

PAPER • OPEN ACCESS

Smart city planning and sustainable development

To cite this article: Ali Abdulsamea Hameed 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **518** 022042

View the [article online](#) for updates and enhancements.

Smart city planning and sustainable development

Ali Abdulsamea Hameed¹

¹Presidency of Baghdad University \ Government Contracts Division

Abstract. The development of the concept of the city as a result of technological developments and changes is taking place in the modern era, the concept of smart cities has emerged and cities are linking their technological policies and development plans to achieve development while linking the objectives and dimensions of sustainable development to provide the best possible benefit from the available technological possibilities. The research aimed at shedding light on the practical potential of smart cities in the process of sustainable development of cities with the application to the Iraqi city of Basra. The study examined the concept of smart cities and their characteristics and components, as well as the concept of sustainable development and its dimensions while studying some of the international experiences for the establishment and transformation of smart cities (Dakota, Dubai / Mecca). The study also conducted a case study for the city of Basra and how to transform it into a smart city through a set of mechanisms, namely, the existence of intelligent objectives and strategies through which to develop a vision for the city of Basra. And building applications that help transform government services and life into an e-government system by developing the city's ICT infrastructure, building citizens' capacities and deploying smart applications, helping to implement the city's e-heritage proposition. The research has reached a set of conclusions and recommendations. The communication infrastructure is the mainstay of smart cities, but it is not enough to create a smart city without the other elements (citizen, management, economy, environment, and living). The smart city is not only urban, The smart city consists of four basic components (networks - databases - applications - citizen), the smart city meets all the concepts of sustainability, and therefore the transformation of smart cities is an implicit transformation of green cities sustainable and environmentally friendly, The development of existing cities to intelligent cities depends on their available infrastructure and then develop mechanisms to develop them in order to reach a communications infrastructure capable of implementing the characteristics of smart cities. The cities studied in the experiments identified basic goals for the transformation of intelligence such as Makah, the basic principle is to develop the city's Hajj system. Thus, each city can set the main objective in which to formulate a vision to identify priority projects. In the process of development, the transformation of cities into smart cities requires the development of vision, goals, and strategies translated into projects. Structure (Intelligent - intelligent infrastructure - intelligent environment - smart living), the strategic plan of the Ministry of Communications in Iraq can be used to develop the urban communications infrastructure and integrate applications Targeted within the smart applications of these cities as a major support in turning cities into smart cities.

1. Introduction

Urban planning is concerned with the development of future frameworks for the development of cities. Cities are generally a reflection of the social and economic situation. The concept of the city has evolved as a result of the development of human activities .



The technical development that accompanied the end of the twentieth century and the beginning of the twenty-first century was reflected in the emergence of communication and information technologies, mainly in the form of life and the way in which different activities are carried out, leading to the emergence of a new type of society that is increasingly dependent on digital knowledge and technology. Virtualization rather than conventional means [1].

The concept of the city developed as a result of this social development, and there were several labels for cities based on technologies such as digital, electronic, virtual, cognitive and intelligent cities. The emergence of this type of society was associated with the emergence of changes in the structure of cities. , Smart Cities, allow communities to develop their capabilities at various levels. Smart City's technological components have comprehensive applications in many areas including services, industry, the environment and the economy, and play an important role in finding solutions to urban problems. The increasing of these problems stimulates the study of the role played by Smart City applications to find solutions to these problem [2].

Although fewer States have formulated clear science and technology policies, fewer have worked to link scientific and technological policies to development plans and have drawn up specific initiatives aimed at their implementation.

Therefore, the countries that will link their technological policies and development plans are the countries that will have the centers of information control and systems, which will play a key role in the economies of the world and will also maintain its sustainability for decades, and these countries can call their cities the designation "cities Global Cities" [3].

2. Problematic search

The problem of research is that there is no clear urban policy to take advantage of the city's smart technologies to achieve sustainable development in cities, as well as lack of appropriate planning mechanisms that allow a system that enables cities to meet growing demand in a sustainable manner within a comprehensive strategy that ensures urban planning Integrated.

3. Research Objectives

The research aims to achieve the main objective is to shed light on the practical potential of smart cities in the process of sustainable development of cities with the application of the city of Basra and its role in the development of urban development policies in cities, through the achievement of a set of sub- Objectives:

- Understand the concept of smart cities and their characteristics and components .
- Identify the concept and dimensions of sustainable development
- Study some of the global experiences for the establishment and transformation of smart cities .
- A Case study of the city of Basra and how to turn it into a smart city .

4. Research Methodology

The research will depend on descriptive research methodology for its suitability and ability to achieve the research objectives.

5. Research terms and concepts

What are smart cities?

Smart cities are defined as the cities based on the electronic technologies produced by the era of information technology from the digital city to the electronic city and then the virtual to reach the knowledge city as knowledge is the most comprehensive framework of data and information, and many researchers have developed concepts of these terms and characteristics, All these cities are based on the digital technologies offered by the IT era.

They all provide interactive services to individuals and virtual spaces across different information networks and applications, so there are many definitions of the concept of Smart City due to the multiplicity of technical trends and social backgrounds of time and the era in which these definitions have emerged since 1997 from those definitions include:

- Droege definition : The concept of a smart city is related to virtual cities, including the emergence of the term digital cities and the most important results of electronic vacuum or virtual space [4].
- Definition of Smart Community Forum 2006 is the region that provides information and communication technologies for the community, that is, combining the intelligence of individuals and institutions that promote learning, innovation and digital spaces, thus enabling creativity and knowledge management. Must be in the city to be smart thus:
 - Provision of broadband telecommunications services.
 - Effective education and training of individuals.
 - Balancing the use of digital services, ensuring that all individuals benefit from the techniques.
 - Promoting creativity in the public and private sectors and establishing economic groups to finance development.
- Achieve economic development that attracts skilled labor [5].

The Smart City term refers to creative systems in activities, institutions and digital spaces that develop interaction and communication to solve city problems and the distinctive characteristics of a smart city is innovation in problem-solving.

- Definition Azamat: Smart City is an urban community based on three basic pillars, a technical pillar, a social pillar, an environmental pillar, and thus three cities in one: the virtual city / informatics , knowledge city, and the environmental city. , Individuals.
- Technical pillar: A digital and virtual city, providing information and communication technologies, wireless networks, sensor networks, which are essential elements of the urban environment, as a smart community operating system, and intelligent urban management.
- Environmental pillar: A city that uses new and renewable energy resources.
- Social pillar: A city that focuses on cognitive activities, individuals' creativity, knowledge institutions, digital communication infrastructure, and knowledge management [6].
- IDC is defined as a limited entity (district, town, city, district, municipality and / or urban area with a sultanate. The entity is built on an ICT infrastructure that enables management City efficiently and promotes economic development, sustainability, innovation, and citizen participation [7].

Through the previous definitions we find the term smart city is focused on the infrastructure of communications and representation of the virtual reality of the city, but this is not enough unit for a smart city without a smart community, and added the last definition of the environmental dimension of the city, which cities smart and sustainable among them, Smart City term to include the city and its immediate territory to confirm the regional role of the city in the provision of regional services and with the emergence of the term smart cities has also appeared several terms related to the components of the city, including :

Smart Growth: Land development theory under the principles of intelligent growth in transportation and housing and the identification of renewal and redevelopment priorities in existing communities

- Intelligent urbanization: the growth of urban centers and large land planning with urban expansion resulting from the pressure on these centers and is one of the strategies for the sustainable development of cities [8].

Sustainable development :-

Is the development that meets the needs of the present without compromising the ability of future generations to meet their needs, that is, equality and justice between generations is one of the factors required for sustainable development [9].

Sustainable development is the effective and effective use of all environmental sources, social life, and the economy of the distant future, with a focus on a better and more valuable life for every member of society present and future [10].

Efforts to build a sustainable lifestyle require an integration of action in three key areas:

Economic growth and justice: The interdependent global economic systems require an integrated approach to long-term responsible growth while ensuring that no country or society is left behind.

Conservation of natural resources and the environment: In order to preserve the environmental heritage and natural resources for future generations, economically viable solutions must be found to reduce resource consumption, stop pollution and conserve natural resources.

Social development: People need work, food, education, energy, health care, water, and sanitation. In addressing these needs, the international community must also ensure respect for the rich fabric of cultural and social diversity, respect for workers' rights and the empowerment of all members of society to play their role in determining their future [11].

6. Basic principles of sustainability

Integration: Integrate environmental, social and economic considerations into the decision-making process effectively.

Community participation: Sustainability cannot be achieved or progress achieved without the participation and support of society in all its segments.

Preventive behavior: Where there are threats of serious environmental damage or irreparable damage, the lack of full scientific certainty is not used as a reason for postponing cost-effective measures to prevent environmental degradation.

Equity within generations, including equity and equality of opportunity for present and future generations as well.

Continuous improvement: The deteriorating environmental situation requires immediate action to make communities more sustainable and seek continuous and continuous improvement.

Environmental safety: work to protect biodiversity and maintain essential environmental (ecological remove environmental) processes and systems that support life [12].

7. Characteristics of Smart Cities and Their Relationship to Sustainability

The characteristics of smart cities are related to the use of IT technologies. These characteristics are: [1]

Smart environment: natural or urban as it is the physical environment of the city in which all activities are carried out.

Smart government / e-government : the development of the system of government work using electronic means in the provision of government services, the most important applications of e-government in:

- 1- Provide information: that is, all events and information related to the city's population.
- 2- Communication: the ability to exchange information and communicate between the population and the Government.
- 3- Electronic transactions: the delivery of services electronically [13].

- **Smart community :** It means the extent to which the city's community of IT applications and technologies, and the possibility of transition from a normal society using technology to an innovative society capable of reaching innovative solutions to its current problems and future development can live in the information city and can conduct its activities and access its services and deal with its administrative organs In other words, you can deal with everything that starts with e-government such as e- government , e-mail, e-cards, e-books, e-commerce, e- Business), Electronic Services e-Se Marketing, e-Marketing [14].

- Smart Living : includes a range of events and activities that contribute to the provision of quality of life, including cultural events, educational and tourism, and emphasize the quality of the health system, and died buildings of good quality.

- smart traffic / intelligent transport : any management of the system of transport and traffic through the range of technologies that rely on information technology, and can replace the smart movement with smart infrastructure and sustainable transformation to the sustainability of infrastructure is the basis for the transition to the sustainability of the city and described in the Green City The following is a presentation of the components of the structure (Energy, water and sewage, solid waste), their transformation into environmentally sustainable elements and the utilization of information technology in their sustainability.

- Renewable Energy: Green cities are characterized by a reduction in the use of renewable energies to their lowest levels using renewable energy such as solar energy, wind energy, underground energy and water power, and increase the proportion of their use at the city level, as well as the development of ways to reduce energy consumption at the level of the building or road lighting The streets within the city of solar photovoltaic [15].

- Water and Sanitation: Reducing energy consumption has not only been a sustainable component of the city but has also reduced water consumption and recycling. Information technology has produced many applications that have contributed to the conservation of natural water resources to ensure its sustainability.

- Solid Waste Recycling : Solid waste is one of the most important contaminants in cities. Therefore, recycling it is one of the most important criteria for the sustainability of the city and transforming it from a green city in a way that transforms it from a major pollutant into a source of energy [16].

- Green transportation : such as walking and the use of clean means of transportation powered by electric or solar energy while reducing the traditional means of transport, and in case it cannot be dispensed with, the Green City is working to reduce emissions from them by rationalizing the use, through investment in means Public transportation and minimizing the use of private transport.

- Intelligent economy / information economy: the approach to dealing with activities such as e-commerce, e-tourism , and e-services. It refers to a new global economic structure in which information services control the production of goods in the creation of employment. It is characterized by the use of information and communication technologies, In general, it means "anything that can be transformed into a digital image" [17].

- The characteristics of the information economy: There are two main elements:

- (1) It is not linked to traditional economic assets, such as capital, raw materials, transport, etc., And its resources consist of information and knowledge that do not result in any consumption of resources or pollution of the environment. In addition to the limited physical requirements of the ground surfaces, buildings , and equipment.

- (2) And it is not linked to geographical determinants, which facilitates the division of stages of economic activity and geographical distribution according to the requirements and requirements of each stage, through the communications networks that spread around the world without the need for means of transport and communication without pressure on road networks [15].

Green Economy: A new model of economic development model, which is based on addressing the interrelationships between human economies and the natural ecosystem. It contains green energy based on renewable energy instead of biofuels. Examples include agricultural, pastoral, tourism, information and knowledge activities , and technological and technological industries [18].

Through the previous presentation of Smart City, Sustainable or Green it is clear that both share many characteristics.

Table 1. The relationship between a sustainable city and a smart city [19]

Characteristics	Sustainability Relationship in Smart Cities
Economy	The smart economy is based on exchanging data and information through various communication networks. It offers many applications that contribute to the development of various economic activities, which helps to reach the most appropriate ways to preserve and develop the basic resources in ways that preserve their continuity and sustainability for future generations.
the society	It is an intellectual society that supports ways to innovate technology and would come up with innovations that benefit the community and provide its current capacity for the future in an effort to maintain the sustainability of available resources
Infrastructure	The main goal of the Green City is to achieve sustainable clean energy that contributes to the development of the city and ensures its sustainability, which resulted in the applications of information technology in the field of energy and access to new sustainable resources. These applications are among the most important components of sustainable cities.
Government and administration	Good urban governance and community participation "is one of the most important requirements of sustainable urban planning. Therefore, IT City is the right offering through the application of electronic management methods
Planning and environment	The smart city is the right offering through the potential of its administrative and planning devices such as remote sensing, geographic information systems and other programs and tools that help to plan well and make the right decision in a timely manner that contributes to the conservation and development according to the concepts of environmental sustainability.
the living	Smart living is a product of all the above characteristics and it can be said that it is life in intelligent ways to preserve the natural environment and ensure its continuity for future generations.

The smart city is a city that meets all the concepts of sustainability. The transformation of smart cities is an implicit transformation of sustainable green cities. Therefore, Smart City is a green, sustainable and environmentally friendly city.

8. Components of smart cities

Smart cities are emerging through the integration of three levels: knowledge-based activities, problem-solving institutions, and digital communications infrastructure. These levels include:

- Individuals / City Society: A culture of creativity and use of IT applications must be available.

- Institutions: through which services are provided such as educational institutions that offer distance education.

- Digital vacuum: It is the information infrastructure of the city provided by the institutions of individuals and the integration of all of them creates an electronic vacuum shared by the individual with the institution through networks and information [20].

9. Based on the above, the components of the Smart City are

- Networks : The main component of the transfer and exchange of data and information between the users and institutions through applications and vary networks between the wire mesh, including fiber optic (fiber), which is characterized by massive data transfer capacity, and also the digital subscriber line (DSL), which depends on the lines. The regular phone, there are also Wi-Fi networks. Large-scale networks are high-speed networks and accuracy and is now the alternative to wired networks [15].
- The speed of data transfer: coverage and cost are key factors in the selection of smart city networks, relying on wireless networks in new cities. In the transformation of existing cities, it is preferable to rely on networks in the city, whether wired or wireless, to reduce initial costs [21].
- Data and analysis: Data represent the most important factors supporting the success of the transformation of the city into a smart city, so data is collected from existing government systems, Internet applications and mobile devices, and then analyzed all data to transform them into insights, value activities, problem-solving and , decision making [22].
- Applications: Applications for specific sectors and applications for different user sectors, such as Internet services and mobile devices (such as smartphones, tablets , and sensors). One application can be deployed to allow users to access services from different departments instead of separate systems.
- End users: individuals, organizations and companies, through Internet applications, smartphones, tablets, sensors or GPS, and the effectiveness of this layer is essential to recognize the city as a truly smart city[1].

10. Global experiences to establish and transform smart cities

- Global experiences in smart cities are classified into two categories: the first is the creation of new smart cities, and the second is the transformation of existing cities into smart cities

10.1. The experience of the city of Dakota: -

- It was one of the first states to implement the Intelligent Transportation System. In 1997, the process of providing travelers with information on roads and weather conditions through mobile phones began, but these applications were used in a fragmented manner without a general strategy. Smart-based access to intelligent integrated transmission systems through the formulation of a strategy for intelligent transport.
- The state's intelligent transportation strategy included several applications, including:
- Traffic Safety and Accident Reduction: Traffic accident management through vehicle monitoring and monitoring (road condition, intersections), location of the accident, response procedures, continuous coordination between these procedures, and can predict dangerous conditions that can cause accidents (weather conditions), With a prediction of the locations and times of such incidents, as well as the dissemination of this information by means of (DMS) and HAR (Radio) .
- Traffic management: transport demand management, traffic signal control, road routing, emission measurement , and reduction.
- Travel and Tourism: Providing information to passengers before and during the trip. Several options for passengers include flight time estimation, selection of appropriate routes, identification of alternative routes to change destination when necessary, and electronic payment.
- Data management: includes data archiving, data collection, performance analysis, and development of data integration mechanism.
- Commercial vehicles; electronic fuel meter, vehicle electronic record, and taxes [23].

10.2. Dubai Smart City

- The transformation of Dubai into a smart city is the technical model of government vision in communications. The strategy of the Dubai Smart Government was based on six pillars

in the transformation process (Infrastructure - Transport - Financial Services - Urban Planning - Electricity) A range of smart applications to serve its citizens as follows:

- Government dealings with the public: such as driving license procedures, payment of various fees and permits via the Internet, or inquiries via mobile phones.
- Government transactions with the business sector: such as applications for issuing commercial licenses and work permits.
- Transactions between government departments, where information and data can be transmitted electronically between government departments [2].

10.3. The city of Mecca

Mecca is one of the most important Islamic cities. It is the first religious tourism city in the world. The government has taken the initiative of turning Makkah from a normal city into a smart city. This initiative is aimed at modernizing and expanding the existing infrastructure through both the municipality and the Ministry of Hajj. Visitors to Mecca and pilgrims have access to electronic services and the municipality has set up GIS to help track Hajj and provide information. Makkah also implemented an intelligent traffic management system to monitor traffic, prevent traffic jams, reduce accidents and improve public safety [24].

11. Mechanisms transform existing cities into smart cities

Studies on several international experiments have concluded a number of mechanisms that must be carried out in the existing cities to give them intelligence as follows[2, 23, 24]:

11.1. Development of ICT infrastructure in the city:

This is done through the following:

- Data collection and classification and identification of the rights of various public and private entities in the access of data by different departments, quality management, and formulation, and update data with the link between the existing and updated.
- Development of the city's telecommunications network (wired-wireless).
 - Building the capacity and skills of the citizens to support its handling of the city's smart applications and upgrading its innovative capabilities, as it is the main pillar of the city's smart system, which is the target.
 - Smart applications: The city is transformed into a smart city. These applications include sensors, smart phones, tablets, RFID technology, NFC technology, wearable devices, and GPS devices. Facility management, building management, or smart health care to ensure that the city takes into account the standardization of deployed devices (or the use of open source devices), taking into account the development of communication levels, the type of data accessed, and the applications used to process the information. Leah deployment of billions of things, and transmit huge volumes of data and management through intelligent systems, and at the present time there are about 13 billion connected to something, and IDC expects that things will be related to some 30 billion things in 2020.
 - Intelligent goals and strategies: Transitions to smart cities require the development of visions and goals crystallized in the form of a strategy that translates into a set of projects achieved for the previous elements, a set of laws and legislation that contribute to supporting this transformation.
 - Funding: The process of transformation requires financial funding must be provided from both the public and private sectors as the return of the transformation represents the satisfaction of the citizen from his government and more investments to the private sector.

Basra City Case Study :-

It is the economic capital of Iraq and the third largest city in Iraq in terms of population after Baghdad and Mosul. It has a population of about 2.15 million. It also has a diversified economic activity. It is famous for tourism, industry, and agriculture.

Characteristics of the city of Basra :-

Basra is the administrative and political center of the province of Basra, located in the far south of Iraq on the West Bank of Shatt al-Arab, which consists of the confluence of rivers Tigris and Euphrates, and pours in the Arabian Gulf, and Basra away from this estuary 110

kilometers, located on the circuit width 30 degrees and 30 minutes North, latitude 47 ° and 50 ° east. The city is located in the center of Basra province .

Basra consists of a large network of highways, highways and highways covering all parts of the city. It is connected to Basra International Airport via a highway extending to its north. It is also linked to other cities of Iraq and neighboring cities through a number of highways. Basra has many industrial, commercial and service establishments, which are the main port of Iraq. It also has large areas of fertile land. It is also an important tourist city, With many markets and malls [25].

11.2. Mechanisms turning the city of Basra into a smart city: -

The transformation of the city of Basra to a smart city depends on the following mechanisms:

1- Intelligent goals and strategies: A vision can be developed for the city of Basra (Basra is a smart heritage city). Based on this vision, a set of goals can be developed to reach the vision of the city as follows:

- Make the city's archaeological content available to the world community electronically.
- The development of infrastructure networks in the city and the adoption of an intelligent transport system in the development of transport and traffic networks.

2- Building applications: helping to transform government services and life into the e - government system and to achieve these goals can take advantage of the strategy of the ICT sector.

The strategy focuses on three main axes:

- Developing an integrated digital system at the national level to access knowledge and services in simple and cost-effective ways at any time and place for all citizens.
- Supporting and developing the ICT industry.
- Strengthening the geographical location of Iraq.

11.3. Development of ICT infrastructure in the city :

The existing communications networks are developed to accommodate the targeted transformation and the development of the information infrastructure through:

- Infrastructure: includes (cloud computing, high-speed Internet, marine cables).
- Information infrastructure and digital content: education, health, justice, culture, tourism.
- Design and manufacture of electronics: including (Tablet PC, Mobile phone, Fiber Optics, Smart Meters, Set Top Boxes).
- Industrial development programs and initiatives: These include (outsourcing industry, technological villages, corporate support, civil society organizations, professional resources, regional and international relations).
- Cyber security and electronic signature: includes (cyber security supreme council, national strategy for electronic signature).
- Legislative structure and governing policies. These include (Telecommunications Regulatory Act, bidding and bidding, free access to data and information, information security, Internet security policies, green technology policies).

11.4. Capacity building for citizens:

In the framework of capacity building, the Ministry of Communications and Information Technology in Iraq launched several initiatives including (Technology clubs, ICDL). As a means of keeping abreast of the technological progress of the world . It is also an enabling tool that encourages all groups of society to use the computer and learn its applications and digital literacy, develop the skills of graduates to qualify them for the labor market, and provide Internet service to connect with the outside world

11.5. Smart Applications:

A set of applications that will help transform the city into a smart one. Two major projects (the Electronic Heritage City - Intelligent) Transport Network) can be adopted as the beginning of smart applications in the city. The other applications will be created.

12. The city's e-heritage proposal

It is the documentation of heritage areas through the applications of geographic information systems to reach the model (two and three-dimensional) through which the use of virtual reality techniques to achieve the simulation of the closest to reality in all its forms (environmental - urban - socio - economic) This model represents the current reality of the city And provides scenarios and alternatives for conservation projects of areas, after the formation of a virtual model of the city is prepared through applications and electronic technologies and then the preparation for the construction of an electronic heritage city whose functions are summarized in:

Table 2. areas and functions of the city of electronic heritage [3]

Domain	Functions
Fixed information	Such as information on heritage buildings and roads leading to it, documentation of buildings and heritage areas.
Direct Services	E-government applications, distance learning and, telemedicine.
Instant Information	Such as weather forecasts, traffic congestion information, ambulance and rescue information and police assistance.
Exchange of social information	Such as dialogue groups, opinion groups, support, and conservation decision-making groups, active groups, neighborhood protection groups.
Relationship to the outside world	Where you can visit archaeological sites remotely through the real simulation programs of the city so that the visitor to the world to visit the archaeological sites and interact with them without traveling to them.

13. The city is built through three levels as follows:-

- The first level: The level of information: which depends on the basis of the Web site through the search on the web pages in addition to the GIS system, where communication is linked by linking the maps of the two-dimensional maps three-dimensional.

- Level 2: The level of the environmental surface is the level through which the urban environment, where technology (virtual reality) is the key to this level to clarify the physical environment within this city heritage, through which it can identify the shape of the city.

- The third level: Social interactions is one of the main objectives within the digital city. If a three-dimensional space is created without people, it becomes unattractive. In this sense, the use of social studies in the digital model of the city will help to create a kind of social interaction that corresponds to the reality of the city. Heritage.

And thus can turn the city of Basra into a smart heritage city to market the city and solve many of its problems, such as:

Problems of transportation through intelligent transport systems where the database can be used in the implementation of electronic systems, and provide all data related to transport networks and traffic within the city and provide technical support for development.

Controlling the urban growth of the city through updating the database and linking it to the outputs of the strategic plan prepared for the city. It is worth mentioning that all the Egyptian cities were prepared their plans through geographic information systems and using space salaries.

Construction management: where the implementation of applications for licensing within the city and follow-up projects in terms of implementation to provide support in the decision-making related to the development of the city.

14. Conclusions and recommendations: -

-The infrastructure of telecommunications is the cornerstone of smart cities, but it is not enough to create a smart city without the rest of the elements (citizen - management – the economy - environment – living) .

-The Smart City is not only urban but also includes its immediate service territory.

-Smart City consists of four basic components (networks - databases - applications – citizen).

-Smart City meets all the concepts of sustainability, so the transformation of smart cities is an implicit transformation of green cities sustainable and environmentally friendly but provided the objectives of sustainability within the smart city.

-The development of existing cities to smart cities depends on their available infrastructure and then develop mechanisms to develop them to reach a communications infrastructure capable of implementing the characteristics of smart cities.

-The cities studied in the experiments set basic goals for the transformation of intelligence such as the city of Mecca, where the main objective was to develop the city's pilgrimage system, and therefore each city can set the main goal in which to formulate a vision to identify projects priority when the development process.

-The transformation of cities into intelligence requires the development of vision, goals, and strategies translated into smart projects, followed by the development of communications infrastructure (data - networks) to build a range of applications that are the most intelligent color of the city (intelligent economy - intelligent infrastructure - Smart living).

-The strategic plan of the Ministry of Communications in Iraq can be used to develop the urban communications infrastructure and integrate the targeted applications into the smart applications of these cities as a major support in turning cities into smart cities.

References

- [1] Mourad, Abdel Fattah 2009 "Smart Cities and Villages" *Alexandria / Egypt: Future Generations House for Printing and Publishing*.
- [2] Zarzis, Jassim Mohammed and Ziad, Magdy 2011 "The Reality of the Information Technology Industry in the Emirate of Dubai" *The Informatics Symposium in the Arab World: The Reality and Horizons*, Abdul Hameed Shoman Foundation, Amman, Jordan.
- [3] Tareq, Ahmed 2012 "Methods of Preservation of Urban Heritage through Digital Revolution Techniques", *presented to the symposium on preserving the traditional local architectural character of Oman* - Ministry of Housing - Muscat - Sultanate of Oman.
- [4] Intelligent Environments: Spatial Aspect of the Information 1997 Droege, P. *Revolution. Oxford/ England: Elsevier*.
- [5] Intelligent Community Forum (ICF), what is an Intelligent Community, 2006. Retrieved from. <http://www.intelligentcommunity.org/displaycommon.cfm?an=1&subarticlenbr=18>.
- [6] Abdoullaev, A. 2011 A Smart World: A Development Model for Intelligent Cities. *The 11th IEEE International Conference on Computer and Information Technology, the Scalable Computing and Communications, Pafos/ Cyprus*, <http://www.cs.ucy.ac.cy/CIT>.
- [7] Kumar, Mega 2015 *Smart cities based on smart data*, IDC analysis.
- [8] Nassar, Waleed 2008 *Integration of Smart Urban Projects with the Surrounding Environment*, Ph.D Thesis, Faculty of Engineering, Ain Shams University.
- [9] Kasimi, Asia 2012 Sustainable Development between the Right to Exploitation of Natural Resources and Responsibility for Environmental Protection, *Second International Conference, Development Policies and Experiences in the Arab Region Challenges, Trends, Horizons, Tunisia*.

- [10] Moussa, Ghada Ali 2009, Risk of Human Security on the Environment and Sustainable Development, *6th Arab Conference on Environmental Management, Human Development and its Impact on Sustainable Development, Egypt*.
- [11] United nations. 2002. Bulletin on the Johannesburg Summit: *World Summit on Sustainable Development 26 August - 4 September 2002*.
- [12] Cotter, B. and Hannan, K. (Enviro Australia) 2011. Our Community Our Future: A Guide to Local Agenda 21. *Commonwealth of Australia. Canberra*.
- [13] Alhamandi, Ahmad Hamad 2004 Qatar Strategy for Building an Electronic Government, *eGovernment Project Portal for the 21st Century*.
- [14] Gokasian, Bogus 2008 "Gray Water Treatment", *article published in Environment and Development Magazine, Amman, Jordan*.
- [15] Zayed, Muhammad Anwar Abdullah 2007 "*The mutual influence between the information technology index in society and its level of development*", PhD Thesis, unpublished, Faculty of Engineering, Cairo University, Egypt.
- [16] Osman, Imad 2016 "Informatics City, The Urban Reality for Green Cities" *Conference on Environmental Challenges and their Impact on the Urban Development of Cities and Regions - Arab Institute for Urban Development - Morocco*.
- [17] Mohamed, Ayman Abdel-Majid 2005 "The role of urban planning in guiding the future of the information economy of countries" *Conference of Knowledge Cities in the Arab World - Assiut University, Egypt*.
- [18] Kato, Molly Scott, 2010 "The Green Economy: An Introduction to Theory, *Politics and Practice*", *I I, Nile Group*.
- [19] Saan, Koman 2014 "Smart Cities Are Sustainable Cities", *E-Cities Magazine, Issue 8 May 2014, Environment Center for Arab Cities, Dubai, United Arab Emirates*.
- [20] Komninos, N. 2008 *Intelligent Cities- Building 3rd generation systems of innovation, URENIO, Aristotle University*.
- [21] Sadiq, Khuloud Riyad 2013 "*Intelligent Town Planning Methodology, Case Study Damascus*" PhD Thesis, Faculty of Engineering, University of Damascus, Syria.
- [22] Walid RFID 2009 *Intelligent Cities, Intelligent Cities Conference, Umm Al-Qura University, Makah/ Saudi Arabia*.
- [23] S. Ayman, M. Kate, Intelligent Transportation Systems (ITS) Statewide Plan, *final Report, Prepared for: North Dakota Department of Transportation, September 2005*.
- [24] Albar, O. 2009 Challenges and Future Vision towards a Smart Holy Makkah 2009 Neighborhood, *Intrlligent Cities Conference, Umm Al-Qura University. Makah/ Saudi Arabia*.
- [25] Mahmoud, Ahmed Mohamed 2017 *Geography and history of Basra, Dar al-Maarifa University, Baghdad, Iraq*.