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## Explanation of Concept and Features of a Smart City

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### Abstract

Statement of the problem: Cities inherently encounter complex, interrelated, and widespread challenges that can only be solved through a systematic approach. In other words, the accumulation of a huge mass of people has led to chaos, and created the conditions that not only led to the collapse of the balance of the cities but also achievement of stability is impossible with the current methods of administration and urban development. As a result, urban planners around the world are trying to provide models with an integrative perspective to all aspects of urbanization development in the 21st century in order to meet new demands and expectations of today. One of the new concepts that deals with the current challenges in the field of urban planning is development of a smart city that has attracted much attention in recent years. Smart City has been raised as a pivotal factor of the Millennium Development that can open new concepts in urban planning and combine capabilities of real and virtual world to solve urban problems.

Research goal: The aim of this study is to provide a foundation for researches in smart cities. In fact, it aims to explain the concept, meanings, dimensions, attributes, indexes, conventional beliefs, challenges and risks facing the smart city theoretically through profound analysis of relevant literature in this field and discussing the concept.

Research Methodology: The research method is descriptive-analytical.

Results: The results show that despite extensive literature on the concept of smart cities, a clear understanding and consensus on this issue does not exist and various academic researchers have suggested various contents. So that some smart technologies are considered as the only or least important component of the smart city, others have suggested a definition that goes beyond technology and believe that technology adoption is not the end. Technologies can be used in cities to empower citizens by adapting these technologies to their needs rather than adapting their lives to the requirements of technology. In addition, the meaning of a smart city is multifaceted. The key point is that cities must respond to changes in the context in which they operate. Moreover, what should be considered as intelligent depends on a variety of underlying conditions such as the political system, geography and dissemination of technology. In fact, smart solutions simply cannot be copied; therefore, the value for each field should be evaluated differently.

### Keywords

Smart city, Smart components, Smart risks, rapid urbanization.

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## Introduction

The third millennium is the millennium of urbanization, because for the first time the urban population of the world has crossed 50%. The size and speed of recent rapid urbanization to the extent that it is known as the second wave of urbanization. Therefore, the growth of urbanization since the beginning of the third millennium, which is the era of governance of information technology in various areas of urban life, has grown more rapidly from the past, which may be called the third wave of urbanization. As projected, urbanization will increase to more than 70% of the world's population by 2050 (UN, 2008). Therefore, the rapid urbanization process is an inevitable reality. The 21st century is a century of cities, hence cities have a central role in the economy, and the driving force behind global competition, information, development and innovation, and becoming a globally integrated poles and more influential and responsible service communities. It is also a place to focus on physical and human capital. As 80% of the world's gross domestic product is in cities, it is anticipated that by the year 2050, 600 cities from the world's largest cities will produce 60% of world GDP1 (McKinsey global institute, 2011). But urbanization, despite the great achievements for humankind, has brought with it problems and problems that, despite the huge scientific and technical advances, the solution to many of these problems has been accompanied by failure. At the moment cities consume 75% of global energy and produce large volumes of waste (Ferraro, 2013) and 70% of greenhouse gas produced from cities. (Coldahi, Frey, & Kelemen, 2013), which has a major contribution to climate change, and air pollution. On the other hand, this rapid growth of cities is not proportional to the capacity to expand their infrastructure and imposes the increasing pressure on urban infrastructure. Therefore, they always suffer from undesirable consequences. This situation is more complicated in developing countries including Iran which is facing with the increasing pressure to provide more and better basic

services to the growing population. Hence, cities are naturally faced with complex and widespread challenges that are interrelated, which can only be solved through a systematic approach. In other words, the massive accumulation of residents has led to disturbances and disorderly conditions that have caused not only the collapse of the balance of cities, but also the achievement of sustainability with the current methods of urban management and development. Therefore, old institutions and old-fashioned governance and governance practices are opposite with a complex and rapidly changing world. As a result, urban planners around the world strive to develop models for the development of the 21st century cities in order to meet the demands and expectations of today's world with a comprehensive look at all dimensions of urbanization. In other words, the necessity and the requirements of these challenges have caused many cities in the world to find smarter ways to manage them. One of the new concepts to address the current challenges of cities in the field of urban planning is the development of smart cities, which has attracted much attention over recent years. The smart city is considered as the centerpiece of the Millennium Development Goal, which means opening up new concepts in urban planning that combines the capabilities of real and virtual worlds to solve urban problems. The enormous amount of data generated in the city space, coupled with the advances made in ICT, provides unprecedented opportunities to cope with the great challenges that cities face. One of the basic foundations of the smart city is the access to real-time information on the actions and choices of citizens. Access to real-time information in the smart city makes it possible to identify and distinguish behavioral patterns (in the city as a whole and at the individual level), which is very valuable. This makes it possible to observe the invisibility (in order to understand what is going on), the behavior of a city over different periods of time, and allow them to influence them and model them. At the moment, many countries in the world have solved their problems and problems of the city,

which cannot be solved by classical approaches, the approaches and strategies of the virtual world in order to maximize the utilization of the capabilities of their urban life. In spite of the fact that the concept of the smart city has become a very popular subject of research in all fields of science, and despite the widespread use of this term and extensive efforts to explain it, there is not a clear understanding and consensus among professionals and academics. There is not a consensus in terms of concepts, meanings, features, elements, and components (for different perspectives from different domains of knowledge). Studies show that scholars from various scientific fields have proposed a variety of terms and used a range of conceptual types instead of the smart attribute. Some people have emphasized the dimensions of technology, and others believe that adopting technology in the smart city is not end of the work and highlight the development of human and social capital and physical infrastructure. But what is the reality creating a smart city as the reality of the 21st century with respect to the global urban integrity that nobody opposes it? The overall purpose of this research is to provide a basis for research in the field of smart city; in fact, it seeks for theoretical explanation of the concept, meanings, dimensions, characteristics, indices, conventional beliefs, and challenges and dangers that facing the smart city through deep analysis of the profound literature related in this area by discussing this concept. Because without a clear understanding of the smart city in practice, and especially in the formation of urban development strategies, it can lead to inefficient use of limited resources and wrong orientation of actions. Mistake in public (urban) policies is particularly costly and it has long-term implications. It is hoped that by designing the correct concept of the smart city and its main structure, it will be a small step to fill the existing gap in this field, especially in Iran. In general, this research seeks to answer the following questions:

- What is the smart city or how is smart city conceptualized in the literature of this area?

- What are the key elements, components, characteristics and indicators of the smart city?
- What kind of goals have smart cities got in the world?
- How are conventional facts and beliefs about the smart city expressed?
- What are the main challenges and dangers of creating smart cities?
- What is the situation in Iran in terms of ICT indicators?

### **Significance of the Research**

**Generally, the main currents that lead cities toward smart approaches are as follows:**

#### **A) Rapid urbanization**

The world is on an unprecedented level of urbanization. This rapid urban population growth rate is not an interesting fact, but it calls for sustainable development and better life. In the 18th century, less than 5% of the world's population lived in cities. According to a report released by the United Nations in 2008 on the prospect of urbanization, 2008 is the year in which more than 50% of the world's population lives in cities. This trend is growing rapidly and it is anticipated to reach more than 70% of the world's population by 2050. In Europe, now 75% of the population lives in urban areas. This is expected to reach 80% by 2020. Therefore, the early urbanization of the world is an inevitable reality that brings about many problems (UN, 2008). Therefore, rapid urbanization and efforts to reduce the problems that caused by urban population growth is one of the main causes of the emergence of a smart city (Chourabi, Taewoo, Shawn, Ramon , SehlMellouli, Theresa & Hans, 2012);(Fig. 1).

#### **B) The effects of cities on the environment (environmental concerns)**

The second issue in moving towards intelligence with regard to population growth in cities and their central role in economic and social dimensions around the world refers to the effects of cities on the environment. Human development since the Industrial Revolution has had significant effects

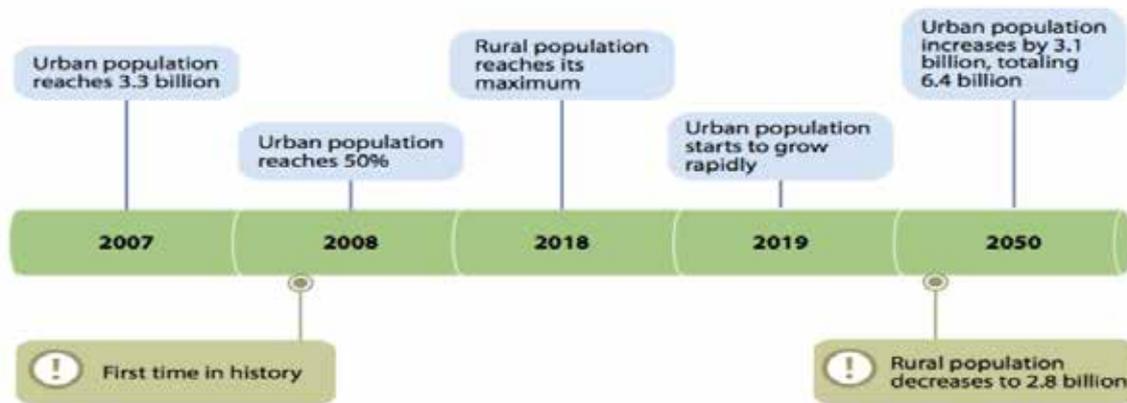


Fig. 1. Urbanization trend 2007 – 2050. Source: Ferraro, 2013.

on the environment, and we live in an age that these changes in the planet are largely attributed to widespread and destructive human behaviors (Steffen, Jaques, Paul & John, 2011). Cities are the engine of economic growth and 80% of global GDP is devoted to cities (Habitat, 2015). But they have 2 percent of the world’s drought and they consume about 75% of the world’s energy (Ferraro, 2013). Today, most resources are consumed in cities all over the world that have high economic importance and poor environmental performance (Albino, Beradi & Dangelico, 2015). About 70 percent of greenhouse gas emissions originate from cities (Colldahi, Frey & Kelemen, 2013), which makes a major contribution to climate change. global carbon dioxide emissions increased by 45 percent between 1990 and 2010, largely due to the growth of cities (Habitat, 2015). Therefore, environmental problems and the need to develop sustainable cities are the focal points of many Smart City projects (Batagan, 2011); Smart cities in Europe focus on energy and sustainability issues. These issues have been considered as important issues for maintaining high quality of life in cities (Meijer, 2013). This unprecedented rate of urban growth creates a necessity for finding innovative ways and solutions to manage the challenges ahead (Nam & pardo, 2011). Smart cities have a look forward to environmental issues and one

of the centers of the smart city is to use technology to increase the sustainability and better management of natural resources (Chourabi, et al, 2012).

C) Economic crises (economic incentives)

The main motivation for moving cities towards intelligence lies in their desire for economic development. During the economic crisis of 2008 and 2009, the cities realized that they were competing with other cities, but in ways that had not experienced it before. They were not only competing with their neighbors in the state or nationally, but they were competing for generations (present and future) through global supply and demand networks and the Internet with their other counterparts around the world (Harrison & Donnelly 2012). Hence, the need for innovative and intelligent approaches to major economic crises was a global imperative. The requirements of the current economic crisis provide a good incentive to overcome resistance to change and transform problems into opportunities; in other words, the most significant stimulus for the development of smart cities was the economic crisis and the need to generate wealth. The global economy is now globally integrated that is based more on services, and cities are central to this trend. They also attract business activities and convert city as global competition centers (Mosannenzadeh & Vettorotob, 2014). Cities are key actors in global competition

and they need to use their resources to generate more wealth (Florida, 2002). It has been predicted that until 2050, 600 cities from the largest world's cities produce 60% of world GNP (McKinsey global institute, 2011). Cities compete together to attract more and younger workforce (something Richard Florida calls the "creative class") to produce more wealth (Florida, 2003). High-value jobs that make the city attractive will be concentrated in a small number of cities and regions (Florida, 2008). As Glycer and Barry (2006) showed that the highest rates of urbanization growth gained in the cities that there is a high share of well-trained workforce (Albino, 2015). Therefore, reducing urban problems and creating a suitable environment with a high quality of life to attract the creative class to generate more wealth and economic competitiveness is another key reason for moving cities to intelligence.

#### D) Demographic changes

The fourth huge process that destroys the capabilities of cities is the series of demographic changes. It is expected that over the next ten years, the older generation over 65 will grow almost twice as much across the world, from 7% to 13%. It means that many infrastructures need to be adapted. Hence, it is expected that there are major changes in health care and the elderly. Therefore, smart solutions are needed for cities whose goal is to increase (or at least maintain) the overall life quality of their inhabitants. The rapid growth in the number and size of their population to cities has, more than ever, played a pivotal role with technological, political and economic power. (Ferraro, 2013). Perhaps one of the most useful functions of the smart city is to help the elderly and the poor to do their daily routine. One of the examples of this assistance is the lack of need to attend a visit for treatment and administration (Hataminejad, et al, 2014:35-39).

#### E) ICT advancements

The urban model of the 21st century is understandable by utilizing the potential of information and communication technology (Habitat, 2015). Taffler pointed out that the advances made in ICT have

created a third wave in the evolution of cities (as cited in Castells, 2001). Communication systems connect citizens, companies, and organizations to a nervous system. With the help of technology and Internet connectivity, citizens receive services without time and space constraints. Without investment in broadband infrastructure, the flow of information between different parts of a city and between cities is cut off. This will slow down economic activity and affect financial services (Karadag, 2013). Therefore, connecting is an important aspect of city life, which is possible in the light of technological advances.

#### F) Other factors

Migrating the brains and creating a suitable space for their absorption in cities, the waste of resources stemming from complex administrative bureaucracy, the waste of other resources, such as water, electricity, energy, etc., and the need for optimal use of these resources and the need for proper management of other issues including transportation, are other reasons for the movement of cities to intelligence.

### **Theoretical foundations and research background**

The term "smart city" and its root must be followed by the smart growth movement that emerged in the late 1980s and early 1990s and supported new urban planning policies (Harrison & Donnelly, 2012). Based on the smart growth approach, developmental decisions affect everything from personal life to communities and nations. In order to overcome the side-effects of development, intelligent growth strategies can help to maintain and develop health, safety, and more comfortable and attractive urban environments (Karadag, 2013). The smart city term was first used in Brisbane Australia and Blacksburg in the United States, where ICT supports social participation, reducing digital gap and access to services and information (Alvarez, et al, 2009). Smart cities appeared as a tool for urban texture visualization. They developed slowly after the 1990s, but quickly evolved since early 2000 (Habitat, 2015). These infrastructure and services include buildings,

transportation routes, electricity, water and sanitation infrastructure, and health and safety. In fact, since 2000, the Smart Growth Approach has given its place to the smart city, based on the advances in information and communication technology in planning, development, sustainability and urban services (Harrison & Donnelly, 2011) And has since evolved from any kind of technological innovation in the planning and development of urban functions. (Alvarez, et al, 2009). Then many governments have found that they have access to sources of free information that has been obtained through a number of trading goals such as water billing, energy billing, tolls, and so on. This general perception has led to widespread use of technology and attention to smart infrastructure around the world (Harrison & Donnelly, 2012). The California Institute for Smart Communities was one of the first institutions to focus on how smart communities and cities are designed based on information and communication technology (Alawadhi, et al., 2012). Many major cities in the world, such as Seoul, New York, Tokyo, Chicago, Amsterdam, Cairo, Dubai, and Tokyo started the Smart City project. In addition, many international and industrial organizations have developed the smart city agenda. Survey of the existing study resources shows that the domestic study background in relation to the smart city is very limited, and the smart city in Iran is a completely new issue and has recently been raised and is in the early stages. In this part of the study some attention is paid to part of the existing literature and theoretical literature that is external.

In a paper titled "Smart Cities in Europe," focused on six major categories in a smart city (using network infrastructure, emphasis on business, social inclusion of urban residents in public services, creative industries, and with high technology, deep attention to the role of social and social capital in urban development and ultimately social and environmental sustainability) Caragliu, et al (2009) emphasized that there is a positive relationship between urban wealth and the presence of creative professional forces in

a smart city. Nam et al (2011) developed another framework for the conceptualization of smart cities. In their view, key factors are: technology, people and institutions. They again recognized that the dimensions of smart cities are: technology (as a tool used for innovation), organization (for innovation management), policy (for creating an enabling environment) and peripheral conditions (Nam & Pardo, 2011). Anastasiya (2012), in an exploratory work entitled "The Concept of Smart Cities; Towards the Development of Societies", expanded the concept of smart city by exploring its different meanings, its potential and its key dimensions for the development of societies and pointed out that Broadband network development (telecommunication, satellite, cable, etc.) greatly enhances the potential of different actors (individuals, small businesses, institutions, and local government) that affects through providing access to information and knowledge resources throughout the city as well as a range of tools for connecting locally and globally. Part of this article is based on the experience of the city of Trikala, the city's first smart city in Greece, and received by the ECF for three consecutive years (2009, 2010 and 2011) the top smart city award in 21 cities. In a research entitled "Understanding Smart Cities: An Integrated Framework", Chourabi et al (2012), while referring to different definitions in the literature of smart cities, cited eight key factors in an integrated framework for Smart Cities Initiative : (1.Management and Organization, 2.Technology, 3.Governance, 4.Politics, 5.People, and communities, 6. Economics, 7.Infrastructure, and 8.Natural environment). They considered technology as an intermediary that affects seven other factors (Chourabi, et al., 2012). The International Telecommunication Center focuses on the technological, human and institutional dimensions of smart cities in a feasibility study in February 2013 entitled "Smart Cities: Seoul's Case Study" and deals with Smart city framework and concludes that urbanization imposes a growing strain on traditional urban infrastructure, and ICT provides a completely practical means of updating

these infrastructures to reflect the demands and demands of 21st century communities (ITU, 2013). Anjelidou(2014) stressed and concluded in a study entitled “Smart City Policies: A Space Approach emphasizes the intricacies of smart cities, conflicting interests and different stakeholders in a city. Despite the discussion there is no consensus on the definition of these cities in the wider context of smart cities. Therefore, we are confronted with many definitions and solutions without a definite definition in a global scale. He called intelligence all the settlements that have begun intentional efforts to invest in information and communication technologies and vision in strategic ways seeking to be effective and competitive at multiple levels of economic and social dimensions. (Albino, Beradi & Dangelico, 2015). Habitat (2015) addressed the various features (sustainability, quality of life, urban aspects and intelligence), issues and topics (society, economy, environment and governance) and required infrastructure in the thematic articles entitled “Smart Cities” (Physical infrastructure, IT infrastructure and infrastructure) dedicated to this concept (smart city), while emphasizing the rule of the smart city, suggested that smart efforts are expected enhances not only the efficiency of urban complex systems, but also the quality and efficient delivery of basic services through a variety of electronic solutions. Smart cities’ citizens should be enabled through access to knowledge and opportunities and it should confront environmental challenges and catastrophic hazards through enabling measures by employing new technologies. It also mentions the need for 21st century urban models that are tailored to the unique needs of developing countries, and in smart cities, it has always been about protecting cultural originality and its coordination with the dimensions of local culture, the interaction between public needs and economic considerations. Furthermore, it should strengthen transparency through open data in the rule of law in the era of new media and improve citizens’ access by using online systems. He also puts emphasis on the need for integrated

planning. Eventually, he concludes that for a comprehensive Smart city approaches should be based on a participatory approach to development based on human rights. It further notes that this is a long-term process and can not be achieved overnight. The transition to more smart, flexible, and sustainable cities requires more time, and each city may need to go through different paths. This process should be compatible with the complex, dynamic, and evolving nature of cities and be able perspectives as a need to constantly update . Finally, it provides guidelines for action (Habitat, 2015).

### **Methodology**

The research method in this research is descriptive-analytical and in terms of purpose, considering that it attempts to explain the concept of smart city and its features through deep study of existing literature on smart cities, is fundamental-theoretical. In this research, a systematic review and analysis of relevant academic literature and practical tools designed to guide cities as well as international official documents from 1990 to 2015 in order to understand the main concepts proposed for the smart city (including all the different labels that are currently being used) and dimensions, key elements, beliefs and views related to this concept. This literature was selected through two main sources: 1- Academic Literature Database 2- Google Scholar. For example, in the EBscohost online, Science Direct, and Google Scholar databases, using the concept of smart city and other similar terms (such as smart society, digital city, smart city, urbanized city, virtual city, information town, creative city, learning city, City of City Knowledge and Innovation). In general, articles were searched for the desirable characteristics of a city in terms of development and innovation. The scope of research was limited to scientific articles, scientific journals and articles of scientific conferences. The research also limited the timeframe to articles published between 1990 and 2015 (when the smart city emerged, and other similar labels began to be published more regularly in such publications).

Due to the interdisciplinary nature of the search, it includes urban studies, public administration, information science and computer science.

## Findings and Discussion

### • Definition of a smart city

Before checking out the details of a smart city, as an innovation, we need to understand the main conceptual elements. In fact, the first step to create a smart city is to understand its concept. A brief overview of the related literature in this area suggests that the concept of smart city is very controversial. In fact, the emergence of similar terms such as intelligent cities, the virtual city, the city of knowledge, the digital city, etc. has added to the conceptual confusion of this term (Schaffers, et al., 2011). The concept of smart city has developed in three main areas: 1. university, 2. industry, 3. government (Mosannenzadeh & Vettorato, 2014). Academic literature holistic and comprehensive approach and according to the interest in the development of knowledge and information means smart covering of the whole range of features such as intelligent self-configuration, self-healing, self-optimizing and self-protecting (Nam & Pardo, 2011). In industrial literature, with a tendency towards business and industrial tools, the concept of smart refers to smart services and products, artificial intelligence and thoughtful devices (Ibid). Finally, in government documents aimed at managing urban development, the word smart was interpreted in conjunction with the “smart growth” urban planning theory, which emerged in the early 1990s to avoid dispersed overlook. Despite this diversity, it seems that the use of technology and social innovation is the key issue in this concept. One of the most influential definitions in academic literature was given by the University of Technology in Vienna in 2007. “The smart city is a city that is well versed in forward-looking ways in the six-personality (smart people, intelligent mobility, smart governance smart life, smart economy and intelligent environments), which is built into a smart mix of fateful, independent, and informed citizens’

assets and activities” (Mosannenzadeh & Vettorato, 2014). While in the industrial literature, including the idea of IBM about the smart city, cities are considered as a system of systems. This company defines the smart city as a city that uses technology to modify its main systems and optimize the return of entirely limited resources (Habitat, 2015). But government literature focuses on the administrative and financial aspects of the smart city and on environmental goals such as greenhouse gas emissions. Generally academic literature has a comprehensive approach and covers a wide range of topics, mainly focused on improvement in three areas of governance, social development and the environment. From an industrial point of view, smart cities have emerged mainly due to the interaction between competition and sustainable urban development. In addition, sustainability and social development are the main goals of smart cities. Finally, government literature focuses more on international challenges such as life quality, economic growth, the environment, energy, sustainability, safety, health and mobility. Mosannenzadeh and Vettorato (2014) defined the smart city as “Smart City is a sustainable and efficient city with high quality of life that its aim is confronting urban challenges (improving mobility, optimizing use of resources, improving health and safety , improving social development, support for economic growth and participatory governance) through the use of information and communication technologies in services and infrastructures, cooperation between stakeholders and key stakeholders (citizens, universities, government and industry) and capital investment in social capital” (Mosannenzadeh & Vettorato, 2014). Ku, et al defined the smart city as a community that teaches learning, innovation, and adaptability (Sinkiene et al, 2014). In the meantime, a number of similar terms with the smart city (wireless communities, broadband communities, digital communities, network communities, informatics communities and intelligent communities, etc.) emerged, which in some cases were used by different scholars instead of each other. These terms refer to

the less inclusive and specific parts of a city, and the notions of the smart city often include them (Caragliu, 2009). On the other hand, an element that does not exist in these terms is people. People are the main actors in the smart city that form it through continuous engagement. For this reason, other terms are often associated with the concept of smart city. But all this suggests that communities have begun a conscious effort to understand and engage in a highly interconnected world (Albert, et al., 2009). Dawes and Pardo discussed that the components of the concept of a smart city are divided into three categories: technology, people and organization. A city can be smart when investment in these three areas leads to sustain that the concept of smart cities is not limited to technological advancements but seeks to reinforce socio-economic development (Nam & Pardo, 2011). Social inclusion is one of the key features of smart city (Allwinke & Cruickshank, 2011), and any opportunity for economic development must be accompanied by investment in social capital (Scott, 2000). Orihi (2009) argued that, while there are different perspectives on smart cities, the idea that ICT is central to the future performance of the city is the central focus of all perspectives. Kommunnos (2003), Hollande (2008), Caraglio (2011) agreed that ICT is the main feature of a smart city, but this does not mean ignoring social issues, and technology does not automatically trigger intelligence. And people have a key role to play. An overview of various definitions shows the meaning of a multi-faceted smart city. Each writer has emphasized on different aspects of a city. Thus, measuring a smart city is complex. Since each city has administrative, economic and social status and its specific geographic location, as well as different priorities; therefore, it is difficult to define a global steady system, due to the diverse character of cities around the world. On the other hand, the definitions raised by certain cities that call themselves smart are not universal. Therefore, it is better to maintain the original structures (smart city model) as the basis of conceptualization, and the city's specific definitions of smart based on

their perspectives, preferences and content. Hence, a profound analysis of literature shows that in the definitions of authors, special emphasis has been placed on some concepts in the definition of smart city. As the use of information and communication technology in urban services and infrastructure, the integration of different systems in planning and implementation, the co-operation of different stakeholders at all stages of urban development, investment in social capital, independence in decision making, participatory governance, interconnection and integration, Creativity, learning and managing various local sources is the initial alphabet of smart city concept (Table 1).

#### • Smart City Goals

A smart city is often defined through its goals, and intelligent is defined as more efficient, sustainable, fair and livable (Alawdhi, 2012). The concept of smart city primarily focuses on the city as a system with multiple subsystems (Chourabi, et al., 2012). This subsystem function as a whole ultimately allows the system to behave in an intelligent and consistent manner (Colldahi, et al, 2013). In other words, the city is a complex system of diverse and unpredictable interactions between its sub-systems. The goal of the smart city model is to find suitable solutions to manage this complexity, in particular by solving the negative consequences of global urbanization and the higher quality of life for urban populations. (Nam, and Pardo, 2011b). The ultimate goal of the smart city is to provide intelligent services in all of the city's vital functions. A look at the Smart City project in the world represents different goals, differences and similarities as follows:

- 1- Carbon reduction
2. Achieving energy efficiency.
3. Influence of ICT in the development of specific industries (in the field of multimedia or knowledge-based industries).
4. Achieving the highest quality of living environment for residents.
5. Developing green spaces within the city.
6. Developing advanced intelligence infrastructures.
7. Achieving economic growth and quality of life simultaneously.
8. Development of sustainable societies.
9. Ensuring

Table1. Smart city definitions. Source: Sinkiene, et al., 2014 & Albino, et al., 2015.

Definition	Source
Smart city as a high-tech intensive and advanced city that connects people, information and city elements using new technologies in order to create a sustainable, greener city, competitive and innovative commerce, and an increased life quality.	Bakici, et al, 2012
Being a smart city means using all available technology and resources in an intelligent and coordinated manner to develop urban centers that are at once integrated, habitable, and sustainable.	Barrionuevo, et al, 2012
A city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel	Caragliu, et al, 2011
into the Smart cities will take advantage of communications and sensor capabilities sewn cities’ infrastructures to optimize electrical, transportation, and other logistical operations supporting daily life, thereby improving the quality of life for everyone.	Chen, 2010
A city connecting the physical infrastructure, the IT infrastructure, the social infrastructure, the collective intelligence of the city.and the business infrastructure to leverage	Harrison, et al, 2010
(Smart) cities are known as territories with high capacity for learning and innovation, which are built based on the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and knowledge management.	Komninos, 2011
Smart cities are the result of knowledge-intensive and creative strategies aiming at enhancing the socio-economic, ecological, logistic and competitive performance of cities. Such smart cities are based on a promising mix of human capital (e.g. skilled labor force), infrastructural capital (e.g. high-tech communication facilities), social capital (e.g. intense and open network linkages) and entrepreneurial capital (e.g. creative and risk-taking business activities).	Kourtit&Nijkamp, 2012
Smart cities have high productivity as they have a relatively high share of highly educated people, knowledge-intensive jobs, output-oriented planning systems, creative activities and sustainability-oriented initiatives.	Kourtit, et al,2012
A smart city is understood as a certain intellectual ability that addresses several innovative socio-technical and socio-economic aspects of growth. These aspects lead to smart city conceptions as “green” referring to urban infrastructure for environment protection and reduction of CO2 emission, “interconnected” related to revolution of broadband economy, “intelligent” declaring the capacity to produce added value information from the processing of city’s real-time data from sensors and activators, whereas the terms “innovating”, “knowledge-based” cities interchangeably refer to the city’s ability to raise innovation based on .knowledgeable and creative human capital	Zigiari, 2013

social compatibility among different groups of residents. 10. The evolution of the city as a living lab for continuous improvement (Ojo, Curry, Janowski & Dzhupova, 2014); (Table 2).

Generally, smart city is a multi-dimensional concept with multiple goals. There are different perspectives in literature. Some authors have focused on producing better policy outcomes in terms of wealth,

health and sustainability, and others, to strengthen citizen participation and open forms of cooperation But what’s real is that the goals of the cities depend on what matters to the urban population. The key point here is that the authors emphasize the inherent nature of urban systems, and the discourse on smart cities is influenced by the domination of one of the best cities. One of the cities in general is depicted as

Table 2. Summary of the goals of Smart City Programs in different cities of the world. Source: authors.

City	Goals
Smart Amsterdam	Focus on reducing carbon efficiency, energy efficiency and behavior change
Smart Malmö	Focus on improving climate, and reducing greenhouse gases by 20%
Smart City of Malta (Malta)	Becoming an industrial city with advanced information technology, skills development and staff training in the field of technology
Smart City of Masdar	Becoming Smart Green City, Sustainable Development, Affordable Economic Growth, Providing High Quality of Life and Innovative Business Environment
Atlantic Planet (Plan IT)	With the goal of building the greenest city in the world from scratch and an operational pattern for the new generation of low carbon dioxide cities, saving on construction costs and higher quality.
Smart City of Singapore	Developing urban infrastructure, becoming an intelligent island with advanced intelligence infrastructure around the world, connecting computers in almost every home, office, school and factory, enhancing quality of life and economic growth.
Smart Curitiba	It seeks to achieve sustainable development and the integration of the Curitiba metropolitan area and addressing the rapidly growing demand for urban services due to population growth and economic growth.
Smart Songdo	Achieving a clever, green and self-contained urban environment that is environmentally friendly and energy saving is a key feature of it.
Eco-friendly City of Tianjin	It aims to be a model for developing cities in China that is socially compatible and environmentally friendly, protects resources and serves as a reference (reusable and scalable) for other cities.
Smart City of Vokehama	Addressing urban issues including pollution, traffic congestion, flood and waste management

the best city for the entire population.

● **Key Dimensions of Smart City**

Many researchers have divided this concept into several characteristics and dimensions in order to clarify what a smart city is doing and the reason for this is the complexity of the smart city as a comprehensive approach. Among them, Deirks and Keeling (2009) emphasized the importance of the organic integration of different systems (transportation, energy, education, health, buildings, physical infrastructure, food, water and public safety) in building a smart city. Researchers who support this smart city integration often believe that

in a dense environment such as cities, no system can operate in isolation. Komninos (2011) introduces four dimensions in an effort to map the characteristics of a smart city:

- The first dimension is : the use of a range of digital and electronic technologies for a cyber city, digital, information, or knowledge-based.
- The second dimension is the use of information technology to transform life and work.
- The third dimension is the introduction of information and communication technology in urban infrastructure.
- The fourth dimension deals with: directing

information and communication technology and people together to enhance innovation, learning and knowledge.

Giffinger et al. identified four components for the smart city: industry, education, partnership and infrastructure (Albino et al, 2015) Then they referred to the center for regional studies at the Vienna University of Technology for the six main components (diagram below) for the smart city, which has been emphasized by many authors in this area. The EU has ranked 70 medium cities on this basis. (Giffinger, Kramar & Haindl, 2008)

1. Smart economy refers to the competitiveness of a city based on its innovative approach to business, research and development, entrepreneurship opportunities, productivity, flexibility of labor markets and the city’s economic role in the national and international markets.
2. Smart people, pertains to providing a high level of consistent education to citizens, as well as describing the quality of social interactions, cultural awareness, open thinking and the level of citizen participation in social life.

3. Smart governance, specifically addresses citizens’ participation at the municipal level. The governing system is transparent and allows citizens to participate in decision-making. ICT facilitates the participation of citizens and access to information and data related to the management of their city. By creating a steady and effective system of governance, barriers to communication and collaboration can be eliminated.
4. Smart mobility supports more efficient transport systems (for example non-motorized options) and drives new social attitudes towards vehicle use that guarantees citizens’ access to public transportation. ICT boosts integrated productivity. Smart cities are seeking to promote the movement of people, goods and vehicles in a city environment.
5. Smart environment emphasizes the need for responsible resource management and the planning of sustainable cities. Natural beauty of the city can be enhanced by reducing greenhouse gas emissions and efforts to protect the environment. Smart cities promote energy efficiency, and the integration of technological innovation leads to productivity gains.
6. Smart living, seeks to improve the life quality of

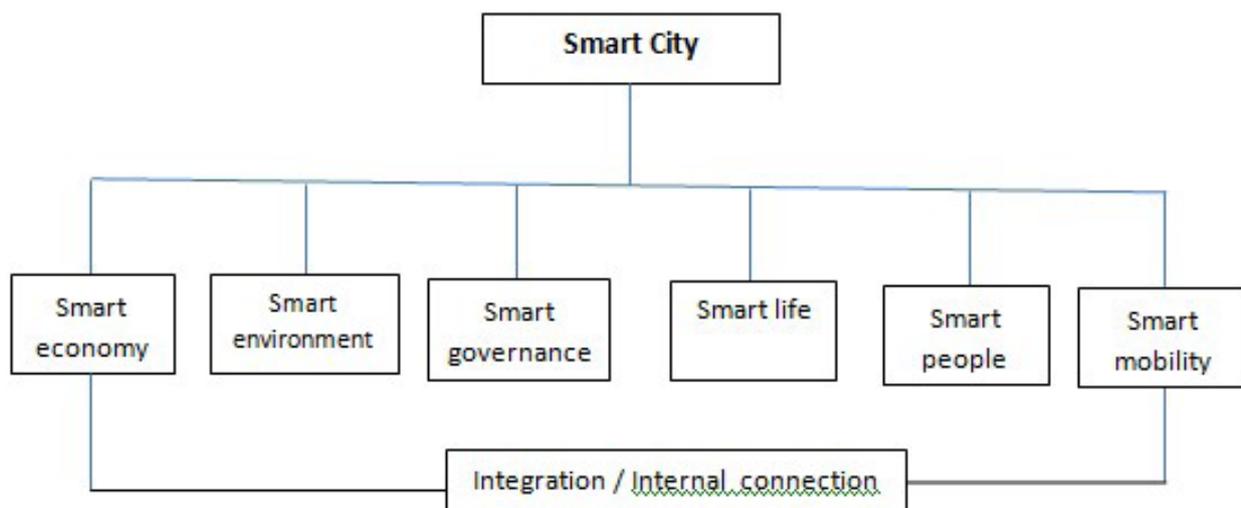


Fig. 2. The main components of the smart city. Source: Giffinger, et al., 2008.

citizens through the provision of safe and healthy living conditions. Citizens in smart cities have easy access to healthcare services and care, electronic health management and social services. Albino and Berardi (2015) have been reviewing key dimensions and smart city indicators since 2008 by various authors (Albino, et al., 2015), which are presented in the following. Many of the dimensions and elements that have been proposed by researchers in literature are often overlapping. According to these researchers, the dimensions of the six Giffinger et al. are more comprehensive regarding the interactions between them (Table 3).

● **Smart City Indicators**

For these six main factors, researchers have cited 33

sub-sections for measuring them in the city (Table 4) Albino and Berardi (2015) have been studying the smart city indexes since 2008 mentioned by various authors .

● **Challenging conventional beliefs (statements of facts)**

This discussion, to this point, explicitly focuses on smart plans as political and managerial innovations to create a balanced view of the technological issues that are currently being discussed and the less-discussed political and management discussions. Most smart city studies are technology-oriented and are optimistic about the future of smart city projects. Their findings are not wrong, but limited and incomplete. Extensive literature reviews of

Table 3. Key Dimensions of Smart City. Source: Albino, et al, 2015.

Dimensions	Source
IT education IT infrastructure IT economy quality of life	Mahizhnan,1999
economy mobility environment people governance	Giffinger et al, 2007
technology economic development job growth increased quality of life	Eger, 2009
economic socio-political issues of the city economic-technical-social issues of the environment interconnection instrumentation integration, applications and innovations	Nam&Pardo, 2011
management and organizations technology governance policy context people and communities economy built infrastructure natural environment	Chourabi et al., 2012

Table 4. Dimensions and Elements of Smart Cities. Source: Ferraro, 2013.

<b>SMART ECONOMY (Competitiveness)</b>	<b>SMART PEOPLE (Social and Human Capital)</b>
<ul style="list-style-type: none"> <li>▪ Innovative spirit</li> <li>▪ Entrepreneurship</li> <li>▪ Economic image &amp; trademarks</li> <li>▪ Productivity</li> <li>▪ Flexibility of labour market</li> <li>▪ International embeddedness</li> <li>▪ Ability to transform</li> </ul>	<ul style="list-style-type: none"> <li>▪ Level of qualification</li> <li>▪ Affinity to life long learning</li> <li>▪ Social and ethnic plurality</li> <li>▪ Flexibility</li> <li>▪ Creativity</li> <li>▪ Cosmopolitanism/Open-mindedness</li> <li>▪ Participation in public life</li> </ul>
<b>SMART GOVERNANCE (Participation)</b>	<b>SMART MOBILITY (Transport and ICT)</b>
<ul style="list-style-type: none"> <li>▪ Participation in decision-making</li> <li>▪ Public and social services</li> <li>▪ Transparent governance</li> <li>▪ Political strategies &amp; perspectives</li> </ul>	<ul style="list-style-type: none"> <li>▪ Local accessibility</li> <li>▪ (Inter-)national accessibility</li> <li>▪ Availability of ICT-infrastructure</li> <li>▪ Sustainable, innovative and safe transport systems</li> </ul>
<b>SMART ENVIRONMENT (Natural resources)</b>	<b>SMART LIVING (Quality of life)</b>
<ul style="list-style-type: none"> <li>▪ Attractivity of natural conditions</li> <li>▪ Pollution</li> <li>▪ Environmental protection</li> <li>▪ Sustainable resource management</li> </ul>	<ul style="list-style-type: none"> <li>▪ Cultural facilities</li> <li>▪ Health conditions</li> <li>▪ Individual safety</li> <li>▪ Housing quality</li> <li>▪ Education facilities</li> <li>▪ Touristic attractivity</li> <li>▪ Social cohesion</li> </ul>

Table 5. List of indicators for smart cities assessment in some rating systems.

Source: Albino, et al, 2015.

Indicators of a smart city	Number of indicators	Source
<p><b>smart economy:</b> Public expenditure on R&amp;D, Public expenditure on education, Per capita GDP of the city's population, Unemployment rate, . . .</p> <p><b>smart people:</b> Percentage of population with secondary-level education, Foreign language skills, Participation in life-long-learning, Individual level of computer skills, Patent applications per inhabitant, . . .</p> <p><b>smart governance:</b> Number of universities and research centers in the city, e-Government on-line availability, Percentage of households with Internet access at home, e-Government use by individuals, . . .</p> <p><b>smart environment:</b> ambitiousness of CO2 emission reduction strategy, Efficient use of electricity, Efficient use of water, Area in green space, Greenhouse gas emission intensity of energy consumption, Policies to contain urban sprawl, Proportion of recycled waste, . . .</p>	60	Lombardi et al, 2012
<p><b>smart living:</b> Proportion of the area for recreational sports and leisure time, Number of public libraries, Total book loans and other media, Museum visits, Theater and cinema attendance ,Pollution, Innovative spirits, CO2, Transparent governance, Sustainable resource management, Education facilities, Health, conditions, Sustainable, innovative and safe public transportation, Pedestrian areas, Cycle lanes, Green areas, Production of solid municipal waste, GWh household, Fuels, Political strategies and perspectives, Availability of ICT, infrastructure, Flexibility of labor market</p>	18	Lazaroiu and Roscia, 2012

e-Government projects, public sector innovation, and urban innovation reveal contradictory beliefs regarding (sometimes misleading) beliefs about a smart city. Therefore, the following statements provide messages to government officials and smart city researchers (Nam & Pardo, 2011). A smart city is not only a technological concept, but also a socioeconomic development; technology is clearly a prerequisite for a city. But the citizens' understanding of this concept is about developing a city community for a better quality of life. The adoption of up-to-date technologies in itself (by itself) does not facilitate the success of smart designs. Instead, innovation in management practices and political orientation makes it a livable city. The success of smart city projects is not determined by technology and capital investment. Success depends on leadership and inter-organizational coordination. Technology alone does not help any innovation (Kramer, 2003).

- Smart City is not system-oriented, but service oriented (the service-oriented); the ultimate goal of a smart city is to improve the overall quality of urban services. Creating an integrated system by itself is not the end of the way, but a mechanism through which delivery services and information are shared. Political and organizational innovation for a smart city, effective management of services and handling of service requests were identified through the governance.

- A smart city is not just a municipal phenomenon, but also a global and national movement; the world's largest metropolitan cities are now entering global competitiveness. Innovative plans of smart cities in these cities are building strategies for marketing a brand (urban brand). The impact of a smart and national city is beyond the urban limits.

- A smart city is not a single-element concept, but rather a multi-component concept; the scope of a smart city plan is beyond a sector or organization. A smart city is a new concept of cooperation and governance developed through electronic communications and communications, multi-level and multi sector governments, and all stakeholders, including

corporations, non-profit organizations and citizens.

- A smart city is not a revolution, but an evolution; some commentators have extracted an image of a revolutionary change about current smart cities. Considering the dimensions of smart city technology alone, this revolutionary image is presented; in other words, this revolutionary image is due to the attention paid to the dimensions of smart city technology, although this is part of the reality (somewhat correct). On the one hand, it may be due to the confusion between apparently revolutionary fruits and long-term strategies (really evolutionary) (Paskala, 2009 & Toppeta, 2010 & Martin & Simmie, 2008). Innovation is a long-term strategy, not a quick solution. On the other hand, we have to follow the long-term evolutionary path of innovation. While technology is changing rapidly, management changes slowly and even more slowly evolve (Dawes, Bloniarz, Kelly & Fletcher, 1999). Considering that we believe that a city could be an evolving city into a more intelligent city through innovation.

- A smart city does not replace physical structures, but a harmony between virtual worlds and material; The expectation that a smart city is beyond the limits of time and space is misleading. Because the physical context and geographical location still to lifestyle and administrative organizational performance is important. Although it's correct that a smart city has a strong potential to change our lives in some ways and to a certain extent by shrinking distance and time. A city in the near future must be able to achieve its prospects through the integrated connectivity of both the material and digital worlds. (Nam & Pardo, 2011).

#### ● **Challenges for smart cities**

Intelligence as an innovation brings about opportunities and risks. A smart city becomes the center for innovation in a laboratory for testing (Caimey & Speak, 2000), which necessarily entails inevitable risks (Emerged through untested and new experiments). The smart city initiative is not just an innovative stimulus, it's an attempt to manage the dangers of innovation. Failure in high risk management has led to a complete failure in public

sector innovation projects. So that 85 percent of IT projects because of challenges posed by the non-technical aspects of innovation in large parts (policy, organization and management of the associated risks) have failed. Common reasons include poor planning, poor business, lack of excellent managerial support and lack of leadership, lack of professional skills, mismatch between organizational goals and project goals, vulnerability to political fluctuations, excessive passion for technology and excessive political pragmatism, incompatibility between New and old management systems and the lack of technological know-how (Brown & Brudeney, 1998; Cat-Baril & Thompson, 1995; Cross, 2005; Dawes, et al., 2004; Goldfinch, 2007; Heeks, 2002). In addition, innovation in the public sector can be a contradiction (Abramson & Lawrence, 2001). Governmental organizations create, without competitive pressure, innovation and structural bureaucracy against change, resistance, or disruption. Existing hazards require a more sophisticated look at technology for effective political tools and management to address the risks of city intelligence (Jennings, 2010). The most important challenges face smart cities are as follow:

- Competitiveness and the inability of cities to compete on a global scale, due to the global cohesion of cities (Cosgrave & Tryphon 2012).
- The lack of financial support for the implementation of a smart city project (Giffinger, et al., 2010).
- The complex texture and the need to accompany the political agenda (Hodgkinson, 2011, Nam & pardo, 2011).
- Innovative projects and small-scale developments do not necessarily guarantee effective realization at a wider level of the city. (Pike Research, 2011).
- Failure in investments and ignoring local needs and priorities (Caragliu & Del Bo, 2012, Giffinger et al., 2010, Walters, 2011).
- Slow progress of projects due to budget issues and failures in attracting residents or capital (Vanloon, 2012; Brooker, 2008; Nordin, 2012).
- A unique focus on productivity can lead to a limited

view of social values such as social cohesion and the quality of city life and sustainability dimensions (Bria, 2012 ; Lind, 2012).

- Repetition of technology solutions involves risk. The same solution may not be appropriate for all cities (Pike Research, 2011, Sassen, 2011, Townsend, Maguire, Liebhold & Crawford, 2010).
  - The complex ecosystem of people, institutions and shareholders requires much effort for organizing and disciplining (Ratti & Townsend, 2011).
  - The infrastructure of existing smart cities can be obsolete and obstruct the realization of the smart city landscape (Pentikousis, Zhu & Wang, 2011).
  - Existing cities have many problems that compete for a share of resources in cities. Therefore, addressing all aspects of a smart city is not possible. Strategies should be based on prioritization.
  - The danger of social disagreements (Social inequality) among the population groups, knowledge and unequal access to information and communication technology (digital divide, expansion of social divide, and strengthening of spatial polarization((Chourabi et al., 2012, Coe et al., 2001, Marciano, 2012., Walters, 2011)).
  - Technology advancements and the complexity of cyberspace continue to lead to inequality within parts of society (Neves, 2009, Townsend, et al., 2010).
  - Issues and problems relating to privacy and the collection of personal information, security and oversight over the citizen (Bria, 2012, Haque, 2012).
  - Lack of trained staff and the need for frequent updates (Alawadhi, et al., 2012; Chourabi, et al., 2012; Aldama-nalda, et al, 2012).
  - The lack of equal access to cyberspace and uncertainty about the high volume of data and information (Neves, 2009).
- **Examining the status of Information and Communication Technology in Iran**
- At present, the cities of Iran, especially metropolitan areas, have many problems (traffic, pollution, overcrowding, class divisions, lack of service

spaces, etc.), taking into account the necessities and requirements for intelligence. In recent years, smart technologies have led to widespread changes in all areas of human life and have been regarded as a platform for the growth and development of other sectors in various dimensions. This has attracted the attention of many countries to increase their capacities and reduce their problems. Therefore, the future of nations in the present era will be more enthusiastic about digital technologies than ever before in history. In fact, using the virtual world, the use of physical equipment and realms is moderated, and cyberspace accelerates with the physical space of the city. In Iran, since 2005, measures have been taken in areas related to smart city (E-government), including the preparation of the National E-Government Strategy Paper (Presidential Information Technology Center, 2005), comprehensive E-Government planning (Supreme Information Council, 2009), and Map of E-government services (Vice President of Human Development and Human Capital Management, 2011). In addition, in the development plans, the third program (matters 103 and 124), the fourth program (matter 40), the fifth program (matter 46 and the assignment of a separate chapter entitled "Administrative system and IT management") on information and communication technology have been emphasized. In the development plans prior to the fifth program (2011), despite the provision of information and communication technology, a separate chapter was not allocated to ICT and its importance was not seen as a key development factor ((Information Technology Organization of Iran, 2012). This has caused the state of IT in Iran to be far from what is expected. However, it's not purely electronic to become smart, And attention to human infrastructure, content and applications tailored to the needs of citizens and stakeholders (sufficiently and on condition of updating). The basis for ICT development requires key prerequisites, access, literacy and content. Each of these is not effective alone. High-speed access and affordable access

to ICT services can be effective if the beneficiary can take advantage of the meaning and usefulness of the services and content provided through the technology. A need today for citizens' use of information technology in all daily activities which in many cases has not been fulfilled. At the end of 2016, about 47 percent of the world's population was the Internet user. This figure was just 2% in the last two decades. According to the International Telecommunication Union, the average indicator of ICT development (access, use and skill) in the developed countries is about 7/4% in 2016. This figure for developing countries is reported to be 4/7%. The value of this indicator for Iran is 4/99%, which is higher than the average in developing countries. Iran's position among 175 countries in 2016 is 89 .The sub-index internet access in Iran in 2016 is 6/26 (ranked 79 in the world), the index using the Internet, 2/74 (ranked 110 in the world) and the index of 96/6 skills (with Rank 65 in the world) .The remarkable thing about Iran is the huge difference between the amount below the access index and the use of information and communication technologies. This illustrates the imbalance between the amount of access and the use of information and communication technology. In addition, according to the United Nations Department of Economic and Social Affairs (based on three key dimensions of access to online services, telecommunication infrastructure and human capital), Iran ranked among 193 member countries with an average of 0/4507 in Asia (among 47 The country) ranked 30th and ranked 105 among all the member states of the United Nations. More ever, the rate of Iran's online services is 0/3701, which is lower than the average Asian countries (0/4652). In the telecommunication infrastructure index, it is lower than the average of Asia (0/3584), which is 0/2940. But in the human capital index, the situation is different, as it is slightly higher with 0/6882 than the average Asia (0/6615). In terms of electronic participation, Iran ranked 110 in the world (Information Technology Organization, 2015); (Table 6, 7).

Table 6. Status of Information and Communication Technology Indicators in Iran in 2015. Source: Information Technology Organization, 2015.

Country	total	online services	Telecommunication Infrastructure	Human Capital	Electronic Participation
Iran	0/4508	0/3701	0/2940	0/6882	0/2941
Asia	0/4951	0/4652	0/3584	0/6615	0/4506
the world	0/4712	0/3919	0/3650	0/6566	0/3947

Table 7. Status of Information and Communication Technology Indicators in Iran in 2014. Source: Statistics Center of Iran, 2014.

Description		total		Urban areas		Rural areas	
		Number	Percent	Number	Percent	Number	Percent
The household	Whole households	24299758	100	17988344	100	6311414	100
	At least with access to the phone	23977109	98/8	17854880	99/3	6122228	97
	At least with access to the computer (at home)	13938943	57/4	11658548	64/8	2280394	36/1
	Households with Internet access	13479815	55/5	11162417	62/1	2317398	36/7
Computer penetration rate per 100 people (percent)		38/4		48/3		21/4	
Percentage of mobile phone owner (6 years old and more)		63/9		72/5		62	
Mobile penetration rate in the country's population (percent)		71/7		80/5		70/8	
Internet penetration rate among 6-year-olds and more		41/6		52/1		26/6	

Iran is not well positioned in this regard, and it is in contradiction with the country's development goals, especially the 20-year vision document (2026). As in terms of telecommunication infrastructure index,

it has the largest distance to the global average. As a result, improving this index is a priority. Therefore, in order to enter the smart cityarena in Iran, the necessary requirements, especially the development

of telecommunication infrastructure, are at the top of the list, the production of content and applications tailored to the needs of citizens (subject to updating) in the second priority and attention to human capabilities (especially digital literacy ) In the third priority, in order to allow everyone to equalize to reduce the digital divide. Because surveys show that there is a deep gap in terms of ICT indicators not only in towns and villages, but also among different parts of the country's cities. If you do not pay attention to this matter in the long run could be irreparable risks. On the other hand, given that the world is moving towards smart cities. Cities and citizens are bound to join this process in order to interact and continue

their lives in different dimensions and play an active role. This, on the one hand, can have a negative effect on the development of the city and the loss of global and transnational opportunities and the unsuccessful production of it without providing the necessary requirements for the establishment of the smart city. On the other hand, if not implemented in an efficient and correct manner, in addition to technology dependence, it could marginalize segments of the population that are incapable of adapting to this new urban way of life. It could also hamper their ability to meet their needs within the city and in fact create a kind of social polarization and digital division.

## Conclusion

Building a smart city requires integrated measures at various levels of the municipality and social fabric. Smart city is a holistic concept that aims to confront the contemporary challenge and to take advantage of the latest opportunities provided by the advancements in information technology and communication and urbanization. Despite the widespread literature on the concept of smart city, there is still no clear consensus on this issue. And scholars from various scientific fields have suggested a variety of contents. Some smart technologies are considered as the only or least important component of the smart city, others have suggested definitions that go beyond technology and believe that adopting technology is not the end of the work. Technologies can be used in cities to empower citizens by adapting these technologies to their needs instead of adapting their lives to the requirements of technology. The study of large arrays in literature shows that the meaning of a smart city is multifaceted. The results of the analysis of the definitions and concepts of the smart city suggest that the following three are the key issues:

1. Infrastructures are central to the concept of smart city. Technology is an empowering factor for the smart city, but it is not necessarily the most critical factor. The combination, connectivity and integrity of systems and infrastructures to make smart a city is fundamental. The main systems are not discrete and separate and transformed into a multidimensional and complex network of interconnected multicast systems in a synergistic manner that distributes better performance.
2. Processes (how a smart city arises) are important in definitions. A key part of the smart city is a fundamental change in the way services are delivered. And the smart city is not primarily about technology, but about the development of services.
3. Vision for a better future is important. A smart city will have to predict smart economy, smart governance, smart mobility, smart environment, smart people ,smart living and how they interact. But having a vision for intelligent alone is not enough , and actions in the field of legislation, policy and organizational change are needed. On the other hand, infiltration of intelligence to each sub-system of a city is not enough to create a smart city, but these dimensions should be taken as an organic whole. The key point is that cities must be

responsive to the context in which they operate and what should be considered as intelligent depends on a variety of contexts (Texture and context) such as the political system, geographic conditions and technology diffusion. In fact, smart solutions can simply not be copied and need to be valued for different fields. In fact, there is no way to become smart, and different cities have adopted different methods that reflect the specific conditions. Cities cannot easily copy good methods, but must develop approaches that are appropriate to their conditions because there are two cities with the same conditions. Meanwhile, city executives should not solve all city problems, but instead should strengthen the capacity of urban systems to confront and deal with a wide range of issues and problems. The smart city model can be considered as a model of urban development in different parts of a country. The study of vast arrays in literature shows that different cities have pursued different goals in the field of intelligence. But all of them aim to pursue different goals, in accordance with the city's conditions and priorities, to improve the quality of life. In this regard, given the inadequate status and low status of Iran among the countries of the world, it is important to establish the necessary foundations (in terms of telecommunication infrastructure, content production and human capabilities, respectively).

## Endnote

1 . Gross Domestic Product

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