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# A Theoretical Study Of The Smart City Using The Digital Transformation Method Of Cities

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**Abstract:**

*Artificial intelligence plays a pivotal role in the development of smart cities, as it contributes to improving infrastructure, services and resources However, progress in this area poses significant legal and ethical challenges Legally, there are different trends in dealing with AI. Some opinions call for the recognition of AI as a legal entity, while others believe that it is necessary to maintain the current legal system and adapt it to accommodate the challenges associated with AI.*

*At the beginning of the research, I dealt with an introduction to our topic of smart cities and how they first appeared and how they affected the world through the development taking place in it, and then I went to explain the goal of research and the problem that this research addresses and find solutions to it. In the second chapter, I talked about artificial intelligence through the use of the Internet, and I learned about what the Internet of Things are and what is the difference between the Internet of Things and artificial intelligence. In the third chapter, I learned about advanced smart cities and how they can We establish an advanced smart city in the fourth chapter I learned about the smart cities in Iraq and how they are developed in the province of Baghdad and in the fifth chapter was the conclusion of a research.*

***Keywords:*** *transformation, study, smart city*

## Introduction

The term smart city emerged with the emergence of the third millennium and its other modern concepts and titles that predicted the advent of a new human era governed by digital technical principles, and high-performance electronic tools and containers, after the tremendous technical development achieved in the field of the international information network (Internet), and the subsequent increase in the communications network (ICT), which contributed to increasing the concept of luxury and global economic growth, and the city of the twentieth century is not commensurate with human needs in light of the increase in digital technologies, and our entry In the

tunnel of the digital world, which is dominated by virtuality achieved from the spaces of the Internet, and the consequent speed of human movement in the systems of space and time, through the virtual space of high-speed and control information packages. The city, as the focus of the civilizational knees of humanity, has gone through several roles and urban stages through which it acquired its spatial and cultural personality together, and embodied through this historical march different urban scenes and models that suited its urban functions, and all these stages did not cancel the role of spatial factors, and the effects of the environmental environment that geographers consider the womb of cities that .

However, the technical turn witnessed by the world during the current century, which was represented by the development of communication and information systems, contributed to the city's entry into the new technology arena, whether it likes it or not, and its planners have to understand this fact and deal with it with high transparency. The new century has carried many new urban terms and concepts whose meaning flirts with the concept of global technology, including (electronic city, international city, information city, virtual city, smart city ... etc) of the modern names that are based on the principles of the contemporary technological revolution, as the principle of (virtual world) available within the international information network (Internet) provided large areas of mature thinking of the citizen and decision-maker together to make the features of modern technology in the service of the movement of urban growth of cities, and began to talk about the possibility of establishing smart buildings in which environmental systems, energy use, and communication systems are integrated until this trend in building design became popular, as it suits the data of modern technology. Presenting the concept of smart city in its realistic form imparts to the planning reality of cities - present.

**1Research problem**

In the light of the research, the main research objective was determined is to try to build smart cities in the world, but you need time, effort and experience in building these cities, but in Iraq it was a major problem through holding many sessions to reach a solution that is long-term in the construction of these cities.

There are several questions:

- What are smart cities?

What is the Internet of Things?

**2Importance of research**

Smart cities contribute to achieving sustainable development by exploiting the power of digital technologies, improving the quality of life, the efficiency of urban operations and services, competitiveness and working to achieve clean economic development at the lowest cost and highest production, in addition to reducing the problem of poverty and deprivation by providing sustainable jobs, as the importance of research lies in the recipient's acquaintance with the development of modern cities in recent times through the use of artificial intelligence, which helped to reduce environmental problems in cities, health, climate, etc. Of the climatic conditions that cause problems and obstacles to humans.

**3Research objective**

This research aims to focus in smart cities on energy efficiency and sustainability, harnessing digital technologies for better use of resources and reducing emissions, which means smarter urban transport

networks, improved water supply and waste disposal facilities, more efficient ways to light and heat buildings, and also means managing a more interactive and responsive city, and public spaces.

**1.4Research Methodology**

The descriptive approach was used in writing scientific research.

**1.5 Data collection tools**

- International Information Networks (Internet)

Some books

**1-6 previous studies**

**1**- Characteristics of smart cities and requirements for transformation, published in Al-Adab Magazine 2019, Volume, Issue, Proceedings of the Conference on Academic Treatments of Iraqi Political and Social Problems, pages 193-208, Intezaar Jassim Jabr, Shorouk Naeem Jassim

The term smart city means a city in which advanced communications and information technology services are available. It relies on the idea of linking public places in the city, such as airports, markets, gardens, parks, hospitals, and public gathering places in the city by using advanced communication technologies.

**2-** Using modern technologies in smart urban city management, Heritage University College Journal 2022, Volume 1, Issue 33, Pages 710-723, A.M.D. Nahla Abbas Mohamed Hamed

Cities are considered the driving force in generating economic growth around the world, in which the percentage of uses and economic activities increases in certain places, which causes poor distribution of the population as a result of poor distribution in other regions, which requires smart management to manage them and use cities in a smart way that preserves the city's resources and benefits. of its resources in an optimal manner, providing its residents with high social and economic well-being.

**1-2What is the Internet of Things?**

The Internet of Things and Artificial Intelligence is a modern and advanced technical example of the extent of development that technology has reached today. The Internet is concerned with technical things and the mechanism of connecting them to the Internet in order for them to analyze data and work better without human intervention in directing them, while Artificial Intelligence is related to the use of computers to simulate the human mind. Dealing intelligently with all problems and solving them in a way that resembles the human way of solving problems. What would happen if both technologies met together?

The term Internet of Things (IOT) expresses the extent of the great and tremendous development that has occurred in technology. It is a technical term that expresses the state of communication between modern technical devices in which no human intervention is mentioned. For example, we find many refrigerators and electrical appliances that operate using Internet of Things technology and that need the Internet. In order to work, they are such as refrigerators, sensors, wearable devices or digital assistants.

Communication between these technical devices takes place via the Internet using platforms that have been prepared in advance using cloud computing, which relies on a set of data collected previously in order to facilitate decision-making on these devices without the need for humans to return except in emergency cases. All of this is done through The Internet, whether with or without it.

**2Artificial Intelligence**

The term artificial intelligence expresses the ability of technical devices to simulate the human mind, so that they become able to deal with things as if they were a human in the way of thinking, discovering errors, dealing with things, and treating errors, and performing various tasks at high speed and great quality, which allows information to be stored in large storage spaces, where When dealing with him, it seems as if you are dealing with a professional and expert and not an ordinary person with limited intelligence.

We find robots to be the largest living example of the use of artificial intelligence in machines or technical devices, as they show high-performance interaction with us and with great professionalism.

**3-2Advantages of artificial intelligence**

Artificial intelligence is considered one of the most prominent things that has been shaken by the large and modern information and technological revolution in recent years, and all of this is due to its many advantages, the most prominent of which are the following:

•Artificial intelligence is characterized by thinking in a qualitative and unique way that differs from the way in which a computer works. It thinks and deals with the outside world in a manner of knowledge, just as the human mind deals with the environment surrounding it, in addition to the fact that it does not use computer language, but rather distorted human languages such as English or Arabic.

•Using binary symbolic representation, as it does not use digital symbols like a computer uses numbers, but rather relies on the binary characteristic, which is similar to the way a person understands, thinks, believes, and imagines, and thus he can make decisions based on this binary way of thinking.

•Relying on distinct and unsystematic methods in solving the problems he faces, such as thinking and striving to provide solutions. He does not rely on ready-made methods or methods that were designed in advance in a systematic manner, but rather deals as if you were dealing with a human mind.

**4What is the difference between the Internet of Things and artificial intelligence?**

Given what has been listed, we see that the Internet of Things depends entirely on the computer, its algorithms, technologies, and the Internet in all its applications without any human intervention. The computer is an integral part of it, because it works using its technologies, and in a systematic and pre-prepared manner, and we see this in all devices that use these devices. Technology.

While artificial intelligence does not rely entirely on the computer in its applications, or even deal with the computer method, not in using the programming language, but rather translating languages or systematic methods of thinking and solving problems, but it depends on the ability of the computer to simulate the human mind. It uses and depends entirely on the method of the human and the mind. Human ability to think, act, analyze matters and problems, address them, and deal with the outside world.

**2-5 Artificial Intelligence of Things**

We also know that artificial intelligence uses the computer to simulate the human mind, think in an intelligent way, and deal with all data, while the Internet of Things connects things or devices of various technology, such as washing machines, refrigerators, and other devices to the Internet, so they are identified through the Internet and dealt with in an intelligent way through The Internet, not through humans.

Hence, we see that in the case of linking artificial intelligence with the Internet of Things, we can obtain a group of technical devices that analyze their data, make decisions, and solve their problems in an intelligent manner and with thinking that mimics the human mind, but without any human intervention, which increases the efficiency and ability provided by this technology. Technology and its great effectiveness, it can make decisions more than if it works alone.

**2-6 Practical examples of artificial intelligence of things**

There was an actual application on the ground of artificial intelligence technology for things, which made the matter seem more effective and enjoyable despite the fact that the idea remained just an idea and nothing more, and among these practical applications:

• Drones in Drone Traffic

The use of a drone in regulating traffic, especially in smart cities, and working as if it were a traffic policeman, is considered a great matter due to the tremendous and amazing service it provides, which will reduce traffic congestion significantly, especially if the drone is deployed. Over large areas, which in turn will transmit traffic data and analyze it using artificial intelligence and make the necessary adjustments in order to make decisions without the need for human presence.

• Using facial recognition technology in smart buildings and modern companies

Which takes a picture of people in the place and compares it through artificial intelligence techniques and sends the image data in order to send it to the database, analyze it, and identify the person in a distinctive and fast way, which makes it easier for employees to register their attendance at the company, because AIOT technology does this task and saves them time and effort.

• Autonomous Delivery Robots

• Smart retail.

**2-7 Integration of artificial intelligence**

with the "Internet of Things" Artificial intelligence is described as the ability of computers to simulate the behavior and intelligence of the human brain, which is expressed in computer capabilities such as speech recognition, computer vision, language translation, and decision-making. The computer is

considered “Deep Blue” - which was able to defeat former chess champion Garry Kasparov in 1997. - One of the examples of computers supported by artificial intelligence technologies.

The ability of smart computers to make decisions independently and without human intervention is one of the most prominent reasons for raising concerns about artificial intelligence technologies, such as computers reprogramming themselves to find a solution or deal with an issue without being asked to do so.

Artificial intelligence technologies are considered one of the most prominent features that must be prevented or limited from appearing in these technologies, especially when it comes to dealing with sensitive data related to the users of these technologies.

**3-1 Modern smart cities:**

Contemporary cities are suffering from unprecedented pressures in all their fields and sectors in light of steady population growth and an urban system that is rapidly expanding to keep pace with population growth. These pressures have made today’s cities centers of environmental, societal and economic problems. Then the principle emerged that cities are just as they are places where problems are concentrated, so they are places of capabilities and qualifications to be places for treatment. And solutions industry. According to this principle, until recently, city leaders believed that modern technology was making cities more developed and more efficient in managing their urban tasks, and they considered the big data of sensors and smart control centers promising ways to manage complex operations and create hub systems.

Urban environment.

But they soon realized that effective strategies start with humans, not technology, because intelligence is not just installing digital interfaces in the city or digitizing traditional infrastructure, or even simplifying decision-making processes within official and private economic institutions, by using artificial intelligence to process huge data to make the best decisions. To carry out work to improve the urban environment and improve the quality of life in it. Rather, intelligence is the means to give residents a feeling of comfort and security in the urban environment in which they live through an intelligent society that produces an administration capable of translating these spiritual requirements and achieving harmony between them and the imposed physical structure, and translating activity and familiarity with the city in a way Smart that ensures that the needs of the population are met and that social justice is achieved. In this case, the matter goes beyond just smart management to many self-interested parties to advance themselves and unite their forces to achieve urban growth within a sustainable environment. Perhaps many personal and individual measures have played the most important role in making the city more responsive, more productive and efficient.

**3-2 The concept of smart society:**

The concept of a smart society is one of the complex, restrictive, relative concepts. Either it is complex, as it consists of a description, which is society, and its class, which is smart. Either it is relative, as the word intelligence is used in smart cities and is referred to material things (devices), as if we say: a smart car, a smart house, and the like. Then it means that that thing performs its function independently using modern technologies and artificial intelligence without manual intervention, and it is used and referred to for legal matters (services), such as how we describe learning or agriculture and the like as intelligence. Then its first meaning is: that with students they acquire knowledge on their own through the use and assistance of smart devices. In a specific environment called (the smart school), and with the second: that the farmer acquires his knowledge about the principles of

agriculture and practices production methods with smart equipment. As for the word "society," it is used at times and means the (local) residents of the city, and it is used at other times and means a larger society, a region or a state), as if half a society is a state. What is intelligence or progress? What is meant by the extent to which individuals comprehend technical and information technology applications and the possibility of moving from a civil society that uses technology to an innovative society or one capable of reaching innovation to develop solutions to problems and capable of dealing with everything that begins with a principle, including e-mail, e-books, e-commerce, and shopping? Electronic, electronic commerce, electronic community services) and regardless of the size of the community locally, regionally or internationally, describing it as intelligent means: that citizens have the ability to use smart devices and technologies to create infrastructure and produce smart services, and to be aware of their importance and how to employ them for transformation and keeping pace with conditions and requirements. The new globalization.

This perception of the smart society is almost close to the most important definitions formulated for it, including what was stated in the Guide to Smart Communities from the work of the California Institute at San Diego State University in 1997, that the smart society is that society that includes a government, business sector, and residents who realize the potential of information technology, and how to Use them to transform life and work in positive ways.

**3-3 The smart city is distinguished from other cities by the following: -**

A- Adopting a stable, secure, and interoperable communications infrastructure to support the huge amount of applications and services based on information and communications technology, with fast computing devices to communicate and exchange data within sensors and software to enable devices and objects equipped with smart sensors to communicate, collect information, and exchange it via wireless communications. Or send it to central control systems to be used in managing and improving a wide range of urban operations and services.

B- Artificial intelligence and machine learning technology that allows processing and quantitative analysis of massive and periodic collections of data and statistics, to reveal patterns used to enrich and enhance the decision-making process in municipal departments.

T- Sharing sensitive information, adopting an open data policy to build trust between citizens and the government, analysis to support a data-based decision-making policy, and the use of scientific methods for diagnosis and forecasting, as well as cooperation by linking databases in different institutions.

D- Providing user-centered services through continuous communication between the service provider and the consumer. Perhaps this characteristic is the most important for society with the attribute of intelligence because it is the result of integrating what came before it together, and because an intelligent society is a society that employs the capabilities of technology to create a more productive human being and more focused on resources to achieve well-being. And quality of life.

The aforementioned characteristics are mainly centered on the members of human society, which cannot be described as intelligent, with the ability to produce and employ the communications and information network of mobile and fixed phones, satellites, cables, and communication applications and their integration with urban services, and to have the ability to develop and create software to activate and support existing and new services that have not yet been achieved. It was not available before, to bring about the hoped-for civil and societal transformations.

Which is embodied by the inclusion of artificial intelligence in urban services and activities, such as management and practices in everything that gives the city competitive ability in sustainability, economics, and community services. The smart society represents an advanced social form in the information age that contains the characteristics of smart social support based on data and joint management, and adopts a comprehensive development thought that benefits from a new generation of information technology, closes the existing gap between social segments, and overcomes regional development differences.

**3-4 Smart community culture:**

The concept of smart digital culture refers to the ability of individuals to harmonize in digital societies. It is the ability of individuals to organize, understand, identify and analyze information using technology and information media that are subject to the laws and regulations imposed in those societies and achieve a type of positive interaction with the digital content environment.

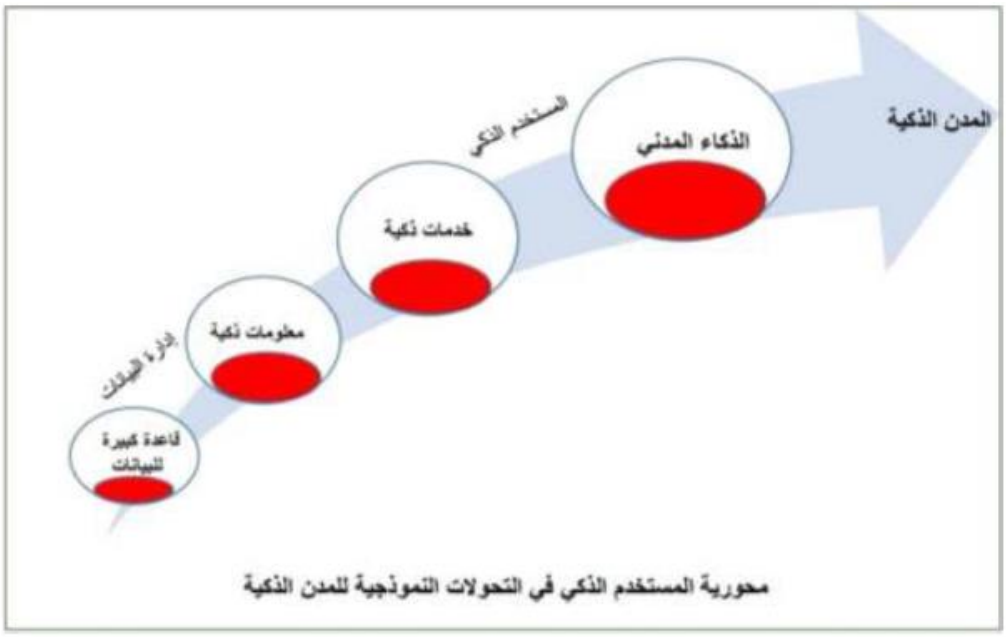
**3-5 Why the smart society?**

Because a city that embraces a smart society that translates digital technologies into public services with better use of resources and less environmental impact is a smart city. In other words, the intelligence of cities is the combination of three variables: a smart society, an advanced technological base, with a balance between resources and the environment, the first of which is Whoever combines them and turns cities into smart ones, and even differentiates between them by making one city smarter than the other. This is because the innovative reality of smart cities is: creating a society capable of using modern information and communication technologies and employing them intelligently to improve the quality of life, achieve financial and emotional well-being, and raise the efficiency of urban activities and services, while ensuring the share of all current generations. From here we find that smart cities only demonstrate their evolutionary potential and competitive capabilities. In two aspects, one of which is inherent in the other: a material one that includes all its physical components, and another intangible that reflects the intelligence of society, its behaviors, its well-being, its multiplicity of options, and its ability to innovate and create advanced technological and future applications. Hence, information and communications technology and digital technologies have provided pioneering opportunities for smart cities, through the provision of big data, its continued flow, and its support to provide Its urban services are more efficient within integrated urban systems that are in harmony with environmental requirements. In other words, it has given it opportunities to achieve what is termed green growth in all areas and sectors of the city. In general, the impact of information and communications technology in smart cities is evident in a large group of smart phones and sensors for fixed readings covering all areas. Urban variables and aspects of daily life are connected to high-speed communications networks, and in the set of applications and software used to classify and process this huge (raw) data and turn it into alerts and insights accessible to those who need it, see image (1).

Image (1): The physical components of the smart city

The centrality of the smart user is evident in the fact that he cannot access these applications or enforce them unless this is done It is widely adopted by society and employed in what derives from the requirements of its members, changes their behaviors, and elevates them to civic intelligence.

Figure (1) The centrality of the smart community in the paradigm shifts of smart cities




Smart Cities

Civic Intelligence

Smart User

Smart Services

Smart Information

Data Management

Large database

The centrality of the smart user in the paradigm transformations of smart cities

**3-6 Smart Community Qualifications**

It is clear from the above, in general, the qualifications and qualities that society possesses in order to be labeled with the label of intelligence. As for the details, intelligence of society is subsequent to and consequent to its modernity, and both modernity and its successor, intelligence, require broad and organized social mobilization aimed at the decline and erosion of the set of classical social, economic, and psychological obligations. So that society becomes available to new patterns of behavior and socialization, and the indicators of this socialization are the predominance of modernist manifestations over machines, buildings, and consumer goods, responsiveness to the media, the requirements of globalization, and apparent sovereignty.

These transformations then lead society to modernity, and then it can be smart by being prepared to deal with advanced technology and the expansion of computing on the one hand, and to introduce them deeper into the social fabric and reorganize its systems socially and engineer it technically.

It should be a smart knowledge society that produces a smart government and smart administrations that employ data generated by information and communications technology and processed by artificial intelligence to enhance governance capabilities.

Local and business management to produce a smart economy, smart services and jobs within a sustainable environment.

The most important thing that gives society the quality of intelligence is that it benefits from the potential of its citizens, employing their abilities, and investing competencies in them while attracting creative talents and creative skills in order to nourish and develop human capital. This is one of the urgent demands for disseminating knowledge and skills among members of society, developing their intellectual capabilities, developing the knowledge economy, and establishing relationships And consolidating it between the local government, local administrations and citizens.

The qualifications of a smart society are that it is the origin of all contemporary activities and practices in the fields of politics, public administration, services, economics, knowledge production, education, culture, behavior, lifestyle, and citizenship, with the requirement to practice all of them so that the intelligence is true to them.

**3-7 The value system of smart societies:**

The economic and technical dimensions dominate the talk about the shift towards the concept of smart cities, but many research and academic studies tend to discuss (smart communities), which constitute the final goal of establishing such cities, and given that the human being is the main focus of these initiatives and the main player in them, and has become There is a major question about whether smart cities, with their technical and economic dimensions, necessarily lead to the establishment of smart societies, with their sociological and anthropological dimensions, as the World Forum for Smart Communities indicates that the capabilities of the smart city necessary to provide the infrastructure and technology that society needs to be (smart) are not sufficient to give it that description, Defining four main elements to achieve the concept of a smart society, which are (broadband services, human skills, innovation-based economy, digital equality, environmental sustainability, and defending "change"), which are the elements that carry within them a value system governing this type of society. The researcher presented " Michel Gorstein envisioned a vision that focused on smart communities to a greater extent than "smart cities," which he saw as the theses presented regarding them that referred them to a series of neoliberal markets. Gorstein presented four concepts that

facilitate the use of smart technologies to increase the empowerment of citizens, the most important of which are:

1- Smart community planning: By supporting citizens' involvement in delivering services via smart technologies, using interactive maps to collect information through which remote residents can be identified, for example, in identifying the best areas to create additional or alternative services.

2- Smart Community Governance: Providing means for public auditing of municipal budgets, including providing the necessary training and support for people with low education to review budgets and ensure that they are spent appropriately and fairly among citizens.

3- Citizenship in the Smart Society: Electronic interaction on public issues based on the availability of government information and in a manner that takes into account the geographical distributions of the population, whereby these contributions are collected from citizens in various local areas in a way that supports public participation in local planning and program design.

4- The structure and resources of the smart society: where citizens are able to report the problems they face regarding the public structure through smart systems capable of collecting their contributions from various regions, based on the concepts of decentralized management, and capable of responding effectively to varying conditions and needs between one local community and another, in A framework for supporting citizen participation in decision-making processes, setting priorities and allocating resources.

**4-1 Smart city applications in the city of Baghdad, Iraq:**

Developing the city of Baghdad and its development to make the city of Baghdad a smart city born of development and information and communications technology, which is employed for the benefit of the city and its residents through urban management implemented by local authorities in the city. Therefore, sustainable cities have begun to play their role through information and communications technology through management. Smart in the field of linear infrastructure (transport, water, energy, and waste) and the smart sustainable city uses information and communications technology to improve the quality of life for city residents.

Development, strategy, and technology are all axes that contribute to the growth and development of the city. There is a rule of Greek philosophers that says (everything changes and everything is in constant motion), and the city is changing rapidly and dramatically due to migration from the countryside to the city, especially the capital, which leads to pressure on linear and cadastral services and the occurrence of problems in The city requires developing a strategy that contributes to addressing these problems, and this strategy includes:

**1- Sustainable development strategy**

Sustainable development is increasing economic growth that exceeds population growth, reducing the phenomenon of poverty, protecting the environment from pollution, and achieving social well-being for humans because that is its goal and purpose.

| Social Dimension | Sustainable development of the citv | Sustainable development of the citv | Environmental dimension |
|---|---|---|---|

**1- Smart city strategies**

It is the use of urban services through digital technology and information technology. Smart cities depend on a sustainable urban model through which human and social capital and infrastructure are linked to information and communications technology to address urban issues, achieve sustainable

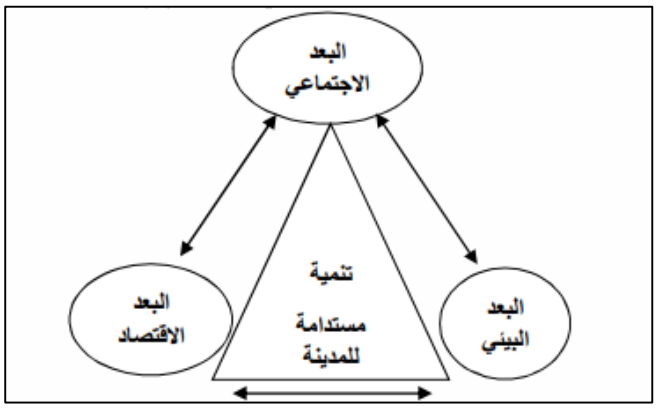
development, and improve the well-being of citizens in cities. Smart cities are a modern urban phenomenon that represents strategies for the development of cities within three axes:

• The basis for the success of smart cities is the application of communications technology in infrastructure

• The basis for the success of smart cities is the presence of smart management

• Training human resources on the use of smart devices.

Smart cities seek, through the use of information and communications technology, to reduce energy consumption, rely on renewable energy




reduce the percentage of Co2, protect the environment from pollution, and preserve natural resources. The strategy aims to do the following:

2- Baghdad's future strategy in the transportation sector:

The interest in the transportation sector in the city of Baghdad is considered one of the most important indicators at the level of urban development and the urban development of the city. Transportation, according to the draft comprehensive development plan for the city of Baghdad for the year 2030, is based on an integrated approach to all modes of transportation, and includes the following:

• Integration between the new and proposed transportation centers and the introduction of advanced technology into various modes of transportation according to the 2030 development plan.

• Connecting the capital with a metro linking the capital center with the airport.

The comprehensive development plan for the city of Baghdad depends on multimodal transport hubs and can be reached through major transport sites with high population densities, such as: hospitals, educational and government services, which are smart means of transport aimed at the comfort of travelers, and the following is available in smart transport:

• A system that provides information about the selection of transport modes that arrive on time

• Providing a tourist and business guide.

**1- Water strategy:**

The city of Baghdad depends on water from the Tigris River, but it suffers from a shortage of water resources due to land uses and dams that were built on the river in Turkey, the most important of which is the Ilisu Dam, whose water supply is expected to decrease to 47% per year, and the water consumption is for every (10) population. In 2030, to (5.6) million square meters per day. In light of this shortage in water resources, the comprehensive development plan emphasized the following:

1- Determine the calculated water percentages in the river

2- Reducing water waste and recycling, similar to Masdar City in Abu Dhabi

3- Pulling potable water lines to homes along with potable water lines in order to ensure water sustainability.

4- Using smart technology to reduce water waste.

**5- Energy:**

Energy is an essential part of the smart city system, since the city of Baghdad depends on thermoelectric energy, and the total production of electrical energy in the city of Baghdad is (31,412,272) megawatts per hour and the total consumption is (13,021,835) megawatts, and the city of Baghdad needs electricity (290,437) megawatts (the balance between production and consumption). Energy: Electricity in the city of Baghdad for the year 2018). It is possible to rely on renewable energy sources such as wind energy, solar energy, and gas extracted from waste. Some streets of Baghdad and some residences in the Karrada area relied on solar cells to generate electrical energy through which smart lamps were placed. Cameras and sensors in the lamps distinguish the lighting state between night and day.

**1- Education:**

The goal of the comprehensive development plan in the field of education is to reach a high level of education through the following:

• Applying international standards and urban planning to make education better

• Providing educational uses of the land to fill the education deficit as a result of increasing immigration

• Using modern methods in education according to the requirements of the new modernization system, especially smart education.

**2- Health:**

The development plan project in the health sector was concerned with developing several proposals and solutions regarding the health situation in the city of Baghdad, namely: allocating land to build hospitals and health care centers according to approved standards, and the proposals contained in the sustainable development plan and reports of the World Health Organization in Iraq, which indicate increasing the capacity of health services. Based on cooperation between community health services and hospitals equipped with the latest advanced equipment by 2030

**3- Intelligence challenges in Iraq:**

The Berlin conference was held entitled (Smart Cities and Regional Government for Sustainability), which was held at the Leibniz Institute for Ecological Studies in the German city of Dresden for two days and five sessions attended by a number of specialized teaching staff from international universities. The University of Baghdad had a share in this conference, as a lecture was given by The Iraqi delegation included professors from the University of Baghdad/College of Urban and Regional Planning and Architecture with the title (Challenges of Smart Cities in Iraq) and included three aspects of sustainability, which are:

• Environmental aspect

• Economic aspect

• The social aspect of government or governance

**5-1 Conclusions and recommendations:**

1. These cities use technology to improve the quality of life for citizens and promote economic growth

Smart cities involve using data and technology to improve government services, infrastructure, sustainable development, transportation, energy, healthcare, and other public services.

2.The Internet of Things strategy aims to encourage institutions and government agencies to join the smart digital transformation system in the world.

3. Through the Internet of Things, costs can be reduced significantly, as effective communication between electronic devices contributes and allows data to be shared between them.

4. Smart cities help save time and effort for residents by applying modern technologies, automation, and intelligent control of public services and facilities. Thus, efficiency and productivity in the city are improved and the comfort of residents is improved.

5. The use of artificial intelligence and machine learning to combat pollution and energy consumption allows authorities and cities to make informed decisions that are better for the environment.

6. Attention is paid to finding integration between the material and moral aspects to give cities the quality of intelligence and to create a kind of relationship and familiarity between residents and their urban environment as a first step to involve the community in creating sustainable urban development.

7. Working to benefit from the experiences of other societies who were first in this field in a way that is consistent with prevailing cultures and preserving national identity, using foreign expertise similar to countries that have implemented the smart city system, such as Masdar City in the Emirates, Jeddah in Saudi Arabia, and Berlin.

8. Establishing a university city outside the capital in which communications and information technology is available to relieve pressure on community services within the city.

9. The center of the capital, Baghdad, meets all the requirements of smart cities. It must include all parts of the city and be an experience for the rest of Iraqi cities.

10. Contemporary problems and challenges must be faced in a scientific and cognitive manner, and the civil environment must be reformulated, whether at the individual or design level, in a way that contributes to achieving sustainable human and environmental development.

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