements.

- An independent panel selected the following four winners:
- Bridgewater was given a proposal to solve energy poverty.

¹¹ OECD 2020,

- Nunavut's city provi¹²ded a suicide prevention project.
- To reduce waste and enhance local food production, the City of Guelph proposed a circular food economy.
- A project of the City of Montreal to enhance transportation for all inhabitants.

XXIV. (Italy), Metropolitan Cities is a European Union-funded program in Italy that promotes urban service renovation and enhances urban inclusion through empowering disadvantaged populations. This initiative currently includes fourteen metropolitan cities and territories including "Milan, Turin, Venice, Bari, Naples, Palermo, and Rome". The program takes a novel strategy, focusing on cities and inhabitants as essential drivers of innovation, with technology and digital services being used to improve quality of life.

Over a hundred initiatives on themes like smart urban mobility, construction permits, and wastewater treatment systems are currently being implemented. The goal is to improve social service management & provision through digital platforms and service delivery platforms, as well as to develop an ecosystem of crosscutting projects centered on users, and data accessibility.

XXV. Brief

Because of what we provided, a smart city can divide into three dimensions: (a) Technology infrastructures (b) Population creativity, and; (c) Institutions policy. Smart and sustainable cities include measurable objectives to be achieved, such as:-

- Environmental preservation with improved citizen quality of life.
- Citizens' well-being is realized when there is income equality, the creation of new jobs, and improved economic growth.
- Improving essential public services and infrastructure.

¹² OECD 2020,

- Responsibility for a consistent approach to sustainable development.
- Ability to handle climate change and environmental challenges.
- Provision of a system to ensure that policies are applied fairly.
- The digital revolution provides a chance to boost Smart Economic Development but needs many physical factors to leverage technology and improve efficiency and lower costs.
- Smart city projects must be tailored to the demands of the local community so, smart city typologies can assist in determining where each city stands.

XXVI. Problems

- It is challenging to apply what has been learned to smaller towns because many smart city studies focus on major cities.
- Those communities to handle smart technology and attract technological investment are contingent on their ability to do so.
- Many physical factors, as well as physical characteristics, influence whether or not specific digital technologies are appropriate.
- The smart city concept is built on digital innovation, and the digital divide between cities is a source of concern.
- because investments in smart technologies and digital discoveries can improve citizens' quality of life
- Smart city efforts will not reach their full potential unless they have the right vision, strategy, talent, and funding.
- It is difficult to accurately document smart cities' contributions to improving people's lives while continuing to give sectorial or multispectral solutions to some of the city's most critical issues.

- Taking a holistic and integrated approach to a city's administration, planning, and infrastructure investment can be tough

XXVII. Conclusion

Through a survey of the literature, this paper provided a theoretical foundation for the notions of smart city and sustainability. Where, it compiled all concepts that may be used to explain the relationship between the concepts of sustainable urban development and smart cities, as well as the environmental benefits and long-term consequences that can be obtained as a result of this relationship.

We observe from this paper that the spread of the sustainability ideology has left a significant mark on city design and development, which is part of the smart urban technologies agenda. Cities have begun to be covered to build large intelligent infrastructure. Where, the smart city notion is now seen as a vision or promise that aims to create a sustainable and ideal city shape. In addition, the smart city is a city that is efficient, technologically advanced, and environmentally friendly. To put it another way, smart city applications prioritize technology in the development of solutions for ecological, sociological, economic, and management issues.

Even though the smart cities idea promises to achieve sustainable outcomes through modern technology, smart cities are widely seen as a fad that has outlived its usefulness. Therefore, the purpose of this article was to determine if the smart cities concept and practice could help our cities become more sustainable.

XXVIII. Recommendation

- 1- The importance of a city's planning and infrastructure investment, by taking an integrated and holistic approach to urban challenges, and digital innovation.
- 2- Smart cities must adapt the business and contractual models to rapidly changing urban surroundings through using a more holistic approach and re-regulate rather than de-regulate.

- 3- Intelligent government is necessarily required for smart cities.
- 4- National governments should play an important role in assisting the delivery of innovative solutions, as well as capacity building and upscaling.
- 5- When it comes to developing smart cities, city business in private sector public must be distinguished, because the city business and private sector business are not the same.
- 6- The rapid adoption of new technologies does not guarantee that all residents will gain equally therefore Smart city policies must be developed, implemented, and monitored as a tool for enhancing people's well-being.
- 7- To move the measurement tools forward, a comprehensive and adaptable framework to the smart city that is linked to local and national strategic goals and incorporates efficiency, effectiveness, and sustainability dimensions is necessary.
- 8- Encourage peer-to-peer dialogue to find common solutions to common problems, and act as a compass to show which direction a city should go.
- 9- Stakeholder engagement and collaborative partnerships in co-creation and co-production models are required in the smart city.
- 10- Citizen-centered services are required to increase public participation, leverage the private sector's role in local decision-making.
- 11- The importance of city-to-city collaboration for data access on; national and regional scale.

References

- 1- Ahvenniemi, H., Huovila, A., Pinto-Seppä, I., & Airaksinen, M. (2017). What are the differences between sustainable and smart cities?
- 2- Andrade, J. B. S. O., Ribeiro, J. M. P., Fernandez, F., Bailey, C., Barbosa, S. B., & da Silva Neiva, S. (2016). The adoption of strategies for sustainable cities: A comparative study between Newcastle and Florianopolis focused on urban mobility. *Journal of Cleaner Production*, 113, 681–694.
- 3- Assessing the local impacts of smart urban attributes. *The European Journal of Social Science Research*, 25, 97–113.
- 4- Angelidou, M. (2014). Smart city policies: A spatial approach. *Cities*, 41, S3–S11.
- 5- Ang, M. (2015). Smart cities: A conjuncture of four forces. *Cities*, 47, 95–106.
- 6- Antonsen, H. (2017) Platform Infrastructure as a Driver of Smart City Development. Master Thesis. University of Oslo, Norway.
- 7- Andrea Caragliu, Chiara Del Bo & Peter Nijkamp (2011)," Smart Cities in Europe" January 2009 *Journal of Urban Technology* 18(0048), Pages 65-82
- 8- Azamat Abdullaev, January 2011 "A Smart World: A Development Model for Intelligent Cities Cities TY - BOOK. Publisher: IEEE
- 9- Bayulken, B., & Huisingh, D. (2015). Are lessons from eco-towns helping planners make more effective progress in transforming cities into sustainable urban systems: A literature review (part 2 of 2). *Journal of Cleaner Production*, 109, 152–165.
- 10- Caragliu, A., Del bo, C., Nijkamp, P. (2009). Smart cities in Europe. Serie research memoranda 0048 (VU University Amsterdam, faculty of economics, business administration and econometrics).
- 11- Chourabi, H., Nam, T., Walker, S., Gil-garcia, J. R., Mellouli, S., & Nahon, K., et al. (2012). Understanding smart cities: An integrative framework. In *Proceedings of the 45th international conference on system sciences*, Hawaii.
- 12- Cosgrave, E., & Tryfonas, T. (2012). Exploring the relationship between smart city policy and implementation. In *SMART*

- 2012: The first international conference on smart systems, devices, and technologies, May 27–June 1, 2012, Stuttgart, Germany.
- 13- Cocchia, A. (2014). Smart and digital city: A systematic literature review. In Smart city (pp. 13–43). Berlin: Springer.
- 14- Cohen, B., & Amorós, J. E. (2014). Municipal demand-side policy tools and the strategic management of technology life cycles. *Tec novation*, 34(12), 797–806.
- 15- Dizdaroglu, D., & Yigitcanlar, T. (2016). Integrating urban ecosystem sustainability assessment into policy-making: Insights from the gold Coast City. *Journal of Environmental Planning and Management*, 59(11), 1982–2006.
- 16- Dhingra, M., & Chattopadhyay, S. (2016). Advancing smartness of traditional settlements-case analysis of Indian and Arab old cities. *International Journal of Sustainable Built Environment*, 5(2), 549–563.
- 17- Dizdaroglu, D., & Yigitcanlar, T. (2014). A parcel-scale assessment tool to measure sustainability through urban ecosystem components: The MUSIX model. *Ecological Indicators*, 41(1), 115–130.
- 18- Edvardsson, I., Yigitcanlar, T., & Pancholi, S. (2016). Knowledge cities research and practice under the microscope: A review of the literature. *Knowledge Management Research and Practice*, 14(4), 537–564.
- 19- Frenchman, D., Joroff, M., & Albericci, A. (2011). Smart cities as engines of sustainable growth. Massachusetts Institute of Technology, prepared for the World Bank Institute
- 20- George Cristian Lazaroiu and Mariacristina Rosica, 2012, "Definition methodology for the smart cities model, vol. 47, issue 1, 326-332
- 21- Gabrielle, F. (2017) the Origin and Implementation of the Smart-Sustainable City Concept the Case of Malmö-Sweden. Master Thesis, Lund University, University of Manchester, and the University of the Aegean. Sweden, Manchester, Lesvos, Greece.
- 22- Kramers, A., Höjer, M., Lövehagen, N., & Wangel, J. (2014). Smart sustainable cities–Exploring ICT solutions for reduced energy use in cities. *Environmental Modeling & Software*, 56, 52–62.

- 23- Lazaroiu, G. C., & Roscia, M. (2012). Definition methodology for the smart cities model. *Energy*, 47(1), 326–332.
- 24- Lee, J. H., Hancock, M. G., & Hu, M. C. (2014). Towards an effective framework for building smart cities: Lessons from Seoul and San Francisco. *Technological Forecasting and Social Change*, 89, 80–99.
- 25- Marco Pellicano, Mario Calabrese, Francesca Loia, Gennaro Maione "Value Co-Creation Practices in Smart City Ecosystem, *Journal of Service Science and Management*, Vol.12 No.1, January 11, 2019
- 26- Nam and Pardo (2011), *Conceptualizing Smart City with Dimensions of Technology, People, and Institutions*, Vol.12 No.1, January 11, 2019.
- 27- National League of Cities (2016) *Trends in Smart City Development*.
- 28- OECD 2020, *Smart Cities and Inclusive, Growth Building on the outcomes of the 1st OECD Roundtable on Smart Cities and Inclusive Growth*, the paper are published under the responsibility of the Secretary-General of the OECD.
- 29- P. Droege 1977 *Intelligent Environments: Spatial Aspects of the Information Revolution* Kindle Edition Book.
- 30- PwC and FICCI (2015) *India: Surging to a Smarter Future*.
- 31- Song, Y., Wang, X., Yi, T., Wu, P., Sutrisna, M. and Cheng, J. (2017) *Trends and Opportunities of BIM-GIS Integration in the Architecture, Engineering and Construction Industry: A Review from a Spatio-Temporal Statistical Perspective*. *ISPRS International Journal of Geo-Information*, 6, 397.
- 32- Yigitcanlar, T., & Lee, S. H. (2014). Korean ubiquitous Eco-city: A smart-sustainable urban form or a branding hoax?. *Technological Forecasting and Social Change*, 89, 100–114.
- 33- <https://www.datek.no/dv-cms/resources/masterhaakoan-1.pdf>
- 34- <https://www.pwc.in/assets/pdfs/publications/2015/india-surging-to-a-smarter-future.pdf>
- 35- <https://www.nlc.org/sites/default/files/2017->
- 36- [https://www.scirp.org/\(S\(351jmbntvnsjt1aadkposzje\)\)/reference/ReferencesPapers.aspx?ReferenceID=2431502](https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=2431502).

الملخص

تم إجراء العديد من الأبحاث حول موضوع المدن الذكية، حيث تم التعرض في بعضاً من هذه الأبحاث إلى مبادئ المدن الذكية ومكوناتها وتقنياتها وكيفية بناء مدن ذكية.

أم في هذا المقال قد حاولنا التعرض لمفهوم المدن الذكية من منظور مختلف وهو مفهوم استدامة المدن الذكية، حيث الربط بين مفهوم المدن الذكية والتنمية الحضرية المستدامة. فالمدن الذكية تعني الاندماج الطبيعي لأنظمة تكنولوجية المعلومات والتقنيات الحديثة والبنية التحتية المادية والبنية التحتية الاجتماعية والتجارية التي تتعاون فيما بينها لتزويد صانعي القرار ببيانات ذكية وقابلة للتنفيذ.

لذا أصبحت المدن الذكية المستدامة من خلال ثورة تكنولوجيا المعلومات لديها القدرة على إيجاد حلول جديدة للمشاكل الحالية والمستقبلية، كما أصبح لديها القدرة على الاستفادة من استثمارات البنية التحتية الحالية وكذلك المخططة لتحسين نوعية حياة الناس من خلال تقديم خدمات أيسر وأسهل، وتوفير مناخ استثماري مناسب للشركات، وأيضاً زيادة كفاءة الموارد الحكومية وشفافيتها. وبناءً عليه يمكن النظر إلى مفهوم استدامة المدينة الذكية كإطار لتحقيق رؤية متقدمة وحديثة للتحضر.