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**“A Smart city with an emphasis on sustainable urban development”**

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**Abstract**

The population increase and its emphasis on cities have devastating and sometimes destructive consequences on natural ecosystems and human life. Therefore, the traditional method of managing cities must be revisited and the modern strategies focused on urban unit management replaced intelligently. This approach is based on the preservation and improvement of natural and cultural resources, balanced distribution of profits and costs, expansion of transportation options, employment in the housing sector, sustainable development and promotion of health, and a healthy community. The purpose of this study is to identify and analyze the concepts of the smart city and introduce its principles and indicators. This article is done descriptively and based on library information and practical model, and in the end, by concluding from the topics discussed, it offers solutions. The findings of this study recognize that adopting the concept of a sustainable city to urban planning not only reduces energy consumption and creates a sustainable economy, but also considers certain principles to contribute to a healthier environment, a more inclusive society, and a better quality of life. It will pave the way for our present cities to seek sustainability in all fields. One of the ideas proposed in the extension of the sustainable development theory is the theory of smart cities, to be mentioned in this article.

**Keywords:** Sustainable urban development, Development, Smart urban growth

**Introduction**

Irregular migration and rising natural population growth have challenged today's cities. Including the growth of urbanization and increasing the population of cities, increasing migration to cities, and consequently the development of large and small cities. As a result, it has had devastating and catastrophic effects, including excessive energy consumption, deforestation, and the extinction of plant and animal species on the planet's natural habitats. Cities also affected the world, as the main areas of human operation and the greatest consumer of natural resources. Certain problems created by population increases in cities include air pollution, noise, poverty, traffic, lack of citizen participation, lack of administrative management, inability to provide services, and fragile urban management due to lack of appropriate infrastructure. In this way, other traditional methods and management do not meet the problems and needs of today's societies, and new solutions must be found to solve the problems of today's cities [10].

In this regard, the idea of the smart city to meet the needs and problems and provide comfort to citizens, preserving natural and cultural resources, fair distribution of costs, proximity to nature, solving traffic problems, improving transportation infrastructure, as well as improving the cultural and social conditions of cities, etc... has been raised. The smart city is focused on a broad range of technology and innovations such as information and communication, telecommunications, smart transport, smart building systems, and advanced control structures. Hence we'll describe the indicators, objectives, and framework of smart city axes in the following [2].

**Research background**

In 1987, at the forty-second session of the General Assembly of the United Nations, the UN Commission on Environment and Development, headed by Mrs. Bratland, prepared a report entitled "Our Common Future," which launched the modern idea of "sustainable development". According to the report, "sustainable development" meets the needs of the current generation without compromising the needs of future generations. This concept refers to a long-term approach that considers environmental issues, human resources and cultural factors, food supply, energy, industry, and urban development [1].

The phrase smart growth was coined by the mayor of Maryland from 1994 to 2002. It could be stated that the foundations of this theory were established in Canada and the United States as a response to the developments that started in the early 1960s. The theory of smart urban growth was gradually formed during the 1970s and 1980s, in response to the expansion of cities in the two countries, centered on the principles of sustainable development and the compact city. And eventually, to stabilize the spatial form of cities it was established in the context of a theory. This theory is consistent with a sustainable city's theoretical framework, which integrates residential and employment with developing pedestrian connectivity as a priority. Smart development approaches are attempting to reshape communities and guide them into an advanced community with exposure to the desired environment [12].

**Research Methods**

The objective of the research is to define and review the smart city concepts and to introduce its principles and indicators with a descriptive method focused on documentary and library information and model applied. In the end, solutions will be presented based on the issues raised.

**Theoretical Foundations**

**Description of smart growth and its characteristics**

In the dictionary, the phrase is defined as sustainable development, and a growth-focused on public transport and reducing the consequences of environmental degradation. Smart growth is considered a meaningful phrase in the US Glossary, which is a collection of strategies that respond to urban issues. Smart urban growth is a development that has the following features, according to Anthony Downey, Head of Economic Department at the Brookings Institution:

• Limits peripheral development.

• Encourages high-density land use.

• Emphasizes mixed zoning.

• Reduces travel by personal automobile.

• Pay attention to the reconstruction and revitalization of old areas.

• Protects open spaces [7].

The ten principles of smart urban growth are:

• Create mixed uses

• Emphasize the advantages of designing compact buildings

• Provide various choices for choosing the housing

• Build neighborhoods with sidewalk access

• Distant and attractive neighborhoods with a strong sense of social identity

• Protection of open spaces, farmland, beautiful nature, and sensitive environmental areas

• Fortify and develop existing communities

• provide a wide range of transport options

• Predictable development decisions

• Encourage the participation of communities and stakeholders in the development [12].

**Dimensions of smart city growth**

The dimensions of smart urban growth, for proper performance in economic, social, transportation, health and safety, and environment, are the smart economy, smart dynamics, smart environment, smart transportation, and smart living.

**Smart economy**

A smart economy means providing solutions for career advancement, reducing poverty, improving housing and infrastructure, and using information technology in production processes. The goals of smart economics are:

• Develop regional-global competitiveness

• Create the right business opportunities

• Eliminate of gaps in social class

• Development of E-business

• Poverty reduction

• Creating investment infrastructure

• Solve the problems of the monetary and banking system [9].

**Smart Dynamics**

Smart dynamics means providing services through information and communication technologies, accelerating the exchange of information using technology, reducing costs and relocation, accessing services and information, and providing better services. Smart dynamics goals include:

• Focus on providing information and communication technology services

• Linking and improving infrastructures for information and communication technologies

• Public Internet access

• Public education and the creation and development of a culture of using information and communication technology to benefit from services

• Usage of local ICT resources and complementary skills in companies, universities, and public institutions

• Developing information and communication-based attitudes mean how technologies can achieve the delivery of public services.

• Effective use of up-to-date information [4].

**Smart Environment**

The smart environment relates to the utilization of emerging technology for ecological security. A smart environment involves developing the best structures to make optimum use of energy, water, and pollution. The smart environment is a concept that enables advanced technologies to be used in urban environments. And the result is an improvement in citizens' quality of life. Such services inevitably generate significant value for both the government and the citizens. The Smart Environment objectives are:

• Environmental sustainability

• Reducing energy consumption with the help of technology and recycling strategies

• Renewable energy utilization

• Architectural design on interaction with the environment [8].

**Smart transportation**

Each of these methods has its limitations if the transportation situation is organized in traditional ways, such as building freeways and highways, widening existing roads, restricting traffic, and increasing the public transport fleet. As a result, they lose their ability to solve transportation problems and therefore need intelligent systems to solve these problems. Smart transportation goals include: Goals for smart transport include:

• Smart transport systems

• Reducing traffic junctions by streamlining urban routes

• Stable, innovative and safe transports

• Traffic flow management and optimization and flow smoothing

• Managing and controlling accidents

• Road information

• Management of public transport intercity

• Urban bus fleet management

• Taxi management

• Electronic tickets

• The management and optimization of traffic flow

• The management and control of incidents

• The management and control of pedestrian systems [4].

**Smart living**

The goals of smart life are:

• Facilitate people's lifestyles

• Maintaining health

• Environmental Protection

• Smart systems for homes and buildings

• Improving the quality of life in terms of services and facilities

• Social cohesion [4].

**Sustainable city:**

It is a city that can survive due to the use of resources, avoiding excessive waste production and recycling as much as possible, and accepting useful policies in the long run. Sustainable city planners need to focus on creating cities with minimal energy input, and less waste and pollution. The sustainable city is a realistic idea for community development in the twentieth century, according to Dr. Bahraini. So besides paying attention to environmental concerns, it also addresses social and human issues, such as suitable housing. It is also an environmentally friendly, economically sustainable, and socially connected community that is sustainable over time [3].

**Development Concept**

Development is the process by which societies develop from primitive circumstances and backwardness to evolutionary communities while passing through more or less the same stages of development and experiencing quantitative and qualitative improvements. Development is considered, as Wolfgang Zax stated, to be a process by which "people are moved from underdevelopment to global destiny and economic growth". Development is a systemic process of economic, social, cultural, and political practices that seek to continuously improve society. And among the fundamental foundations are the activities of democracy, proper participation, and fair distribution of interests [5].

A definition for development has also been stated by other great and well-known experts in the field of economics, such as Adam Smith, Bayer Clark, Hirschman, Myrdal, and Rostow, etc., and that is: Development is a fundamental transformation of ancient society in modern society [5].

"Development should be seen as a multi-dimensional mechanism involving fundamental improvements in social construction, perception of individuals and national structures, description of economic growth, reduction of inequalities, and eradication of severe poverty," Michael Todaro said. Development usually means a mechanism in which an object or living being's possible capabilities or abilities are discovered and the object or living object becomes its complete state. It is based on the definition that the phrase is used to apply to plant and animal natural development [11].

**Sustainable urban development**

Urban development can be defined as a spatial concept and improvements in land use and density rates to meet the needs of urban residents in housing, leisure, etc. Or it is a development that brings together all the social, economic, and other aspects of the city. In sustainable urban development, the maintenance of resources for the present and the future through the optimal use of land and the creation of the least destructive effects on renewable resources. Sustainable urban development addresses concerns such as emission reduction in urban and regional areas, recycle support, no help for harmful technologies, and bridging the gap between rich and poor. it also recognizes how these targets can be met by integrated urban, rural, regional, and national planning, as well as comprehensive policy support for these plans. Urban sustainability development is a condition for urban dwellers of today and citizens of tomorrow to be able to live in complete peace and security and enjoy wellbeing [13].

To be able to call sustainable development 4 features are needed.

1. Productivity: It is a dynamic equation, between the natural system and the socio-economic systems that ensure the production of food and other goods for the people, without harming the system. Productivity measures society's capacity to use or transform natural systems in the production of food and goods with optimal efficiency.
2. Justice: This is, society's capacity to reasonably distribute opportunities and challenges resulting from the application or modification of existing natural environments, such as the allocation of what comes through the process of development. This change also relates to wealth distribution between citizens.
3. Flexibility: Society's potential for reacting to normal or imposed pressures or unexpected shocks. Flexibility requires the system's ability to repair or sustain short- or long-term irregularities in productivity levels.
4. Stability: That is, the capacity of society to continue to use or change the process of natural systems without drastic changes.

The indicators used to examine the sustainability of cities are as follows:

1-Social indicators 2- Economic indicators 3- Environmental indicators 4- Physical indicators [6].

**Executive solutions to achieve urban sustainability**

In most third world countries, the urban structure is generally not flexible and efficient. And for various reasons such as the inefficiency of the urban system, the lack of expertise of urban affairs experts in the management and oversight structure of urban planning, inconsistency and lack of coherence between organizations related to the city and the interference of urban executive efficiency, the disproportionate urban mobility systems and the growing population of the urban population have made it impossible for the country's urban structure to be in line with international standards. The table below provides solutions to the existing challenges and logical solutions to achieve sustainable urban development [13].

**Table 1: Sustainable urban development Executive approaches**

|  |  |  |
| --- | --- | --- |
| Public participation role | Urban development | Environmental planning |
| -Increase cultural and educational activities  - Those involved in urban issues relating to environmental protection, in particular, green spaces  - Teaching citizens the strategies for developing urban sustainability  - Encourage citizens to expand green associations and community support organizations in urban environments  - Transfer of services of urban renewal and naturalism to citizens free or cheap | -Pay attention to citizens' needs and problems, especially consideration of the time-distance factor  - Be aware of the two-way relationship between the village and the city  - Paying attention to citizens social, cultural and economic levels  - Be aware of natural factors, especially climatic factors  - effort for regular and measured urban development and increase the quantity and quality of urban services and facilities  - Organization of urban traffic  - Improving urban safety and shielding residents from natural disasters  - Optimal location of services and infrastructure facilities in cities due to population density  - Keep all types of urban uses active | - Urban life must be adapted to the atmosphere around it  - Pay attention to environmental problems and planning limitations  - Emphasis on abilities, facilities, standards and per capita in any urban environmental planning  - Emphasis on climate design with an emphasis on natural issues in urban projects |

**Conclusion**

Urban sustainability is a concept that has been introduced in the world as a new concept following the project "Sustainable Development." The roots of the approach to sustainable development go back to dissatisfaction with the socio-economic development and ecological growth results in cities. This model, called Sustainable Development, blends production, distribution, and consumption patterns that are incompatible with nature, resulting in resource degradation, and environmental devastation. And it just reinforces a process that can contribute to an increase in quality of life. To achieve urban sustainability development, politicians need to address two key priorities at the same time. Develop community development to achieve high expectations of life and improve the environment for current and future generations. A town has sustainable development that at least requires the following:

• Have a sustainable economy.

• Have social solidarity and integrity.

• Have a sustainable urban shelter. In the sense that for the people of the city, there should be decent housing for everyone.

• Have a sustainable urban environment while maintaining stable ecosystems.

**Suggestions**

Overall, several factors and components such as technology, residents, and institutions affect the transition of a city into a smart city. The following strategies for achieving the objectives of the smart environment could be recommended.

**Efficient leadership:** City management represents a diverse and purposive leadership in all aspects of urban management in the most influential smart cities in the world.

**Assess existing conditions:** In the first step, the most effective way to make cities smarter is to recognize city conditions in various areas. Initially, all smart programs will be prepared, focused on existing resources. And preparation will be performed in the next phase, depending on the necessary resources.

**Vision preparation:** Create a roadmap in which the smart city's objective is defined and the implementation of different sections of this target is clearly described so that the required preparation can be planned and executed to accomplish a smart city's objective.

**Predicting the costs of the executive project:** Predicting costs to encourage developers to help handle such costs can be seen as one of the most critical steps in smart urban management growth. One may start attracting investors by taking advantage of the environment and introducing a city's economic, social, and environmental values. And instead, it accelerated this by setting the foundations for the entrance of colleges and development firms.

**Planning:** Early project success depends on having the right plan and moving in the right direction. Programs that, despite spending small amounts of money, accelerate the return on investment over a short period, can be seen as an early success of projects at this level.

**Sharing achievements and encouraging innovation:** Sharing information resources can be considered the most important factor in the growth and development of an innovation ecosystem in urban management. Taking advantage of innovative ideas in smart management of urban management makes the smartening processes go ahead with more acceptable quality and in different parts of it, we see a significant reduction in the implementation costs of smart management projects.

**Educating citizens:** Citizens, as the main beneficiaries of the Urban Management Intelligence Program, will be able to take maximum advantage of the potential that they have. An opportunity that would not be recognized if people don't have the adequate and required knowledge.

**Develop the concept of intelligence:** One of the smartest ways to accelerate and develop in such projects in the first place is to develop the concept of intelligence at different levels of society and sensitize different workgroups in line with the intelligence of urban management. Developing the smart concept helps multiple workgroups to provide information and introduce smart city-centric new technologies. So it helps city planners to implement the urban planning projects through entirely local teams who are acquainted with the community's social and cultural circumstances. This will increase the adoption of this project type at different levels of society and will guarantee the development of business and social intelligence among citizens.

**References**

1. Azizi, M. (2001), Sustainable Urban Development, Sofe Magazine, No. 33, Shahid Beheshti University.

2. Behzadfar, M. (2003), Necessity and obstacles to creating a smart city in Iran. Journal of Fine Arts, No. 15.

3. Baro, C.J. (1997), Quarterly Journal of Geographical Research, Sustainable Development: The Concept of Value and Practice, translated by Seyed Ali Badri, 67, pp. 67-43.

4. Frost & Sullivan (2014).IBM 2014 global best-in-class smart city integrator visionary innovation leadership award.Palgrave Macmillan, 1–7.

5. Mayer, G. (2000), Hedayati Translator, Seyed Ali, Pishgaman Tose'e, Tehran, Samat Publications.

6. Moldan, B. (2002), Sustainable Development Indicators, translated by Neshat Haddad Tehrani et al., Tehran, Environmental Protection Organization Publications.

7. Pourmohamadi, M. Bagheri, R. (2003), Dimensions and Strategies of the Density Paradigm of Urban Spaces, Quarterly Journal of Humanities Teacher, No. 29, pp. 108-85.

8. Siemens (2012).Smarter neighborhoods smarter city solutions for a more sustainable New York-Today.

9. Vanolo, A. (2013).Smartmentality: The smart city as disciplinary strategy.Urban Studies, 51(5), 883–898.

10. Winters, J. (2011).Why are smart cities growing? Who moves and who stays.Journal of Regional Science, 51(2), 253–270.

11. Zax, V. (1998), Translator, Farhi, Farideh, Bozorgi, Farid, A New Look at the Concepts of Development, Markaz Publishing.

12. Ziari, K. (2001), Sustainable Development and Responsibility of Urban Planners in the 21st Century, Journal of Literature and Humanities, University of Tehran.

13. Ziari, K. (2004), Urban Land Use Planning Book, First Edition, Yazd University.