



## Electronic cities' strategic planning case study: uremia city, Iran

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### Abstract

Electronic cities result from the implication of information and communication technology (ICT) in the contemporary era. Significant ICT development and internet network expansion as well as the need of urban management to new ideas in managing cities lead us toward a new strategy called "electronic cities". The current study aims at investigating the Electronic Cities' Strategic Planning Case Study: Uremia, Iran. The research method is documentary and survey research population consists of managers and specialists working in Uremia's urban planning and ICT, obtained from Morgan table. To collect data, Likert spectrum is employed. Findings indicate that the most important challenges in the way of establishing an electronic city include the lack of strategic document for urban development, high number of decision-making centers and administrative extra parallel works among them, the inclination of the urban managers toward traditional methods, low-speed, high-cost internet connection, the lack of infrastructures for ICT, the lack of digital literacy among citizens and so on. With respect to ANOVA results, findings indicate that some of the sub elements play a key role in the establishment of electronic cities. Concerning the inequality of the role of factors effective on the establishment of electronic cities, each factor's sub elements has been ranked through multi-criteria decision making techniques and TOPSIS model. According to the findings, some strategies have been recommended, which need the serious care of urban managers and planners in the metropolitan Uremia.

**Keywords:** Strategic planning, Electronic city, Uremia city, SWOT and TOPSIS model.

### 1. Introduction

The twentieth century witnessed the rapid urbanization of the world's population. The global Proportion of urban population increased from a mere 13 per cent in 1900 to 29 per cent in 1950 and, according to the 2005 Revision of World Urbanization Prospects, reached 49 per cent in 2005. Since the world is projected to continue to urbanize, 60 per cent of the global population is expected to live in cities by 2030. The rising numbers of urban dwellers give the best indication of the scale of these unprecedented trends: the urban population increased from 220 million in 1900 to 732 million in 1950, and is estimated to have reached 3.2 billion in 2005, thus more than quadrupling since 1950. According to the latest United Nations population projections, 4.9 billion people are expected to be urban dwellers in 2030 [1].

By 2010, 12 of the 21 mega-cities in the world are expected to be in Asia. Tokyo, the largest, is projected to

have a population of 35.4 million, followed by Mumbai (20.0 million), Delhi (16.9), Shanghai (15.7), Kolkata (15.5), Jakarta (15.2), Dhaka (14.6), Karachi (13.2), Manila (11.7), Beijing (11.7), Osaka-Kobe (11.3), and Istanbul (10.5). By 2015, Guangzhou with a population of 10.4 million may qualify as a mega-city. Not too far behind are nine other Asian cities with large populations including Seoul (9.5 million), Shenzhen (8.9), Lahore (8.3), Wuhan (8.2), Tianjin (8.1), Bangalore (7.9), Hong Kong (7.8), Bangkok (7.4) and Hyderabad (7.4) [2]. Urbanization is progressing rapidly in the less developed regions and urban population is anticipated to grow an average 2.3% per year in the developing world between 2000 and 2030 [3]. Since 2008, more than half of the world's population is living in urban areas. The number of urban residents is expected to continue to grow, especially in developing countries. In Asia some 1.1 billion are anticipated to move to cities in the next 20 years [4].

According to Statistical Year Book, Iran 2011, nearly 75 per cent of Iranian population lives in urban regions [5]. Therefore, Iranian cities such as Tehran, Isfahan, Tabriz, Mashhad and Uremia, to name few, face such challenges and problems as unequal access to services [6], social inequality in passing leisure times [7], income and education inequalities [8], queues in access to services [9],

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lack of citizens' participation in urban management [10], urban traffic congestion [11], lack of efficient public transportation systems [12], lack of safety in urban neighborhoods [13], lack of paying due attention to the rights of people with disabilities and target groups in the access to services [14], ecological pollutions [15], carbon economy [16], low life quality, centralization, corruption and bureaucracy [17], approximately 8 million of urban dwellers in Slums [18] and so on.

The establishment of electronic cities is considered among the scenarios proposed for solving above-mentioned challenges in the contemporary literature of the urban planning [19, 20, 21, and 22]. Apparently, in the contemporary era, urban management may not be carried out based on traditional methods because not paying attention to this point entails not only wasting natural and human resources, but also lowering the life quality of the citizens.

Urban planning has experienced numerous changes over its long history. However, from the viewpoint of urban planners and other stakeholders, none of those changes has made such methodological revolution as using ICT in all stages of planning process. Electronic planning (E-planning) refers to a new planning paradigm. In this type of planning, ICT, especially internet, Geography Information System (GIS) and virtual reality technologies have widely assisted urban managers, planners and other stakeholders [23]. Although ICT may be seen as neutral technologies, it can be actually employed for targeting different socio-political goals or responding to different values and principles. Therefore, using ICT seeks different goals in rational planning approach in comparison to communicational planning. In the first glance, ICT foundations allow planners and planning departments to improve conventional decision-making processes for either carrying out new initiatives or implementing conventional methods through new tools such as GIS, virtual reality technologies, electronic participation tools, etc. In the second stage, using ICT seems as inclination toward epistemological turn and change in the pattern of planning. It is beyond the fundamental goal of common improvement in planning. Better planning and more efficient urban management services with lower costs as well as collaborative, participative, transparent and accountable planning are considered as informed decision-making about fundamental goals of e-planning, requiring the move from conventional urban planning to electronic one [23]. Therefore, it is not surprising to say that cities in developing countries need a new approach in urban development literature more than those in developed countries in order to reduce negative consequences of urbanization development because they suffer more from a paradox resulted from planning nature than their counterparts in the developed countries [24] in such a manner that developers, politicians and citizens, all and all, believe in planning tradition as a main cause of disorders that occur in urban societies [25]. The present study is significant from the viewpoint that there is no research carried out comprehensively concerning the strategic planning of Iranian electronic cities. Therefore, it attempts

to cover the above-mentioned important point in the Metropolitan Uremia.

## 2. Literature Review

With reference to successful case studies, many urban policy makers and planners in different countries try to account for the fact that how urban development strategies can create positive changes in daily lives of citizens and reduce urban problems [26]. In this approach, the main aim is to provide urban sustainable development through creating social potentials for widening participative outlook and public action [24]. It seems what can realize that analytical framework for urban performance from the viewpoint of urban development strategy that is, inclusive city, creative city, good governance and sustainable city is the establishment of electronic cities [27] for the creation of electronic cities will entail many influences on economic, social, cultural and political aspects of urban administration. The successful experiences of city development strategy in different cities (Sofia, Johannesburg, Eden, Delhi, etc.) can be good examples for the future development projects of Iranian cities with emphasis on different aspects of city development especial for each case, because in Iranian projects of city development, the participation of public is nearly nothing in different stages, the relationship of the projects is low with economic, social, historical, geographical and physical comprehensive studies, realism in the goals and feasibility of projects is also low and the observance of justice in projects is very low [28]. the main questioned to be answered are: "What is achieved by urban planning?", "Do citizens benefit from urban planning?", "What role can citizens play in urban planning?" and especially "How can the relationships and cooperation among different urban stakeholders be made use of?" New opportunities opened through ICT are considered as a key point in the contemporary theories of urban planning [29]. So the most important and most basic stage in the creation of electronic cities is to develop their strategic document. In the document, the perspectives, missions, projects and initial plans of the establishment of digital cities have been gathered [30]. Therefore, to improve the life quality of citizens requires moving toward web-based urban management or network management.

### 2.1. Electronic city model

In 1994, the first electronic city was developed in Amsterdam, Netherlands. Many European and American cities and some Asian cities such as Tokyo and Singapore entered in this urban space [31]. In the electronic cities, citizens will have more time for leisure and rest. Daily works time reduction, economic growth, productivity enhancement, reduction in citizens' personal refers to public offices, unemployment solution and many other benefits of electronic cities facilitated ever-increasing development of electronic cities in the world. Meanwhile, four basic elements have played key roles: e-life, e-organization, e-government, e-infrastructure [32].

However, in spite of all benefits of e-cities, all countries entered in this arena could achieve favorite successfulness. The most important goal of electronic cities is to deliver pleasant services to citizens and get their satisfaction. This is done if citizens, as receivers of such services, are capable in using those services [33]. Therefore, individuals seeking successful lives in the era of information governance need learning essential skills in IT field. To learn the skills necessary for electronic citizens enhance the capability of using new communication technologies; therefore, it makes them ready for enjoying e-cities' facilities and services [34]. ICT concept refers to the techniques and tools employed for optimizing and supporting active knowledge-based systems. Those include study, design, development, installation, maintenance and management of computer-based information systems, especially computers' software and hardware applications and are used for processing, collecting and transforming texts, sounds and visual data [35]. From on the other hand, the reasons for the discrepancies between ICT and other technologies are as following:

1. ICT is a technology strong enough to affect deeply and simultaneously in all economical sectors [36].
2. ICT technical advances are able to shake all elements of whole economy – from conglomeration and possession of companies' finances to factories' warehouse management systems.
3. ICT products have all economic characteristics of knowledge including unlimited expansion and geographical distance insignificance, to name few but not all [37]. Electronic city is one of the arenas where citizens and urban managers could deliver and use civic services based on new technologies. The definition of electronic city is so important because of the necessity of identifying its key features and dimensions in order to obtain required tools and indexes for investigating its conditions all over the Uremia city. Totally speaking, for electronic city, there are several definitions, some of which are as following:

E-city is a city where it is invested on the opportunities created by ICT in order to enhance success and efficiency [38]. E-city is a city where citizens are allowed access to public and private websites and databases in 24 x 7 format. Such a city offers vast part of its services through internet and provides necessary grounds for high quality, high speed and low cost services virtually regardless of time and distance limitations [39]. In e-cities, network-based, coordinated communications are in place for performing citizens' daily chores electronically, which were previously done personally in common cities [40]. On the other hand, a close look at those definitions reveals that e-cities consist of several elements significant in their establishment, development and improvement. In this regard, many efforts have been done and many models have been

presented with mostly similar frameworks and layouts. General view of those models, presented in Taipei Electronic City Conference (2002), is as following:

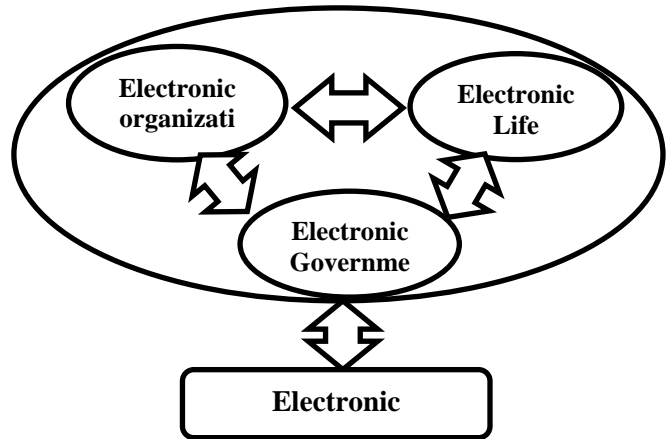


Fig. 1. Electronic city model [41].

2.2. Important indexes of the establishment of electronic cities

Regarding the key, fundamental role ICT plays in facilitating the change from an industrial society into an information one and ever-increasing growth of ICT, there is an opportunity for governments to pave the way for delivering better services to citizens through fundamental changes in their bodies. So, for more than one decade, e-city establishment projects have been started in many countries. As one of the developing countries, Iran has attempted to establish e-cities in the recent years although it is probably not palpable for some citizens. Therefore, the current study aims at investigating the situation of this national-regional attempt and identifying the most important factors effective on its success. As research population in the study presented here, Uremia electronic city has been investigated in this regard.

Future developments in the e-Planning systems are dependent of external and internal conditions [50] [51]. The overall growth of the ICT sector and the expansion of the information society (e.g., interoperability of ICT, market penetration of specific ICT, broadband universal access, digital literacy, digital divide, etc.) are examples of these external factors. In the second case, the prevailing planning theory, confidence in the system, material and financial conditions experienced by the planning department are some of the factors that will certainly have an effect on the expansion of e-planning systems.

From the view point of the external conditions, the growth of ICT use among urban stakeholders, including the use of online urban planning services, in spite of its social and geographical unevenness [52], will increase the number of participants in e-Planning systems and, due to that, will create new demands for planning services and information, a trend that will be further stimulated by broadband connectivity, which will allow the use of more sophisticated online planning services. In addition, the present resistance in the use of information and communication technologies due to weak digital literacy will diminish or disappear as analogical forms of

communications are gradually replaced by digital technologies. Parallel to these technological trends that stimulate greater use of online information and online planning services, there is at the political level, in national as well as in local governments all over the world [53], a trend towards the implementation of digital government projects that will certainly reinforce the ongoing expansion of the information society.

Internal factors are also critical for the future expansion of e-Planning systems. Data integrity protection, the risks

associated with the loss of privacy and confidentiality in the transactions between citizens and the e-Planning system and a myriad of other ethical issues are critical factors that urban planning departments have to consider carefully[54], as well as planning professional organizations [55]. The characteristics of digital archives for future use are also factors that may affect confidence in the system. Security and confidence in the e-planning system are for those reasons two critical factors for its success.

**Table 1** The most important indexes of the establishment of electronic cities are as follows:

Index	Elements
E-government index[33] [42], [42]	specifying people in charge of establishing e-city/ reflecting significance of ICT and its elements in governmental policy making/ delivering organized national plan/ encouraging private sector to invest in ICT/ Enhancing governmental services through virtual spaces
E-infrastructure index[43 [44] [46] [49]	Developing regulations on money electronic transmissions/ Developing organized laws on electronic crimes/ Developing electronic signature laws/ Developing laws guaranteeing information free flow/ Developing intellectual property laws/ Enhancing general education average level/ Reducing costs of internet access/ Increasing IT specialists/ Improving ICT specialists' technical knowledge quality
E-organization index[19] [29] [32] [45] [46]	Enhancing professional information services regarding electronic organization/ Empowering organizations in electronic support/ Increasing organizations' investments on ICT training/ Increasing organizations' investments on ICT facilities/ Training ICT specialists in organization, especially municipalities as incumbents of electronic city establishment
E-life index[29] [36] [42] [45] [48]	Enhancing percentage of electronic commercial transactions/ Enhancing efficiency of credit cards/ Enhancing electronic trainings/ Enhancing internet penetration coefficient

The growing access and use of information and communication technologies, especially the Internet, although experienced unevenly by the different urban stakeholders, implied a democratization of knowledge on urban issues, which affect the dominant position of planners within the urban planning process, in all phases of the process. This shift in the way knowledge on urban issues is produced, both formal and informal knowledge, on how the urban planning process is organized and on how urban plans are implemented, monitored and evaluated, creates new challenges for urban planners, for citizens in general, and for other urban stakeholders as well, challenges that need to be addressed by planning theory and planning ethics as well as through new urban planning methods and e-tools.

**3. Materials and Methods**

The present study is of descriptive-analytical nature. To collect data, documentary investigation, library research and field studies have been done. According to

gathered data, strengths, weaknesses, threats and opportunities of the possibility of electronic city establishment in Uremia has been investigated. To analyze data, SWOT model has been employed. For so doing, Uremia's external environment (strengths and weaknesses) and internal environment (threats and opportunities) have been investigated and required data has been gathered from senior urban managers, specialists and ICT experts through questionnaires. Then, SWOT matrix has been completed through assigning weights to the elements. Ultimately, proper strategies have been recommended for the establishment of electronic city in Uremia. Also, to rank the factors effective on the establishment of electronic cities, TOPSIS model was used. The model means the selection of shortest distance from positive ideal solution (PIS) and the farthest distance from negative ideal solution (NIS) in order to solve problems with several decision making rules. Regarding studies done on electronic cities, the factors effective on the establishment of conceptual model of the current sturdy are as follows:

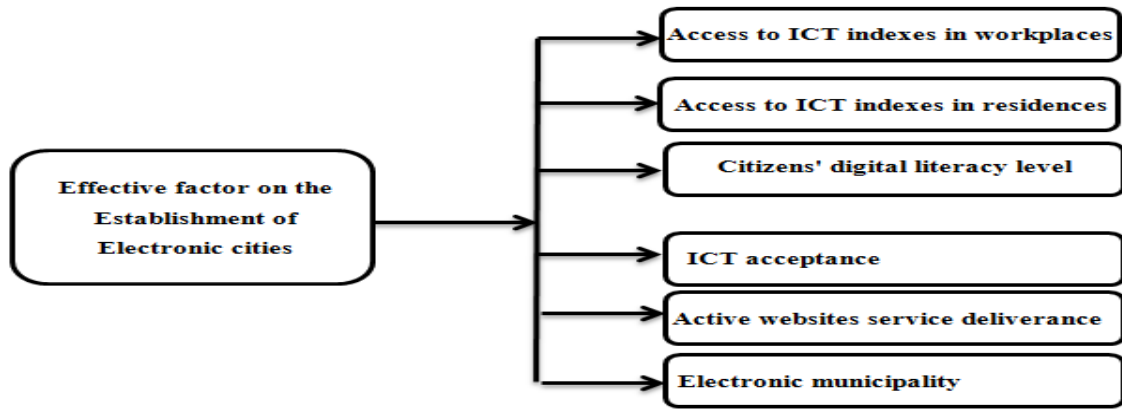


Fig. 2. Research Analysis Model

### 3.1. Study area

As one of the Iranian metropolitans, Uremia is the capital of West Azerbaijan province. According to Statistical Year Book, Iran 2011, its "urban dwellers" is 667499 [56]. Furthermore, in accordance for Uremia's Master Plan, it has four urban districts [57].

### 3.2. Research purpose

In the current research, efforts are made to evaluate threats and opportunities in the face of the possibility of electronic city establishment in Uremia, Iran.

### 3.3. Research question

1. What are factors effective on the establishment of Uremia's electronic city from the viewpoint of managers and specialists working in Uremia's urban planning and ICT?
2. How is the importance of factors effective on the establishment of Uremia's electronic city from the viewpoint of managers and specialists working in Uremia's urban planning and ICT?
3. What are practical solutions for the establishment of Uremia's electronic city from the viewpoint of managers and specialists working in Uremia's urban planning and ICT?

## 4. Findings and Discussion

### 4.1. SWOT technique

SWOT technique is a tool that identifies opportunities and threats available in the external environment of a specified system and determines its internal strengths and weaknesses in order to evaluate the existent situation and develop strategies for controlling and leading that system. It is considered the best for organizations [58]. The technique is a tool for evaluating the existent situation and developing strategies. These are done through identifying and classifying any specified system's internal strengths and weaknesses, identifying and classifying its external threats and opportunities, completing SWOT matrix and compiling various strategies for leading the system in the

future [59]. This technique evaluates the system's effective and progressive factors (city, region, etc.) through grading each factor.

The analysis of the factors effective on the establishment of Uremia's electronic city

The development of ICT infrastructures, the improvement of citizens' digital skills and literacy, the upload of services on urban organizations' websites electronically, the inclination of urban managers toward new urban management methods are among those factors which could be considered as factors effective on the establishment of electronic cities. In the current research, it is attempted to investigate factors effective on the establishment of electronic cities and their strengths, weaknesses, opportunities and threats in the Uremia city. Therefore, creating a scientific vision based on available facts, feasible strategies of the establishment of Uremia's electronic city would be presented in addition to the identification of factors involved in the establishment and development of electronic cities.

SWOT model is one of the methods used for organizing external factors in the form of opportunities and threats and internal factors including weaknesses and strengths.

This method analyzes factors effective on and in the face of any specified system (city, region, etc) through scoring all factors. To investigate how factors affect the establishment of electronic cities and to analyze them, the following stages are taken (For example, see Table 2). In SWOT table, columns are as following:

Column 1 (external and internal factors): The most important strengths, weaknesses, opportunities and threats of any specified system are introduced.

Column 2 (weights): Based on the above-mentioned factors' probable effects on the system's present strategic situation, weights from 1 (the most important) to 0 (the least important) are assigned to each factor. The more the weight, the more effective the factor on the system's present and future situation (total sum of column 2 is 1 regardless of number of factors).

Column 3 (grading): Based on the system's present situation and the importance of factors, grades from 5 (very strong) to 1 (weak) (according to the results obtained from the evaluation of urban affairs specialists) are assigned to each factor.

Column 4 (weighted grade): Each factors' weight is multiplied by its grade (column2 x column 3) so that weighted grades may be achieved. For each factor, a weighted grade is assigned from 1 to 5 in that average value is 3.

Ultimately, weighted grades of all external and internal factors are separately summed in column 4 and total weighted grades are achieved. Total weighted grade shows how the system responds to its internal and external forces. The average total weighted grade in any specified system's special field is 3 [60]. If the amount is higher than 3, the

factor is more important and If the amount is lower than 3, the factor is less important.

#### 4.2. Uremia's electronic city establishment external factors analysis summary (EFAS)

To organize external factors in the framework of threats and opportunities in the face of the system, making use of factor grading and the importance of each threat and opportunity, their effectiveness on Uremia's urban functions are calculated and shown in the following tables.

**Table 2** External Factors Analysis (Opportunities)

Opportunities	Weights	Grades	Weighted Grades
Gradual formation of a new social generation for absorbing investments (creative generation)	0.09	5	0.45
Establishment of without-border city enjoying dynamic, knowledge-based economy	0.08	5	0.40
Promotion of social justice regardless of citizens' religion, ethnicity, age and gender	0.08	4	0.32
Establishment of unified urban management	0.06	3	0.18
Protection of ecology and the establishment of sustainable city	0.07	5	0.35
Establishment of social understanding and collaborative participation	0.06	4	0.24
Changes in life style and dynamic presence in globally financial networks and currents	0.08	4	0.32
<b>TOTAL</b>	<b>0.52</b>	<b>-</b>	<b>2.26</b>

According to Table 2, the most important opportunities of Uremia in the establishment of an electronic city from the viewpoint of urban specialists include: gradual formation of a new social generation for absorbing investments (creative generation) with weighted grade of 0.45 as the first opportunity, establishment of without-border city enjoying dynamic,

knowledge-based economy with weighted grade of 0.40 as the second opportunity, protection of ecology and the establishment of sustainable city with weighted grade of 0.35 as the third opportunity, promotion of social justice regardless of citizens' religion, ethnicity, age and gender with weighted grade of 0.32 as the fourth opportunity.

**Table 3** External Factors Analysis (Threats)

Threats	Weights	Grades	Weighted Grades
Lack of identical distribution of ICT indexes among Uremia's districts	0.06	4	0.24
Lack of a specified strategy (strategic document) for Uremia's future development and lack of attention to global experience in this regard	0.09	5	0.45
Uremia's horizontal development and sprawl development against vertical development and infill development	0.07	3	0.21
Parallel extra working and wasted double working in Uremia's urban development process	0.05	5	0.25
Security-oriented look into data flow	0.08	5	0.40
Reinforcement of traditional urban management, bureaucracy, personal refers and high congestion of citizens in public organizations, institutes and bodies	0.04	3	0.12
High-cost and low-speed internet	0.09	4	0.36
<b>TOTAL</b>	<b>0.48</b>	<b>-</b>	<b>2.03</b>

However, according to the Table 3, the most important threats of Uremia in the establishment of an electronic city from the viewpoint of urban specialists respectively include: Lack of a specified strategy (strategic document)

for future development) with weighted grade of 0.45, security-oriented look into data flow with weighted grade of 0.40, High-cost and low-speed internet with weighted grade of 0.36.

4.3. Uremia's electronic city establishment internal factors analysis summary (IFAS)

To organize internal factors in the framework of

strengths and weaknesses in the face of the system, making use of factor grading and the importance of each threat and opportunity, their effectiveness on Uremia's urban functions are calculated and shown in the following tables.

**Table 4** Internal Factors Analysis (Strengths)

Strengths	Weights	Grades	Weighted Grades
All citizens' access to telephone, cell phone, telephone kiosks, and ICT offices all over the city	0.05	4	0.20
Access of over than three quarters of urban households to computers	0.04	5	0.20
Available regulations regarding cybercrimes	0.09	5	0.45
Inclination of Uremia urban specialists toward the implementation of electronic city	0.07	5	0.35
Uremia's population over than 600,000	0.05	3	0.15
Citizens' desire for access to single-stage services	0.08	3	0.24
Meetings and conferences held on electronic cities all over the city	0.05	2	0.10
Creation of some ground for electronic commerce development	0.06	4	0.24
Installation of electronic systems for organizations, universities, terminals, airports and so on.	0.06	5	0.30
<b>TOTAL</b>	<b>0.55</b>	<b>-</b>	<b>2.23</b>

From the viewpoint of urban specialists, the most significant strengths of Uremia in its way toward the establishment of electronic city include: available regulations regarding cybercrimes with weighted grade of 0.45, inclination of Uremia urban specialists toward the

implementation of electronic city with weighted grade of 2.35 and installation of electronic systems for organizations, universities, terminals, airports with weighted grade of 0.30, respectively, as three most important factors. Furthermore, one can see other factors in Table 4.

**Table 5** Internal Factors Analysis (Weaknesses)

Weaknesses	Weights	Grades	Weighted Grades
Lack of digital literacy and proficiency among citizens	0.09	5	0.45
Local and international companies' lack of desire for investment	0.08	4	0.32
Lack of urban managers' desire for uploading services on portals	0.05	5	0.25
Lack of citizens' participation in urban projects	0.07	4	0.28
Invasion to others' privacy	0.05	3	0.15
Lack of citizens' belief in cyber spaces	0.05	2	0.10
Carbon and industrial economy dominant on Uremia and ignorance of knowledge dominancy	0.06	5	0.30
<b>TOTAL</b>	<b>0.45</b>	<b>-</b>	<b>1.85</b>

According to Table 5, lack of digital literacy and proficiency among citizens with weighted grade of 0.45, local and international companies' lack of desire for investment with weighted grade of 0.32, carbon and industrial economy dominant on Uremia and ignorance of knowledge dominancy with weighted grade of 0.30 are among the most important weaknesses in the face of the establishment of electronic city in Uremia.

Using IFAS and EFAS tables and combining their results, the most significant strategic factors in the establishment of Uremia's electronic city have been presented. In fact, analyzing strategic factors, planners making strategic decisions limit strengths, weaknesses, opportunities and threats to lower numbers. This has been carried out through the reinvestigation of available factors in IFAS and EFAS tables. Actually, the most weighted factors of those tables should be included in SFAS table [48]. One can see the above mentioned points in the following table:

4.4. Strategic Factors analysis Summary (SFAS)

**Table 6** Strategic Factors analysis Summary regarding The Establishment of Electronic City

Strategic Factors	Weight	Grading	Weighted Grade	Planning		
				Short Term	Medium Term	Long Term
Internal Opportunities (S)	S1available regulations regarding cybercrimes	0.09	5	0.45	*	*
	S2inclination of Uremia urban specialists toward the implementation of electronic city	0.07	5	0.35		*

	S3installation of electronic systems for organizations, universities, terminals, airports	0.06	5	0.30	*	*
	W1lack of digital literacy and proficiency among citizens	0.09	5	0.45	*	*
Internal Threats (W)	W2lack of urban managers' desire for uploading services on portals	0.08	4	0.32	*	*
	W3carbon and industrial economy and ignorance of knowledge dominancy	0.06	5	0.30	*	*
	W4lack of urban managers' desire for uploading services on portals	0.05	5	0.25	*	*
External Opportunities (O)	O1gradual formation of a new social generation for absorbing investments (creative generation)	0.09	5	0.45	*	*
	O2establishment of without-border city enjoying dynamic, knowledge-based economy	0.08	5	0.40	*	*
	O3protection of ecology and the establishment of sustainable city	0.07	5	0.35	*	*
External Threats (T)	T1lack of a specified strategy (strategic document) for Uremia's future development	0.09	5	0.45	*	*
	T2security-oriented look into data flow	0.08	5	0.40	*	*
	T3low-speed, high-cost internet	0.09	4	0.36	*	*

Putting all factors together, different offensive (SO), diversity (ST), review (WO) and defensive (WT) strategies have been developed.

## 5. Developing Strategies

### a) Offensive Strategies (SO)

- Preparing necessary plans regarding tackling space and time barriers so that citizens can have easy access to urban facilities and services and presenting national organized plan or project.
- Developing and/or promoting ICT infrastructures and facilities in Uremia's four districts proportionate to their population and avoiding digital divide(s) among citizens.
- Defining composite land uses in the city.
- Avoiding the city's irregular physical development and paying attention to urban infill development.
- Exploiting global experiences on the establishment and development of electronic cities including Vienna, Tokyo, Zurich and Munich.
- Employing managers and expert specialized in the establishment of electronic cities.

### b) Diversity Strategies (ST):

- Developing a specified strategy, that is, strategic document for the establishment of electronic city in Uremia.
- Assigning a specified organization or institute as main responsible for establishing electronic city.
- Allowing all citizens to have access to needed data and avoiding having security point of view.
- promoting high-speed internet with low costs.
- taking necessary measures regarding environment

protection including car usage reduction, bureaucracy reduction, efficient energy consumption, etc.

### c) Review Strategies (WO)

- Paving way for the investments of public and private sectors in the establishment of projects of electronic city.
- Paying special attention to knowledge-based economy and elites in this regard.
- Holding necessary workshops for citizens and encouraging their participation in urban projects and plans.
- Respecting people's privacy
- Promoting the average level of public education, the proper information of mass media regarding electronic city and digital literacy.

### d) Defensive Strategies (WT)

- Developing laws and regulations on the promotion and correction of managerial entities, employing knowledgeable managers in the different departments of developing electronic cities and promoting management stability in this regard.
- Paying attention to electronic municipality and electronic citizens as the necessary ground for the establishment of electronic cities.
- Training efficient and expert work forces for managing electronic cities.
- Promoting electronic exchanges and different integrated systems (educational, medical, managerial-institutional and so on) in Uremia.
- Removing political and cultural barriers through transforming administrative system to efficient, flexible, transparent, decentralized, democratic and legal administrative system and supporting content production.



- Enacting proper regulations regarding electronic money transfer, cybercrimes, intellectual property, information free flow and electronic signature.

It seems that the factors effective on the establishment of electronic cities have different shares in the procedure.

Concerning the normality of research population, to assess the factors effective on the establishment of

electronic cities, t-student parametric statistical methods was used. One of those parametric methods is the comparison of averages. In averages comparison test method, each main factor was separately investigated together with its sub factors. The summary of results of each factor effective on the establishment of electronic cities is presented in the following table.

**Table 7** effective factor on the establishment of electronic cities

Factor	t-student	df	sig
Access to ICT indexes in workplaces	20.34	398	0.001
Access to ICT indexes in residences	21.11	398	0.021
Citizens' digital literacy level	32.1	398	0.000
ICT acceptance	23.76	398	0.000
Active websites service deliverance	29.87	398	0.005
Electronic municipality	25.3	398	0.000

According to the results of statistical analyses, six factors are key elements in the establishment of electronic cities: access to ICT indexes in workplaces and residences, citizens' digital literacy level, ICT acceptance, extent of satisfaction from active websites in the cities, electronic municipality. Of course, all of them have equal influence on the establishment of electronic cities. To obtain the extent of the influence of each one of those factors, ANNOVA has been used. The outcome of this test includes the table of Mauchlys test of sphericity and epsilon values for more conservative tests and internal effect test table. Regarding significance level of Mauchlys test of sphericity

(>0.05), the influence of those six factors seems equal. As mentioned in research analysis model, all six factors have consisted of sub elements. Now, it should be questioned whether each sub element of those factors influences equally on the establishment of electronic cities or not. With respect to ANNOVA results, findings indicate that some of the sub elements play a key role in the establishment of electronic cities. Concerning the inequality of the role of factors effective on the establishment of electronic cities, each factor's sub elements has been ranked through multi-criteria decision making techniques and TOPSIS model. The following table shows ranking results.

**Table 8** Ranking key factors in the establishment of Electronic cities through TOPSIS technique

Factor	Effective variable	PIS	NIS	Ci	rank
Access to ICT indexes in workplaces	PCs connected to high-speed internet	0.175870	0.213269	0.75788345	1
	scanner connected to the network	0.212135	0.215318	0.55652236	2
	video projector	0.247517	0.214348	0.51187439	4
	telephone	0.165515	0.105273	0.55012712	3
	TV	0.198286	0.251056	0.66213467	1
Access to ICT indexes in residences	telephone	0.226691	0.22364	0.59512341	2
	cell phone	0.248965	0.35051	0.55986754	3
	PCs connected to high-speed internet	0.234037	0.261422	0.493564244	4
	radio	0.254341	0.229136	0.48986711	5
	the extent of using telephone, cell phone, ...	0.245403	0.281246	0.481995699	4
Citizens' digital literacy level	the extent of working with PCs,	0.236139	0.248631	0.69111123	1
	the extent of using the electronic services of urban organizations	0.261402	0.214444	0.54724833	3
	the extent of using internet cafes and ICT offices	0.171553	0.189979	0.67546823	2
	the extent of using credit cards, electronic shopping	0.252281	0.234159	0.442735315	5
	decentralization of urban districts	0.245844	0.214348	0.54666453	2
ICT acceptance	reduction of personal refers	0.238935	0.218675	0.55664231	1
	service deliverance in the level of neighborhoods	0.248119	0.246024	0.416978347	4
	diversity in urban spaces	0.215565	0.195178	0.44532122	3
	increase in virtual participation	0.043235	0.051567	0.42678955	5
	bank telephone systems	0.267452	0.22383	0.437947462	3
Active websites service deliverance	ATMs	0.463553	0.332142	0.665576918	1
	internet services, internet cafes	0.283565	0.153499	0.604173368	2
	municipality website	0.155423	0.246221	0.414438161	4
	acquisition of necessary data and software (databases)	0.232285	0.229049	0.48878888	1
Electronic municipality	payment of urban costs	0.273619	0.232666	0.436515608	3

acquisition of permits for starting and ending construction projects	0.234544	0.223784	0.39101339	4
design of electronic conferences, seminars and workshops	0.199922	0.216662	0.440197227	2
participation in local decision making	0.219915	0.227833	0.319627746	5
Findings				

Results from table 8 show that several factors are effective on the establishment of electronic cities. In the dimension of access to ICT indexes in workplaces (radio, scanner connected to the network, video projector and telephone), in the dimension of access to ICT indexes in residences (TV, telephone, cell phone, PCs connected to high-speed internet), in the dimension of citizens' digital literacy level (the extent of using credit cards, electronic shopping, the extent of working with PCs, the extent of using the electronic services of urban organizations, the extent of using internet cafes and ICT offices, the extent of using telephone, cell phone and so on), in the dimension of ICT acceptance (increase in virtual participation, decentralization of urban districts, reduction of personal refers, service deliverance in the level of neighborhoods, diversity in urban spaces, electronic shopping and so on), in the dimension of Active websites service deliverance (municipality website, ATMs, internet services, internet cafes, bank telephone systems and so on) and in the dimension of Electronic municipality (participation in local decision making, payment of urban costs, acquisition of permits for starting and ending construction projects, design of electronic conferences, seminars and workshops, acquisition of necessary data and software (databases) have the most influence on the establishment of e-cities respectively. Findings indicate that from those six factors effective on the establishment of electronic cities, all are mutually interrelated. For instance, if we provide essential infrastructures for ICT in the cities but citizens do not have proper digital literacy, it is useless. Also, the vice versa is this case. Therefore, the success of investment in ICT depends on the extent of the inclination of citizens toward the application and use of systems. Concerning organizations' investments in creating necessary grounds for technology in performing affairs, users' reception rate and their practical use of available new technologies are important. Organization managers should necessarily know about true management and architecture of information and software for the factors effective on "the establishment of electronic cities" and could achieve desired goals through their control and management.

## 6. Conclusion

The unprecedented growth of ICT, theoretically and practically, has greatly changed the industrial era into an information one. signs of this rapid change could be the emergence of such concepts as electronic city, electronic municipality, electronic life, to name few but not all, which today have been essential parts of human lives. As in those types of urban projects most part of activity is dedicated to citizens' needs, it is necessary to spend much time for their establishment and improvement so that the

most acceptable and most proper civic services could be delivered. Beyond any doubt, acculturation and projects carried out through citizens' participation will be useful and efficient. Therefore, it is predicted that regarding eye-catching development of ICT, numerous urban services will be done electronically through increase in governmental supports and dedication of more resources. It, in turn, causes government and people to enjoy the benefits of such projects.

The results of the current paper, carried out through survey-documentary studies and content analysis, reveal that beside positive actions done for the establishment of electronic city in Uremia, some problems have challenged the establishment of such a city. Those problems are as follows: the lack of digital literacy among citizens, the lack of national and international companies' inclination toward investment in this regard, the lack of zeal of managers for uploading services on urban portals, the lack of public participation in urban plans and projects, the lack of respect to citizens' privacy, the lack of citizens' belief in cyber spaces, the lack of attention paid to knowledge dominancy as weaknesses and the lack of similar enjoyment of all urban districts from ICT indexes, the lack of a specified strategy (strategic document) for Uremia's future development, Uremia's horizontal development and sprawl development against vertical development and infill development, low-cost and high-speed internet, Security-oriented look into data flow, traditional urban management reinforcement, bureaucracy, personal refers and high congestion of citizens in public organizations, institutes and bodies and Parallel extra working wasted double working in Uremia's urban development process as threats.

With respect to above-mentioned problems in developing and establishing electronic cities and to achieve efficient urban management and improve citizens' life quality, some recommendations are offered as below: Using knowledgeable managers regarding technology and electronic city issues, building coordination among managers and specialists of different organizations regarding uploading electronic services, developing participation of citizens in decision making and decision building and performing electronic city programs, creating organized organizations institutes in electronic city section and its implementation policies, investing properly in cultural and educational parts for citizens in order to apply ICT in their daily lives and acquire digital literacy and skills, designing comprehensive websites for access to online services, promoting ICT infrastructures and facilities in Uremia's four districts proportionate to their population in order to avoid digital gap among citizens (it is noteworthy that those indexes are much lower in district 1 and 2), developing specified strategy or strategic

document for the establishment of electronic city in Uremia, assigning a specified organization or institute as the main responsible for establishing electronic city, allowing all citizens to have access to needed data and avoiding having security point of view, taking necessary measures regarding environment protection including car usage reduction, bureaucracy reduction, efficient energy consumption and so on, paying special attention to knowledge-based economy and elites in this regard, promoting the zeal of managers for uploading services on the portals of municipalities and other organizations related to urban affairs, avoiding traditional management and looking toward knowledge-based management, developing policies, instructions and standards required and permanent updates, etc.

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