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Review Article

## Relationship of Smart Cities and Smart Tourism: An Overview

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### Abstract

Smart cities and smart tourism terms have become very popular in the past and present decades. Research in the field of smart tourist cities still fails to cover the developments of the smart tourist city. The aim of the study is to review the recent literature on smart cities and smart tourism and their roles in achieving a sustainable tourism sector and enhancing the competitiveness of the country's tourism sector by making it more developed and modern. In this study, the relationship between the smart city and tourism is presented and tries to present the relationship or conceptual approach between the smart city and smart tourism. In addition, the current situation and the potential for growth and development of tourism in Iraq through the establishment and application of smart cities are identified. The recent studies that were mentioned in this study indicate that there is a close relationship between the smart city and smart tourism and also indicate that the smart city has a fundamental role in the growth and development of tourist destinations. The smart tourist cities are results of the convergence and interconnection between the smart city and the tourist city. Finally, recommendations for the smart tourism city applications in Iraq are provided.

**Keywords:** Smart City; Smart Tourism; Smart Economy; IoT; Information and Communication Technology.

### 1. Introduction

The population is growing steadily, especially in urban areas. Half of the world's population lives in urban areas, and it is estimated to rise to 60% by the year 2050. This puts tremendous pressure on the environment and resources. Governance and technology are also subject to this huge population. Smart is the ability to solve problems with understanding, speed, flexibility, and accuracy, or it is the quality of having experience, knowledge, and good judgment [1]. The word "smart" has become widely known in recent years to describe technological, economic, and social developments that depend on sensors, big data, and new methods of communication such as the Internet of Things [2]. Urban population inflation and the continued depletion of resources constitute a burden on the individual's life, in conjunction with obtaining the most basic services. Therefore, most of the world's cities have turned into smart cities, which have a fundamental role in providing direct services to the citizen through the optimal use of information and communication technology. A "smart tourism city" is an urban transformation that aims to provide basic services to citizens and tourists through technology.

Recently, many researches provided suggestions regarding the smart city and its importance in tourism development. Pasquinelli and Trunfio (2020) [3] suggested using the smart city lens and integrating it with human, social, and technological capital. In other words, an emphasis on the integration of smart city engines, which represent information and communication technology, and intellectual and social capital. They also emphasized the impacts of sustainable urban development. Shafiee et al. (2019) [4] provided a model for smart tourist destinations that includes

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some of the steps. First: open coding, which includes collecting initial classifications and then extracting the analytical classifications. Second: the axial coding, which includes determining the relationship between these classifications. Third: selective coding, represented by integrating all classifications. This model is likely to serve the development of smart tourism destinations. Fog computing technology and the Internet of Things have a major role in building smart cities, which facilitates the development of industrial and urban businesses. Zhang (2020) [5] proposed building a network of the Internet of Things and fog computing, consisting of several layers that contribute to processing big data and have the flexibility to expand. Tripathy et al. (2018) [6] emphasized the solution to the problem of access to sustainable mobility for tourists, through cooperation between citizens, city administrations, and tourism institutions. The researcher presented an application based on the Internet of Things called i-Tour, which contributes to the independence of sustainable tourism mobility. Kim et al. (2021) [7] aimed to contribute to sustainable development in Seoul for the purpose of urban planning for the citizens to reach a smart city that satisfies all its residents, through analyzing a questionnaire collected within 10 years from an electronic platform in which citizens in the city participate. One of the main tasks of a smart city is to extract tourists' preferences in an intelligent way. Abbasi-Moud et al. (2019) [8] suggest automatic extraction of user preferences in smart tourism. User comments and data posted on social media are exploited. The researcher extracted user preferences through semantic grouping of data and sentiment analysis. This paper aims to clarify a general view of the smart city and smart tourism and the relationship between them, in addition to highlight the most important challenges facing the construction of the smart tourism city.

The rest of the paper is as follows. In section 2 the related works (smart city and smart tourism) are explained. In section 3, the relationship between the smart city and the smart tourism is presented. Section 4 produces smart tourism city and its challenges, while in section 5, the conclusion and recommendations are discussed.

## 2. Related Works

### 2.1. Smart Cities

With technological progress and development, and with a growing population, many cities are turning to smart cities in order to improve the lives of citizens. The definition of smart cities, which are also called Digital Cities, Cyber Ville, Intelligent Cities, and Wired Cities, as urban areas where data is collected from the devices, assets and citizens for the purpose of managing available resources more efficiently. Some smart city definitions can be found in [9]. Smart cities use information and communication technology applications to enhance innovation and knowledge, reduce costs, use resources optimally, enhance living and work, and to facilitate communication between government and people living and working in the city [10-12]. Although there are many goals behind the smart city, but in general it promotes the optimum and effective use of physical infrastructure and works to enhance communication between citizens living in the city and the government to improve life in the city. Table 1 contains survey studies were conducted on the smart cities in 2019 and 2020, according to the purpose of the survey and according to the methods or means that contributed to building the smart city.

**Table 1. Survey studies on the smart cities for the period 2019 and 2020**

Authors, year	Purpose	Method or means
Shafiq et al., 2020 [13]	Network traffic classification for Sustainable Smart Cities	Data Mining, Machine Learning, feature extraction
Al-Turjman & Malekloo, 2019 [14]	Smart parking	Internet of Things
Shah et al., 2019 [15]	Discovering technologies and projects implemented in New York City	Internet of Things
Curzon et al, 2019 [16]	Exploring how individuals are exposed to privacy and how to reduce the risk of such exposure	Privacy enhancing technologies
Alsamhi et al, 2019 [17]	Increasing the smartness of smart cities	Applications of collaborative drones and IoT
Xie et al., 2019 [18]	Improving smart city services and promote the development of smart cities.	Blockchain Technology
Chaudhry et al, 2019 [19]	Planning for smart cities.	Things (IoT) and Artificial Intelligence (AI)
Chen et al, 2019 [20]	Intelligent transportation system	Wireless Optical ITS
Khan et al., 2020 [21]	Highlight the role of edge computing in realizing the vision of smart cities	Edge computing applications
Ali et al., 2019 [22]	Convert classical cities into smart cities one can design and develop smart cities	Internet of Things
Alfás & Alsina-Pagès, 2019 [23]	Environmental Noise Monitoring	Wireless acoustic sensor networks
Laufs et al., 2020 [24]	investigate to what extent these new interventions correspond with traditional functions of security interventions	smart city' security technologies

The benefits of smart city development are based on four dimensions: environmental sustainability, economic sustainability, social sustainability and governance [25-27]. The planning of Smart city application includes eight basic elements: smart education, sustainable smart environment, smart tourism, smart transportation, smart health care, smart industry and smart happy life [28-30].

Smart Cities seek to improve the quality of life using data and digital technology with the change in the infrastructure. Building smart cities depend mainly on the dynamic needs of citizens. An index has been developed to rank the best global smart cities. The results were based on a number of categories such as transport and mobility, innovation and economics, standard of living, etc. the Figure 1 illustrates the 10 top smart city index scores for the world in 2019 (www.statista.com).

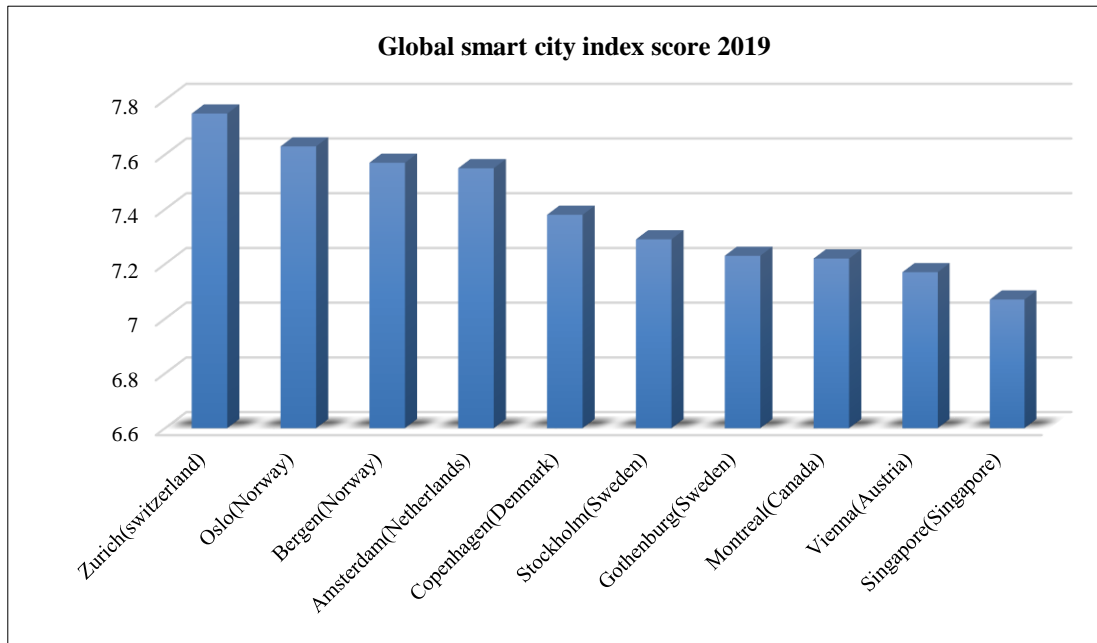


Figure 1. Smart city index scores around the world in 2019

In the figure above, the Swiss city of Zurich ranked first in the index at 7.75 in 2019. In another ranking index prepared by the IMD World Competitiveness for 2019 in the form of a yearbook for the ranking of smart cities in the world. Dubai has a rating of 45 while Singapore is ranked first and Zurich is second. The classification was based on several factors, including: affordable housing, road congestion, air pollution, fulfilling, security, recycling, green spaces etc. (see Figure 2).

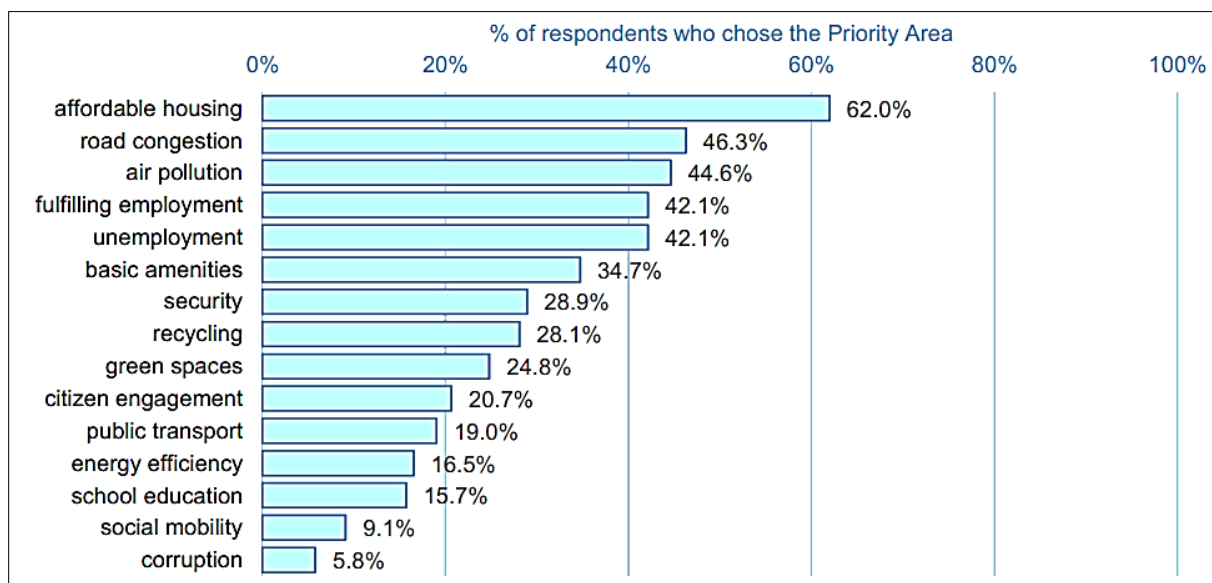


Figure 2. The classification of several factors based on respondents

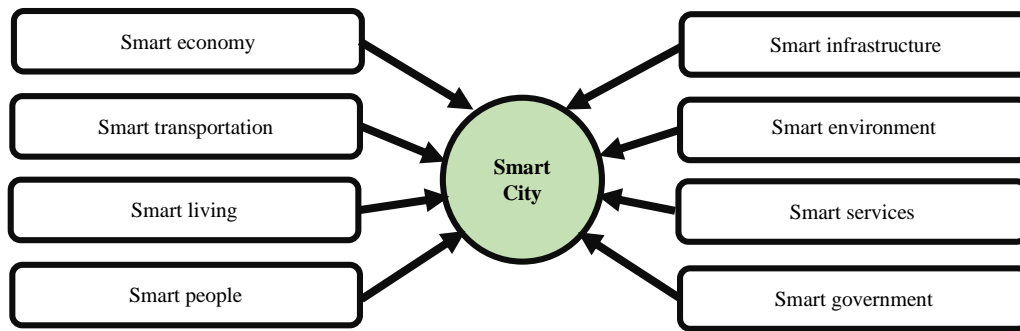


Figure 3. The basic elements of the smart city

The Figure 3 shows the basic elements of the smart city [31-34]. These elements have the ability to solve the problems in smart ways and provide facilities for their citizens to build a smart society. Smart infrastructure is represented by the use of the smart sensors and the network technologies for the purpose of accessing the smart infrastructure such as energy resources, water networks, streets, buildings, etc. Intelligent transport provides transportation networks with real-time, technological control systems. Smart environment includes the protection and supervision of natural resources using smart technology such as waste management systems and control of environmental pollution, etc. Smart services provide health services, education, tourism and others using smart technology. Smart governance provides good governance that has the ability to adapt to new changes. The smart people element means investing creativity and innovation that introduced by individuals and people. Smart life element provides quality of life for residents and visitors, and includes all aspects of life, including tourist attractions. In smart economy, the use of technology and innovation in business leads to the rise and growth of the economic side of the smart city. The main feature that made these elements described as smart lies in the optimal use of resources and improved performance.

2.2. Smart Tourism

The tourism sector is one of the largest sectors in the world [35]. This is because it plays an important role in the growth of the economy of many countries [36]. Therefore, there was an urgent need to make the tourist destinations as attractive as possible [37]. Tourism is a cultural, social and economic phenomenon based on people traveling to places or countries for recreational, commercial or health purposes [2].

The tourism sector has a large return [38]. With the huge technological development, the development of tourism marketing via the Internet from electronic tourism marketing to smart tourism marketing. Competition between countries has become in attracting tourists depends mainly on the technology in several areas such as presentations, booking airline tickets, accommodation, and facilitate communications with visitors. The smart tourism can be defined as a smart tourism platform that combines tourism resources and information and communication technology in all phases of the tourist trip. It is based on the bilateral interaction of information between companies and tourists through the marketing of tourism products based on smart technical development [39]. Tourism experience is important in the success of smart tourism. Tourists are the ones who create the smart tourism experience by publishing photos and their tourism activities as they move between tourist destinations using smart phones.

Smart tourism is a multidimensional technology that consists of infrastructure and communication systems. The development of the smart tourism is based on the collection, exchange and processing of data generated through the components of the smart tourism system. As in Figure 4, the basic components are included smart experience, smart business, and smart destination [40, 41]. Smart tourist destinations are based on three pillars of information and communication technology which are Internet of Things, cloud computing and end-user internet applications.

Cloud computing provides three basic services which are the hardware infrastructure services of servers and computer resources. Online platform services and software services. These services facilitate the work of smart tourist destinations.

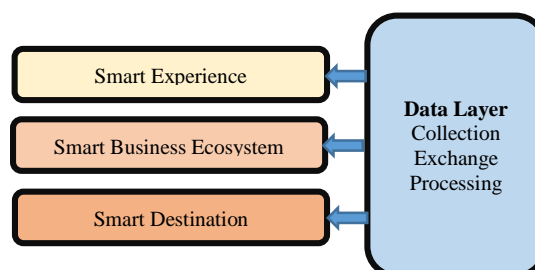


Figure 4. Smart tourism components and data layer

The smart tourism experience is based on an intelligent ecosystem that works through a smart tourism destination [33]. Literature review for the last six years can be found in [37, 42]. The tourism industry is an important component and an effective factor in building smart cities. The concept of smart tourism is a product of the concept of smart cities [43-45]. It is a part of the smart living, which is one of the elements of the smart city [46, 47]. That is why it is playing an important role in smart city strategy. Therefore smart tourism requires knowledge and awareness of tourism information such as tourism, economic, activities and events, and the participation of tourists to achieve adjustment in order to obtain tourist information at the right time and the right place through the use of Internet tools.

One of the technologies that support the formation of smart tourism is the Internet of Things (IoT) technology that plays an important role in the development and growth of the tourism sector. The Internet of Things is defined as a computer concept that expresses the idea that different physical devices connect to the Internet and the ability of each device to identify itself to other devices. It is a virtual network that combines various things classified within electronics, software, sensors and motors and connects them via the Internet, which allows these things to exchange data between them. Kumar (2020) [48] indicated that the IoT is a part of the technology layer, which is one of the layers of smart tourism architecture, as in the Figure 5. Technology layer also contains cloud computing, network and communication and virtual reality. The data layer includes the integration of the technology layer with smart tourism elements. The application layer includes smart applications that provide tourism services

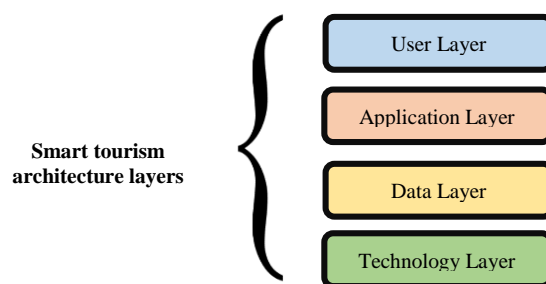


Figure 5. Smart tourism architecture layers

### 3. Relationship of Smart city and Smart Tourism

Information and communication technology is an important factor in establishing a smart city. As for tourism, information and communication technology at the present time plays a fundamental role in many services such as transportation services, cultural and entertainment services. The human factor also has a big role in attracting tourists to the city. The infrastructure offers uncle tourists and enjoyable tourist experiences. An environment can provide tourists with a green environment, or green tourism, which is a tourism activity that works in an environmentally friendly way. We can say in another sense that a smart city is a tourist destination [49]. The Figure 6 briefly illustrates the relationship between a smart city and smart tourism [50].

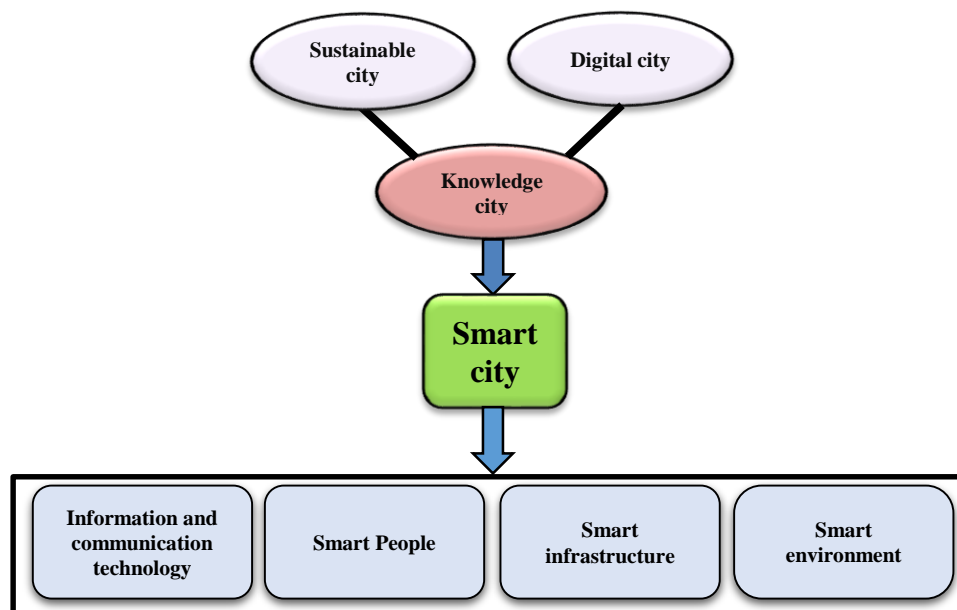


Figure 6. The relationship between a smart city and smart tourism

Providing cultural experiences to tourists helps create an innovative knowledge city capable of attracting tourists, and the establishment of smart transportation means to support travel and provide facilities for travelers. In addition to the availability of green tourism while preserving the urban environment of tourists. All these factors help in building a smart tourism city.

#### 4. Smart Tourism City and Its Challenges

It is a critical component of economic and social activity as it provides employment opportunities and business opportunities [37]. Tourism activity is greatly affected by information and communication technology, which is the backbone and basic pillar of the tourism industry, as the availability of information depends on making the decision to travel. The information has entered many tourism sectors, including tourism companies, hotels and aviation. To build more intelligent and sustainable tourism cities for their citizens, governments must use information and communication technology in exemplary ways. A smart sustainable tourism city is an innovative city that uses the information and communication technologies to improve the quality of life for citizens and tourists, the efficiency of urban operations and services, and the ability to compete, while meeting the needs of current and future generations in terms of economic, social, environmental and cultural aspects.

According to UN data in 2018, by 2050, two out of every three people will live in cities. Therefore, there must be smart and sustainable planning in cities to face population growth in cities.

There are many obstacles and challenges facing Iraq to build smart cities, including the unstable security situation, political conflicts, and a lack of service provision in addition to urban planning for cities that are not qualified to build smart cities in Iraq despite the availability of communication and information technology that can be exploited to change Iraq's cities into cities Smart.

To achieve access to the smart tourism city, it is necessary to achieve and develop the tourism investment for the city that is linked to general economic growth, which is based on four main sources: natural resources, human resources, intellectual capital, and the institutional factor. By increasing the growth of these resources, it positively affects the growth of the economy. To achieve this goal, tourist attractions must be available to be a pillar in attracting tourism investment and providing services to tourists using modern means and at a safe level. In addition to the availability of a tourist guide using websites and electronic applications for the places that tourists visit. The tourism industry is an important and effective factor in building smart cities. Therefore, it plays an important role in the smart city strategy. Hence, smart tourism requires knowledge and awareness of tourism information such as tourism, economic, events, and participation of tourists to achieve a modification in order to obtain tourism information at the right time and in the right place by using Internet tools [2].

#### 5. Conclusions

In this paper, an overview is provided of building a smart city, smart tourism, and the relationship between the smart city and smart tourism. In addition, we highlight the most important obstacles and challenges facing the construction of a smart tourism city. The most important conclusions and recommendations reached through the literature review can be summarized as follows:

- Converting cities into smart cities is based on several basic elements, namely: Smart transportation, Smart people, Smart living, Smart economy, Smart environment, Smart government, Smart services, and Smart infrastructure. Where tourism is a part of smart living that includes cultural and entertainment facilities, security, attractions, housing quality, health conditions, and educational facilities.
- The development of smart tourism cities is mainly supported by the continuous development of artificial intelligence technologies, the Internet of things, and smart networks.
- Paying attention to the sectors that society needs, such as education, energy, transportation and others, will facilitate the process of transformation into smart cities.
- Setting sustainable plans that will lead to smart tourism destinations.
- The smart tourist city is the result of the interconnectedness between the tourist city and the smart city.

Information and communication technologies can be used by Governments to build smart and sustainable tourism cities for citizens and tourists visiting these cities for the purpose of improving the quality of life and increasing the efficiency of urban services while meeting the needs of social, cultural and economic aspects. A realistic solution cannot be reached without governments taking full responsibility in partnership with urban residents and their cooperation in making this experiment a success, to turn it into a realistic life model capable of reducing crises through the use of modern technological systems.

## 6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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