



Publisher homepage: www.universepg.com, ISSN: 2663-7782 (Online) & 2663-7774 (Print)

<https://doi.org/10.34104/bjah.02403060316>

British Journal of Arts and Humanities

Journal homepage: www.universepg.com/journal/bjah

British Journal of
**Arts and
Humanities**



The Transition toward Smart and Sustainable Cities

Seyedehmina Ghari^{1,2*} and Amirhossein Riazalhosseini^{1,2}

¹Abbasāga, Ihlamur Yıldız Cd. No: 8, 34353 Beşiktaş/Bahcesehir University, İstanbul, Türkiye; and ²Department of Architecture and Design, Bahcesehir University, Istanbul, Turkey.

*Correspondence: seyedehmina.ghari@gmail.com (Seyedehmina Ghari, ¹Abbasāga, Ihlamur Yıldız Cd. No: 8, 34353 Beşiktaş/ Bahcesehir University, İstanbul, Türkiye; and ²Master of Architecture Department of Architecture and Design, Bahcesehir University, Istanbul, Turkey).

Received Date: 12 August 2024

Accepted Date: 26 September 2024

Published Date: 5 October 2024

ABSTRACT

Increasing population followed by uncontrolled city expansion neglected many essential criteria, resulting in management challenges, social service inequities, and worsened environmental conditions. However, this development is always ongoing and overshadows daily life. City administrators desire to implement smart cities to address a wide variety of prevalent issues in metropolitan areas. This study aims to take steps toward creating a smart city. Citizens' understanding and support for a project in a city are crucial to its success. The focus of this research is to examine citizens' awareness of smart cities and their importance in helping city managers, urban planners, and architects in improved planning to realize the vision of a smart city. This article comprehensively explains the smart city by compiling and evaluating relevant facts. Also, numerous smart cities throughout the world have been researched and compared to gain insight. Furthermore, being the most important part of a smart city, the level of public knowledge about "smart cities" in Iran through a survey distribution has been analyzed. This study has the potential to create new insight into city development. The findings offer novel perspectives that can be applied to the design and planning of intelligent cities.

Keywords: Smart city, People's awareness, Urban planning, and Public engagement.

INTRODUCTION:

There are several advantages to living in an urban area and metropolis, especially in terms of the economy, social services, and job prospects. Nowadays, cities house more than 55% of the world's population (United Nations, 2018). More than three-quarters of all energy is consumed in urban areas, and these activities result in the release of greenhouse gases. One of the most significant factors that contribute to climate change is that urban areas are responsible for producing more than 60 percent of these gases (United Nations, 2020). This number has been showing tremendous growth year after year. With this intense

demand for urbanization, cities need robust infrastructure and intelligent planning. The combination of a growing population and a concentration of that population in urban areas has severe and frequently disastrous impacts on the urban infrastructure and the sustainability of cities. In the meantime, cities in Iran are not immune to these problems either. The smart city concept was coined to address these issues. One of the most practical approaches is smartening the city, which is spreading rapidly and has been positively received, especially in developed nations. However, the list of smart cities compiled by the International Institute for Management Development (IMD) does

not include any cities in Iran. In order to better quality of life and urban services in Iranian cities, smart cities can take steps to reduce or eliminate problems. Despite some progress in the direction of smartness and developments in various fields of research, technology, and internet services, no smart city has emerged in Iran, according to statistics (IMD, SCO, and SUTD, 2021). Iran still lacks a comprehensive strategy and orientation for implementing smart city elements in its cities. In this research, it was decided to assist urban managers in the planning process in order to bring about a smart city in Iran. This study begins by examining a smart city's definition, characteristics, and components and comparing five smart cities. Then, this paper investigates people's awareness, support, and cooperation with smart cities through a survey because, despite the existence of technologies and government planning, the city cannot achieve smartness without citizens' knowledge and contribution.

Smart City Characteristics

According to the peculiarities of each region, such as the geographical location, socio-economic situation, priorities of each city, and incentives, such as universities and industries, an intelligent city covers the aspects of urban sustainability, quality of life, and urban services (Ramaprasad *et al.*, 2017; Dameri, 2013). Even though it is challenging to have a universally applicable definition of a smart city that can be easily applied to all cities, in general, it is possible to state that a city that is able to generate intellectual capital and use that capital and knowledge to further urban development is referred to as a smart

city (Dameri, 2013). The problems caused by urbanization and population growth can be solved with the help of advanced technologies in smart cities. Smart cities also have upgraded infrastructure, which helps improve the city's economic, social, political, and cultural viability, as well as the quality of urban space and transportation. A green city can also be created with the help of technology for the sustainability of the environment, protection of environmental quality, reduction of carbon emissions, and increasing energy efficiency. Furthermore, with the help of intelligent systems, natural disasters such as earthquakes, floods, and hurricanes can be reduced or identified. Last, but not least, it has the potential to improve public services and provide the highest possible quality of life (Kumar *et al.*, 2020; Ramaprasad *et al.*, 2017). It is important to emphasize that most definitions of an intelligent city point to the resident as the ultimate recipient and beneficiary (Chamoso *et al.*, 2018). Hence, a "smart city" is a novel idea that uses Information and Communication Technology (ICT) to deal with the issues plaguing cities and raise the living standards of inhabitants (Bawany and Shamsi, 2015).

The characteristics of each smart city are very different from one another. In general, a smart city is distinguished by six primary features smart people, smart government, smart economy, smart mobility, smart environment, and smart living. **Table 1** (added as supplemental material) briefly introduces each indicator (Giffinger *et al.*, 2007; Ramaprasad *et al.*, 2017; Pourahmad *et al.*, 2018; Ferraro, 2013)

Table 1: Smart City Characteristics.

Smart People	Smart Government	Smart Economy	Smart Mobility	Smart Environment	Smart Living
High level of education	Allows citizens to participate in decision-making and access data	Creating entrepreneurship	Easy access to public transportation locally and internationally	Protecting the environment	Improve the quality of housing
Creativity	Transparent governance system	Spirit of business innovation	Safety and sustainability in transportation systems	Controlling pollution and greenhouse gases	Improve personal health and the health sector
Willingness to learn	Provides smarter public and social services	Productivity	Access to ICT infrastructure	Reducing energy consumption	Improve facilities and safety
Open thinking	Facilitate urban	Flexibility in the	Autonomous	Saving on	Improve the quality

	management	labor market	vehicles	freshwater consumption	of education
Flexibility	Address barriers and problems	City's economy	Real-time public transit information	Managing resources	Improve individual safety
Participation in social life	Political strategies and perspectives planning	Ability to transform		Natural environment attractiveness	Create attractiveness and social cohesion
Digital literacy	Collaboration	International embeddedness		Intelligent waste disposal and collection system	Welfare and social inclusion

Smart City Components

The three most crucial elements of any smart city are citizens, government, and technology (Dameri, 2013). Technology is the primary driver of smart cities and serves as their foundation. Technology has recently emerged as an essential component of many urban sustainability plans. As a result of the powerful and helpful answers that new technologies may offer, more and more are being integrated into people's daily lives (Husar *et al.*, 2017). Most smart city strategies highlight the importance of information and communication technology (ICT) in enhancing urban system efficiency and fostering knowledge and innovation networks. Projects based on ICT can address a wide range of urban difficulties, progress the quality of services, and increase the efficiency of all activities (Chamoso *et al.*, 2018; Angelidou, 2017).

Citizens are the second pillar of a smart city, whose are the most fundamental component in establishing a smart city, and the primary objective of a smart city. Studies indicate that the cooperation of citizens makes a contribution to the quality of life; therefore, the government should work to increase the skills of citizens' participation. For citizen engagement, specific tactics and methods are required, such as providing access to the necessary technology, investing in citizens' abilities (e-literacy), and communicating with them through various media (Barrutia *et al.*, 2022). So, smart city policy should incorporate social sense and takes into account inhabitants' opinions about smart cities, public services, and amenities. Public participation is a prerequisite for attaining inclusive and sustainable urban development (Singh *et al.*, 2021). According to (Nakamura and Managi, 2020), citizen satisfaction is a key measure in evaluating urban performance since it eventually influences the residents' profit and comfort. Another important

UniversePG | www.universepg.com

consideration is the employment of knowledgeable and qualified individuals. It should go without saying that systems and services performance is successful only when people generally embrace them. The foundations of human and social capital are found in one's knowledge, intelligence, and creative potential. As a result, well-informed and educated residents are regarded as critical components of a smart city (Angelidou, 2017; Sizan *et al.*, 2021).

The government is also a crucial component in creating a smart city, as it is responsible for determining the city's physical layout, rules, and legal framework. The government's investments in urban revitalization initiatives and infrastructure expansion plans are effective and productive (Dameri, 2013). Governments' roles in fostering innovation include setting standards, coordinating the efforts of important parties, financing initiatives, and shifting procurement practices. Municipal officials need to adopt a more inclusive mindset in which they recognize their place within the ecosystem and make space for the involvement of citizens and other stakeholders (Woetzel *et al.*, 2018). To put it another way, leaders should be able to develop long-term knowledge ecosystems that promote government, industry, and citizen engagement (Angelidou, 2017). Strategic planning for smart city development also includes entrepreneurship as a determinative aspect because it is crucial for long-term financial stability. This goal is mostly accomplished in smart cities by the establishment of business-friendly settings that offer innovative services to both existing enterprises and startup companies (Hollands, 2008; Angelidou and Psaltoglou, 2017; Davies *et al.*, 2015).

Smart Cities

For better understanding and more efficient planning, five of the world's smartest cities are examined and

evaluated in accordance with the IMD classification. The criteria for choosing these smart cities are as follows; Singapore is considered the smartest city, Tokyo is considered the biggest smart city, Lausanne is considered the smallest smart city, Amsterdam is considered the first smart city, and Rio de Janeiro is considered the lowest smart city level. These cities have been chosen because smartness can be analyzed in all dimensions and widely from all over the world to reach an ideal step. Singapore, an Asian island city, is home to more than 5.6 million people over its 728.6 square kilometers of land (Woods 2020). When it comes to international trade, Singapore is both the most accessible country and one of the world's most influential economies. In addition to being one of the world's busiest ports, it is also Southeast Asia's largest port. The standard of living in the country has been high, and it is currently enjoying rapid economic and educational development (Santhi and Saravanakumar, 2020). In terms of quality of life, Singapore ranks high (NUMBEO, April 2022d). After Singapore, Tokyo, the most populous and largest city in Japan, is located in Asia with a population of over 37 million and a total area of around 2194 square kilometers. Tokyo is home to numerous prestigious educational institutions and museums, as well as beautiful traditional Japanese gardens, making it the cultural capital of Japan. From neon-lit skyscrapers to ancient temples, Tokyo has a wide variety of architectural styles. As a result of its strategic location, it has developed into a major industrial, commercial, and financial hub for Japan and a leading global economy (Britannica, 25 March 2021). Tokyo has a very high rank in the quality of life index (NUMBEO, April 2022e).

Amsterdam's territory in continental Europe is about 219.3 square kilometers (Sharbatdar *et al.*, 2015). With a population of more than one million people, this city has the title of being the most populated city and the capital of the Netherlands. As the government offers incentives for students and workers, many people opt to live and work in the Netherlands between the ages of 25 and 50 (Somayya and Ramaswamy, 2016; Onderzoek, 2009). As Europe's fourth largest port, this city plays a crucial role in the flow of commodities and services across the continent. The city has a historical reputation because it was a

global economic hub in the seventeenth century. Amsterdam is a major business hub in Europe, and headquarters for many multinational corporations may be found there (Onderzoek, 2009; Sharbatdar *et al.*, 2015; Somayya and Ramaswamy, 2016). Amsterdam ranks very high on the quality of life index (NUMBEO, April 2022a).

Another city that is located on the continent of Europe is Lausanne. It is the fourth largest city in Switzerland, with an area of 41.3 square kilometers and a population of more than 140,000 individuals, of whom more than forty percent are not native-born. It is a green city with a stellar reputation as an academic and cultural center. The economy of Lausanne is mostly centered on services and knowledge, and the city has a greater number of jobs available than residents. The city of Lausanne is home to a wide variety of culturally significant institutions, such as theaters, galleries, concert halls, and music venues (Ville de Lausanne and BLI, August 2019). In the same vein as Amsterdam and Tokyo, the quality-of-life index in Lausanne is very high (NUMBEO, April 2022b). The city of Rio de Janeiro is located on the coast of Brazil in South America, and it covers an area of around 1,200 square kilometers. This metropolis is home to approximately 13.5 million residents at present. The combination of a modern metropolis with a large number of ports, beaches, museums, tropical woods, and historical attractions makes this city an appealing destination for many visitors. Rio de Janeiro is one of the most important economic cities in Brazil and the country's second most important industrial sector. Due to the fact that Rio de Janeiro was formerly the capital of Brazil, many centers and headquarters stayed in Rio de Janeiro when the capital was moved to Brasília. The city has a large-scale economy, with heavy and light industries, trade, commerce, gold and diamond mines, and other service sectors all contributing to its growth (Schneider *et al.*, 1 April 2022). In contrast to the other four cities mentioned earlier, the quality-of-life index in Rio de Janeiro is quite low (NUMBEO, April 2022c). After a brief study of each city, **Table 2** (added as supplemental material) reveals each city's ranking according to (IMD, SCO, and SUTD 2021) in terms of smartness out of 118 cities and in terms of technology and structure from AAA to D. In the same

way, the intelligence of each city and the ways they have gone to achieve a smart city have been shown in **Table 3** (added as supplemental material) as a comparative table to give a comprehensive perspective to city managers and planners. Studies from the intelligence of five cities of Singapore, Tokyo, Amsterdam, Lausanne, and Rio de Janeiro revealed that one of the main issues related to smart cities is

smart people and high cooperation of people with the government and the city. This is the reason why the awareness of the people in Iran regarding the smart city has been investigated in this article to ensure that by strengthening the awareness and participation of the people, the steps towards achieving smartness will continue.

Table 2: Ranking analysis of each smart city.

	Singapore	Tokyo	Amsterdam	Lausanne	Rio de Janeiro
Smart City Ranking	1	84	17	5	118
Structures Ratings	AAA	B	A	AAA	D
Technologies Ratings	AAA	CCC	A	A	D

Table 3: Analysis of six characteristics of smart cities.

	Singapore	Tokyo	Amsterdam	Lausanne	Rio de Janeiro
Smart people	High level academics	High level academics	High level academics	Energy optimization & awareness platform	Citizen-government interaction
	High citizen participation	Citizens training to save energy High citizen participation	Knowledge sharing High citizen participation	High citizen participation	High citizen participation
Smart economy	Entrepreneurship Start-up support	Start-up support Low unemployment rate	Entrepreneurship Serving smart workplace	Entrepreneurship Innovation supporting	Recession & limited budget NGO non-participation
	Innovation supporting		Innovation supporting		
Smart governance	Enable public data access	Reduce unnecessary energy usage	Enable public data access	Promote energy efficiency	Increase digital & telecom networks
	Infrastructure development	Use diversified renewable energy	Use ICT & digital tools	Protect the city space	Technology promotion
	Use ICT & digital tools	Energy-based style modification training	Create solidarity	Renewable energy usage	Interact with people to improve services
	Digital literacy training	Cooperation with research institutes	Cooperation with research institutes	Environment & energy ICT usage Cooperation with research institutes	
Smart mobility	Sustainable mobility	Sustainable mobility	Sustainable mobility	Sustainable mobility	Low-cost, underdeveloped transportation system
	Use public transport & bicycles	Promote cycling	Use city bikes & trams	Promote green mobility	Use taxis & vans
	Use electric & self-driving vehicles	Establish a dense public transit network	Minimize private vehicle use	Utilize subways, buses, and e-bikes	
	Promote clean cars Discount low-emission automobiles			Give the grant to buy bicycle Decrease private car use	
Smart environment	Create green spaces	Create green spaces	Create green spaces	Have green spaces	Shortage of environmental protection and sustainability projects
	Biodiversity conservation	Development of green belts	Construct energy-generating structures	Platform for calculating energy for structures	
	Construct green buildings	Construct green buildings	Use energy-saving	Create green energy	
	Create green energy	Create green			

		energy	bulbs		
		Solar photovoltaic or heating system funding	Create green energy		
Smart living	Promote health, safety, education, & clean water	Promote health, safety, & life expectancy	Promote health & safety	Promote health, security, & well-being	Install security cameras & monitoring systems in rich neighborhoods Water & health service inefficiencies Socio-economic inequalities and poverty
	Build covered walkways		Build walkways	Build bike lanes	
	Provide ramped bike lanes for unobstructed access		Reconstruction with minimal energy waste	Traffic reduction	
	Smart elderly needs system		Cultural heritage preservation		
			Traffic-reducing smart parking		

Note: Data for six characteristics of Singapore are from (Woods 2020; Khamsi 2020; Jiang, Geertman, and Witte 2020; Singapore-Government 2018). Data for six characteristics of Tokyo are from (Fietkiewicz and Stock 2015; Pham 2015; UED, Jain, and Okazawa 2019; TMG 2021). Data for six characteristics of Amsterdam are from (Camboim 2018; Mora and Bolici 2017; Somayya and Ramaswamy 2016; Washington University 2006). Data for six characteristics of Lausanne are from (Ville de Lausanne and BLI August 2019; Calzada 2020; Chênes, Giuliani, and Ray 2021). Data for six characteristics of Rio De Janeiro are from (Schreiner 2016; Tripadvisor 2016; Cabral, Ramos, and Carvalho 2021).

METHODOLOGY:

The data used in this study is both qualitative and quantitative. Bibliographic studies form the basis of the qualitative component of the research. Document study, data collection, analysis of gathered data and findings, case study review, and comparison in a comparative table are the foundations of the research process. The data is analyzed using a combination of thematic and content analysis. A survey was carried out to ascertain the general public's awareness and opinion about smart cities in Iran, with a particular focus on the city in which each respondent resides. Following the confirmation version of the scientific process, the quantitative portion of the research relies on the collection and analysis of quantitative data. The survey was distributed randomly to the Iranian population, regardless of respondents' race, gender, or socioeconomic standing. The responders were from communities across the country and varying cities. People over 18 years are the survey's focus since its goal is to create findings that can be generalized to the entirety of the population in society. People were given electronic versions of the questionnaire, which they could access through various online platforms. It was done since an online survey with a random sample is the most democratic and trustworthy approach for gaining insight into the perspectives of the members of society. This survey format gives respondents sufficient time and space to formulate their responses,

so allowing for more honest responses. In this survey, no one's identifying information was requested. Since the questionnaire was designed specifically for native Persian speakers in Iran, the questionnaire was written entirely in Persian. The questionnaire's objectives and significance were explained to the participants before they filled it out. The 15 questions on the survey were designed to best serve the objectives of the investigation. The first five questions cover demographics and fundamental information about individuals. The remaining ten questions assess the respondents' familiarity with the concept of smart cities. The questions consisted of both open and closed questions. The majority of the questions on this survey provided space for the respondents to freely express themselves through writing and explanation. Conclusions about the data were arrived at after numerous comparisons and analyses of the responses and inferential statistics.

RESULTS:

The purpose of this survey is to inquire Iranian residents about attitudes and familiarity with the term "smart city" and its associated concepts, as well as their opinions and feelings regarding the "smartness" of their own city. Furthermore, residents' expectations for how a smart city would impact their daily lives and the extent to which they are eager to help make their city smart is probed. A total of 154 people participated in filling out this survey's questions. The data were

gathered between August 5th, 2022, and September 20th, 2022. Governments might use this questionnaire as a model for a more extensive undertaking when introducing smart city features. The initial set of questions pertains to demographic data. Based on the responses, it appears that the majority of the participants fall into the young adult age range and are between the ages of 18 and 45. The majority of those who took part were college graduates. That means three-quarters of the responders have a bachelor's degree or above. According to the respondents' occupations, twenty-four of the respondents have worked in architecture-related fields, making up 15.5% of the total. In accordance with (Tebyan, 2018), 12.3% of the respondents reside in rural-urban areas with a population of less than 25,000. Cities with populations between 25,000 and 1,000,000 account for 34.4% of participants and metropolitan areas with populations above 1,000,000 constitute 53.3% of participants. Also, the length of time each person stays in their current city has been divided into three parts in order to gauge their familiarity with the area. There are three levels of familiarity with a city: brief and insufficient which is less than five years, moderate which is between five and ten years, and long and sufficient which is more than ten years. More than 90% of people are quite familiar with their local areas.

The next ten questions tested participants' awareness of the concept of "smart cities" in Iran. At first, the participants were asked if they had ever heard the term smart city and how much information they had about it. There were 83 yes, meaning that 55 percent of respondents are familiar with the term. The remaining 46% of respondents, which translates to 71 persons, are completely unfamiliar with this word, and they had not heard this term before. Also, three of the twenty-four people who identified as architects said they were unfamiliar with the word. In addition, just 27 participants, or nearly one-third of the 83 persons who had heard of smart cities, knew about a number of smart cities. Dubai, Tokyo, New York, London, Amsterdam, Seoul, Singapore, Stockholm, Barcelona, Chicago, Copenhagen, and Hong Kong were the locations in the answers, respectively. Furthermore, among those who had heard the term smart city, 13.3% were unaware of its defining features. So, the

concept of a "smart city" is not actually known even by those who have heard of it. The other participants' cognition of the smart city characteristics was the smart environment, smart living, smart government, smart economy, smart mobility, and smart people, respectively. In light of the above responses, a generic definition of the smart city was presented, and everyone became at least somewhat acquainted with the concept. Then, participants' opinions were asked about smart cities and their potential, in which 35 respondents either did not provide an opinion about the smart city or did not respond. Out of those 35 people, the majority, or 51.4%, had reported that they were familiar with the term "smart city." Among these 35 people also, 8.5% were working in architecture-related sectors. In addition, 49 individuals merely agreed with the existence of a smart city and did not have any other opinion. The responses of the remaining 70 people can be broken down into six distinct categories.

- A smart city is one in which cutting-edge technologies play a pivotal role in daily life.
- A smart city enhances convenience and prosperity of Residents as a result.
- A smart city is environmentally responsible and works to limit its carbon footprint and protect renewable resources.
- A smart city aids the growth of infrastructure and new amenities and urban services.
- A Smart city enhances safety, security, fiscal management, transportation system, urban infrastructure, and information systems.
- A smart city raises inhabitants' knowledge and sense of responsibility, fosters relationships between individuals, companies, and the government, and promotes transparency in all of these spheres.

After these questions, the opinion of the participants was asked about their city and the implementation of the smart city there. At first, respondents most commonly cited the following answers about their urban issues.

- A dearth of public transportation and the subsequent proliferation of traffic congestion.
- Parking shortages and insufficient parking spots
- The lack of parks, services, and recreational

- facilities
- Environmental pollution
- Unchecked urbanization and a failure to safeguard city bounds
- Buildings that do not adhere to accepted building codes and designs that do not reflect the area's cultural norms
- Low levels of public awareness and participation
- Urban insecurity
- Crumbling city infrastructure

The majority of people responded positively to participation in a platform that is an opportunity for projects related to the development and smartness of their city and entered explanations such as the following.

- Everyone can contribute to the growth and development of the city, thereby enhancing the standard of living for its residents to the extent of their abilities and within the scope of their experience and knowledge.
- Every citizen has an obligation to work with their fellow city dwellers to ensure the growth and prosperity of their community.
- Cooperation infrastructure should be set up, the will to participate should be bolstered, people should be involved in ways that are tailored to their skill sets, and everyone's talents should be assessed.

A number of participants also responded negatively to participation in the development and smartness of their city due to factors including inadequate background in the subject field, insufficient time, and a lack of enthusiasm for contributing to the field. According to 78% of people, the introduction of smart city elements increases the quality of life in their city. They explained it in the following three ways.

- Through raising awareness and absorbing comments on this issue
- Through citizen-official cooperation, the efficient administration, planning, and enhancement of facilities
- Through enhancing human comfort, work speed, traffic and pollution control, time and money savings, and the environment

They believe that the smart city provides its citizens

and society with the enhancement of welfare, peace, quality of life, services, traffic congestion, and public transportation. The following these items have been included accelerating and facilitating works, decreasing environmental pollution, minimizing costs and time, providing more security, preparing proper education and knowledge, using skills where they are most needed that lead to increased civic engagement, preserving natural resources, enhancing urban order, and as a direct consequence, higher levels of contentment and life expectancy, in addition to significant advancements brought about by the utilization of new methods and various technologies. 6.5% of people responded negatively to the implementation of smart city features in their city due to reasons such as the lack of adequate infrastructure and proper facilities for the establishment of smart city elements or the presence of more fundamental difficulties in the city. Also, 15.5% said they were unable to remark because they were not familiar enough with the smart city's components.

Due to the reasons and benefits that the participants said the smart city brings to the city and citizens, the majority prefer to live in a smart city. Just 3.2% of respondents cited concerns that increased technological complexity in urban areas leads to increased problems and restrictions. 77% of these people welcome the smart transformation of their city, and they believe:

- Collaborating in this area gives them new life experiences and valuable learning opportunities.
- Everyone in a smart city stands to gain higher standards of living, greater prosperity, comfort and security, and lower levels of pollution.
- Availability of services and technologies is critical to the growth and development of a city because it allows for the resolution of pressing urban issues and the satisfaction of basic citizen demands.
- For a city that has stood still for years with nothing in the way of improvement, becoming smart is essential.

13% of them responded negatively in response to the desire to make their city smart. They cited a lack of awareness about the topic and an absence of a proper

platform as reasons. The remaining respondents claimed to be unable to provide a response due to insufficient data about smart cities.

DISCUSSION:

Establishing a smart city necessitates coordinated actions on a variety of governmental and societal fronts. A wide variety of urban areas can benefit from the innovations made possible by "smart city" initiatives. Nevertheless, the implementations of smart solutions vary widely. It is because the available resources in smart city regions are directly tied to factors such as cultural variety, societal awareness, investment in the research sector, and the level of socioeconomic growth in the country, region, or city. Smart city implementations may take different approaches, but they all share the same overarching aim of enhancing urban life and service provision. By comparing the cities in the comparative table, it can be seen that Rio de Janeiro has not fared well in many different areas, including sustainability, economics, mobility, environment, and urban life, and these problems have caused setbacks over time. As creating and developing urban infrastructure to carry out projects on a greater scale takes more time, Tokyo has not achieved the best results on all occasions, but the city has been able to do well and achieve proportional success regarding the size and population of the town. The cities of Singapore, Amsterdam, and Lausanne have all fulfilled their goal of smartening the city through investments in these areas. Sustainable development, ecology, reduction of carbon dioxide emissions, entrepreneurship, innovative economic development, human capital formation, public engagement, transparency, efficiency, and social welfare are all emphasized by ICT policies in these cities, along with cutting-edge technologies and lofty objectives. Nevertheless, these cities use unique strategies and prioritize distinct factors in their smart city initiative; each of them is successful and an example in its own right. In light of the above survey, almost 75% of the people who filled out the questionnaire were young. Also, over 75% of the younger generation group heard the term smart city and were more aware. In addition, most people from metropolitan areas were among those who were familiar with the term smart city. The study and analysis of the survey show that most people

without a university degree do not know what a "smart city" is and do not want to learn it. In contrast, those with a higher education degree are more likely to have heard the term "smart city" or understand its meaning. The willingness to cooperate to improve urban areas and create smart cities is also strongly correlated with educational attainment. Moreover, as evidenced by the responses to the questions on smart cities and the number of participants who gave such responses, more than half of the participants were familiar with the phrase "smart city," but not all of them had a thorough understanding of this idea. There was a lack of understanding of this topic, even among individuals working in sectors closely connected to architecture. Almost half of the remaining participants were utterly unfamiliar with this term. Most participants could have a favorable impression of the concept of a "smart city" after reading a brief explanation of what it entails. Although some participants had a firm perception of the smart city's intended goals, the vast majority's views on the topic revealed an obsession with the inclusion of cutting-edge technology in the city while ignoring its myriad other applications. Regarding the smart city's advantages for the residents of each city, participants were eager to collaborate for their city to develop in this direction. The everyday problems of the majority of city dwellers, which worsen as the city expands, are the fundamental issues of smart cities. Everyone in the city is aware of these issues. As was previously noted, the vast majority of respondents were willing to collaborate on city-related initiatives. So, when people are willing to cooperate in the development of their city, with sufficient education and necessary knowledge, it is possible to increase their enthusiasm for cooperation. The lack of complete awareness and precise information of participants on this subject likely contributed to their negative views of the smartness of their city and their unwillingness to cooperate in the city's development. These findings highlight the importance of education in raising awareness. Consequently, paying attention to boosting people's knowledge and educating them about a smart and sustainable city might be quite useful and vital.

CONCLUSION:

The path to smartness follows a set of rules, but these are not rigid, allowing for considerable leeway. It can

be claimed that younger generations are more enthusiastic about exploring and benefiting from the smart city concept. It is also true that as a city grows, its inhabitants become more connected and knowledgeable about the concept of a smart city. Nonetheless, it is important to stress that awareness and knowledge dissemination about this topic in Iran has been quite low. Citizens are interested in learning more about the smart city; thus, local governments would be wise to provide educational resources and spread awareness on the topic. A city can be upgraded and smart only through extensive collaboration between city officials and residents. These objectives can only be met if the projects for the growth of the smart city be wholly transparent and responsive to the citizens. In order to create a smart city and implement smart city solutions, scholars also emphasize the importance of citizen participation in planning and developing the city (Castelnovo *et al.*, 2016; Webster *et al.*, 2018). When citizens actively take part in the decision-making process alongside their government's representatives, citizen engagement becomes a reality. Authorities in a smart city must adopt novel approaches to encourage greater citizen involvement and remove obstacles to people's active participation in civic life. Cities can leverage the public's perspective on current issues and concerns, as well as suggestions for improving the system, by implementing new technology to facilitate two-way communication between government institutions and the people.

It can be inferred that the development of communication and information infrastructures, as well as cultural advancement, are among the important criteria for implementing smart cities, and meeting these criteria will require time and additional effort from experts as well as the use of the knowledge of advanced countries in the field of information and communication technology. This study reveals that prosperous smart cities have a high quality of life index. All successful smart cities have a very high ranking in terms of structures, which refer to the physical infrastructure already in cities, and technologies, which represent the technological resources and services available to locals. All government and private agencies, scientific-research institutions, and residents are the primary and ongoing contributors to

the city's ever-increasing improvement and problem-solving. The area of sustainability receives extra focus in smart cities, and the six defining features of a smart city are also crucial to determine a city's ranking among the smart cities. What counts as smart depends on several factors, including the political, economic, and geographical conditions and the rate at which new technologies spread. In fact, intelligent approaches are not easily replicable and need to be assessed in different contexts. While it is true that cities cannot just copy successful strategies, they can craft unique plans and policies that fit their circumstances.

AUTHOR CONTRIBUTIONS

S.G. designed the study. S.G.; and A.R. performed the methodology and data analysis. S.G. composed the manuscript. All the authors checked and approved the final manuscript.

ACKNOWLEDGMENT:

The author would like to express special thanks to Prof. Dr. Sema Esen Soygeniş for her guidance and support throughout the research.

CONFLICTS OF INTEREST:

The authors report there are no competing interests to declare.

REFERENCES:

- 1) Angelidou, Margarita. (2017). "The Role of Smart City Characteristics in the Plans of Fifteen Cities." *J. of Urban Technology*, **24**(4), 3-28. <https://doi.org/10.1080/10630732.2017.1348880>
- 2) Angelidou, Margarita, and Artemis Psaltoglou. (2017). Angelidou, M., & Psaltoglou, A. (2017). An empirical investigation of social innovation initiatives for sustainable urban development. *Sustainable cities and society*, **33**, 113-125.
- 3) Barrutia, J. M., Echebarria, C., & Hartmann, P. (2022). Leading smart city projects: Government dynamic capabilities and public value creation. *Technol. Forecast. & Soc. Chan.*, **179**, 121679. <https://doi.org/10.1016/j.techfore.2022.121679>
- 4) Bawany, N. Z., & Shamsi, J. A. (2015). Smart city architecture: Vision and challenges. *Intern. J. of Adv. Comp. Sci. and Appl.*, **6**(11).
- 5) Britannica, T. (2020). Editors of encyclopaedia. *Argon. Encyclopedia Britannica*.
- 6) Cabral, L., Ramos, M. D. C. P., & Carvalho, L. (2021). Beyond the control room: The smart

- (sustainable?) pathway of Rio de Janeiro in times of crisis=Para além da sala de controle: o caminho da cidade inteligente (sustentável?) do Rio de Janeiro em tempos de crise.
- 7) Calzada, I. (2020). Replicating smart cities: The city-to-city learning programme in the Replicate EC-H2020-SCC project. *Smart Cities*, 3(3), 978-1003. <https://doi.org/10.3390/smartcities3030049>
 - 8) Camboim, G. F. (2018). The way to make cities smarter: Evidences from Europe.
 - 9) Nezhad, S. F., Mollazadeh, F., & Hanachi, P. (2021). Evaluation of Authenticity in the Conservation andm Development of the Jameh Mosque of Urmia. *The Historic Environment: Policy & Practice*, 12(1), 53–76. <https://doi.org/10.1080/17567505.2020.1824744>
 - 10) Castelnovo, W., Misuraca, G., & Savoldelli, A. (2016). Smart cities governance: The need for a holistic approach to assessing urban participatory policy making. *Soc. Sci. Comp. Rev.*, 34(6), 724-739. <https://doi.org/0.1177/0894439315611103>
 - 11) Chamoso, P., González-Briones, A., and Corchado, J. M. (2018). Tendencies of tech-nologies and platforms in smart cities: a state-of-the-art review. *Wireless Communications and Mobile Computing*, 2018. <https://doi.org/10.1155/2018/3086854>
 - 12) C Chênes, C., Giuliani, G., & Ray, N. (2021). Modelling physical accessibility to public green spaces in Switzerland to support the SDG11. *Geomatics*, 1(4), 383-398.
 - 13) Dameri, R. P. (2013). Searching for smart city definition: a comprehensive proposal. *Inter J. of computers & technology*, 11(5), 2544-2551.
 - 14) Davies, A, J Simon, and V Boelman. (2015). "Growing Social Innovation: A Guide for Policy Makers." In.
 - 15) Ferraro, Saverio. (2013). "Smart Cities, Analysis of a Strategic Plan. Chapter 4: A Comprehensive Framework for Smart Cities." *UNIVERSITÀ DI BOLOGNA*.
 - 16) Fietkiewicz, K. J., & Stock, W. G. (2015, January). How" Smart" Are Japanese Cities? An Empirical Investigation of Infrastructures and Governmental Programs in Tokyo, Yokohama, Osaka, and Kyoto. In *2015 48th Hawaii International Conference on System Sciences* (pp. 2345-2354). *IEEE*.
 - 17) Giffinger, R., Fertner, C., & Meijers, E. (2007). City-ranking of European medium-sized cities. *Cent. Reg. Sci. Vienna UT*, 9(1), 1-12.
 - 18) Hollands, R. G. (2008). Will the real smart city please stand up?: Intelligent, progressive or entrepreneurial?. In *The Routledge companion to smart cities* (pp. 179-199). *Routledge*. <https://doi.org/10.1080/13604810802479126>
 - 19) Husár, M., Ondrejčka, V., & Variş, S. C. (2017). Smart cities and the idea of smartness in urban development—a critical review. In *IOP conference series: materials science and engineering*, 245(8), p. 082008). *IOP Publishing*.
 - 20) IMD, SCO, and SUTD. (2021). "Smart City Index 2021."
 - 21) Jiang, Huaxiong, Stan Geertman, and Patrick Witte. (2020). "Smart urban governance: an alternative to technocratic “smartness”." *Geo-J*. <https://doi.org/10.1007/s10708-020-10326-w>
 - 22) Khamsi, Arezoo. (2020). Smart city, Green Book 1400 (Municipal Action Guide): Center for Urban and Rural Planning Studies of the Organization of Municipalities and Rural Affairs.
 - 23) Kumar, H., Singh, M. K., & Madaan, J. (2020). Moving towards smart cities: Solutions that lead to the Smart City Transformation Framework. *Technol. forecast. and soc. chan.*, 153, 119281. <https://doi.org/10.1016/j.techfore.2018.04.024>
 - 24) Mora, L., & Bolici, R. (2017). How to become a smart city: Learning from Amsterdam. *Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2015 1*, 251-266.
 - 25) Nakamura, H., & Managi, S. (2020). Effects of subjective and objective city evaluation on life satisfaction in Japan. *J. of Clean. Prod.*, 256, 12-0523. <https://doi.org/10.1016/j.jclepro.2020.120523>
 - 26) NUMBEO. April (2022a). "Quality of Life in Amsterdam, Netherlands." In.
 - 27) ———. April (2022b). "Quality of Life in Lausanne, Switzerland." In.
 - 28) ———. April (2022c). "Quality of Life in Rio de Janeiro, Brazil." In.
 - 29) ———. April (2022d). "Quality of Life in Singapore, Singapore." In.
 - 30) ———. April (2022e). "Quality of Life in Tokyo, Japan." In.

- 31) Onderzoek, SEO Economisch. (2009). "Amsterdam, Netherlands." In.
- 32) Pham, Clarisse. (2015). "Tokyo Smart City Development in Perspective of 2020 Olympics
- 33) Opportunities for EU-Japan Cooperation and Business Development." In.
- 34) Pourahmad, A, K Ziari, H Hataminejad, and Sh Parsapashabadi. (2018). "Explanation of Concept and Features of a Smart City." *The Scientific Journal of NAZAR research center (Nrc) for Art, Architecture & Urbanism*, 15(58), 5-26.
- 35) Ramaprasad, Arkalgud, Aurora Sánchez-Ortiz, and Thant Syn. (2017). "A Unified Definition of a Smart City." 13-24.
https://doi.org/10.1007/978-3-319-64677-0_2
- 36) Santhi, S., & Saravanakumar, A. (2020). The Economic Development of Singapore: A Historical Perspective. *Aut Aut Res. J*, 11, 441-459.
- 37) Schneider, Ronald Milton, A Guimarães, Geiger Passos, and P Pedro. (2022). "Rio de Janeiro." *Encyclopedia Britannica*.
- 38) Schreiner Clara, (2016). International Case Studies of Smart Cities: *Rio de Janeiro, Brazil*. IDB.
- 39) Sharbatdar, Musa , Mohsen Kahani, and Ulfat GanjiBidmeshk. (2015). "A comparative study of the smart cities of Amsterdam, Barcelona and New York and an introduction to the document studies of the smart city of Mashhad." In *8th Elect. Administ. Syst. Conf.*. Tehran, Iran.
- 40) Singapore-Government. (2018). "Towards a sustainable and resilient Singapore: Singapore's Voluntary National Review Report to the 2018 UN High- Level Political Forum on Sustainable Development." Sustainable Development Goals.
- 41) Singh, P., Lynch, F., & Helfert, M. (2021). Role of Citizens in the Development of Smart Cities: Benefit of Citizen's Feedback for Improving Quality of Service. In *SMARTGR*. (pp. 35-44).
- 42) Sizan NS, Dey D, and Mia MS. (2021). Application of IoT for developing sustainable and smart farming. *Aust. J. Eng. Innov. Technol.*, 4 (4), 78-89.
<https://doi.org/10.34104/ajeit.021.078089>
- 43) Somayya, M., & Ramaswamy, R. (2016). Amsterdam Smart City (ASC): fishing village to sustainable city. *WIT Transactions on Ecology and the Environment*, 204, 831-842.
- 44) Tebyan, (2018). "What is the definition of a city?"
- 45) TMG, Tokyo Metropolitan Government. (2021). "Tokyo Sustainability Action." In.
- 46) Tripadvisor. (2016). "Rio de Janeiro: Public Transportation."
- 47) UED, Research Institute, Vibhu Jain, and Yuko Okazawa. (2019). "Case Study on Tokyo Metropolitan Region, Japan. Tokyo Development Learning Center Policy Paper Series, 3." World Bank, Washington, DC.
- 48) DESA, U. United Nations Department of Economic and Social Affairs. (2018). "68% of the World Population Projected to Live in Urban Areas by 2050, Says UN,"
- 49) ———. "Climate Action: Cities and Pollution." <https://www.un.org/en/climatechange/climate-solutions/cities-pollution>
- 50) Ville de Lausanne, and (Lausanne Office for Immigrants) BLI. (2019). "Living in Lausanne A practical guide." In, edited by 7th edition.
- 51) Washington University, (2006). Amsterdam, NL: Savannah Hines-Elzinga 'Venice of the North'.
- 52) Webster, C., R. William, and Charles Leleux. (2018). "Smart governance: Opportunities for technologically-mediated citizen co-production." *Information Polity*, 23, 95-110.
<https://doi.org/10.3233/IP-170065>
- 53) Woetzel, Jonathan , Andres Cadena, and Valerie von der Tann. (2018). "Smart Cities: Digital Solutions for a More Livable Future." In.
- 54) Woods, O. (2020). Subverting the logics of "smartness" in Singapore: Smart eldercare and parallel regimes of sustainability. *Sustainable Cities and Society*, 53, 101940.
<https://doi.org/10.1016/j.scs.2019.101940>

Citation: Ghari S., and Riazalhosseini A. (2024). The transition toward smart and sustainable cities, *Br. J. Arts Humanit.*, 6(5), 306-317. <https://doi.org/10.34104/bjah.02403060316> 