

Devising sustainability criteria in new towns of Iran

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Abstract: New towns in Iran tend not to be sustainable and have appropriate structures because of a great deal of problems such as lack of exact determination of legal status for new towns, uncertain construction expenses' supply resources, lack of cooperation and harmony between different organizations and lack of substructure facilities. To compare the present situation in these towns in Iran with the goals considered in this research we can claim that: most new towns have not achieved their goals fully and the confusion dominant in Iranian new towns approves this claim. The aim of this research is to identify the sustainability criteria as the means of measuring the sustainability of Iranian new. To do so, first we carried out library studies based on documents and analyzed them and then the different sustainability approaches were identified according to guidelines 21 of sustainability criteria of Iranian new towns. The results of this research are as follows: introducing sustainability criteria in Iranian new towns and describing the tools of measuring sustainability by identifying sustainability criteria based on pressure framework, present state, and response.

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Introduction:

The idea of establishing new towns which started in developed countries after the industrial revolution and is used in developing countries like Iran was aimed to meet the physical development requirements resulted from developing urbanization and organizing the metropolitans. Regarding the pass of a quarter after Islamic Revolution in Iran and the changes it brought about, the urban population in Iran is about 40 millions and it has been estimated to reach 100 millions in the year 1400 (2021). The number of towns was about 300 in the year 1961 and it is more than 950 now and it will become 1900 in 2021 (Nourinejad, 2006, P: 349). New towns were approved to achieve goals such as the direction of overpopulation and decentralization of big cities and metropolitans and responding the need to get houses and apartments for the people with low income after Islamic revolution happened (Ghamami, 2007, P: 87). It seems that while there have been much efforts to implement residential areas and place the population in new towns, they have not been successful in achieving the goals (Shieh, 2006, P: 151). Although some of them have been seemingly successful, the efficiency and independence of life has encountered with several problems such as the severe dependence on main cities. Generally, work place, education, amusement, common needs' supply and even the treatment of a great deal of inhabitants in new towns

are responded by the main cities which are located near them; thus, we are afraid that if the importance of this issue is underestimated the dependence level of these new towns will result in the lack of their success and finally they will be changed into a dormitory and even the permanence of this problem will result in the evacuation of inhabitants and in-hospitality of these new towns.

Utilizing sustainable development criteria is one of the effective methods to establish sustainable new towns. The aim of this system is to use sustainable development criteria globally and locally regarding the different valuation dimensions and environmental, social and economical dimensions. Different countries have changed this system regarding their own environmental conditions and in other words, they have localized it. But the basis for all of them is Agenda 21 and criteria which have been posed by United Nations as the principles and basics.

The main goal in this research is to achieve urban sustainability in Iranian new towns according to the sustainability criteria application. Other aims of this research include the identification of sustainability criteria in three dimensions of economy, social-environmental, and supplying the tools to measure sustainability. Thus, first we studied the application of sustainability criteria according to Agenda 21 and then study the problems of new towns and choose the sustainability criteria for new towns and select some

criteria based on different sustainability approaches and Hart's checklist.

By choosing the framework used by development and economic co-operations' organization as a pattern (pressure system, present state, response), sustainability criteria of Iranian new towns are adjusted in three fields of economy, society, and environment. They also were used as sustainability measurement tools to identify the status of new towns.

Research method:

The research method in this paper is content analyzing and reasoning and deduction method has been utilized to adjust philosophical discussions regarding the urban performance limits. Thus, we have tried to use Agenda 21 as a fundamental issue and identify sustainability criteria in Iranian new towns in three dimensions of economy, society, and environment based on the framework used by organization of economical co-operations and development (pressure, state, response).

Assessing the amount of sustainability in new towns

Sustainability criteria:

In the description posed by organization of economical co-operations and development, a criterion is: a parameter or a set of parameters gained which can represent information about an environment or a phenomenon and beyond the related parameters (Organization of economical co-operations and development, 1993).

Criteria are the hypotheses related to what has been studied and they are not directly observable (Chevalier, et al. 1992). Spangenberg stated that:

criteria are used to implement tools for guidance in sustainable development policies (including criteria controlling and the communications and their results generally) (Spangenberg, et al. 2002, 61-77).

The national project of working on the criteria was commenced in 1989 by focusing on criteria and three different aspects of sustainable development such as environmental, maintenance of systems of ecological life support, humans' health and their welfare in sustainable development of natural resources.

The first set of criteria were published by organization of economical co-operations and development (OECD) in late 1980s and early 1990s, even before Rio-de-Janerio summit and was continued in some other countries. Canada was one of the countries which published environmental criteria set in 1995. Then Dutchmen worked on environmental criteria for several years and the criteria became the main core of programming their environmental-national development and still they are considered as the main policy makers in the country. United Nations formed a workshop towards the movement for establishing sustainable development in Rio in 1992 and introduced chapter 40 of Agenda 21. According to the convention, implementing the required activities was enforced by sustainable development commission. Diamanti & Zanon believe that: in every country the criteria are affected by quality of life and environmental, local, economical, cultural, and natural factors and each operation should be adjusted with the local conditions regarding sustainability criteria (Diamanti & Zanon, 2000; 299-310). The main incidents in relation with sustainability criteria are presented in table 1.

Table 1: Historical approach towards sustainability criteria Source: writers

Field subject	Sustainable Development Criteria
Roots	1925: the emergence of the term "urban ecology" in school of Chicago 1941: Linderman introduced the theory of ecosystem.
Preliminary concepts	1971: Club Rem published "halt to the growth". 1972: United Nation's summit was held in Stockholm, Sweden about ecosystem entitled: "Eco Development".
International concepts	1980: Sustainable Development was first posed by UICN. 1987: The famous "Brantland" report borrowed the concept of "sustainable development". 1989: Focus on environmental criteria started.
Future steps	1990: First sustainability criteria were published. 1992: Agenda 21 was held in United Nation's summit in Rio. 1996: The biggest set of criteria including 120 criteria was published in Britain. 1997: Rio+5, determined valuation of how to implement calendar 21 in New York.
New searches	1999: Emergence of sustainable criteria, overall structure and methodology by United Nations. 2001: Ecosystem criteria were presented by OECD (Organization of Economic co-operations and Development).

Different approaches of sustainability in new towns:

Sustainable development is a new field which considers both politics and culture concurrently and

emphasizes on both economic flourishing and business and industry flourishing. It supports ecosystem and coexistence with environment and supports the equal rights of human beings and deals with both local and international issues of the countries. In fact sustainability has changed to be a criterion in the new era. If once the development was confined to productivity and economic growth, today it has changed its nature in such a way that it is believed that development is a comprehensive and multi-dimensional issue which is applied not only in economics, but also in qualitative developing the life of human beings, ecosystem and changing the cultural beliefs of people (Keshtkar, 2010).

Different approaches of sustainability in new towns affect sustainable development criteria selection greatly. One of the most important factors in sustainable development approach is the concept of sustainability. In dynamic systems such as human societies, sustainability is considered to be an issue of equilibrium during the pass of time (Dahl, 1995; 17-19). Sustainability is a concept which can not be measured easily. Wheeler states that: "a sustainable development is the one which improves the long-term ecological and social health of cities and townships" (Wheeler, 1998; 436). According to the above definition, we can suggest the main approaches in

three economical, social, and environmental fields as follows:

New towns as living complexes are preplanned and their approach to develop and rebuild the cities can be effective and the considerable effect of it is called sustainability. In dictionary definition, a new town is a planned living complex, a town, township or a complex which starts from zero point and develops with a predicted program and almost has a plan (Pascaline, 2004; 45). The existence of a lot of problems in towns, and new towns forces us to change our view about urban life due to the inconsistency of environmental, social, and economical conditions. The problems of new towns and suburbs are almost the same. Some of the most important problems are lack of access to appropriate transportation system, lack of having urban centers, lack of urban growth, and absorbing poor citizens (Ghalehnooue, 2006; 285). The selection of a concise approach which can contain all the present methods for development and measurement of sustainable development is highly important. Regarding the three main approaches of sustainability and the table of sustainable development commission, sustainable development criteria based on Agenda 21 suggest the following different applied approaches for the new towns:

Table 2: different sustainability approaches

Source: Writers

No.	Sustainability dimensions	Different sustainability approaches
1	Environmental	<ul style="list-style-type: none"> - Preserving the quality and supporting sweet water resources - Preserving the beaches - Complementary approach and ground resources' management - Sensitive ecosystems' management, fight against draught and desertification - Sensitive systems' management; mountains' sustainable development - Sustainable agriculture development and urban development - Fight against jungle destroying - Supporting living species' variety; appropriate environmental biotechnology management - Preserving the atmosphere of earth - Appropriate management of environmental wastes and leftovers - Poisonous materials' management - Appropriate management of dangerous environmental leftovers - Appropriate management of radioactive leftovers
2	Social	<ul style="list-style-type: none"> - Fighting against poverty - Population dynamics and sustainability - Education, general awareness and understanding development - Preserving and developing human health - Sustainable human settlement development
3	Economical	<ul style="list-style-type: none"> - International cooperation for increasing sustainable development rate in countries an their domestic policies - Changes in consumption patterns - Financial resources and mechanisms - Transfer of appropriate technology, cooperation and capacity implementation
4	Organizational and official	<ul style="list-style-type: none"> - Complementary environment and development in decision making - Sustainable development sciences

		<ul style="list-style-type: none"> - National mechanism and international cooperation to create capacity in developing countries - Cooperation between international institutions - Presenting information for decision makers - Reinforcing the role of main groups
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It should be noted that besides the three main factors of sustainability, there exists a fourth dimension called organizational and official dimension which is presented in Agenda 21. Thus, the 4th approach is included in the discussion. The aim of this research is to utilize sustainability approaches as a study system, implementing sustainable development criteria in a global measure to the local measure in different valuation continuums and different social, environmental, economical, and cultural dimensions.

The value and importance of sustainable urban development criteria:

The criteria are important components in measuring the total sustainable development. The overall principles of measurement were suggested in 1996 in a conference in Blagio, Italy. Utilizing the criteria is the implementation of tools to direct the policies in sustainable development which includes controlling the criteria and the relationships and their results in general measurement (Spangenberg, et al., 2002; 61-77).

Criteria should present fundamental information for environmental and economical policies in the future and act as preserving against satisfaction from the environment (Smith, 2002; 305-310). Additionally, sustainable development planning should be based on environmental and biophysical criteria and efficiently describe the comparative potentials of development and environmental barriers (Schultink, 2000; 47-58).

If we suppose that the public institutions can not plan the needed strategy for sustainable development without having the required knowledge about the system (Ronchi, et al., 2002; 197-210), we can utilize the criteria of environment and sustainable development for improving the decision making about environmental issues under the conditions of indefinite variables (Levy, et al., 2000; 79-86).

Urban sustainability criteria are the main factors to create communication of performance status, a factor of sustainability which reflects the basic status and a foundation for economical, social, and ecological health of a society during the pass of different generations (Whorton & Morgan, 1975; Clark & Wilson, 1994). Every operation should adjust with the present local conditions regarding the fact that whenever the conditions change in a country, the quality of life is affected by factors such as local,

environmental, economical, cultural and natural (Diamanti & Zanon, 2000; 299-310). The point which should be considered here is that: if highly valued and important criteria are used in determining sustainable development criteria, a chance can be emerged to inform the people about how to deal with their desired expectations and responsibilities in the future. On the contrary to theoretical and independent criteria which are not favored by the public for their value and credibility or one dimensional criteria which are expressed by technical scholars and small and valueless social groups, those criteria which are gained by the totality of the society deserve more participation on the part of individuals to preserve their benefits (Farjaam, 2006; 31). Thus, sustainable development criteria should develop to prepare a strong basis for decision making in all of the levels and play a main role in environmental sustainability and development systems.

The goals of using sustainable development criteria in new towns:

The goal of using sustainable development criteria is to direct the new development decisions. It is done through the implementation of criteria over a set of social tendencies, values and future desires. Some societies express the present issues and problems in dealing with redevelopment decisions and react against the creativity of urban engineering and development investors and skill-oriented development plans through working on opportunities and social capabilities. Meanwhile, it is believed that the new development methods cause more controlling over the society. On the whole, although most of new towns in Iran are plan-oriented, often the towns didn't progress according to the preplanned programs and thus many problems emerged. We can exactly identify the problems by using sustainability criteria in planning systems of new towns and thus administer the needed strategies based on the predicted problems. Regarding the selection of criteria based on sustainability approach we can solve the problems of new towns and direct them towards sustainability.

The fundamentals of sustainable development criteria selection:

As sustainability means to find a way to create equilibrium between economy, society and environment, the development of a set of criteria for

sustainable development should be in a state of equilibrium. Thinking about this issue can create hundreds of criteria and making decisions about their number is a difficult task. One of the methods and principles used in criteria selection is Hart's checklist. We have used Hart's checklist in this research. To organize the criteria, there are 4 common methods which are defined as a framework. One of the framework's methods is "system pressure, present state, response" (figure 1). This method was used by United Nations in sustainable development field. Using this framework presents the second phase's analysis which can be used by policy makers. The framework, "system pressure, present state, response", can show the relationship between human activities, environmental status and also a working framework for long-term sustainability aspects. The most important point in the above framework is that: it can not respond to the predetermined goals well.

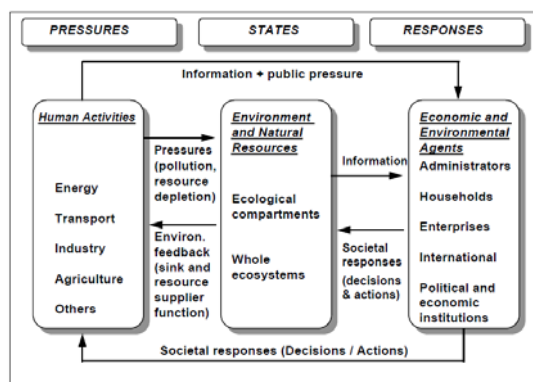


Figure 1: the total framework of the model of "system pressure, present situation, response"
 Source: (Peter Hardi, Models and Methods of measuring Sustainable Development Performance, 1995)

Study process:

To assess the sustainability in new towns, first we should study the problems in three aspects of

economical, social and environmental. Although new towns have gained economical and social success in some parts of the world, most of them have encountered great problems in starting point, during the development process and after development regarding the legal regulations which can be generalized to other new towns too. Some of the problems in new towns are national-regional and some are related to specific new towns. Besides the overall social problems and problems resulted from the first era of new towns, some of the problems are resulted from the lack adjustments of planning principles based on structural characteristic of human societies in the last 50 years and the characteristics of these societies which are dominant today. Daneshpour believes that: "the important and major problems of new towns are as follows: the problem of achieving self-sufficiency, the problem of achieving a state of equilibrium, the problem of resolving settlement needs and job self-sufficiency, the problem of imbalance in age structure of the population, the problem of lack of settlement of households with low incomes in new towns, the problem of land ownership and plants constructed, the problem of depreciation of structures, the problem of financial helps' stop in the legal framework, the problem of condensation and accessibility, the problem of transportation, the problem of planning and designing fundamentals, the problem of insecurity of settlement in new towns, the problem of varied management structures of neighboring buildings, the problem of lack of people's participation in new towns, the problem of ecosystem costs in new towns" (Daneshpour, 2006; 79).

Today a variety of approaches are used to achieve the criteria, but the overall structure for all of them is nearly the same and they differ only in the procedures and details of the characteristics of every region such as goals and regional policies. In this paper, the selection of sustainability criteria has been done regarding Agenda 21, the problems of new towns and using Hart's checklist:

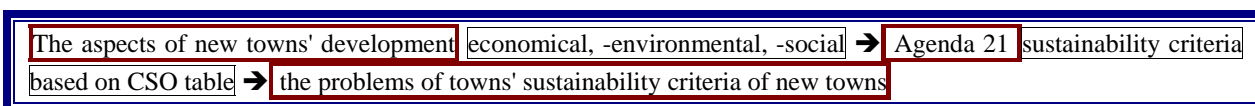


Figure 2: sustainable development concept towards sustainability criteria
 Source: writers

The exact identification of criteria helps us to understand the problems better and implement the policies and investments according to the type economical, social, and environmental conditions in the future. As it has been shown in figure 2, based on discussions in Agenda 21, and considering the problems on new towns we can choose the criteria. It should be noted that the problems posed are overall and criteria selection has been done generally. We can choose the criteria regarding the special conditions of each region and accessibility of the data.

Table 3: sustainable development criteria based on the problems of new towns Source: writers
Pressure (1), State (2), and Response (3) criteria

Problems	Sustainability criteria			
	Social	Economical	Environmental	organizational
1- the problem of achieving self-sufficiency	1- rate of unemployment 2- poverty rate 3- the national capital consumptions for substructures	1- annual rate of energy consumption 2- renewable energy consumption rate 3- capital added for sustainable development	1- fossil energy consumption rate 2- environmental assessment 3- sustainability training	1- management system depended on the central government 2- access to information 3- people's participation
2- the problem of achieving a state of equilibrium	1- labor working groups 2- job ranking equilibrium 3- management considering social equilibrium	1- goods import 2- import goods share 3- capital amount added for internal production	1- annual rate of fossil energy consumption 2- renewal amount 3- natural resources' management	1- lack of complementary planning 2- multi-directional planning amount 3- sustainable development strategies
3- the problem of resolving settlement needs and job self-sufficiency	1- urban population growth rate 2- amount of land per person 3- cost of substructures per person	1- cost for house 2- cost of land per person 3- programming for cheap house	1- amount of construction 2- changing conditions of land 3- natural resources' management	1- planning for appropriate land for the population 2- planning for the present land 3- planning scenes for the future
4- the problem of imbalance in age structure of the population	1- population growth- births and deaths 2- the balance between population and jobs 3- population control plans	1- rate of unemployment 2- cost consumed for education 3- cost for population control education		1- lack of planning for real population capacity of new towns 2- presenting population control data 3- country population planning
5- the problem of lack of settlement of households with low incomes in new towns	1- labor working groups 2- social classes' equilibrium 3- cheap house planning	1- house price compared with incomes 2- the amount of cheap houses 3- the interest rate of cheap houses in annual programs of country's financial planning	1- the amount of using non-local materials and work force 2- houses adjustable with the materials accessible 3- using local materials and local workers in house construction	1- planning for cheap house 2- obligatory program in building cheap houses 3- planning for future cheap houses
6- the problem of land ownership and plants constructed	1- land ownership by public sector 2- the amount of private ownership 3- privatization of land	1- land price increase 2- investing on urban land 3- strategies to control land price	1- land conditions' change 2- land condition based on the concise plan 3- governmental control on the type of application adjusted with environmental conditions	1- the policy to change land application 2- the amount of interference and management of natural resource 3- strategies needed in land ownership
7- the problem of depreciation of structures	1- increasing old and abandoned house structures and population absorbing centers 2- population absorption and public places 3- revitalization of abandoned texture	1- cost of restoring exhausted texture 2- annual consumption for improvements 3- reinforcing improvement and reconstruction	1- structures' exhaust 2- the amount of exhausted buildings compared with out space 3- planning to restore exhausted textures regarding the environment	1- appropriate management of constructions 2- control of governmental organizations over constructions regarding the technical issues 3- planning to restore exhausted buildings
8- the problem of financial helps' stop in the legal framework	1- privatization of urban structures 2- acceptance amount of privatization by people 3- gradual privatization	1- reduction of government's financial resources 2- the amount of governmental financial resources in investments 3- financial helps for house cooperatives	1- texture destroying 2- inappropriate status regarding urban plans 3- texture restoring regarding the environment	1- reduction of governmental financial resource 2- governmental investment 3- planning for gradual reduction of financial helps
9- the problem of condensation	1- dissatisfaction of people of accessing urban services	1- the cost of access to urban services 2- the high rate of	1- high environmental damage for broadness	1- increasing official centers and managerial agents 2- the number of

and accessibility	2- the time of accessing urban services 3- increasing urban services in lanes	costs to deliver goods because of transportation 3- reduction of goods transportation cost	2- rate of land change 3- increasing urban condensation	official centers 3- centralization of management system
10- the problem of transportation	1- dissatisfaction about distances and lack of public transportation 2- the amount of public transportation 3- increasing public transportation	1- increasing private automobiles 2- cost of transportation 3- investing in urban transportation	1- increasing pollutant gases resulted from transportation 2- condensation of pollutants in urban areas 3- increasing public transportation and using green fuel and transportation without automobiles	1- automobile production increase 2- planning for automobile production and automobile imports 3- planning to increase public transportation
11- the problem of planning and designing fundamentals	1- lack of attachment of inhabitants 2- lack of identity for urban spaces 3- planning urban spaces according to what people want	1- low efficiency of space regarding profitability 2- high economical activity of the space 3- economical encouraging policies	1- environmental pressures resulted from lack of adjustment 2- cooperation with environmental conditions 3- designing regarding the environmental resources	1- potential scientists and engineers in the field 2- sustainable development strategy 3- complementary program for environment and economy
12- the problem of insecurity of settlement in new towns	1- rate of unemployment 2- immigration rate 3- increasing social security	1- households' economic status 2- economic development status of the region 3- policies to improve welfare	1- natural damages' rate 2- house conditions adjusted with the environment 3- harmony of houses with weather conditions of the region	1- regions contaminated by dangerous leftovers 2- condensation of pollutants in urban areas 3- exhaust of greenhouse gases 4- exhaust of sulfur oxides
13- the problem of varied management structures of neighboring buildings	1- social divergence 2- social context convergence regarding social classes 3- unitary management regarding social context	1- high class-differences 2- convergence of context regarding economy 3- efficient taxation system	1- divergence of urban structure regarding environment 2- adjustment of structure with the environment and natural bed 3- environmental planning before administration	1- lack of harmony in planning for areas and lanes 2- environmental complementary program 3- sustainable development strategy
14- the problem of lack of people's participation in new towns	1- attachment to government's policies 2- elections by the government 3- reinforcing people's participation in policy making and planning	1- governmental and private investments' amount 2- investments by private companies 3- encouraging policies for private investments	1- lack of observing the environment and weather as a national capital 2- amount of people's participation in environmental sustainability 3- policies for using people's cooperation in preserving environment	1- lack of awareness of government's programs among people 2- the amount of encouraging people to participate in government's activities 3- educational programs and informing the people by the government about those programs
15- the problem of ecosystem costs in new towns		1- waste of agricultural lands 2- costs consumed for substructures 3- economical yields compared with ecological cost	1- manipulations in environment to create substructures 2- harmonizing the design of new town with area conditions 3- harmonizing planning and designing of new town with area	1- environmental programming and locating new towns 2- the adjustment amount of new town administration and appropriate environmental planning 3- development scheme of new town regarding the appropriate environmental planning

As it can be seen in the table above, the proposed criteria for new towns equal 174. A certain criterion was suggested for each problem regarding sustainability, and for each field three different criteria

as: pressure, state, and response were proposed. One of the prevalent problems in sustainability criteria usage in policy makings is the interactive interference of each criterion in the system which indicates the

lack of transparency of the system. Another disadvantage of working with criteria is lack of in time decision making (figure 4). The framework "pressure, state, response", is used to present an efficient system regarding sustainability measurement to make the criteria applicable in the system. If we use this framework in new towns, we can study the conditions in these new towns based on state criteria. And finally we can propose the required policy makings and decision makings by using these criteria. The framework for "pressure, state, response", in the system is defined as follows:

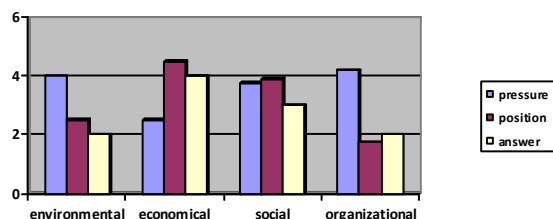


Figure 3: sustainability measurement tools

Source: writers

Regarding the above figure and the total framework for "pressure, state, response", we can say that: in most cases, pressure criteria have a reversed relationship with conditions in society and they have a direct relationship with society's reactions. In other words, if the pressure is high in a society, the conditions are inappropriate and most likely policy makings in that society is weak. In order to study a society exactly we should collect the data by using the proposed measurement tools and assess the status of the society. The figure above is simply introducing the tools and the numbers are not real.

Conclusions:

Regarding the studies carried out, we can conclude that the existence of a lot of problems in new towns is an attempt towards environmental, social, and economical in-sustainability. Choosing a concise approach which can lead our new towns towards sustainability is absolutely necessary. Utilizing sustainable development criteria in social, economical, and environmental dimensions, is an appropriate approach in this trend which is suggested by the term "an efficient method" regarding the in-sustainability of new towns in this research. To present a sustainable urban pattern by using sustainability criteria identification in new towns, the following methods were experienced and these results were achieved:

Introducing sustainability criteria for Iranian new towns regarding the problems of Iranian new towns based on Agenda 21.

Selecting appropriate sustainability criteria for environmental, social, and economical conditions of new towns in Iran by using Hart's checklist.

Identifying sustainability measurement tools by determining sustainability criteria based on "pressure, state, response" framework.

It should be noted that the application of the tools prepared was applicable in each of Iranian new towns and accordingly we can determine 1. Pressures imposed on the system, 2. The present status of the system, and 3. Administrable policy makings, in order to modify the system towards sustainability. To achieve these goals it is suggested that we should collect the data by using field studies and studies related to organizations and studying the needed statistics and then deal with measuring the place status of each of three sustainability fields by the proposed tools.

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