



The Evaluation of Sustainable development in Tabriz metropolis, Iran

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Abstract

The Urban Sustainable Development is multilateral and it deserves the consideration of different dimensions of the issue. Traditionally the urban development was generally limited to unilaterally economic policies and goals. However, in the last decade of 20th century sustainable development is multilateral, and it includes social and environmental-ecological goals as well as economical ones. The aim of this research is to study the sustenance of development in Tabriz according to the quality characteristics of sustainable development in the period between 2003 and 2013. The results of studying chosen variables and related criterions show that Tabriz encounters a state of relatively instability in economic, social-cultural, and environmental-ecological fields. Also we have used a combination of method in this research.

Keywords: Tabriz, sustainable development, urban sustainable development, economic instability, social-cultural instability, environmental-ecological instability.

Introduction

Sustainable development and urban sustainable development have been turned into a new and dominant paradigm in the principles of development and urban planning, theoretically and scientifically, in recent decades. Although this paradigm supervises the different attitudes and interprets, it emphasises on the sustenance and continuity of the development for all the people and future generations and sophisticated multilateral dimensions of economic, social and environmental process of development in a country or a city.

The most important thing which forces the authority and the urban designers to think deeply and notice the concept of urban sustainable development is the fact that inhabiting in the cities is increasing fast and it is estimated to be continued in the future. Also the astonishing development of metropolises, especially in the southern countries, has had a very bad effect on the inhabitants of these lands¹.

There is no single formula for the urban sustainable development in all countries. And every country should follow a special criterion regarding its own social-cultural, economical, and environmental-ecological conditions.

Nowadays as a result of the increasing centralization of the population in Tabriz, the city faces lots of problems and difficulties, some of which are problems seen in most other metropolises, so the concept of sustenance can be studied regarding different criterion.

To design a pattern for urban sustainable development, things such as economic, social-cultural, and environmental-ecological sustenance have the key roles. Also urban sustainable

development is important because there is a mutual relation between urban sustainable development and regional economic development and this is something inevitable. However, as we notice it can be seen that there has been little consideration of this factor in the common literature of urban development by the managers and decision makers in urban issues in the mentioned district².

The theoretical concepts of sustainable development

There are different theories for sustainable development which are divided into two groups; the structural perspective and the ways of sustainable development perspective.

The structural perspective: In this perspective sustainable development consists of a social and political structure.

The adherents of this theory have described it as: preserving the current ecological conditions which are needed to have an acceptable level of human beings' welfare in the cities and also regarding the living conditions for the next generation. Regarding the first perspective we can study the following models³.

The ever changing and bothering model: Where the means to set the policies continuously tries to maximize the product and grow it. In fact the maximum use of the natural resources is the main issue.

Weak sustainable development model: The goal in this model is to combine the capitalism with environmental issues. This means that we can use neoclassic economic principles to solve the environmental problems.

The supporters for this view claim that the preliminary requirement for any economic development is to preserve the environment: These people suggest the policy makers to combine the environmental preservations with their economical policies.

The ideal sustainable development model: The ideal model of sustainable development doesn't consider the human being's life alone, but it considers all the other living beings and non-living beings very valuable. On the other hand this model is seeking for equal criterion for the different forms of the life.

So in this model the different social and environmental dimensions of sustainable development are considered a lot. And it claims that the current measurement criteria in the quality of life are not enough and offers to prepare more landmarks for the measurement of life quality.

The ways of sustainable development perspective: In this category three basic fields of development, needs and sustenance will be considered as sustainable development.

Development: There are two functions in this field, one of which is concentration on knowledge of human being. In this field development means the growth; the growth which follows western development samples. This kind of development is based on free international commerce, maximizing the products and economic development in national and local scales based on gross national product (GNP). The next function is concentration on living beings. In this function development opposes the concentration on human being and his/her talents by relying on the concept of inner growth. According to the concentration on human being, the aim should be gaining the maximum welfare using the least.

Needs: In most cases the needs are similar to development issues. According to this theory, increasing the wealth is considered much. Also some of the most important issues in this theory are as follows: considering the basic social needs, making helping factors available for all members of a society.

Sustenance: The sustenance means regarding the natural potentials of the earth resources in every kind of human activity

and being serious enough to preserve them in urban planning. Also we should notice that besides the relations between urban sustainable development and ecological systems, the identities, city forms and the culture and art works of the people should be considered.

Choosing important variables to make a criterion

A point should be clarified before determining the important variables of each factor and it is the fact that since the measurement and analysis process of each field is done in two qualifying and quantifying methods, we have taken into account the followings; there aren't formal and qualified references for needed statistics and information. The statistics and information for chosen variables aren't up-to-date and it isn't easy to access the statistics and information on time. Since the statistics and information aren't in time and reliable there is the possibility of errors in measurements and it is because of our quantifying method. Avoiding the effective deviations in analysing, this is originated from the variety of units of counting quantity criterion.

Regarding the items above, the quality method, as a basis for measurement and analysis, for sustainable development in Tabriz has been chosen.

The variables of urban sustainable development factors

Some of the most important variables related to effective factors on the evaluation of sustenance or non-sustenance in urban development are as follows:

The analytical Model: In urban studies the trend and the kind of study is based on deduction. So the comparative study is the basis for deductive logic⁴. Because our study and measurement is not possible out of comparative analysis⁵, in this phase we are looking for a model to evaluate the sustenance of urban development in Tabriz.

There are different models such as: the symbolic analytical model which is based on factors' symbol and factors' importance coefficient.

Table-1
Chosen variables for evaluate urban sustainable development

Economic	Social-cultural	Environmental-ecological
-studies to approve the possibility of urban development projects	-preparing suitable places to enhance the social life	-compatibility of urban functions
-predicting permanent revenue resources	-social cooperation	-having a healthy climate
-organizing informal inhabiting and country inhabitants	-obeying the rule	-confronting environmental dangers
-efficiency of city functions	-social compatibility	-performing plants management
-economic compatibility of citizens	-preventing social deviations and perversions	-giving the identity and preventing the space chaos

Table-2
The related criterion to chosen variables for evaluation urban sustainable development

Economic	Social-cultural	Environmental-ecological
<p>1-studies to approve the possibility of urban development projects</p> <ul style="list-style-type: none"> -to examine the facilities and needed basic foundations -to examine the cost of management and establishment -observing the economic benefits of people benefiting from urban development projects 	<p>1-preparing suitable places to enhance the social life</p> <ul style="list-style-type: none"> -preparing some special places for gathering urban inhabitants to train them and strengthen the group life spirits such as educational camp sites, -building self-employing complexes in different parts of the city for men and women separately 	<p>1-compatibility of urban functions</p> <ul style="list-style-type: none"> -harmonizing the current and predicted usages with natural space regarding the colour, form, equipments and the kind of activity
<p>2-predicting permanent revenue resources</p> <ul style="list-style-type: none"> -predicting alternative revenue resources for example the devotion of some of urban taxes to municipalities -having a processing and gradual auditing system to increase municipalities' revenue 	<p>2-social cooperation</p> <ul style="list-style-type: none"> -forming city council assistants in different parts of cities as a valuable source -using the information and different experiences of people and non-governmental organizations, people organizations and professional societies in different fields of programming, designing, and urban management -using professional women's viewpoints and considering female desires in planning and division of urban districts -active presence of people in political decision-makings such as elections 	<p>2-having a healthy climate</p> <ul style="list-style-type: none"> -the number of industrial factories and the amount of the pollution they cause -the quality of traffic in the city and having better public transportation services
<p>3- informal inhabiting condition and country inhabitants</p> <ul style="list-style-type: none"> -having informal inhabiting places and country inhabiting -having informal and pseudo jobs 	<p>3-obeying the law</p> <ul style="list-style-type: none"> -the quality of observing security and disciplinary laws by the mass of people 	<p>3-confronting natural dangers</p> <ul style="list-style-type: none"> -teaching the people how to react against natural disasters through radio-television and in-service training classes for those involved in crisis management -the previous records of geomorphologic activities such as earthquakes, landslides in the city and important urban projects -the prediction of open-air and safe spaces for temporary settlement of the citizens in natural disasters' time such as earthquake and fire
<p>4-efficiency of city functions</p> <ul style="list-style-type: none"> -regular and periodic studies of expected functions for current usages - regular and periodic studies of expected functions for predicted usages 	<p>4-the social-cultural compatibility</p> <ul style="list-style-type: none"> -having different tribes and races in the city -having different dialects in the city -having different rules to force some for social detachments 	<p>4-performing plants' management</p> <ul style="list-style-type: none"> -using electronic portal between the governmental organizations to decrease street traffics and air & sound pollution - planting trees and implementing plantations in at least 20% of the lands owned by the factories and industries -installing electronic municipality -evaluation urban development designs environmentally
<p>5-economic compatibility</p> <ul style="list-style-type: none"> -having equal chances between the citizens regarding job, housing, and income 	<p>5-occurrences of social deviations and eversions</p> <ul style="list-style-type: none"> -people addicted to narcotics -increasing the number of beggars -the occurrence of armed burglaries from homes and banks -the spread of mental and psychic illnesses such as aggression and stress -increasing the anti-social phenomena such as sexual abuses and counter-ethical treats 	<p>5-giving the identity and preventing the space chaos</p> <ul style="list-style-type: none"> -considering cultural-historical values in programs and execution of urban development designs -supervising city plans' performances in buildings to observe the urban rules -organizing the old and vulnerable structures

The combined criterion for development: This model is one of the dominant methods in combining examining and evaluation criterions, which is known as "Morris pattern"⁶. Also there are some other methods such as "Delphi" and "Guttman scalogram" (Institutional Scalogram) which are used in special fields. But the method in this paper, to cover the limitations of quantitative analysis methods (as we explained above) and considering the requirements and facilities to prepare this paper, is a combined method devised by the writers which is a combination of "Bazrgar's method" and "AHP" (Analytic Hierarchy Process). In this method we devise an importance coefficient for each of the important chosen variables. These coefficients which have been measured by using AHP method and their values are between 0 and 1 ($0 < w < 1$), are based on forming the pair variables' matrix and after determining the geometric average of the matrix's lines are changed into the normalized amounts as the weight of the variables. It is clear that the closer the normalized amounts to 1, the relative importance of the variable is higher in comparison to the other chosen variables. Then the amount of relative observance of each one of the variables in different time spans will be measured. In measuring the observance amount of the variables (in a qualitative hierarchy of "very good" to "very bad" and 0 to 4 credits), interviews with experienced authorities and managers of organizations related to urban management and city constructions, surveying the attitudes of university teachers and in some cases referring to the documents and urban development plans in Tabriz have been taken into account. So when one of the variables in the studied city has been observed in a suitable form, the credit for that variable will be determined as "very good". In a hierarchical scale (applied adjustments of the variables in the city studied) the amount of above credits can be lowered to "very bad" also.

On the whole we can say that the combined model consists of two parts namely: i. normalized relative importance of the variables and, ii. The amount of relative observance of variables. The process of determining relative importance of social-cultural, economic, and environmental-ecological variables (forming judgement matrixes, measuring the relative importance of variables and normalizing them) has been done in pages 6 to 8 and determining the amount of relative observance of variables, according to table 5 includes the values and credits related to them and they have been measured and mentioned in tables 6 to 8. Finally by multiplying the relative importance of variables with their relative observance credits, the percentage

for observing the variables will be measured. On the other hand the judgement about the comparison of pair variables would be done in a matrix and according to credits 1 to 9 and amounts in table 4. In this kind of judgement the numbers of each one of the comparisons will be in one of the two ways: i. using numbers 1 to 9 and, ii. The reverse of a (from 9 to 1). Considering the fact that showing numbers 1 to 9 is the preferred one, if the amount of a_{ij} is more than 1, it means that the variable which lies in the i th. line has more relative importance than the variable which lies in the j column and on the contrary the amounts less than 1 which are shown as the ratios of numbers show that the i th. Variable has a less relative importance than the j th. Then, the related numbers of partial dimensions which is identified as the weight of variables and usually range between 0-1 converted to normal values. For this, at first, the partial dimension numbers of any variable, is multiplied each other separately, reached to the power of 0.25 and then their algebraic total calculated under geometric average of lines, next the product of partial dimension figures of any variable divided by geometric average of lines and achieve the normalized values for triple factor variables of social, economical and ecological – environmental. Thus the relative importance of normalized variables mentioned in the second column table No. 5, 6 and 7 is given.

The relative importance of social cooperation

$$\left(1 \times \frac{1}{6} \times 7 \times \frac{1}{8} \times \frac{1}{7}\right)^{0/25} = 0/382$$

The relative importance of obeying the rules

$$\left(\frac{1}{7} \times \frac{1}{6} \times 1 \times \frac{1}{8} \times \frac{1}{5}\right)^{0/25} = 0/16$$

The relative importance of supplying proper spaces for improving social life

$$\left(5 \times 1 \times 6 \times \frac{1}{8} \times 9\right)^{0/25} = 2/4$$

The relative importance of social compatibility

$$\left(8 \times 8 \times 8 \times 1 \times 8\right)^{0/25} = 8$$

The relative importance of social cooperation occurrences of social deviations and perversions

$$\left(7 \times \frac{1}{9} \times 5 \times \frac{1}{8} \times 1\right)^{0/25} = 0/83$$

Table-3
The criterion for measuring the AHP preferences

Credit	Meaning	Descriptions
1	Equal importance	Both activities have equal effects on the goal.
3	One is less important than the other	The experience or judgement prefers one to the other strongly.
5	The basic or crucial importance	The experience or judgement prefers one to the other strongly
7	The proved importance	Empirically one's preference proved over the other.
9	The extraordinary importance	The preference of one over the other is in the highest positive amount.
2,4,6 and 8	The average credits which show the average state of each of the above comparisons.	

The geometric average of lines $0.382+0.16+2.4+8+0.83=11.77$
 The normalized amounts of relative importance are in fact the weight of variables and are usually between $0 < w < 1$.

$W1 = 0.382 / 11.77 = 0.032$
 $W2 = 2.4 / 11.77 = 0.2$
 $W3 = 0.16 / 11.77 = 0.013$
 $W4 = 8 / 11.77 = 0.68$
 $W5 = 0.83 / 11.77 = 0.07$

The relative importance of studying the possibilities of urban development projects

$(1 \times \frac{1}{5} \times 5 \times 7 \times 8)^{0/25} = 2/73$

The relative importance of predicting the permanent revenue resources

$(5 \times 1 \times 3 \times 6 \times 4)^{0/25} = 4/35$

The relative importance of the informal and countryside inhabiting state

$(\frac{1}{5} \times \frac{1}{3} \times 1 \times 8 \times 5)^{0/25} = 1/27$

The relative importance of urban functions' efficiency

$(\frac{1}{7} \times \frac{1}{6} \times \frac{1}{8} \times 1 \times \frac{1}{7})^{0/25} = 0/14$

The relative importance of economic compatibility

$(\frac{1}{8} \times \frac{1}{4} \times \frac{1}{8} \times 7 \times 1)^{0/25} = 0/41$

The geometric average of lines $2.73+4.35+1.27+0.14+0.41=8.9$

The normalized amounts of relative importance are in fact the weight of variables and are usually between $0 < w < 1$.

$W1 = 2.73 / 8.9 = 0.3$
 $W2 = 4.35 / 8.9 = 0.49$
 $W3 = 1.27 / 8.9 = 0.14$
 $W4 = 0.14 / 8.9 = 0.015$
 $W5 = 0.41 / 8.9 = 0.05$

Table-4
Judgement about comparisons of pair social-cultural variables using AHP

Social-cultural variables	Social cooperation	Obeying the rules	Supplying proper spaces for improving social life	Social compatibility	Occurrences of social deviations and perversions
social cooperation	1	1/6	7	1/8	1/7
Obeying the rules	5	1	6	1/8	9
Supplying proper spaces for improving social life	1/7	1/6	1	1/8	1/5
Social compatibility	8	8	8	1	8
occurrences of social deviations and perversions	7	1/9	5	1/8	1

Table-5
Judgement about comparisons of pair economic variables using AHP

Social variables	Studying the possibilities of urban development projects	Predicting the permanent revenue resources	The informal and countryside inhabiting state	Urban functions' efficiency	Economic compatibility
Studying the possibilities of urban development projects	1	1/5	5	7	8
Predicting the permanent revenue resources	5	1	3	6	4
The informal and countryside inhabiting state	1/5	1/3	1	8	5
Urban functions' efficiency	1/7	1/6	1/8	1	1/7
Economic compatibility	1/8	1/4	1/8	7	1

Table-6
Judgement about comparisons of pair environmental-ecological variables using AHP

Environmental-Ecological variables	The compatibility of urban functions	Benefiting the healthy climate	Resistance against natural dangers	Implementing plant management	Giving the identity and preventing the space chaos
The compatibility of urban functions	1	1/5	1/6	1/5	1/4
Benefiting the healthy climate	5	1	1/4	1/6	7
Resistance against natural dangers	6	4	1	7	4
Implementing plant management	5	6	1/7	1	4
Giving the identity and preventing the space chaos	4	1/7	1/4	1/4	1

The relative importance of the compatibility of urban functions

$$W4 = 2.02 / 8.85 = 0.23$$

$$(1 \times \frac{1}{5} \times \frac{1}{6} \times \frac{1}{5} \times \frac{1}{4})^{0/25} = 0/2$$

$$W5 = 0.43 / 8.85 = 0.05$$

The relative importance of benefiting the healthy climate

$$(5 \times 1 \times \frac{1}{4} \times \frac{1}{6} \times 7)^{0/25} = 1/1$$

The relative importance of resistance against natural dangers

$$(6 \times 4 \times 1 \times 7 \times 4)^{0/25} = 5/1$$

The relative importance of implementing plant management

$$(5 \times 6 \times \frac{1}{7} \times 1 \times 4)^{0/25} = 2/02$$

The relative importance of giving the identity and preventing the space chaos

$$(4 \times \frac{1}{7} \times \frac{1}{4} \times \frac{1}{4} \times 1)^{0/25} = 0/43$$

The geometric average of lines
 $0.2+1.1+5.1+2.02+0.43=8.85$

The normalized amounts of relative importance are in fact the weight of variables and are usually between $0 < w < 1$.

$$W1 = 0.2 / 8.85 = 0.02$$

$$W2 = 1.1 / 8.85 = 0.12$$

$$W3 = 5.1 / 8.85 = 0.58$$

As shown in the matrixes above, first the variables for each one of social, economic and ecologic factors are written in the rows and then in the columns of the matrix; then according to the codes and meanings defined in table-4, their importance have been measured in comparison to each other. One of the features in these matrixes is that always the diameter is equal to 1 and this means that the importance of each variable in the rows of the matrix in comparison to itself (the same variable in the columns of matrix) is the same. But measuring the importance of the other variables of the matrixes in comparison to each other (rows to columns respectively) are based on the contents of table-7.

Table-7
The used values and their relative credits to measure sustenance of urban development (Bazrgar)

The values	The relative credits
Very good	4
Good	3
Average	2
Bad	1
Very bad	0

Now the observance rate of each one of the important chosen variables is presented below for economic, social-cultural, and environmental-ecological variables separately.

Table-8
Measuring the percentage of observing economic variables between 2003 and 2013

Economical variables	The normalized relative importance	The credit for relative observance of the variable										The multiply of relative importance and relative observance of the variable	
		Very good		Good		Average		Bad		Very bad			
		4		3		2		1		0		2013	2003
		2013	2003	2013	2003	2013	2003	2013	2003	2013	2003		
Studying the possibilities of urban development projects	0/3					*			*			0/6	0/3
Predicting permanent revenue resources	0/49						*	*				0/49	0/98
Informal and countryside inhabiting state	0/14					*			*			0/28	0/14
Urban function's efficiency	0/015							*	*			0/015	0/015
Economic compatibility	0/046						*	*				0/046	0/092
Total credit	1											1/43	1/53
Average credit												1/43	1/53
The percentage of observing economic variables												36	38

Table-9
Measuring the percentage of observing social-cultural variables between 2003 and 2013

Social-cultural variables	The normalized relative importance	The credit for relative observance of the variable										The multiply of relative importance and relative observance of the variable	
		Very good		Good		Average		Bad		Very bad			
		4		3		2		1		0		2013	2003
		2013	2003	2013	2003	2013	2003	2013	2003	2013	2003		
Social cooperation	0/032					*			*			0/064	0/032
Obeying the rules	0/2				*		*					0/6	0/4
The supply of proper spaces to improve the social public life	0/013					*			*			0/026	0/013
Social compatibility	0/68					*			*			1/36	0/68
Occurrence of social deviations and perversions	0/07				*				*			0/07	0/21
Total credit	1											2/12	1/34
Average credit												2/12	1/34
The percentage of observing social-cultural variables												53	33/4

Table-10
Measuring the percentage of observing environmental-ecological variables between 2003 and 2013

Environmental-ecological variables	The normalized relative importance	The credit for relative observance of the variable										The multiply of relative importance and relative observance of the variable	
		Very good		Good		Average		Bad		Very bad			
		4		3		2		1		0		2013	2003
		2013	2003	2013	2003	2013	2003	2013	2003	2013	2003		
The compatibility of urban functions	0/02					*	*					0/02	0/04
Benefit from healthy climate	0/12					*	*					0/12	0/24
Confronting the natural dangers	0/58					*			*			1/16	0/58
Performing plant management	0/23					*			*			0/46	0/23
giving the identity and preventing the space chaos	0/05					*	*					0/05	0/1
Total credit	1											1/81	1/19
Average credit												1/81	1/19
The percentage of observing environmental-ecological variables												45/25	29/75

Conclusion

Regarding the aim of this paper which was the analysis of urban sustainable development in Tabriz according to the chosen analytic model and according to the evaluate criterion related to some of the variables of urban sustainable development, the comparison of economical, social and ecological conditions of Tabriz between the years 2003 and 2013 suggests that except the economical fields, in the other fields of social-cultural and environmental-ecological fields, the studied variables in 2013 have had a better condition in comparison to the year 2003. It is clear that the percentage of observing the social-ecological variables were 33.5 and 29.75 in the year 2003 respectively and these amounts have increased to 53 and 45.25 respectively in the year 2013; in a way that the variables such as social cooperation, obeying the rules, and social compatibility in social-cultural fields and resistance against the natural dangers and performing plant management in the field of environment-ecology in the time span between the two defined periods for our study have had growth of 200%. Although regarding the issues of preventive efforts for social deviations and perversions, the compatibility of urban functions, benefiting from a healthy climate and preventing the urban chaos, we have

seen a reverse functions in the subject of urban sustainable development in Tabriz. Also we should mention that in the times mentioned, the observance of economic variables has decreased to 36% in the year 2013 in comparison to 38% in the year 2003. One of the most important reasons for this decrease in credits is that the predictions from permanent revenue resources has been decreased in Tabriz, having the most coefficient of relative importance (0.49) has changed from 0.98 in the year 2003 to 0.49 in the year 2013 and has confronted Tabriz with an increasing trend of non-sustenance economic. On the whole in the year 2013 the observance amount for sustenance in Tabriz has been 44.75 and its amount has been 33.75 in the year 2003.

On the whole we can conclude our study that while the urban sustainable development in Tabriz has had a rising trend in the time span mentioned, the changes made during the recent years have been in a form that the possibilities for non-sustenance specially in the field of economy caused the different weaknesses in the desired urban life in Tabriz and the conditions for life in Tabriz have not been so desirable in recent years. Some of the most important changes which have caused the

incompatibility and non-sustenance in social, economical, and environmental-ecological fields are population increase, spatial and frame urban increase, structural changes and the advent of the centralization phenomenon and the results of such a phenomenon. The things outlined caused the population density, overpopulation, an increase in migrations to Tabriz, an increase in air pollution, an increase in the urban traffic (drivers and pedestrians), informal inhabitation of people with low incomes in the urban region, countryside inhabitation has changed and the villages near Tabriz have changed to be residential areas rather than farming regions, therefore the neighboring townships came into existence, the spatial polarization between the poor and the rich has been done in north and east of the city respectively. According to social pathology these issues pave the way to different social and cultural deviations and perversions and they intensify the factors causing non-sustenance in urban development in this city. On the other hand the advent of centralization phenomenon in a metropolis like Tabriz which is caused by the centralized governmental systems and polarized investments in industries and services in Tabriz and the regions surrounded it, have increased the vulnerability and urban non-sustenance against the environmental, ecological threats such as earthquakes, air and water pollution, destroying farming regions around the city.

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