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Understanding of Smart Citizen Components in Urban Environment with Technological Learning Approach (Case: Yazd City)

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Abstract: Smart citizenship component has been forgotten in the light of the theory of smart growth and urban excellence. In this theory, most urban planners and planners only study the indicators of the economy and exceptional services in cities, and the lifestyle and culture of citizens and its impact. They are less concerned with urban development. In this regard, in this research, Yazd city has been selected as the study to evaluate the indicators of smart citizens and its components in urban development and excellence. A survey from a sample of citizens, appropriate data was collected through a multi-criteria questionnaire with desirable validity and reliability. Using SPSS software, exploratory factor analysis was used to determine the validity and reliability of independent and dependent variables and then the named components were named. In the next step, using the confirmatory factor analysis in AMOS software, the validity of the research structures was tested. The statistical relation between the variables and their indices was confirmed. In the final model, using the fittest tests, the relationships between the variables and the effect of independent and dependent variables were confirmed. Findings of the research indicate that the significance of the law-governed factor is 31.579 percent of the variance explained more than other factors and citizens consider the role of law-governed in the characteristics of the smart citizen more critical. From the perspective of citizens, the optimal use of information and communication technology and the formation of the smart city have a positive effect on the various economic, social, and environmental dimensions of Yazd city. So while recognizing the need for training with new ways and content, they see the role of ICT in better life experience.

Keywords: Smart Citizen, Smart City, Yazd City, Urban Environment, Technological Learning
JEL Classification: P25, N35, D83, P46

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1- Introduction

The current era is the "information age," based on the information. In other words, the era of change from industrial society to the information society, which modern information and communication technologies have transformed the traditional face of societies. The hallmark of the information age is the penetration and dominance of information and communication technologies that the third millennium strives to accelerate the development, use of information technology in various sectors of the social system from traditional patterns, and replace new patterns adapted to the requirements of the information age (Soleimangoli et al., 2017). Every day, many people connect to global networks and get their information in less than a few seconds. Today, access to information as a tool of strength and excellence has drawn all the attention of countries, and military superiority has replaced its place with information excellence. Therefore, attention to the development of the city and the smart city is an important topic and requires the attention and efforts of all nations and citizens (Kline, 2015).

However, many public sector agents still fail to grasp the actual perceptions of the information age and, instead of interactive and practical strategies, take a passive strategy that seeks to combat the blind and oblique changes or adherence to it. In each case, the attitude of those who have ignored the approach and refrain from applying adaptive mechanisms becomes more and more felt. Of course, one should not overlook the fact that the reorganization of the state in the information age is confronted with limitations and that brokers must be aware of them and consciously and purposefully seek to bring about change in their subcategories.

In today's world, metropolitan cities are vital economic hubs in the world, and their differentiation in comparison with other cities is that such cities are managed by intelligent and innovative systems (Dameri & Ricciardi, 2015). The rapid growth of the population and their concentration in cities throughout the world affects the prospects of life for most of humanity. Cities have become increasingly meaningful and increasingly vulnerable to disastrous crises, especially in developing countries. Poverty, environmental degradation, lack of urban services, the downgrading of existing infrastructure, lack of access to land and shelter, and in one sense the loss of natural and human capital is among the crises related to this issue (Shokoei, 2011). In this regard, "Smart City" has been proposed as a solution to many problems in current cities. Major policies and significant achievements in the field of city intelligence have been documented in the articles of the Innovative Society Award from 1999 to 2010. Cities like Songdo and Suwon and Gangnam are from Seoul (South Korea), Stockholm (Sweden), Waterloo in Ontario and Calgary in Alberta (Canada), Taipei (Taiwan), Mitaka (Japan), Glasgow (Scotland), New York City and Lagrange from Georgia (the United States of America), and eventually Singapore was all the city that was praised for their efforts to add high-speed networks and electronic services that helped sustain the creative environments, urban growth, and urbanization. (Cohen 2015). In this regard, one should not ignore the behaviors and characteristics of a citizen in the smart city. but the citizen in the cultural sense of the word is a

social being; in fact, citizenship is the expression of a collective identity, and the citizen refers to all members of a large society that takes the title of a culture, and this A landscape can lead citizenship to all territory and a civilization and culture (Dagnino, 2018).

The purpose of this research is to study the characteristics of citizenship that require smart and intelligent urban living. As a result, citizens need to step in to become a smart city by acquiring awareness and enhancing their smart skills in the direction of the partnership and the success of the city in which they live. To this end, the following research questions can be raised:

A. By which evident variables the status of the smart citizen in Yazd can be measured?

B. What are the components of smart citizen with a technology learning approach?

C. What is the significance of each of these components?

2. Literature Review

a) Foreign Researches

Litman (2017), in a theoretical review of smart growth critique, examines intellectual growth, and, along with the numerous benefits of smart growth, introduces criticisms that are related to intelligent citizens. Such as the intellectual growth of a kind, it is a social trap because it prevents citizens from making local decisions and, as a result, citizens do not have the power to change the situation.

Another study on the health and well-being of a smart citizen, called Citizen Health Assistant by Christopoulou (2013), found that if the healthcare network is deployed on the smartphone platform, in addition to having a citizen with an online health record, self-care and treatment, as well as ICT, facilitates the treatment of vulnerable groups in the community.

Mei-Chih Hu (2014) studied the direct and indirect records of the adoption of new technologies (ICTs) and the emerging wireless cities of Singapore and Taipei. The results showed that the development of the wireless city of Taipei relies on external factors, which has risen from top-down policies and business strategies, while in Singapore, it depends more on domestic factors and the market share of specific customers.

Juan Gabriel et al., (2015) in research entitled Smart Government and Local Citizen Interaction with Local Issues through E-Municipalities: The Spanish Municipalities examined the importance of three types of information and communication technology to use smart government and civil society development. The main conclusion of this study was that although ICT can leverage the adoption of responsible government, it cannot alone create interactions between the traditional activities of local governments.

Alexander & Tomalty (2014), in an article titled "Smart Growth and Sustainable Development," reviewed 13 indicators of the relationship between urban density and urban development in 26 municipalities of British Columbia, Canada. In their research, they pointed to the relationship between density and the efficiency of infrastructures and reduced vehicle use along with increased efficiency.

Waal & Dignum (2017), a citizen in the smart city, the authoritative role of citizen in creating innovation and promoting the optimization of traditional processes to smart, pointed out that, in addition to its impact on citizen's life, the accountability of urban management stakeholders and movement in the direction that triggers

transparent city situation. A citizen in a smart city can contribute to the city through its participation in the community in addition to enjoying its citizenship rights.

Smart citizen in an article titled Evaluating Smart Growth and its Consequences for Small Communities in 30 Small Societies of America, by Edwards and Haines (2007), suggests that the results of this study indicate that communities do not equally welcome intellectual growth. Moreover, the reason is that access to its benefits is not the same for everyone. Smart growth does not seem appropriate for small communities, and the passivity of citizens is one of its most necessary consequences while we must look for a theory that makes citizens more pragmatic.

Clark et al., (2016) in the study of urban intelligence growth is a collection of planning, regulation, and developmental methods that utilize the form of small building, expansion, and modulation of street standards and parking of land more effectively.

b) Iranian Researches

Azani et al., (2011) conducted an article titled An Analysis of Citizenship Culture in Yazd with a survey method of 200 citizens who concluded that citizens of Yazd in the three dimensions of citizenship, namely, participation, accountability, and compliance with the rules and adherence to the principles of citizenship to the extent are average.

Sajadi & Aghaei (2016) in an article that aimed to evaluate the components of the smart citizen in urban spaces with a critical approach to the theory of smart citizenship development that was carried out in Velenjak district of Tehran. Most planners and urban designers are looking at indicators Economic and smart city services in the city and less attention to the lifestyle and culture of the citizens. The results of this study indicate that the total of 11 indicators that were studied were four sociological indicators, social participation, civic behavior, and social tolerance of the obtained number below the average, indicating the inactivity and inactivity of the citizens in social spaces, which can be attributed to them by pointing to the blurring of the urban space.

Ghorbani & Nowshad (2008) in an article titled Smart Growth Strategy in Urban Development, Principles and Strategies, examine the benefits and disadvantages of smart urban growth. Among the disadvantages and consequences of smart urban growth, are increasing population density, reducing citizens' freedom, reducing the purchasing power of people, and increasing the regulatory burden on urban areas.

Fallah & Esteghlal (2014) conducted an article entitled a review of the concepts, indicators, and criteria of smart city on smart life and various aspects that help to improve the quality of life of citizens, and factors such as cultural facilities, health conditions, and individual security. They consider the quality of housing and education facilities to be effective.

Roostaei et al., (2018) in research entitled "Theory of Smart City and its Infrastructure Components in Urban City Management: Tabriz Municipality," which has addressed a fundamental approach to identifying the infrastructure components of the smart city in the urban management of Tabriz Municipality. The following sub-criteria analysis indicated that structural transformation and an approach to institutional factors should be made in

order to transform the capacities of the smart city into infrastructure.

Babanasab & Zarabi (2015) did a research to analyze the citizenship indicators on citizens, views in Tabriz city. According to the findings, ICT and electronic city, if realized, affect different economic, social, environmental and physical factors, and this means that the best use of ICT results in sustainable urban development.

Ahmadi et al., (2016) concluded that there is a significant relationship between social trust and electronic citizen and their findings showed that, with the increase of social trust, the use of electronic services has increased and electronic citizen has realized more.

3- Theoretical Background

Citizenship and Citizenship

Citizen and "Citoyen" in French is rooted the word Civitas, which is the Latin word Greek word "polites" meaning a member of a police or government - Greek city. This word came from the western culture of our country and had no precedent in Iran. Persian culture today is the first culture to define a citizen: "A person who is from a city or country and has the right to enjoy its rights." The notion of a citizen does not come to one another and not to gather together and to gather people together, but this concept forms in the framework and scope of civil society" In the cultural sense of the word, a citizen is a social being; in fact, citizenship is the expression of a collective identity, and the citizen refers to all members of a large society that takes the title of a culture, and from this perspective one can regard the title of citizenship to all realms and civilizations, and Culture drove (Dignum, 2018). Citizenship is one of the most dynamic social concepts of modern society, centered on social policy (Waal & Dignum, 2017). Especially in the context of the debate and controversy over recent decades of the "social rights" of citizenship that the welfare state represents and provides, the concept of citizenship is changing the position of rights to homework, both at the level of ideology and at the level of practice, and Policy-making and acceptance of adjectives such as active, kind, sensitive, responsible, conscious, and contributing to the living and tangible ideal of contemporary times (Mousavi & Mobaraki, 2018).

The concept of citizenship is a combination of several key elements that are:

- Participating in social affairs,
- Both effective and being affected
- Ensures a sense of identity,
- Adopting social values,
- Having rights and responsibilities (Capra, 2016).

Citizenship is the birthplace of living in a contemporary world, which is struggling with new emphases to make it easier for people to make progress in society through social life.

Citizenship Education

Citizenship education is beneficial in enhancing the quality of civil society organizations' performance, which will help strengthen social ethos and expand the social solidarity of a community at the "local, national, and global" levels, such as altruism and public acceptance are of great importance. Citizenship education is part of the tasks of urban management, in fact, the state and legislatures, national and local organizations, and civil society organizations and so on. Through education of citizenship, rights and collective life skills and recognizing the principles of

urban management will play a significant role in educating citizens. Citizen education informally informs citizens at home, work, or workshops or officially as a separate curriculum in schools and even primary schools or colleges, to educate citizens as an active, informed and accountable citizen. In the UK, since 2002, citizenship education and formal education have officially been in the curriculum of schools aged 11 to 16 (Keating & Janmaat, 2015). The sense of citizenship is not created by the accumulation of people alongside each other, but rather by institutions that create this feeling, such as education, the media, municipalities and city councils, elections and popular institutions. Anthony Giddens (2000) states: "In fact, individuals need to be members of civil society to be recognized as citizens. In such institutions, people learn to accept differences, respect the rights of others, neglect the interests of others, and also practice obedience to common social rules and rules, and eventually be democratically behaved."

As a result, it is likely to be significant in the role of awareness of the rights of citizens in the development of all-inclusive societies.

Citizenship Rights

Awareness of citizenship rights is one of the most critical aspects of human and social relations and it is a significant factor for the continuation of collective life in a modern, risky world. Failure to pay attention to the rights of citizenship will confuse the bases and roles, delay the work and cost them, interfere in relationships and interactions, and cause problems in participation. The rotation of sociological theories into soft concepts such as awareness of citizen rights and participation in this direction is the main reason. If awareness of the rights of citizenship in a society is not high, people do not know what kinds of rights and duties they have in society and relation to others, and how they should work towards their realization and their fulfillment. There is no doubt that a society in which a person has full self-knowledge rights is different from a society in which people are not even aware of their right to life (Baraldi & Cockburn, 2018).

Each citizen has legal rights in the public community, according to his or her status. On this basis, citizenship rights are divided into three categories:

(A) Legal and civil rights: including individual freedoms, freedom of expression, property rights, the right to enjoy justice.

B) Political rights: the right to participate in elections, the right to political participation.

(C) Social rights: including the right to benefit from security, social welfare, civil services, etc. (Cox & García, 2017).

Among the three rights mentioned above, the social rights of citizenship are of particular importance, especially for modern and developed western societies. In general, the relationship between citizens and the economic, political, legal and cultural systems of a two-way society is that the parties have mutual rights and duties about each other.

Smart Citizen

Smart citizen is someone who is thinking and planning and maximizing the use of information technology to save time, increase productivity in day-to-day operations, and evaluate and correct normal processes. In general, smart people are people who are aware of their people, their community, their needs and how they respond to these needs, and they set them in their planning for future.

According to some scholars, the smart citizen is in the hands of a technocratic algebra and somehow boosts the bottom-up ideas. The smart citizen can change the situation in this idea and can play a more significant role in the theory of smart city alongside ICT, which, on the other hand, is in the service of citizens and has caused the world Information to Citizens (Hemment & Townsend, 2013). In other words, the smart citizen is so sure that he has reached a level of knowledge and understanding that has a good interaction with the human environment and the surrounding environment in urban spaces. Smart citizen is not limited to information, technology, and the amount of its use. The smart citizen has the knowledge of citizenship in urban spaces (Barco & Peiró, 2015).

The idea of a smart citizen was looking for the problems of smart growth. The city is not only a collection of modern and modern buildings, but the city manifests itself in human relationships with humans and the environment, but also nowadays, due to the prevalence of the concept of smart urban growth, dynamism in human societies has declined, and human relationships have been limited and individualized. The results of recent studies and experiments show that human intelligence, which is characterized by indicators such as preservation of the natural environment, the sense of participation, social assistance, and social assistance, should be noticed more than before (Sajadi & Aghaei, 2016).

4- Research Methodology

Considering the exploratory-confirmatory factor analysis used in the research, the exploratory nature of this research is based on the questions that the researchers have provided with the help of theoretical framework and survey implementation a structural pattern based on the need of citizens for the components of achieving a smart citizen.

Therefore, the research method is exploratory and, unlike conventional methods, which in a deductive manner does not seek to validate the theoretical model using previously existing theories. It uses exploratory-inductive (i.e., exploratory factor analysis) technique to explore independent and dependent variables and then using structural equation modeling (confirmatory factor analysis), looking for the best structural pattern confirming the multiple relationships of independent and dependent variables.

The population of the study was to survey residents of Yazd city (582682 people). The sample size was 665 by Cochran formula. Regarding the fact that access to the opinions of all residents of the city is impossible, a simple random sampling method was used to select some citizens. Since the nature of the research topic requires the respondents to be informed about IT related issues as well as knowledge of living conditions in Yazd, individuals were selected to respond with the following characteristics:

A. In the past five years, they have been living in Yazd.

B. Have a minimum degree of college education (in order to ensure technology-oriented information);

(C) Having adequate income (to ensure that they are aware of the socio-economic situation)

Furthermore, in order to reach the appropriate distribution of respondents in different regions of Yazd, based on the experiences of the researcher in some regions of Yazd based on population

density and the presence of people with the characteristics mentioned above were selected. The demographic distribution of the statistical sample is presented in Table 1, based on the division of the regions of Yazd (Fig. 1).

The tool used to run the survey is based on the 5-point Likert scale, which respondents have included their degree of agreement or opposition to research questions. In order to cover the different aspects of smart citizenship, 42 questions were included in the questionnaire, which was developed based on the components extracted from the past research and the opinions of the experts.

Table 1- Distribution of Citizens in Surveying Based on Different Areas of Yazd

Postal area (Two-second digits)	Number of respondents
13	65
14	90
15	205
16	180
17	40
18	55
19	30
Total	**665**

Two reliability and reliability indicators were used to ensure the validity of the research tool. The face and content validity of the questionnaire was confirmed due to the extraction of the items from the research literature and their confirmation based on the views of the professors and experts in the field of urban services and information technology. In addition, the construct validity of this insight is given to the researcher so that the structures used in the research have a secure and reliable relationship with their items and, on the other hand, have no significant differences with other structures and are not correlated. The validity of the construct of the tool used was obtained by analyzing the factor loads of the extracted structures in such a way that the factor loads of each item were at least 0.4 (Estabrook & Neale, 2017).

Due to the reliability of the design of the items, care was taken to make the questions clear and straightforward. For this purpose, reliability test and Cronbach's alpha coefficient have been used. Given that the coefficient for each of the extracted factors is higher than 0.7, the questionnaire has accetable reliability.

Data analysis has been done using factor analysis method, which is known as the method of exploratory-inductive. The researchers firstly sought to extract the primary structures of the research based on the questionnaire's terms, which are presented in the form of intangible variables. In analyzing data, two methods of exploratory factor analysis (extraction of main research structures) and confirmatory factor analysis (structural model validation test) have been used. In order to ensure the reliability of the components of the research, indicators of goodness of fit have been used, and the amount of each of them has been studied.

Exploratory Factor Analysis

An authoritative benchmark is a measure that measures what the researcher wants. Validity or lack of validity does not relate to the measure itself, but its

application is used to measure the subject under review. In this research, after verifying the validity and reliability of the research tool, exploratory factor analysis is used which seeks to identify the constituents of the variables. This method, based on the correlation matrix, identifies the variables that have a strong connection (regardless of the direction of the relationship) and identifies them in distinct structures.

Factor analysis is a statistical method whose purpose is to simplify the correlation matrix between variables so that they can be explained regarding a small number of underlying factors. In other words, the purpose of the factor analysis is to summarize the usefulness of the information obtained from a large number of observed variables and to transform them into a smaller set of agents with minimal loss of information (Hox et al., 2017).

In order to implement the factor analysis, it is necessary to pay attention to its basic definitions. These assumptions are:

1. The scale of variables is quantitative.

2. There is enough sample size for factor analysis. Some researchers find the ratio of 1 to 20 as acceptable to the subject for the variable. That is, for each indicator or marker, 20 subjects or responses are necessary.

3. For each factor, at least two variables, indicators or markers are required.

4. Agents with less than 5 percent variance are excluded from the analysis.

5. Factors whose unique value is less than 1, is excluded from the analysis.

6. Suitability of data for factor analysis would control (McDonald, 2014).

In implementing this method, the Kaiser-Meyer-Olkin index is used to ensure the adequacy of the sample size, which should be more than 0.6 in optimal conditions. The Bartlett's test is also used to ensure the significance of the correlation matrix among the research variables. The significance of this test is the certainty that there is a strong correlation between the community-based measurement variables, which should be less than 0.05. The values obtained for these indices are presented in Table 2, which indicates the desired quality of the data to implement the factor analysis.

Table2. KMO Index Values and Bartlett Test

KMO		0.825
Bartlett Test	Chi-Square	831.290
	df	231
	Sig.	0.000

Confirmatory Factor Analysis

Structural Equation Modeling is one of the advanced statistical tests and is a multivariate regression family. Structural Equation Modeling is, in fact, the same as the confirmatory factor analysis method, which is a method for testing the hypothesis. The purpose of this method is to ensure the validity of the structures or variables identified in the measurement of the phenomenon concerned. This method also tests the accuracy of selected markers that represent or fit the variable (Hooman, 2005).

In general, the evaluation of the confirmatory factor analysis model has several characteristics of fitness. In this research, the Characteristic of the X-ray ratio to the degree of freedom (x^2/df), the root mean of Residual Squares (RMR), the Goodness Fitness Index (GFI), and the adjusted goodness of fit index (AFGI)

are used. Chi-square tests the hypothesis that the model is consistent with the pattern of disintegration between observed variables. The small values of the Chi-square ratio to the degree of freedom indicate the higher fitness of the model. The root mean of residual squares (RMR) means the difference between the matrix elements observed in the sample group and the matrix elements estimated or predicted with the assumption that the model is correct.

The better (RMR) is close to zero for the tested model, the better fit model. The GFI and AGFI index by Jareskog & Sorbom (1989), in contrast to the other indicators presented in this section, are not influenced by the sample size and show that the model is as good as its lack of fitness. The value of these two indicators should be higher than 90/0 to allow the model to be accepted (Hooman, 2005). The fitness indicators of the incentive scale are presented in Table 4.

Steenkamp & Trijp (1991) argue that the path coefficients between each of the questions and factors as well as between the total and total variables, if significant, are the reason for the validity of the initial convergence in the research tool. Additionally, if the coefficients are higher than 0.5, then there is a sign that the convergence validity is complete and very well in the research tool.

In this research, AMOS software has been used to implement the confirmatory factor analysis method.

5- Results

According to the questionnaire, 46 percent of the sample size is women, and 54 percent of them are men. The domains of the age group indicate that the group between the age of 25 and 35 years old was 62 percent and 45 percent above 4 percent, respectively, and formed the smallest sample size, respectively. In addition, undergraduate education is the largest sample of 50 percent (Table 3).

Table3. Sample profile

Sample member attributes		Percentage
Gender	Female	46
	Man	54
Age	18 to 25 years	24
	25 to 35 years old	62
	35 to 45 years	10
	45 years up	4
Education	Assistant	15
	Masters	50
	Masters or higher	35

Based on the results of exploratory factor analysis, five factors have higher values than one and account for a total of 59.056 percent of the total variance of the questionnaire, but the share of the first factor is more significant than the rest of the factors, and 31.579 percent of the variance is explained. Kaiser's criterion has been used to determine the number of factors.

Thus, in the next step, to extract the factors that are significant and inherently the basis of the test, the processing operation continued only for the five factors extraction. To determine whether each variable (sub-index) is sitting on which factor, only

those indexes selected that have at least a high factor load on other agents are not. Out of the 42 indicators identified in the first phase, only factor 22 had a factor load factor of 0.4 in the factor analysis, as shown in Table 4. Given the factors and indexes that were loaded on them, and considering the degree of correlation between each of the indicators, they were chosen as suitable titles. The factor rotation with Varimax method was then used in order to identify factors related to each factor and also to interpret the factors.

Investigating the variables related to the first factor showed that these variables were related to issues related to the observance of urban and social laws in the community, which was named as the law-governed entity. Investigating the variables related to the second factor showed that these variables relate to the ability and skills of citizens to use information technology, which was named as scientific and technical literacy. Investigating the variables related to the third factor showed that these variables were related to the ethical and behavioral status of the citizen and the future, which was the target of the targeted thinking. Investigating the variables of the fourth factor shows that the citizen should behave as a factor in social intelligence about the social being in which he or she lives. Finally, the examination of the variables of the fifth factor in the information of the citizen of the news and events of the whole world is also referred to as global awareness. The results are summarized in Table 4.

As one of the organizations that provide the most services to citizens, municipalities can take practical steps to create cities and citizens electronically by e-mailing their services, as well as encouraging others to provide and use online services.

Moving towards smart cities is inevitable due to population growth and the transformation of relationships between people. Smart city and smart citizen is vital and one of the main pillars of e-government, considering that it is part of the e-government project and, from the perspective of some economists, is the starting point for e-government.

Because the world is moving towards being smart, we also have to join the process of interacting with our social, economic, political life, and this is almost impossible and impossible without a smart city and smart citizen.

Today, the widespread use of information and communication technology in urban communities has also changed the geographic focus of services and has led to the emergence of public e-services. Improving productivity and enhancing access are the merits of creating e-services.

Considering the critical role of information and communication technology and smart city in the development of the urban community, and with the knowledge that the first step in the realization of the smart city, the familiarity of citizens with information and communication technology and its application in their daily life is acceptance of its effectiveness.

Table4. Identifying Independent and Dependent Variable Components Using Exploratory Factor Test Results

Variable name	Index name	Propositions KMO:0.825 BTS:831.290 DF:231 SIG:0.000	Factor loads	a special amount	Percentage of variance	Cumulative variance	Alpha value
First factor: The rule of law	Q8	Good use of urban amenities and respect for the rules	0.671	6.947	31.579	31.579	0.820
	Q2	Observe the official rules governing the community	0.668				
	Q3	Attention to the public interest and the proper use of them	0.664				
	Q9	Respect for nature and use it without hurting	0.613				
	Q4	Citizenship behaviors on occasions and in the external environment	0.597				
	Q1	Responsiveness about others at the community level	0.582				
	Q5	The culture of social life and urbanization	0.513				
Second factor: Scientific and technical literacy	Q25	Ability to use communication and information technologies	0.777	1.873	8.515	40.094	0.792
	Q15	Use online services to do daily jobs and earn money	0.714				
	Q12	The inclination to learn new knowledge with study	0.622				
	Q34	The desire to know and learn	0.568				
Third factor: Purposeful thinking	Q29	Health status and physical and mental health	0.717	1.746	7.936	48.029	0.763
	Q36	Truth and honesty in speech and behavior	0.588				
	Q19	Perspectives and motivation for a good life concerning goals	0.517				
	Q23	Having planning and prioritizing goals	0.477				
	Q20	The ability to take risks and consider probabilities	0.319				
Fourth factor: social intelligence	Q31	The ability to interact and interact individually and socially	0.573	1.328	6.034	54.064	0.657
	Q42	Virtual identity and personal behaviors	0.477				
	Q26	The ability to understand and	0.448				

Variable name	Index name	Propositions KMO:0.825 BTS:831.290 DF:231 SIG:0.000	Factor loads	a special amount	Percentage of variance	Cumulative variance	Alpha value
		comment on the ideas in the media					
	Q24	Understanding the history and history of the community and the international community	0.412				
Fifth factor: Global awareness	Q38	Being updated and aware of the issues of the day	0.656	1.098	4.993	59.056	0.638
	Q21	Awareness of global events (political, economic and so on)	0.458				

After checking the factory loads, it is necessary to ensure the fitting of the collected data with the conceptual model of the research. Chi-square test is usually used to assess the fitness of structural models, which is reasonable depending on the sample size and for the sample size between 75 and 200 cases (Hanafizadeh et al., 2011). In addition to the test, other indicators are moderated and can be used to evaluate structural models. According to these results, it can be said that the smart citizen model is suitable and applicable. In other words, the observed data has mostly coincided with the conceptual model of research. Table 5 shows that all fitness characteristics are at an acceptable level, the data of this research are appropriate to the factor structure of this scale, and the items of this scale are in line with the fundamental structure.

Table5. Indicators of Smart Citizen Conceptual Model Fitness

Fit indices	Great fit criterion	Acceptable fit criterion	Model results	Result
X^2 squared			525.4	-
The degree of freedom (df)			200	-
X square divided by degree of freedom (x^2/df)	<3	<5	2.627	Excellent
Significance level (p-value)			0.000	Confirmed
Necessary Fitness Index (GFI)	>0.95	>0.90	0.932	Acceptable
Adaptive Adequacy Necessity Index (AGFI)	>0.90	>0.85	0.914	Excellent
Tucker Lewis Index (TLI)	>0.90	>0.85	0.890	Acceptable
Bentler and Bonnet Normal Fit Index (NFI)	>0.90	>0.85	0.857	Acceptable
Adaptive fit index (CFI)	>0.95	>0.90	0.905	Acceptable
Root of mean square error approximation (RMSEA)	<0.08	<0.1	0.051	Excellent

Given that the most crucial fit statistic is the Chi-square, this statistic measures the difference between the observed and estimated matrices. This statistic is very sensitive to sample size, so its value is divided into degrees of freedom. The result should be less than 3, as shown in Table 5, this value is 1.25. Other indicators are Goodness of Fitness (GOF), which represents the acceptable fit of the model. The value of the root means square of the estimation square (RMSEA) is suitable for fitting 0.051 and, given that it is less than 0.08, its value is excellent and indicates the confirmation of the research model. Other indicators are all at an acceptable level that confirms the suitability of the model.

As shown in Fig. 2, in the structural model of the smart citizen's confirmation factor analysis, all of the path coefficients are significant, and all of them have values higher than 0.5. It should be noted that significant factor loadings are considered to be more than 0.4 percent (Estabrook & Neale, 2017).

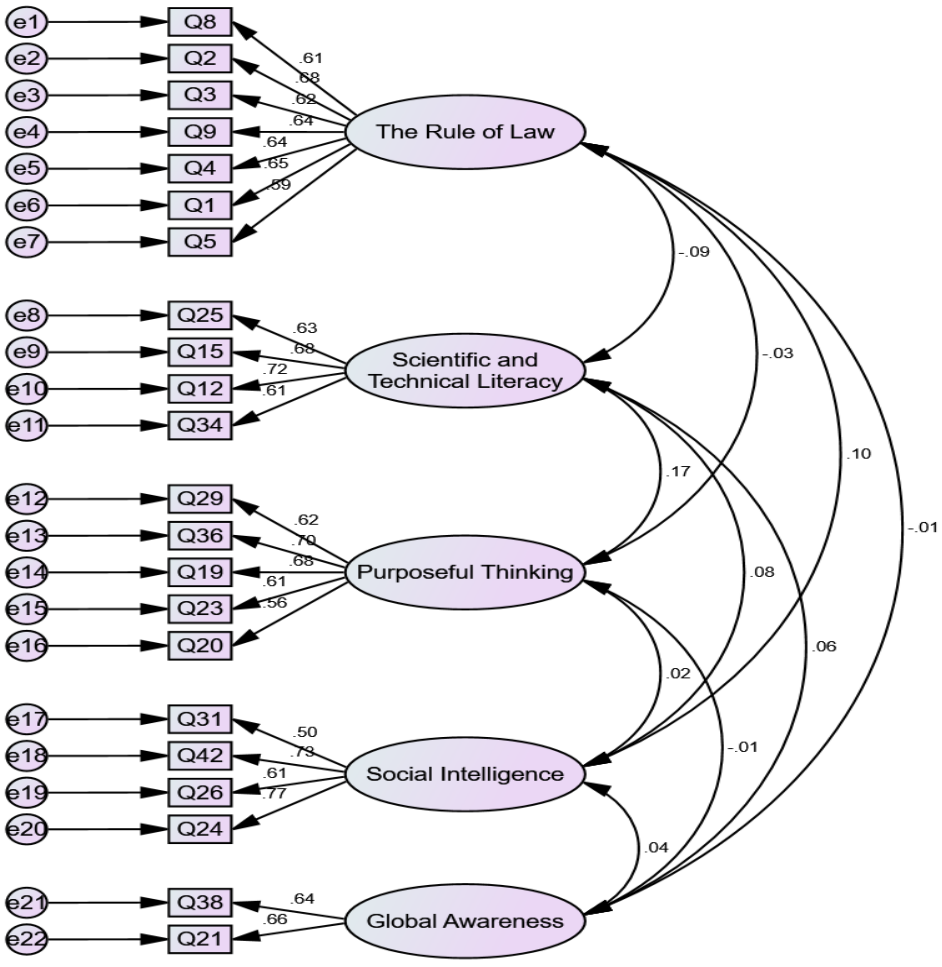

Fig2. Structural Modeling Factor Analysis of Effective Factors on Smart Citizen Characteristics

Table6. Standardized Regression Relationships Between Structures (Factor loadings)

Structural Relationship With Items			Standardized Load Factor	Estimation Error	P-Value
Q8	--->	The rule of law	0.614		
Q2	--->	The rule of law	0.680	0.086	***
Q3	--->	The rule of law	0.620	0.085	***
Q9	--->	The rule of law	0.635	0.084	***
Q4	--->	The rule of law	0.639	0.080	***
Q1	--->	The rule of law	0.650	0.084	***
Q5	--->	The rule of law	0.594	0.087	***
Q25	--->	Scientific and technical literacy	0.632		
Q15	--->	Scientific and technical literacy	0.682	0.091	***
Q12	--->	Scientific and technical literacy	0.721	0.088	***
Q34	--->	Scientific and technical literacy	0.610	0.080	***
Q29	--->	Purposeful thinking	0.622		
Q36	--->	Purposeful thinking	0.697	0.092	***
Q19	--->	Purposeful thinking	0.679	0.086	***
Q23	--->	Purposeful thinking	0.611	0.083	***
Q20	--->	Purposeful thinking	0.556	0.083	***
Q31	--->	Social intelligence	0.498		
Q42	--->	Social intelligence	0.725	0.136	***
Q26	--->	Social intelligence	0.614	0.124	***
Q24	--->	Social intelligence	0.767	0.142	***
Q38	--->	Global awareness	0.637		
Q21	--->	Global awareness	0.660		

In Figure 2, the ellipses, the variables, or agents, and rectangles show the materials of the quick citizen questionnaire. The directional arrows from the ellipses to the rectangles show which clauses are loaded, which values are written on the arrows, shows the number of variances that can be explained by the agent. The small arrows show the remaining variance (error), which is not explained by the agent. Two-way arrows show the correlation between agents.

In order to ensure the significance of factory loads, it is necessary that the standardized load ratios between each construct with its positions are more than 0.4 and inferential statistics are also significant. In this regard, the number of items in the statistical hypothesis model based on the significance of factor loads has been tested. Their examination of the values shows that all factor loads are significant and their significance is less than 0.001 (Table 6).

In addition, to ensure differentiation between extracted structures, the significance of the covariance relations between them is shown in Table 7. Examining the value of p for each binary relationship between structures, because their value in all cases is more than 0.05, therefore, the assumptions about the existence between structures are rejected, and it can be concluded that the proposed structures have weak relationships between each other and therefore, they are assumed in an independent model.

Table7. Covariance Relationships and Significance Degree Between Structures

			Estimation of covariance	standard error	P-Value
The rule of law	<--->	Scientific and technical literacy	- 0.057	0.034	0.091
The rule of law	<--->	Purposeful thinking	- 0.017	0.032	0.598
The rule of law	<--->	Social intelligence	0.056	0.027	0.040
The rule of law	<--->	Global awareness	- 0.007	0.038	0.863
Scientific and technical literacy	<--->	Purposeful thinking	0.114	0.037	0.002
Scientific and technical literacy	<--->	Social Intelligence	0.046	0.030	0.120
Scientific and technical literacy	<--->	Global awareness	0.041	0.042	0.330
Purposeful thinking	<--->	Social intelligence	0.012	0.028	0.656
Purposeful thinking	<--->	Global awareness	- 0.007	0.040	0.863
Social intelligence	<--->	Global awareness	0.024	0.033	0.477

6- Conclusion and Discussion

By expanding digital resources, new types of cities are emerging, called smart cities or virtual ones. Therefore, communities are moving towards smart and electronic worlds. The smart and electronic city in the world are developing rapidly and have created many opportunities for living, working, and recreational environments, and provide a place in an information society to give people new experiences in their lives. In many developed countries, most citizens are turning into smart and electronic citizens and in our country citizens will have to be smart and e-citizens in the next few years.

The realization of smart cities in Iran requires attention to two specific issues, the provision of infrastructures and the development and education of smart citizens. Considering the complexity of recent technologies in cyberspace, attention to social development and the ability to use these technologies should be taken into consideration by experts and work on e-readiness of citizens. The smart city and smart citizen are important issues and require a comprehensive attempt by governments, executives and citizens.

The results obtained from field studies in the analysis of smart citizen indicators regarding citizens in Yazd showed:

1- First factor, rule of law, with 31.579 percent of the total variance as the most important and influential factor of the smart cities. The components of this factor in this research are urban friendliness, law-governedness, socialism, nature-friendliness, public behavior, social responsibility, and social orientation. These components are consistent with the researches of Ishani & Babaali (2017) and Shirbygi et al. (2017). The results of the research, Lerbygy et al., show that the law-order of managers with a bachelor's degree is more than those with other documents.

2. The second factor of scientific and technical literacy is 8.515 percent of total variance. Based on the findings of this study, the components of this factor include technological literacy, participation in electronic business, studying and acquisition of knowledge and flair. Kamalipour et al., (2017) and Adib et al.,

(2016) referred to these components as technological and media literacy in their research.

3. Targeted thinking is the third factor mentioned in this study with 7.936 percent of the total variance. Health status, truthfulness, prospectiveness, prioritization, and risk aversion were identified as components of this factor. Litman (2017) and Ahmadi et al. (2016) referred to these components in their findings.

4- The social intelligence factor was named as the fourth factor of the smart citizen with 6.034 percent of the variance. The components that are involved in this are personal and social interaction, virtual identity, functional literacy, and cultural literacy. In these studies, Pirouz & Abdollahi (2016) and Wall & Dignum (2017) have also been mentioned.

5. The fifth of smart city is global awareness with a 4.993 percent of the total variance: the components of this factor point to global awareness and global awareness. These components are consistent with the researches of Hemment & Townsend (2013) and Sajadi & Aghaei (2016).

In response to the questions posed in the research, it can be noted that:

1. The status of the smart citizen can be measured by the variables shown in Table 4 with 5 categories of factors and 22 indicators.

2. The components of smart citizens with a technological learning approach are technological literacy, the amount of study and knowledge acquisition, and acumen.

3. The significance of each component of the smart citizen provided in the research can be indicated by the factor loads of each indicator and the percentage of variance of each factor presented in Table 4.

The suggestions offered to promote the status of the smart citizen in Yazd are as follows:

Information and communication technology, smart city, as well as a smart citizen, if they are realize, will influence on various economic, social, environmental and physical factors, this means that the optimal use of ICT results in the development of urban sustainability. Since the city of Yazd is considered a growing city in the center of the country, the citizens will face problems such as air pollution, noise pollution, traffic jams, energy waste, less citizen participation in future. However, citizens need to recognize the need for new methods and content, and experience with the use of ICT, to make the role of smart citizen a valuable measure for better life experience.

Based on the findings, the following suggestions can be presented for the optimal use of information and communication technology, infrastructures, culture and education of smart citizens.

A. Using the knowledge and experiences of smart cities in advanced countries consciously, adapting it to the characteristics of urbanization in Iran, and using expert opinions in improving the process of correct implementation of urban intelligence in order that attention to the factors of law and order, the level of scientific and technological literacy and also, achieving targeted thinking should be taken into consideration.

B. Serious attention of the public and private sector to investing in smart urbanization and smart citizens. Considering the opportunities offered by profitability in reducing costs and increasing citizens'

satisfaction, this can be attractive for private sector investors.

C. The quantitative and qualitative development of electronic service centers with the aim of facilitating the urbanization process and creating a better life experience for citizens.

D Support for research in the field of urban development and smart citizen.

E. Promoting citizens' awareness about the nature and methods of implementing smart city and using citizen participation in collective processes.

Moreover, The production of training programs to justify people and authorities in order to be aware of the city and the smart citizen, which this process will be achieved with the serious consideration of urban managers in the culture of citizens among them and through the deliberate use of ICT tools, and in particular social networks. However, taking into account the role of advertising in order to inform about the consequences of the city and the smart citizen can also contribute to the development of the concept in the city.

It should be noted that although in conducting this research, attempts have been made to analyze the situation with the smart citizen in the city of Yazd, taking into account the appropriate statistical sample and paying attention to the characteristics of the respondents, and their appropriate geographic distribution, according to research constraints, it is suggested to examine the wider population in future so that the results obtained can be further generalized.

In addition, in the research, only the respondents' perspective on the components of the smart citizen was considered from the purposeful learning. It is suggested that in future studies, the personality traits of individuals according to demographic divisions (including gender, age, and educational levels, etc.) as well as types of psychological features (participation, effort, etc.) to be considered. Surely measuring these features will help urban decision makers in the development of smart cities concerning the characteristics of citizens.

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