



## Identifying and evaluating smart city marketing parameters (Case study: Tabriz)

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### ABSTRACT

The main goal of this article is to investigate, identify, and rank the factors that influence the development of a sustainable smart city in Tabriz. The statistical population comprises all of Tabriz Municipality's managers, which number 257 at the moment. The data collected using a standard questionnaire of parameters from "A unique taxonomy of smart sustainable city metrics," which was randomly distributed. In addition, descriptive and inferential statistical techniques were used. Spss software is also used to analyze data using descriptive statistical methods and conclusions from sample tests and Friedman ranking tests, as well as to execute Econometric operations. The findings suggest that all of the variables affecting the improvement of a sustainable smart city in Tabriz have a direct and relatively strong relationship, with four variables affecting the marketing of a sustainable smart city. The socio-cultural parameter, which has an average rank of 3.80, the governance parameter, that has an average rank of 3.18, the second parameter, the environmental parameter with rank of 2.03, and the economic parameter, with rank of 1.00, all impact on the improvement of a sustainable smart city marketing..

## 1. Introduction

The city is a living thing. It is always changing and, according to many researchers, urban issues are a clear manifestation of civilization and a valuable sign of the human societies. The purpose of forming cities will be to create favorable living conditions for citizens and anywhere in the world. But on the other hand, the rapid growth of the city has created various problems that have manifested themselves in various forms. It has changed a lot, especially in recent decades. The dispersion of human settlements on earth has created many environmental problems. As a new idea of urban development, the concept of smart growth has gradually matured and has made great progress in many countries (Ameen, Mourshed, 2019). The concept of smart growth emphasizes the comprehensive and coordinated socio-

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economic development of resources and the environment and the intensive, focused and efficient development of the city by replacing the function of urban land use, controlling the dispersion of the urban border, protecting the environment and transforming the old city. Promotes. Given the smart growth of cities, researchers have studied this issue. Physical, economic, social, environmental and population development of the city are used as the main parameters to measure smart growth (Ali Akbari et al., 2019).

Accordingly, when the smart urban growth model is formed and the dynamic changes of each index are predicted and analyzed, and the impact of each index on the smart growth of the city and its effects on sustainable urban development in the future is studied, since the city of Tabriz Has problems such as lack or lack of proper infrastructure, disproportionate use, environmental problems, inequality in the distribution of services in each region and access to them, the importance of this issue is raised by examining growth parameters Smart in this city can identify shortcomings and provide solutions in this area (Imani, 1400). In order to solve the problems caused by the imbalances of the regions in terms of the parameters of smart urban growth, the first step is to identify and rank the regions in terms of cultural, social, economic, environmental and governance. In this regard, the mental gap of the present study has been based on the fact that we examine the status of the parameters affecting the improvement of a sustainable smart city in Tabriz (Zeynali Azim et al., 2021).

- Smart growth is the search for better planning options and techniques to adapt to continuous population growth. Smart growth is different from other growth-restrictive approaches because it favors growth. Smart growth considers urban growth in two ways. Redirecting growth to inner-city areas (endogenous) and limiting out-of-town expansion (preventing horizontal expansion of the city) will reduce both the wasteful use of capital and the wasteful consumption of natural resources. (Littman, 2020). In fact, smart growth is a tool-driven concept whose definitions are not widely agreed upon, but proponents of smart growth agree on the ten principles set out by the US Environmental Protection Agency. Smart Growth Strategy Ten basic principles including:
  - Mixed uses
  - Use of compact buildings
  - Creating different housing choice opportunities
  - Creating walkable neighborhoods
  - Creating distinctive and attractive communities with emphasis Strong on the concept of place
  - Protection of open spaces, fields, vulnerable natural and environmental beauties
  - Guiding and empowering development in current societies.
  - Creating diverse opportunities for transportation.
  - Predictable Focuses on making development decisions fair, equitable and fruitful; and
  - Encouraging citizens to participate sustainably in development decisions.

Acknowledging the fact that it is not possible for a society to conform to all these principles, but it must be borne in mind that these principles in any society that are implemented, must be in communication and harmony with each other, otherwise the desired result will not be achieved. Be (Haribabo, 2021).

In recent decades, the promotion of a sustainable urban future has become the focus of urban studies, and as a result, numerous urban concepts have been developed to promote urban sustainability. In the late 1980s and early 1990s, research on urban governance from an academic and policy perspective gradually increased. At the same time, a series of international conferences and initiatives focused on

the problem of instability, as well as highlighting sustainable urbanization and creating many ramifications. The Brantland Conference (1987) provided an initial definition of urban sustainability that was continuously improved and perfected in subsequent international sessions. Research on sustainable urbanization has since become much more detailed and complex, raising the need for systematic summarization to move towards sustainability. A comprehensive set of principles, strategies and concepts of urban planning was introduced by planners to harmonize traditional planning and design with the new and updated concept of sustainability (May et al., 2006).

The term "smart city" has reached great maturity and development and has gained considerable popularity among urban researchers. In the basics of the smart city, the trivial relationship between the environment, the economy and the Society has had less reflection on ecological sustainability than socio-economic sustainability (De Jong et al., 2015). These cases have led research in this field to new directions. Very new approaches in the study of "smart city" of various socio-economic issues, including improving economic and executive productivity with better networks and technologies to defend urban development to include and integrate all social classes for sustainable development and The generator explained a threefold economic, ecological and social structure (Hassan, Lee, 2015).

Irregular migration and rising natural population growth rate have faced the city of Tabriz with many challenges, including urbanization and increasing urban population, increasing migration to other cities and, consequently, the development of large and small cities and in The result has been devastating and catastrophic effects such as excessive energy consumption, deforestation and extinction of plant and animal species on the natural habitats of the planet, so that cities as the main place of human activities and the largest consumer Natural resources are threatening the planet. Other crises caused by population growth in cities include air pollution, noise, poverty, traffic, lack of citizen participation, inadequate administrative management, inability to provide services and good urban management due to lack of necessary infrastructure in Tabriz. In this way, traditional methods and management no longer meet the problems and needs of today's societies and new solutions must be considered and adopted to solve the problems of the current city.

In this regard, the idea of the smart city of Tabriz with the aim of meeting the needs and problems and providing comfort to citizens, preserving natural and cultural resources, fair distribution of costs, proximity to nature, solving traffic problems, improving transportation infrastructure, roads Communication, cultural, social, information and communication, resource management and energy waste and environmental challenges through Transformation of lifestyles and activities, planning, design, development and modernization of communities has been proposed. Smart City is based on a wide range of technologies and technologies such as information and communication, electronics, intelligent transportation, intelligent building systems and advanced control structures (Saberifar, 2020). The main purpose of this study is to identify and rank the parameters affecting the improvement of a sustainable smart city in the city of Tabriz. Therefore, while identifying the parameters affecting the improvement of a sustainable smart city according to the managers and employees of Tabriz Municipality, the researcher seeks their ranking and other sub-indicators related to the main parameter. According to the contents of this research, it tries to answer the question that parameters are effective in improving the sustainable smart city in Tabriz or not.

## **2. Literature Review**

A lot of research has been done on this topic, and below we will review some examples of foreign and domestic research:

Zeynali Azim et al. (2021), in a study entitled "Study and measurement of environmental sustainability in the city of Tabriz based on environmental indicators of smart urban growth." The purpose of the

above research is to measure the environmental sustainability of Tabriz city based on environmental indicators of smart urban growth. The findings of the above research show that for environmental sustainability in Tabriz, among the environmental indicators of urban smart growth, air pollution index, green space and outdoor space, respectively, with coefficients extracted based on the structural model of the research, 0.825, 0.799 and 0.781 have the most and waste production with a coefficient of 0.705 has the least impact. The results of the above research showed that in order to achieve environmental sustainability in the city of Tabriz, much attention should be paid to the environmental indicators of smart growth.

Blasi in 2022 investigated the effect of ranking the components and indicators of the smart city in the 22nd metropolitan area of Tehran. The main purpose of the above research is to review and rank the components and indicators of the smart city in the 22nd metropolitan area of Tehran. The results of the above research showed that in order to be smart in this area, it is necessary to look at all these dimensions together in order to create a sustainable environment. The results of statistical analysis of T-test also confirm this, and based on this, the indicators of governance, environment and intelligent dynamics are at a reasonable level, and the indicators of citizen, life and smart economy are at a moderate level.

Lee and Ren (2019), a new evaluation model for urban smart growth based on the components of neural network main regression and radial performance, state that smart growth is widely accepted by urban planners as an innovative approach. , Which can lead a city to a modern city that is environmentally friendly. Therefore, determining the degree of intelligent growth is quite significant. To determine the degree of sustainability, an assessment of the level of urban smart growth is presented, which is examined by the main components of regression (PCR) and radial basis function neural network (RBF).

Litman (2020), in a study entitled Smart Urban Growth and the Benefits of Intensive City, states that smart growth involves a variety of policies that lead to intensive, multi-state development. Credible research shows that residents of the smart growth community consume less land, have fewer vehicles, drive less, rely more on alternative modes, have lower transportation costs, and have a lower accident rate. They reduce driving, consume less energy and have less pollution than scattered amounts, increasing productivity and economic development. Smart growth can also increase some costs, including land unit costs (land price per hectare) and local traffic and parking congestion, all of which must be considered when evaluating development policies.

Pira (2021) in a study entitled A new study and classification of smart indicators of a sustainable city. In the above research, building a smart city that follows the goals of sustainability, increases the quality of life and preserves environmental, human and social capital. However, existing smart sustainable city projects focus on the technological dimensions of smart cities, such as the use of big data or smart devices to pursue sustainable goals. At present, there is no comprehensive classification of the characteristics of a smart sustainable city in the literature. The purpose of this research is to discover these indicators by considering the common features of the concepts of sustainability and smart city. Two rounds of content analysis technique were used to examine the semantic, lexical and conceptual relationships between smart city and sustainability indicators. The findings provide a new set of indicators that enable policymakers and researchers to consider the intelligence and sustainability of their projects simultaneously. This includes socio-cultural, economic, environmental and governance categories with 28 related indicators. The result of the above research presents a unique combination of smart sustainable city characteristics by considering the key elements of sustainability and smart city concepts. Academics and policymakers can also use this set of indicators as a guide to building a sustainable, intelligent society.

## 3. Theoretical Foundations

### 3.1. Smart City Marketing

Smart city is a concept that has attracted a lot of attention in urban planning in recent years. The first step to creating a smart city is to understand its meaning. The concept of smart city has been developed in three main areas:

- academic
- industrial and
- governmental

For services firms in the market, regardless of the ownership issue of prices is very important. Prices are in close relationship with all the variables of marketing determine amount of sales, the profitability of the company, its viability and financial stability (Samadi-Parviznejad, 2021)

In general, academic literature has a holistic and comprehensive approach and covers a wide range of topics and focuses mainly on improvement in the 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, productivity and sustainable environment and social development are the main goals of smart cities. Finally, government literature focuses more on international challenges including quality of life, economic growth, environment, energy, sustainability, safety, health, and mobility (David et al., 2015)

Here are some definitions of smart city:

A city that connects physical infrastructure, information technology infrastructure, social infrastructure, and business infrastructure to strengthen the city's collective intelligence.

Smart cities are known as areas with high capacity for learning and innovation, which are based on the creativity of citizens, institutions, knowledge-based organizations and their digital infrastructure to communicate and manage knowledge.

Smart cities are the result of creative and knowledge-based strategies that aim to enhance the competitive, supportive, ecological, socio-economic performance of cities. Such smart cities are based on a promising combination of human capital (skilled labor), infrastructure capital (high-tech communication facilities), social capital (open and intensive network communications), and entrepreneurial capital.

Smart cities are highly productive, as well as having a high proportion of people with higher education, knowledge-based jobs, output-oriented planning systems, creative activities and sustainable-oriented initiatives. Smart city refers to a local institution, department, city, region or small town that adopts a comprehensive approach to the application of information technologies with real-time analysis and encourages sustainable economic development. A society that has a moderate level of technology, Cohesion and integration, stability, comfort, attractiveness and safety. The use of information and communication technology (ICT) with their effects on human capital, communication capital, social and environmental issues, which is often illustrated by the concept of smart cities.

A smart city provides information to its physical infrastructure to improve comfort, facilitate movement, increase efficiency, conserve energy, improve climate quality, identify and resolve issues, rapid post-accident reconstruction, and collect data for Injects better decision-making, efficient use of resources, and data sharing to enable collaboration between institutions and departments.

The smart or creative city experience aims to foster a creative economy by investing in quality of life, which in turn attracts highly knowledgeable employees to live and work in the smart city (Ahmadpour et al, 2018).

### **3.2. Sustainable Smart City**

Most of the environmental damage and instability in development are the consequences of urbanization and industrial development, so the most important points for impact and change of direction towards sustainable development originate from urban centers. It seems that the application of technology capabilities in all urban sectors, along with the emphasis on the integration of communications and information, measurement and control of hardware and applications can remove the barriers facing cities in the field of intelligence and provide a basis for promoting their attractiveness and sustainability (Adelova Akande et al., 2019).

A sustainable smart city is an innovative city that uses information and communication technology and other tools to improve the quality of life, efficiency of urban operations and urban services, and increase the competitive advantage of cities, while ensuring that the needs of the generation Satisfy present and future with respect for the economic, social, environmental, and cultural aspects. Sustainable marketing involves the development and promotion of products and services that meet customers' needs in terms of quality, efficiency, price, and convenience without having a detrimental effect on the environment, society, or economy (Nozari, 2021). In general, sustainable development means achieving social and economic progress without affecting the natural balance of the environment (Najafi et al., 2022). The ability of a city to maintain ecosystem balance while the city's services and affairs are in progress is known as sustainability. Cultural-social, economic, environmental, and governance infrastructures are considered the four pillars of a smart city (Mahdizadeh, 2021).

## **4. Scope of Study**

East Azarbaijan province with a population of 3909652 is one of the Turkic provinces of Iran that Tabriz, the capital of East Azarbaijan province, is located in its northwestern region (Faramarzi et al., 1397). The capital of Tabriz province with a population of 1593,373 people is 42% of the province's population. Based on the physical divisions of the master plan, this city is divided into 10 regions (Zeynali, 2022). Tabriz's share of the worn-out urban fabric of the province is 2522 hectares. The city of Tabriz is located at 46 degrees and 25 minutes east longitude and 38 degrees and two minutes north latitude of the Greenwich meridian. Its altitude is 1400 meters above sea level. With an area of about 11,800 km, it is located in the middle territory of the Azerbaijan region, in the eastern part of Lake Urmia and 619 km west of Tehran. It is located 150 km south of Julfa, the border between Iran and the Republic of Azerbaijan (Faramarzi et al., 2018).

The population of Tabriz is more than one and a half million people. Tabriz is bounded on the south by a single snow-capped mountain range, Sahand, and on the northeast by the Red Fam (Aoun Ibn Ali Einali) mountain. Aji Chai River (Talkheh Rud) passes through the north and northwest of Tabriz and after a considerable distance in the plain of Tabriz, flows into Lake Urmia and Mehranrood passes through the middle of Tabriz, which is mostly in different seasons of the year. Tabriz once had wonderful and famous gardens and farms, along with numerous aqueducts and springs, but today all those gardens and farms have been destroyed or are about to disappear, and the surrounding city is surrounded by residential areas. Has made commercial, administrative, industrial and service converters (Asghari et al., 2021).

## 5. Methodology

The conceptual model of the research entitled Identifying and ranking the parameters affecting the improvement of a sustainable smart city (Case study: Tabriz city) is shown in Figure 1.

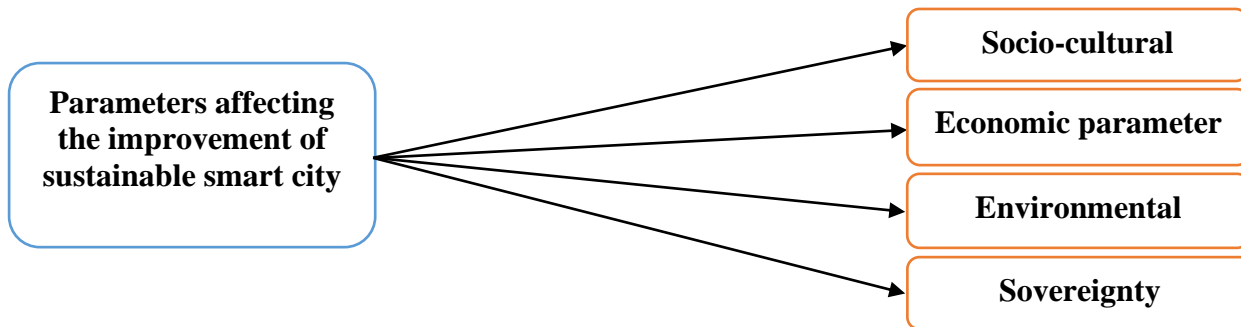


Fig.1. Conceptual model of research

This research is applied in terms of the purpose of implementation. Applied research is research that is done to solve a specific scientific or social problem or dilemma. Also, the present study is a combination of survey method. One of the most common methods of data collection in survey research method is personal interview and the use of a questionnaire. In this research, the researcher collects data from the standard city parameters questionnaire. Milad and Pira in 2021, has been used and distributed randomly, which is related to research questions and variables. Also, this research is cross-sectional in terms of research execution time and is inductive in terms of execution logic, and the research method is descriptive in terms of execution method (because variables are not manipulated by the researcher and their current status is identified), Survey and It is of the correlation type (because the relationship between the research variables is measured).

The main and sub question of this research are:

Are the parameters affecting the improvement of a sustainable smart city in the city of Tabriz important?

Do the existence of socio-cultural parameters for the improvement of a sustainable smart city in the city of Tabriz, have a degree of importance?

Do the existence of economic parameters for the improvement of a sustainable smart city in the city of Tabriz, have a degree of importance?

Are the existence of environmental parameters of equal importance in improving a sustainable smart city in the city of Tabriz?

Do the existence of a governance parameter for the improvement of a sustainable smart city in the city of Tabriz have any degree of importance?

## 6. Research Finding

In the present study, the statistical population includes all managers of Tabriz Municipality, which currently includes 257 managers of Tabriz Municipality. In addition, 154 municipal managers were selected as a statistical sample using Cochran sampling method. Due to the nature of this research, the library method has been used to collect the required information. Theoretical topics of the research have been collected through the study of sources, publications, internal and external sources in books and the use of the Internet. That is, the information and data required for the research is generally done by the

library method. Finally, descriptive and inferential statistical methods are used to analyze the information in this research. This research uses descriptive statistical methods (mean, median, mode, standard deviation, minimum, maximum, skewness and elongation) and inferences from sample t-tests and Friedman ranking test to perform operations. Econometrics also uses Spss software.

**Table 1- Research variables and measuring their reliability**

Variables	Component / dimensions	Questions	Reliability coefficient
Stable smart city parameters	Socio-cultural parameter	1 to 14	./711
	Economic parameter	15 to 20	./788
	Environmental parameter	21 to 30	./767
	Sovereignty parameter	31 to 43	./763
Total questions of sustainable smart city parameters		1 to 43	./873

A questionnaire was used to determine the validity of the questionnaire using the opinions of supervisors, consultants and suggestions of experts. Cronbach's alpha test was also used for the reliability of the variables. The socio-cultural parameter variable has a reliability of 0.711, the economic parameter variable has a reliability of 0.788, the environmental parameter variable has a reliability of 0.767 and the governance parameter variable has a reliability. Therefore, all four variables of the present study had a good reliability according to table 1.

In the present study, four influential parameters (socio-cultural parameter, economic parameter, environment and governance) on the improvement of a sustainable smart city are identified and ranked. These four parameters are the most important parameters affecting the improvement of the stability of the smart city of Tabriz. While identifying them, the researcher will rank these parameters according to Friedman test and the purpose of this ranking is to help the responsible institutions in the field of intelligence to make the city of Tabriz in the best way intelligent. Each of these parameters, in turn, has a direct impact on the improvement of the smart city, which the researcher has tried to identify in this article, to have the best output for public and private organizations in the city of Tabriz.

The research variables in terms of normality examined in Table 2:

**Table 2- Test of normality of the studied variables**

Variable	Sample size	Test statistics	The significance level
Parameters affecting the improvement of the smart city	154	0/091	0/003
Socio-cultural parameter	154	0/060	0/200
Economic parameter	154	0/114	0/047
Environmental parameter	154	0/072	0/000
Sovereignty parameter	154	0/103	0/003

According to Table 2 - the results of the Kolmogorov-Smirnov test (given that all levels of significance are greater than 0.05) the assumption that the data are normal is rejected in this study to determine the



research objectives of the test. Non-parametric statistical tests such as sample t-test and Friedman test will also be used.

Using the independent t-test, the main hypothesis is tested according to Table 3.

**Table 3 - Results of one-sample t-test**

Variable	Average	The standard deviation	Number T	Significance level	Assurance distance		Hypothesis zero	The importance of variables in society
					Low limit	High limit		
Parameters affecting the improvement of a sustainable smart city in the city of Tabriz	56/045	5/006	137/686	0/000	54/748	56/342	Rejected	Very high

In Table 3, the significance level of the test is zero. Due to the fact that the significance level is less than 0.05, the null hypothesis is rejected and the opposite hypothesis is confirmed and due to the positive upper and lower confidence limits, the effective parameters are estimated to be more than average. In other words; Parameters affecting the improvement of a sustainable smart city in the city of Tabriz are of great importance. In order to rank the importance of the parameters affecting the improvement of a sustainable smart city in the city of Tabriz, Friedman ranking is used, the results of which are as follows in table4:

**Table 4. Friedman test**

Variables	Average rating
Socio-cultural parameter	3/80
Economic parameter	1/00
Environmental parameter	2/03
Sovereignty parameter	3/18

According to the results obtained from Table 4, Comparison of average rankings can be said; Socio-cultural and governance parameters with an average of 3.80 and 3.18, respectively, have the highest rank and the most effective parameters on improving a sustainable smart city in Tabriz and environmental and economic parameters have a lower rank and the least effective parameters on improving a sustainable smart city in Is the city of Tabriz. According to Table 5, the non-uniformity of the rank of the parameters is calculated:

**Table 5. Inequality of parameter factors**

Variables	Average rating
N	154
Chi-square	429/341
Df	3
Sig	0/000

To answer the question of the research, independent t-test we used according to Tble6:

**Table 6. Results of one-sample t-test**

Variable	Average	The standard deviation	the amount of T	Significance level	Assurance distance		Hypothesis zero	The level of variables in society
					Low limit	upper limit		
Social-cultural	3/335	56/04545	138/925	0/000	55/2485	56/8424	Rejected	Too much
Economical	3/421	23/02597	106/865	0/000	22/6003	23/5616	Rejected	Too much
environmental	3/420	38/58442	88/139	0/000	37/7196	39/4493	Rejected	Too much
Government	3/490	51/47403	105/618	0/000	50/5112	52/4368	Rejected	Too much

In Table 6, the significance level of the test is zero. Due to the fact that the significance level of less than 0.05 is zero, the null hypothesis is rejected and the opposite hypothesis is confirmed and due to the positive upper and lower confidence limits, the factors affecting the improvement of a sustainable smart city in Tabriz are more than average. In other words; Parameters affecting the improvement of a sustainable smart city in the city of Tabriz have a very high level. Then, in order to rank the importance of the effective parameter (socio-cultural, economic, environmental and governance) on the improvement of a sustainable smart city in the city of Tabriz, Friedman ranking is used, the results of which are described in Table 7:

**Table 7. Friedman test of research variables**

Socio-cultural parameter														
question s	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Average rating	6/6	8/1	4/9	9/2	7/3	8/9	8/5	9/1	9/3	5/1	5/8	8/7	6/7	6/0
	8	9	3	4	9	8	5	9	8	1	2	6	4	4
Economic parameter														
question s	15	16	17	18	19	20	--	--	--	--	--	--	--	--
Average rating	2/8	3/4	2/8	3/7	4/5	3/5	--	--	--	--	--	--	--	--
	3	9	6	2	3	8	--	--	--	--	--	--	--	--
Environmental parameter														
question s	21	22	23	24	25	26	27	28	29	30	--	--	--	--
Average rating	6/1	4/7	4/4	5/2	6/0	5/0	4/7	6/4	5/8	6/2	--	--	--	--
	7	6	7	0	7	1	7	3	3	8	--	--	--	--
Sovereignty parameter														
question s	31	32	33	34	35	36	37	38	39	40	41	42	43	--
Average rating	6/9	7/6	5/7	6/9	8/3	8/6	7/2	6/6	5/9	5/5	6/7	7/5	7/0	--
	4	6	1	9	8	0	1	4	5	3	4	8	7	--

According to the results obtained from Table7 Comparison of average rankings can be said: Question 9; The level of education progress with an average of 9.38 has the highest rank and the most influential and the third question; The prevalence of contraception with an average rank of 4.93 has the lowest rank and the least effective socio-cultural parameter on improving a sustainable smart city in the city of Tabriz and the average rank of the rest of the socio-cultural parameter questions is obtained according to Table

7. Also, according to the results obtained from Table 7 Comparison of average rankings can be said: Question 19; Employment rate with an average of 4.53 has the highest rank and the most influential and the fifteenth question; Percentage of residents with housing shortage in each of the 5 cases, including: drinking water, sanitation, overcrowding, inadequate material quality, or lack of electricity with an average rating of 2.83 with the lowest rating and the least effective economic parameter on improving the smart city They are stable in the city of Tabriz and the average rank of the rest of the economic parameter questions is obtained according to Table 7.

In the following, according to the results obtained from Table 7 Comparison of the average rankings can be said; Question 28; Waste recycling and reuse with an average of 6.43 has the highest rank and the most effective and the twenty-third question; Measurements of airborne particles such as ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide emissions with an average rating of 4.47 have the lowest rating and the least effective environmental parameters on improving a sustainable smart city in Tabriz and the average rating of the rest. The environmental parameter questions are also obtained according to Table 7.

Finally, according to the results obtained from Table 7- Comparison of average rankings can be said; Question thirty-six; Availability of a multi-faceted transportation program with at least three integrated services with an average of 8.60 with the highest rank and the most influential question 40; Percentage of non-motorized transport trips of the total transportation with an average rank of 53.5 have the lowest rank and the least effective governance parameter on improving a sustainable smart city in Tabriz and the average rank of the rest of the governance parameter questions is obtained according to Table 7.

In the following, you can see the situation of inequality of the rank of the four socio-cultural, economic, environmental and governance parameters according to Tables 8 to 11:

**Table 8. Lack of resistance in ranking socio-cultural factors**

Variables	Average rating
N	154
Chi-square	386/375
Df	13
Sig	0/000

According to Table 8- for the socio-cultural parameter and since sig (significance level) is less than 5%, the claim that the socio-cultural parameter factors have the same rank on improving a sustainable smart city in the city of Tabriz is not accepted.

**Table 9. Non-uniform ranking of economic parameter factors**

Variables	Average rating
N	154
Chi-square	119/951
Df	5
Sig	0/000

According to Table 9 - for the economic parameter and since sig (significance level) is less than 5%, the claim of the same rank of economic parameter factors on the improvement of a sustainable smart city in the city of Tabriz is not accepted.

**Table 10. Non-uniform ranking of environmental parameter factors**

Variables	Average rating
N	154
Chi-square	115/870
Df	9
Sig	0/000

According to Table 10 - for the environmental parameter and since sig (significance level) is less than 5%, the claim that the environmental parameter factors are the same on the improvement of a sustainable smart city in the city of Tabriz is not accepted.

**Table 11. Non-uniform ranking of governance parameter factors**

Variables	Average rating
N	154
Chi-square	151/958
Df	9
Sig	0/000

According to Table 10 - for the governance parameter and since sig (significance level) is less than 5%, the claim that the governance parameter factors are the same on the improvement of a sustainable smart city in the city of Tabriz is not accepted.

## 7. Conclusions

From the perspective of Tabriz municipal managers for effective parameters (43 effective parameters) affecting the improvement of a sustainable smart city that has 14 effective socio-cultural parameters with an average rating of 3.80, the first and most important parameter and 13 effective governance parameters with an average rating 3.18 The second parameter and 10 effective environmental parameters with an average rating of 2.03 The third parameter and finally the fourth parameter that has 6 economically effective parameters with an average rating of 1.00 were identified. Therefore, it can be concluded that the four influential parameters (socio-cultural, governance, environmental and economic) are not of equal importance and according to Friedman test, socio-cultural, governance, environmental and economic parameters are not equally important and each They have a separate degree of importance, respectively.

Each of the four variables (socio-cultural, governance, environmental and economic) that socio-cultural parameters were determined according to the opinion of Tabriz city managers and using Friedman statistical test method. The 14 influential parameters in the socio-cultural variable, Education achievement level parameter with an average rank of 9.38% of the first rank, parameter of the amount of population that has access to safe drinking water with an average rank of 9.24% of the second rank, parameter of the number of educational services with an average rank of 9.19 Third rank percentage, percentage of residents with a unified health record that facilitates patient access and health care provider

access to complete medical records, with an average rank of 8.98%, fourth rank, population growth rate parameter, with average rankings 76.8% of the fifth rank, the parameter of nutritional status of the population with an average rank of 8.55% in the sixth rank, the parameter of immunization against infectious diseases with an average of 8.19% of the seventh rank, the parameter of the number of civic participation activities provided by the municipality last year With an average rank of 6.74% in the eighth rank, the parameter of the amount of population that has access to basic health facilities with an average rank of 6.68% in the ninth, the parameter of voter participation in the last municipal elections (percentage of eligible) with an average rank of 6.04% 10th rank, population growth rate parameter with an average rank of 5.82%, 11th rank, male parameter Violent crime per 100,000 population with an average rank of 5.11 percent in the twelfth rank, the parameter of the prevalence of contraception with an average rank of 4.93 in the thirteenth rank and the parameter of the population with access to safe drinking water with an average rank of 24 / 4 ranked 14th in the socio-cultural variable on improving a sustainable smart city in the city of Tabriz. In addition, according to the managers of Tabriz Municipality, 13 effective parameters in the governance variable, The parameter of the availability of a multimodal transport program with at least three integrated services with an average rank of 8.60% of the first rank, the parameter of the number of public transport services (such as: bus, train, subway, etc.) that provide simultaneous information to The public offer, with an average rank of 8.38% of the second rank, the parameter of the existence of privacy policy in the city to protect the confidential data of citizens with an average rank of 7.66% of the third rank, the parameter of the number of common vehicles per capita , With an average rank of 7.58%, the fourth rank, the parameter of the number of Internet subscribers per 1000 population, with an average rank of 7.21%, the fifth rank, the parameter of the number of electric charging (EV) stations in the city, With an average rating of 7.07% in the sixth rank, the parameter of the percentage of traffic lights connected to the real-time traffic management system with an average of 6.99% in the seventh rank, the parameter of free public access to a set of data (open data usage), with Average rank of 6.94% in the eighth rank, the parameter of the integrated fare system for public transportation, with an average rank of 6.74% in the ninth, the parameter of the percentage of commercial users And residential with internet download speed of at least one Gbps with an average rating of 6.64 percent, tenth rank, the parameter of economic and human damage caused by natural disasters with an average rating of 5.95 percent, eleventh rank, the parameter of demand-based pricing such as toll lines with Variable prices, parking places with variable prices with an average rank of 5.71 percent in the twelfth rank and the parameter of the percentage of non-motorized transport trips of total transport with an average rank of 5.53 in the thirteenth rank in the governing variable on improving the smart city Sustainable in the city of Tabriz. Also, according to the managers of Tabriz Municipality, from 10 parameters.

Affecting the environmental variable; Waste recycling and reuse parameter with an average rating of 6.43% of the first rank, percentage parameter of residential, commercial and industrial buildings with smart meters with an average rating of 6.28% of the second rank, green area parameter per 100,000 (Per square meter) with an average rating of 6.17%, the third rank, the parameter of the share of renewable energy consumption with an average rating of 6.07%, the fourth rank, the parameter of the number of buildings with LEED or BREAM certificate in the city with an average rating 83 5.83% of the fifth rank, the parameter of annual energy consumption per year with an average rank of 5.20% in the sixth rank, the parameter of energy consumption intensity with an average of 5.1% in the seventh rank, the parameter of industrial and municipal solid waste production, waste production  $\rightarrow$  Hazardous and radioactive waste production with an average rank of 4.77% in the eighth rank, the parameter of environmental concentration of air pollutants in urban areas with an average rank of 4.76% in the ninth and the parameter of measuring airborne particles including ozone, di Nitrous oxide, sulfur dioxide and carbon monoxide emissions with an average of 4.47% rank tenth in the environmental variable Every

stable smart in the city of Tabriz is dedicated to themselves. In the end, according to the managers of Tabriz Municipality, 6 effective parameters in the economic variable, Employment rate parameter with average rank of 4.53% first rank, poverty rate parameter with average rank of 3.72% second rank, labor force percentage (LF) parameter involved in creative industries with average rank of 3.58% third rank, the parameter of the number of new start-ups based on opportunity per year with an average rank of 3.49% Fourth rank, the parameter of the number of participants in international congresses and exhibitions with an average rank of 2.86 The fifth rank percentage and the parameter of the percentage of residents with housing shortage in each of the 5 items, including: drinking water, sanitation, overcrowding, inadequate material quality, or electricity shortage with an average rating of 2.83% in the sixth rank in the variable The economy is dedicated to improving the sustainable smart city in the city of Tabriz.

In the end it should be said; With IT infrastructure and bandwidth, let's bring the different stakeholders of this industry together so that everyone does not do something on their own. The most important solution in smartening cities is in the first step to identify the current situation in cities in different areas so that in the beginning all smartening programs are planned based on existing assets and in the next steps planning is done based on infrastructure and then the necessary infrastructure, one of the smartest solutions In order to accelerate and develop in such projects, the first step is to develop the concept of intelligence at different levels of society and sensitize different working groups in line with the smartening of urban management. The development of the concept of intelligence causes various working groups to provide content and implement new technologies with a focus on the smart city, which gives the opportunity to city managers to make the project of urban management intelligent with completely native and familiar teams. Implement with the social and cultural conditions of the community, this will increase the acceptance of this style of projects at different social levels and increase the growth rate of technology natively in this area, which is promising business development and social intelligence. It is among the people. For many cities, the key to implementing smart digital technology is sustainable development. In large cities, digital technology can be used to intelligently monitor the energy consumption of buildings. As a result, a central control system of energy consumption of residential and commercial buildings is minimized and the common interests of buildings are preserved. Even tasks such as fire services, weather control, air conditioning and lighting, etc. can be easily achieved. Will be in control. Research predicts that cities could save nearly \$ 19 billion by smartening in the next few years. To save money, you must first spend money. The global smart city market is projected to raise \$ 15 billion over the next few years, and that's just software development. As a result, the use of smart city control and monitoring systems reduces energy consumption and costs of buildings, and ultimately stores resources such as energy and money.

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