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SMART CITIES AS A MEANS TO ATTAIN SUSTAINABLE URBAN DEVELOPMENT.

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Abstract:

Urbanization, with all its dimensions of sustainable urban development, is embodied in the model of the smart city, which combines three key pillars(technological ,environmental ,and social), this cities contribute to solving environmental issues and reducing the impacts of natural phenomena such as climate change, while simultaneously achieving economic and social development.

In this context, Algeria has adopted the approach of catching up with this trend by developing a strategy for urban development, and sustainability. However, Algeria's experience in this regard is still in its early stages and faces practical challenges, preventing the realization of the desired smart city model.

Keywords: Smart cities, sustainable development, urban planning.

Introduction:

The rapid urban growth exerts significant pressure on the environment, resulting in severe impacts such as the pollution of vital resources, increased demand for energy and water, and the intensification of climate change phenomena. The world is witnessing a continuous increase in the population living in cities, which reached 54%, and is expected to rise to 66% by 2050 ("Urban Expansion and Sustainable Development in the Arab Region, 2014) This rapid expansion towards urban areas is likely to continue in the future. As a result, many countries have moved beyond traditional methods of urban management

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and have committed to advancing their cities through sustainable development by intelligently utilizing information and communication technologies (ICT), improving and designing infrastructure, reducing energy consumption by investing in renewable energies, adopting sustainable mobility systems and eco-friendly transportation, and creating smart facilities and spaces to provide necessary services to achieve sustainable living. All of this is achieved through the adoption of the smart city model.In this context, Algeria has undertaken the creation of smart cities, relying on digital technology as a fundamental support to keep pace with rapid urban transformations, turning cities into more sustainable and smarter places. However, several challenges and obstacles hinder this process, such as controlling digitization at the regional level, which is marked by diversity, preventing the achievement of the desired smart city model. This model is distinguished by the use of more modern methods based on information and communication technologies, protecting natural resources, and preserving the potential for future generations.

The importance of this study lies in the qualitative leap in urban life achieved by successful smart city models worldwide. A smart city takes the environmental dimension into account, focusing on rationalizing energy consumption, managing transport and water systems, and adopting environmentally friendly building practices. The smart city aims to preserve the environment and sustain regions while not neglecting economic and social development. In other words, It attains sustainable development through its three dimensions: economic, social, and environmental.As for the objective of this study, it lies in modernizing and updating urban management within Algerian cities through digitizing their regions and implementing the smart city model in practice, not just within legal texts.The study relies on a descriptive approach by introducing some new terms related to the subject of the study, along with an analytical and critical approach. Based on the above, the following problem can be

raised: What role do smart cities play in achieving sustainable urban development? In order to deal with this question, I have divided the topic into two main sections:
Section One: Smart Cities as a Method for Ensuring Sustainable Urban Development.
Section Two: Strategies for Executing Smart Cities and the Obstacles They Face.

SECTION I : SMART CITIES AS A METHOD FOR ENSURING SUSTAINABLE URBAN DEVELOPMENT

Given the imbalances that Algerian cities have experienced since independence and still face today, it is essential to develop the urban system and view the city as a place for achieving sustainable development in all its dimensions. This can only be achieved through adopting the smart cities model. In this section, I will address the conceptual framework of smart cities and sustainable urban development (**First Requirement**) and the legal framework for urban sustainability in Algeria (Second **Requirement**).

First Requirement: The Conceptual Framework of Smart Cities and Sustainable Urban Development.

Smart cities have emerged as an unusual element in the approach to sustainable urban policy. In this subsection, we will discuss the notion of smart cities (**Paragraph 1**) and sustainable urban development (**Paragraph** 2**).**

Paragraph1:The Concept of Smart Cities

In this study, it is necessary to focus on the concept of a smart city (First), its characteristics (Second), to distinguish it from other similar concepts (Third), and to discuss its historical origin (Fourth).

First. Definition of Smart Cities

Various definitions of smart cities have been proposed, but it has been agreed that The term "smart city" lacks a common meaning. Some consider it a model for urban and regional development,

using information and communication technology infrastructure to attain sustainable economic growth, improve quality of life and deliver services online. It leverages the intellect of individuals, organizations, and technology to foster creativity and enhance problem-solving abilities. (Moaz, 2015)· Azamat, the scholar, provided the subsequent definition: "A real smart city is an urban conglomerate that includes three fundamental elements: a technical foundation, a social foundation, and an environmental foundation. It may be described as three cities amalgamated into one: the virtual informational city, the knowledge city, and the environmental city. It is a place where the virtual world and the real world meet. It has three elements: information, the environment, and persons. "From this definition, we can conclude that a smart city is an urban cluster founded on three primary pillars: the environmental, social, and technical foundations. The technical foundation of smart cities encompasses digital and virtual urban environments integrated with information and communication technologies, wireless networks, and other critical components that constitute the urban landscape, serving as systems for the operation of a smart society and the intelligent management of urban planning. The social foundation emphasizes individual and institutional knowledge and creative endeavors, with digital communication infrastructure and knowledge management.

The environmental foundation refers to smart cities as those that use new and renewable energy resources. The International Telecommunication Union (ITU), a United Nations agency, defined a smart city in 2014 as: "A modern city that employs information and communication technology, among other methods, to enhance quality of life, operational efficiency, urban services, and competitiveness, while addressing the economic, social, and environmental demands of both present and future generations." (Eddine, 2015/2016, p. 05) It can be defined as a city that seeks to solve public sector problems through a participatory approach, using solutions resulted from the use of information

and communication technology facilitated by the globally digital revolution.

Second. Characteristicsof Smart Cities

The European Union has adopted six key dimensions for smart cities. A city can be considered a smart city if it aligns with these six pillars. However, some cities, based on their resources, nature, priorities of citizens, and public services, may focus on one or more of these pillars. Rudolf Giffinger, an authority in urban and regional development at the University of Austria, asserts that smart cities may be categorized based on six principal criteria pertaining to regional theory and neoclassical urban growth and development theory. The criteria are founded on ideas of regional competition, transportation economics, information and communication technology, natural resources, human and social capital, quality of life, and civic engagement in the democratic processes of the city.To form a smart city, several characteristics distinguish it from a traditional city. These features include the adoption of smart living through enriching the urban environment with smart policies and applications aimed at environmental management. This involves relying on smart energy, including renewable energy, energy networks that utilize technology, measuring devices, pollution monitoring and control, building and infrastructure renewal, green buildings, and green urban planning. These smart applications enhance resource efficiency and promote the use of alternative resources that contribute to the goals of a smart environment. (Eddine L. S., 2019)

Third. Distinguishing the Concept of Smart Cities from Similar Concepts

The concept of the smart city is relatively modern compared to some other concepts and terms. Before its emergence, there were descriptions of the integration of cities with information and communication technologies. The earliest of these was the term "Wired City," which emerged with the advent of the internet. There was also the concept of the "Sentient City," referring to

urban areas with pervasive sensor responses, as well as the terms "Digital City," "Virtual City," and "Knowledge City." However, the most widely used and accepted term in academic circles is "smart city" (ville intelligente), which is synonymous with the English term "Smart City." Although all these concepts agree on one key idea ,that information and communication technology is fundamental to the functioning of future cities,they diverge in specific applications and approaches. (les caractéristiques d'unes ville intelligente .SMART GIRDS-CRE, 2023), Smart cities provide an effective urban structure designed to address modern challenges and urban problems.

They are cities with greater competitiveness and creativity, driven by knowledge hubs, individual innovation capabilities, and global networks. Smart cities also provide high-level environmental monitoring and management, advanced transportation, and safer urban spaces (Klthoum, 2016)

Fourth. The Historical Foundation of Smart Cities' Emergence

The term "smart city" (la ville intelligente) emerged in the 1990s as a result of the market recovery strategy established by IBM. This company considered cities as large potential markets if managed with information and communication technologies. The popularity and widespread use of the term can be attributed to a promotional campaign conducted by IBM as part of its efforts to reposition itself in the market.The expression "smart cities" first utilized during the European Digital City Conference in 1994. In 1996, Europeans initiated the European Digital City initiative , which met with modest success. Subsequently, European authorities adopted Amsterdam as the primary model of a digital city, followed by Helsinki. The European Smart communities Project was executed in 70 medium-sized communities by 2007, after which they were categorized according to the characteristics of smart cities. The objective of the project at the time was to determine the advantages and disadvantages of these cities in order to make them more competitive by fostering local

development that benefits everyone (Chouk Mufid Ihsan) In the United States, many efforts have been undertaken to designate specific cities as "smart cities". However, most of these efforts have been more commercial in nature rather than encompassing the full civic aspects of a city.

Most countries then shifted towards adopting the smart city model as the future city paradigm, especially in the face of challenges such as rapid urbanization, depletion of natural resources, energy shortages, and climate change. The goal is to transform traditional cities into more sustainable ones, preserving the environment for future generations, while improving the quality of life for present generations. In addition, it aims to promote economic growth by exploiting information and communication technology, founded on the three pillars of sustainable development: economic advancement, social progress, and environmental conservation.

Paragraph 2: The Notion of Sustainable Urban Development

Urban public policies have sought to adopt the idea of sustainability by achieving a balance between the environment and urban development. It has become essential to apply sustainable development principles in urban planning to meet social, economic, and environmental needs, achieving environmental harmony in urban development. In this regard, I shall examine the notion of sustainable development and its overarching objectives (first), and specifically the notion of sustainable urban development (second).

First- The notion of Sustainable Development : In this section, I will cover the definition of sustainable development (1), its dimensions (2), and its goals (3).

1.Definition of Sustainable Development : The notion of sustainable development offers a framework for integrating environmental policy with developmental methods. Different efforts are necessary in diverse places globally to establish a sustainable lifestyle. This requires integrating actions in the fields of economic growth, justice, conservation of natural and

environmental resources, and social development. The aim is to organize human activity in accordance with the requirements of environmental protection and improvement.

In its "Our Common Future" report, the World Commission on Environment and Development,which was created by a resolution of the UN General Assembly in December 1983 and presided over by Norwegian Prime Minister Gro Harlem Brundtland,described sustainable development as " Addressing current need without compromising the capacity of future generations to satisfy their own necessities.

Sustainable development requires the inclusion of environmental considerations in all policies and when setting and implementing development plans. The fourth principle of the Rio de Janeiro Declaration asserts that to attain sustainable development, environmental preservation must be an intrinsic component of the development process and cannot be regarded in isolation." (Eddine B. M., p. 20) Sustainable development is the right of the present generation to make use of natural resources without compromising the rights of future generations.

2- Dimensions of Sustainable Development

Sustainable development has three dimensions: economic, social, and environmental.

-The economic dimension is based on the principle of maximizing societal welfare and eliminating poverty via the efficient use of natural resources and efficient utilization of human resources.

-The social dimension pertains to the interaction between nature and humanity, emphasising human well-being, enhancing access to fundamental health and educational services, fulfilling minimal security factors, and protecting human rights.

-The environmental dimension concerns the preservation and increase of material and biological resources bases and ecosystems. In recent years, World Bank reports have emphasized the importance of the environment as a key pillar of development, stressing the need to protect natural resources and

use them optimally based on predictive analysis of potential changes in ecosystems, as a precautionary and preventive measure.Therefore, sustainable development goes beyond merely reconciling environmental concerns with development; in its broadest sense, it requires a balance and mutual interaction between these three dimensions, without neglecting any of them.

3.Sustainable Development Goals

Sustainable development aims to attain several aims, the most important (Mohamed Ghoneim Osman, 2nd edition, 2007, , p. 29) which enhance the quality of life for the people by strategic planning and the execution of development strategies in economic, social, and psychological domains. This emphasis is on the qualitative dimensions of growth, rather than only the quantitative components, and is carried out in a fair manner. It aims to elevate public knowledge of environmental concerns by fostering a sense of responsibility towards the environment and promoting active engagement in identifying suitable solutions to the challenges it faces, while respecting the natural environment. This involves human activities that do not harm nature and aim to preserve it, as well as the prudent utilisation and exploitation of resources. Sustainable development views resources as finite, and therefore seeks to avoid their depletion, using and employing them in a rational way. Also, it links contemporary technology with social goals by integrating sustainable development with the use of modern technology to serve societal objectives, by promoting awareness of the significance of diverse technologies in the developmental sector.

Second :The Concept of Sustainable Urban Development.

Sustainable urban development falls within the broader concept of sustainable urbanism, which emerged during the Earth Summit in Rio de Janeiro in 1992 and was translated into the preliminary local Agenda 21, which represents a strategic plan for execution the principles of the Rio Declaration. It was also emphasized in the Chicago Declaration, issued during the 18th meeting of the International Union of Architects in Chicago, USA, in 1993. This

declaration positioned environmental and social development as a key focus in urban practice. Furthermore, it was reinforced at the Habitat II Conference in Istanbul in 1996 and at the Urban21 conference in Berlin in 2000, which showcased best practices for implementing sustainable urban development in cities worldwide. The same principles were reiterated during the World Summit on Sustainable Development convened in Johannesburg in 2002.According to the "Urbain21" conference, sustainable urban development indicates the enhancement of urban living standards. This encompasses the urban component as well as the environmental, cultural, political, institutional, social, and economic aspects, without putting a burden on future generations. Urban sustainability represents a state of balance and the redefinition of the economic, social, environmental, and even political goals and parameters in cities. It aims to integrate the sustainability of natural resources, technological, economic, and social sustainability.

To evaluate a city's sustainability and accomplish sustainable urban growth, the "Berlman" principles were adopted, which include the notion that a global sustainable environment cannot be achieved without a sustainable urban environment. Circular urban planning is better than linear planning as it is essential for resource recovery. A sustainable resolution to poverty and environmental deterioration necessitates an effective civil society and creative land use. Urban change cannot take place until outdated driving practices and work regulations are modified. It is essential to form cooperative partnerships between sectors and link local to global through independent communication networks. A sustainable city in the 21st century necessitates equitable society, political engagement, economic efficiency, and preservation of the environment.

On the regional level, the Euro-Mediterranean Ministerial Meeting held on June 25, 2009, addressed issues of sustainable development, including sustainable urban development in Mediterranean cities. In this context, it was decided to hold a

ministerial meeting on sustainable urban development by the spring of 2011 for the future Mediterranean urban strategy, which included a charter on sustainable cities in the Mediterranean. This charter aimed at establishing projects that work towards the development of model sustainable cities and neighborhoods. In line with the recommendations from this meeting, European countries created their own charters on sustainable cities, which, although they did not establish a fixed definition, focus not only on urbanism but also on the environment)Roncayolo(2002 ،

"Sustainable urban development seems to be related to improving the living conditions of its residents, ensuring their well-being and comfort, enhancing public services, preserving environmental resources, and using them wisely without compromising the requirements of coming generations.

Second Requirement: **The Legal Framework for the Sustainability of Algerian Cities.**

Algerian cities have experienced deep and advanced deterioration in their urban framework and architectural appearance, along with a decline in the quality of life due to neglect and indifference towards public spaces, widespread violations of urban environmental standards, and the excessive waste of urban and environmental resources." (El-Hadi, 2008)Due to industrialization and urban expansion, on the one hand, the city has become unable to meet the increasing needs of its citizens, and on the other hand, it has become incapable of keeping up with the demands associated with modernity and globalization (Harbouch, 2017)

To restore the ecological and aesthetic balance of Algerian cities, an urban improvement policy (l'amélioration urbaine) has been adopted, providing the necessary conditions for a transition toward establishing a sustainable city characterized by quality, competitiveness, and attractiveness. As an introduction to joining the path of sustainable urban development, Algerian legislators have directed efforts to formulate an urban policy that considers environmental preservation as one of its main principles, as

reflected in the Urban Orientation Law 06/06 and Law 02/08 regarding the conditions for creating new cities, aiming for sustainable urban development.In this context, I will address the novelty of introducing the concept of sustainable development within urban policy (**Paragraph 1**), as well as the rehabilitation of new cities to become smart cities in the future (**Paragraph** 2).

Paragraph1 :The Innovation of Integrating Sustainable Development into Urban Policy.

Sustainable development is a modern concept that has only recently been legally addressed. Algeria introduced this concept into its institutional framework in 1994 with the creation of the High Council for the Environment and Sustainable Development, following its ratification of the Earth Summit Agreement in Rio de Janeiro in 1992 and its adoption of the Agenda 21. Its legal significance was reinforced by the 2016 constitutional amendment, specifically Article 19, Furthermore, the 01/20 Law on territorial planning and sustainable development, as well as the 03/10 Law on environmental protection and sustainable development, defines it in Article 4,paragraph 4, wich sase that is the balancing between sustainable social and economic advancement and environmental conservation, signifying the incorporation of environmental considerations into development to satisfy the requirements of present and future generations.

As part of the new approach acquired by Algerian legislators to address deficiencies and foresee a better future for urban expansion, the Urban Orientation Law 06/06 is the first law concerning cities in Algeria. It marks a significant step toward sustainable urban development for Algerian cities and the improvement of living conditions. This is particularly reflected in the specific provisions aimed at defining elements of urban policy within the framework of territorial planning and sustainable development.

This is embodied through various objectives aimed at directing and coordinating all interventions, especially those related to reducing disparities between neighborhoods, promoting social

cohesion, eliminating substandard and unhealthy housing, controlling transportation and mobility plans, improving roads and networks, ensuring public services, and generalizing them ,especially in health, education, training, tourism, culture, sports, entertainment, environmental protection, disaster risk prevention, protecting citizens, combating social ills, exclusion, delinquency, poverty, unemployment, and promoting partnerships and cooperation between cities, as well as integrating large cities into regional and international networks.

The urban policy aims to achieve sustainable development as an integrated framework with multiple dimensions, sectors, and stakeholders. It is implemented through various fields: sustainable development and urban economy, urban and cultural domains, social domain, management domain, and institutional domain. Each of these areas contains specific goals integrated within a comprehensive plan that is put into action, as outlined in the aforementioned Urban Orientation Law 06/06.

Paragraph 2 :Preparing New Cities to Beco me Smart Cities in th Future.

The legislator has attempted to create new cities to replace traditional ones and establish sustainable new cities, in order to alleviate the pressure on the three major cities, develop the southern regions and the steppes, protect agricultural lands, and restore balance to the urban framework. This is achieved through the redistribution of activities and populations by mobilizing modern technology in urban areas, taking into account citizens' aspirations and aligning with sustainable development. Therefore, it has become more than necessary to qualify these cities by transforming them into digital spaces that adopt technological advancements enabling the governance and rationalization of public services. As a result, technology hubs were established under the fourth strategic plan, included in the national urban planning and sustainable development plan, which focuses on qualifying and modernizing the four major cities: Oran, Constantine, Annaba, Algiers, and Ouargla.

These new cities were classified among the major projects aimed at developing the country's economy, particularly in terms of urban, scientific, and technological aspects. These projects were seen as an opportunity to transfer technology from abroad to Algeria and represented a critical stage in the country's strategic development. Each city was assigned a specific area of focus. For instance, the new city of Sidi Abdellah specializes in the technological and informational fields, hosting two important hubs: the advanced technology hub and the information and communication technology hub. This has qualified Sidi Abdellah to become Algeria's first smart city. It has adopted high-quality standards, with its system relying on high-speed internet, such as magnetic cards, fiber optics, advanced medical technology devices, and administrative logistics. Additionally, it boasts an electronic fleet. (Chahra, 2019) .The new city of Boughezoul plays a key role in advanced technology, positioning it as a hub for the digital economy. It paves the way for the exploitation of renewable energy sources, the development of non-polluting technologies, and the adaptation of technologies to climate change. Meanwhile, the city of Bouinan has established itself as a biotechnology hub, falling under the Algerian-American partnership that extends until 2021. It focuses on several technological sectors, including biotechnology and food biotechnology. What drives these sectors forward is the strengthening of Bouinan's infrastructure with wired and wireless communication facilities.

In Algeria's strategy for modernizing its new cities, a planned distribution of technological hubs has been implemented, taking into account the capabilities and characteristics of each city. This approach is expected to achieve a balance between urban space and sustainable development (Sharif, 2019). It is clear that there is a will to transform the new Algerian cities into smart and sustainable cities based on digitalization and information and communication technologies,aiming to enhance the standard of urban services and provide well-being for citizens, especially

since these cities have the sufficient resources to bring about this transformation.

SECTIONII :Strategies for Executing Smart Cities and the Obstacles They Face.

Smart cities are realized on the ground through the application of various smart mechanisms and technologies aimed primarily at managing smart cities. The objective is to enhance the quality of life and the efficacy of urban operations and services while ensuring and enhancing the effective use of resources and environmental sustainability. However, there are certain obstacles and difficulties in achieving this. Therefore, the mechanisms for implementing smart cities (**Requirement**1) and the challenges preventing the realization of the smart city model (**Requirement 2**) are addressed.

First Requirement: Mechanisms for Implementing Smart Cities on the Ground.

Smart cities are characterized by the use of advanced technological applications that aim to preserve the environment and natural resource base on the one hand, and ensure economic and social development on the other. This is achieved through smart energy management, a shift toward using renewable energy, and investing in it (**Paragraph 1**), smart waste management (**Paragraph** 2), and organizing transportation and facilitating traffic flow (**Paragraph** 3).

Paragraph1 : Rational Use of Energy and Renewable Energy

The continuous industrial development and disregard for environmental concerns pose a threat to the exhaustion of natural resources and disrupt the ecological balance. Given the likelihood of exhaustion of the energy sources currently relied upon, it is essential should depend on renewable energy, as it is sustainable and will satisfy the wants of present and future generations. Therefore, one of the primary aims of smart cities is

to reduce energy consumption and water use through smart energy networks, and to invest in renewable energy. These sources are inexhaustible, non-polluting, and naturally available, continuously replenished by wind, water, sunlight, and wave motion. This differs from traditional energy sources such as fossil fuels, nuclear energy, and petroleum, which harm nature and life (Qalqil, 2017, p. 251) .The idea of effectively protecting the environment from pollution has received attention in Algeria since the 1980s. Intelligent energy management systems utilise sensors, sophisticated meters, and renewable energy sources, digital controllers, and analytical tools to distribute and use energy automatically and monitored. This necessitates several advancements in intelligent energy infrastructure, including decentralised renewable energy production, microgrids, smart grid technologies, energy storage solutions, automated demand response systems, virtual energy initiatives, and demand-side innovations such as electric cars (Samia & AmrouchSharif, 2019) and smart devices, which contribute to improving air quality.

Paragraph 2 : Smart Waste Management.

The waste problem is one of the most significant and prominent issues facing humanity today, both in terms of volume and the presence of complex, toxic materials that severely impact both humans and the environment. The quantity of waste has increased at a rapid pace alongside the rise in population and urban expansion, outpacing the rate of urbanization. This has made it challenging to identify the sources of various types of waste. As a result, methods for intelligent waste management systems have been developed, focusing on the complete elimination of waste and its transformation into reusable resources, thus achieving the circular economy model (Ahmed, 2020)

Paragraph 3 : Smart Transport Organization.

Sustainable transport is considered a key driver of economic growth and integration, while simultaneously respecting the environment. It also plays a vital role in facilitating the adaptation of cities to a carbon-free model, linking urban centers with rural areas, all while ensuring environmental safety and security. This is part of the international and local efforts by responsible governments to achieve cities with smart transport networks.The increase in air pollution levels caused by traffic congestion and the excessive use of private vehicles has led to a rethinking of how to find new ways to ensure public health and environmental safety in urban areas. This was one of the main focuses of the participants in the 1992 Rio Conference, where the unsustainability of the car-dependent transport model was highlighted, contributing to 40% of carbon dioxide emissions by 2030. Strict measures concerning fuel consumption could help reduce these emissions **(Nazzali Samia, p. 58).**Utilizing information and communication technologies (ICT) in transport systems is achieved through the application of intelligent transportation systems (ITS), which provide answers to several urban transportation problems, such traffic jams and excessive pollution, therefore enhancing people's quality of life, longer travel times, and energy consumption. ITS employs communication and electronics technologies to gather data on transportation facility performance, demand for transport, and the interaction between vehicles and roadside devices, as well as near-collision events, all aimed at solving transportation-related problems.It is now crucial to change the mechanisms of urban management towards sustainability. Urban managers face the challenge of implementing these new methods in city management to create cities that are sustainable, smart, safe, and adaptable.

Second Requirement: Challenges in Establishing Smart Cities.

The development of smart cities utilising information and communication technology (ICT) is intended to improve the quality of life and optimise urban efficiency. However, there are numerous obstacles and difficulties that prevent achieving the desired model of smart cities and urban sustainability in Algeria. Among these are the inefficiency of e-governance (**Paragraph 1**), the substantial funding required for managing smart cities (**Paragraph 2**), and the lack of digitalization in urban and spatial planning (**Paragraph 3**).

Paragraph1 : Inefficiency of E-Governance.

E-governance is a crucial element in the development of smart cities. Its applications and technologies define the operational mechanisms of a city and provide an intelligent work environment, requiring changes in the administrative and organizational structures within the city. E-government can be implemented to offer information electronically, facilitate communication, exchange data, and deliver services online. However, its implementation faces several challenges, including technical obstacles such as the weak ICT infrastructure and the inability of the state to keep pace with the rapid evolution of modern technologies and software used in network applications, due to the high costs associated with these mechanisms. The inadequate basic level of information and communication technologies has led to limited internet access and its lack of spread even in some urban areas where obtaining a phone line is difficult. This has resulted in the emergence of what is known as the digital divide (Eddine B. M., , op. cit., p. 48) .

Additionally, there are social challenges, considering the deficiency of competent staff in the field of electronic systems. Public employees still show a significant delay in mastering and managing modern technologies, especially as the necessary training programs aimed at developing their skills to adapt to new information systems during this vast electronic transformation have not been sufficiently intensified. This has led to the absence of a secure electronic environment according to

the principles of digitalization. Furthermore, there is a lack of awareness among Algerian society about the emerging information systems in the context of the ever-increasing digital and electronic transformation (Aoukil Mohamed Amin, op. cit.,, p. 31) . All of this makes the contribution of e-governance to the approach of smart cities seem very weak in Algeria.

Paragraph 2 : Massive Funding for Smart City Management

Smart cities require a solid foundation and strong infrastructure to thrive. The implementation of infrastructure, which is complex and costly, depends on the installation of high-speed internet and the use of sensor technologies, such as probesto gather and evaluate data in an effort to enhance the quality of life for inhabitants. These sensors gather data on virtually everything, making it essential to allocate financial resources and government support to bring about a successful transformation of infrastructure. This requires enduring, sustainable investments that facilitate effective utilisation of resources.

The inability of the state to keep up with the rapid development of modern technologies and software used in network applications, due to the exorbitant costs compared to the financial situation of the postal and ICT sectors, which suffer from a lack of budgetary allocations.weakens the idea of implementing smart cities in reality. These technologies form the digital infrastructure, which is the backbone of any smart city.

The total reliance on advanced technology to build smart cities that meet sustainability standards presents a barrier for poorer countries, due to the high costs involved. This cost is the primary obstacle to the expansion of smart city projects. In this context, the 2020 report of the second session of the UN-Habitat Executive Council highlighted the need for financing urban digital innovation by increasing investment in smart cities, focusing on the execution of sustainable development objectives, especially in developing countries and small to medium-sized cities.

Paragraph 3 : Lack of Digitalization in Urban and Spatial Planning.

The national territorial development and sustainable planning scheme serves as the legal reference for digitalization through the idea of regional digitalization. This concept was considered in the strategic plan for services, transportation, and communication infrastructure for the next 20 years. In this regard the law approving the national territorial development scheme (Law 10/02) emphasizes accelerating the use of information and communication technologies (ICT) by the administration and integrating them into the economic sector to achieve better competitiveness and develop the ICT industry. This would be done by creating competitive and attractive hubs, establishing high-quality secured communication infrastructures to ensure high and very high data flow for everyone, while raising awareness about the role of these technologies in enhancing the quality of life for citizens and fostering social and economic development. It also aims to adapt the legal framework to meet the requirements of the information society.

Numerous urban and spatial planning tools exist, such as the national territorial development plan, regional plans, guidelines for large urban spaces, urban planning guidelines, and land use plans. However, these plans are still focused on traditional goals such as achieving urban balance, dividing urban properties, and forecasting future developments. These plans fail to address the detailed frameworks and prospects of digitalization that would enable Algerian cities to integrate modern technologies. Most of these plans merely mention the establishment of wired and wireless communication networks without addressing the widespread digital measures in the digital space. This contradicts one of the key principles of urban planning, which is flexibility. Effective planning requires restructuring its tools and adapting them to new circumstances (Makhlouf Omar, The Need for Smart Cities to Achieve Sustainable Development: Opportunities and Challenges,, 2020, p. 43).

Thus, the challenge of digitizing urban environments in Algeria, starting with urban planning tools and territorial development, remains a new challenge, fraught with many difficulties and obstacles. These barriers hinder the development of digital media and the transition to smart cities. Despite the clear adoption of the concept of digitalization by the legislature, the desire to move toward this type of city alone is not enough without mobilizing financial, human, and technological resources to achieve it.

Conclusion:

The shift toward smart city models has become more than a pressing necessity, especially with the accelerating urbanization and the negative environmental impact of traditional cities. Therefore, studying this topic is a serious attempt to highlight the foundations and pillars of smart city development and their role in achieving sustainable urbanism, as well as the need to elevate Algerian cities to the level of smart cities. However, the reality does not reflect this, as Algerian cities are still far from an era that increasingly gravitates towards sustainability, intelligence, and digitalization. These cities continue to face a range of difficulties and challenges that make their progress towards this direction slow and hesitant. Based on this study, the following conclusions were reached:

- Smart cities embody the essence of human intelligence in dealing with urban environments and shaping urban features that reflect the evolution of human society and meet all sustainability concepts. Therefore, the transition to smart cities is implicitly a move towards green, sustainable, and environmentally friendly cities.
- The telecommunications infrastructure is the fundamental pillar of smart cities, and digital transformation is the cornerstone of their engineering. It relies on strong and solid data and information infrastructure. However, this alone is not sufficient to establish a smart city without the

integration of other elements (citizens, governance, economy, environment).

- Smart cities face numerous challenges that can only be overcome with strong political will to move toward this model, along with raising public awareness of its importance.

Therefore, I suggest the following:

- Adapt the legal framework for urban planning in Algeria to align with the advancements in information technology systems and diversify digital channels, promoting the new Algerian city to the rank of digital cities to achieve sustainable urbanism.
- Reassess urban planning tools in light of digitalization, making them more flexible and open to investment in the digital sector while relying on the experiences of leading countries in this field to achieve a qualitative leap in urban sustainability.
- Train human resources in technology and information science through training courses and by leveraging foreign expertise in this field.
- Work on reducing the environmental costs associated with creating smart cities by developing research centers in various fields.
- Overcome the challenges faced by local talents in investing in various technologies.
- Rely on participatory democracy by involving the public, through regional authorities (provinces and municipalities), in smart city projects, and raising citizens' awareness of the importance of their involvement in achieving the goals of smart city management, particularly those related to the environment and sustainable development.

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