Changing urban uses according to infrastructure parameters using scenario-oriented planning

(Case study: Tehran)

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Abstract

This research was conducted with the aim of changing urban uses according to infrastructural parameters using scenario-oriented planning in Tehran. This research is a combination of documentary based and survey methods in terms of research.The nature of the research is based on futures studies science, analytical and exploratory new methods that has been made using a combination of quantitative and qualitative models. And it is intended to be an applied research. After selecting the sample, using the variables (economic, social and physical dimensions) and also changing the urban uses as a variable of the objective function, the hypotheses were tested through the method of operations research and using the Lingo and SenarioWizard software.The statistical population at the time of the study was estimated at 15 people. With regard to the size of the statistical population and based on the judgmental and purposive approach, 15people were determined as the sample size.The data of this study are collected through a questionnaire in the first stage with the help of experts.In the second stage, by designing the questionnaire, the data related to the OR matrix are collected from the same experts and used in the analysis of the case.The results represented that the components of social dimensions have the greatest impact (-33) on the change of urban land use in Tehran.Also, according to the results, the best scenario is [A7 B1], which has the highest effective score with an influential score of 6. This means that in order to change the land use of Tehran in the future, the best solution is to use the component model of facilities and services from the physical variable and the transport network component of the social dimensions variable, which replaces the many current land use changes by proportioning the current land use in Tehran.

Key words: land use change, Scenario planning, social dimensions, urban facilities and services, urban transportation

1. Problem statement

Today, one of the important issues in urban management and planning is to provide appropriate model and policies for the establishment of land use in different areas of the city.Proposing this model and its solutions can be based on the modern principles of planning and the characteristics of the city limits and neighborhoods. Based on this attitude, land use planning has entered a new phase, which, contrary to previous approaches, emphasizes on the relative recognition of reality, the need for prudence to intervene in social phenomena and the need for sustainable use of environmental resources to improve the quality of human life in this planning.

The main purpose of the series of urban land use planning is to ensure the social and economic well-being of citizens. (Mirsadeghi, 1390). During the Urban land use planning, a specific application is allocated for each plot of land. The purpose of this planning is to create a program that increases the level of social welfare according to the limitations (Arkhi, 1394). Urban activities are made especially in cities in which uses have high combination and diversity. Achieving this goal requires an understanding of how to allocate space and distribute land between uses, which is possible with quantitative and qualitative assessment methods of them (Gholamalifard, 1393). The issue of physical divisions of the city and the state of its dimensions and hierarchy are one of the main topics of urban planning, which is directly related to how to use the land, distribution of activities and determination of urban per capita. In fact, the basis for the distribution and allocation of uses and the determination of urban standards and per capita is based on the divisions of the physical space of the city. Based on this, the cognitive, analytical and evaluation processes of uses are possible and, finally, the necessary approaches for organizing and planning urban uses are provided based on it (Mohammadi, 1394). In many cities of developing countries and in the old centers of cities of developed countries, unlike American cities where uses have been specifically separated, there is a significant combination and variety of uses (Taheri, 1393). Therefore, in addition to quantitative and qualitative goals, the purpose of urban land use planning is to organize and promote spatial patterns, especially in cities where land uses are very complex and diverse. This variability, as presented by Zizmatz et al. Based on a study of satellite imagery in 53 major cities, consists of three sections in total; Half of the urban land is for residential use, one-third for transportation and one-sixth for commercial, industrial and facilities uses. The rest of the land is occupied by recreational and idle uses (Soleimani,1393).

To identify and evaluate the efficiency and performance quality of these uses and the characteristics of each, various criteria can be chosen, which due to the

abundant and growing importance of new theories and planning techniques, which is one of the main goals of the third millennium, environmental, aesthetic and participatory planning criteria are among the most important in explaining the concept and design of the optimal model and their solutions, which If these criteria and the techniques derived from them are followed, achieving the desired urban environment of living with high quality of life, in which citizens can easily enjoy the lost rights of their citizenship, seems possible (Salarian, 1394).

The main problem with conventional methods such as the use of Gis and multi-criteria techniques in land use appraisal is that these models do not measure the interrelationships between performances in the target land complex. For this reason, today, some problem-solving processes with an approach change, model the problem of land use appropriateness analysis based on scenario planning decision-making processes, and use futures studies-based models to solve it.

In this study, this model evaluates and optimizes the indicators that are needed to improve land use in a region and the indicators of land use that need to be relocated. These indicators are all examined in the dimensions of scenario planning and as desirable indicators, which include 3 dimensions:

1- Economic dimensions of infrastructure parameters, which include 6 components in the field of income and employment.

2- Social dimensions of Infrastructure parameters in the city, which include 6 components of public education, health, personal and social security, transportation, recreation and leisure, social cohesion.

3- Skeleton-physical dimensions of infrastructural parameters in the city, which include two components of housing, facilities and services and installation.

According to the above, the main issue of this research is whether the land use pattern of Tehran's urban lands is based on the dimensions of its infrastructure parameters?

Theoretical basis of research

Urban design thinkers consider the city to be a complex organized set of three main components of body, imagination, and activity, which is continuously changing and evolving. Urbanologists define the city as a place where humans give up and start thinking. According to different viewpoints, different definitions are provided for the city. In most of the efforts, two criteria have been considered for the basic definition of the city:

1. Determining the minimum size of the city, in terms of population.

2- Determining the quorum for the population density or the relative population.

The second criterion is what Mills confirms for defining the city (Moradi, 1393).

An urban manager must be able to recognize the strengths and weaknesses of his city in a competitive world and seek to strengthen its competitive advantages. In

this way, the city can find a reliable point in the global network of cities and improve its functions in the international capitalism system. Regionalization is a method in which physical planning organizes the land use for the public interest, and its main purpose is to allocate land for major, residential, industrial, etc. purposes in the future development of the city. Zoning is a method by which urban lands are used properly with regard to the internal functions of cities. In this way, sufficient space is provided for different types of urban activities, urban development and urban functions, and each part of important urban activities finds its space and acts according to other functions and activities (Adibi et al., 2010).

The investigation of theoretical studies shows that the first theory of land use was proposed by "VonThunen" in the book isolated state.He pointed out that there is a direct relationship between land use and the distance to the city center. In VonThunen's theory, the location of cities and the pattern of use of urban lands in relation to reducing the cost of production of goods (the distance of the place of production from the market) were considered.Such land use studies were based more on understanding the relationship between the city and the factors influencing the creation and development of cities;But in the early twentieth century, for further explanation, these factors were presented in the context of theory and model.The first efforts in the theoretical and systematic explanation of land use are related to the actions of individuals such as; Bergs, Identity, McKinsey, Harris, Allen, and Fairy (Juan, 2013).

In Iran, urban land use studies are based on urban development projects.Despite the fact that four decades have been passed since the rise and fall of modern urbanization in Iran, the proposals of urban development plans, including: guide plans, comprehensive, detailed and land preparation, are limited to providing a per capita table and land use maps which its data is based on either Western patterns or the empirical theories of relevant experts that have been developed only with a physical view. Now, in the rapid process of urban development, the theoretical and practical shortcomings of these projects, due to the neglect or lack of attention to economic, social, environmental and legal dimensions of land use and space in cities, have been revealed to all.Clearly, any urban land use planning requires accurate analysis and assessment of land use. In general, this evaluation includes the assessment and performance evaluation of the programs and plans with the criteria, goals and forecast standards, such as identification and analysis of the economic and social effects of the programs.In the use of urban lands, in order to ensure the proper placement of uses and the necessary suitability, the evaluation is done in both quantitative and qualitative ways:

The quantitative evaluation is based on the comparison of the available per capita of uses with the relevant standards or by examining the current and future needs of the study area.

Qualitative evaluation is determined using qualitative characteristics and their relationship to each other is examined on the basis of four matrices:
(1) Compatibility matrix; (2) desirability Matrix; (3) capacity matrix and (4) dependency matrix (Soleimani, 1393).
One of the main goals of urban land use planning is appropriate proximity of uses and the separation of incompatible land uses from each other, which is based on the compatibility matrix. The appropriateness of land use with the location and characteristics of the land means suitable placement of uses in relation to the location and level of their operation. Uses located in one area should not interfere with or inhibit the activities of other uses (Taheri, 1393).
One of the stages of land use planning process is land suitability analysis, which includes all suitable land maps that are produced based on environmental conditions, land tolls, activity centers, infrastructure systems and their service areas, which are related to the current situation characteristics and existing location criteria of land use.In determining the appropriateness of land use, it is very important to pay attention to the indicators that make the type of land use coincident or close to each other.For this reason, different methods are considered in this regard according to the social, economic and cultural structures of each society.Principles needed for future location of uses and that how much land will be needed for each of uses for future urban growth over the next 20 to 25 years.Factors influencing this case:
1-Local reality
2. Official rules
3- Accumulation and dispersion of land uses
4- Uses transformation (Azizi, 1392).

Planning

During the 1960s and 1970s, the set of theories and urban experiences and urbanization in Western countries tended to be an approach that could be called a systemic approach to planning.
Although this approach has not enjoyed a unified system, the main content and its ultimate goals, in total, have moved away from comprehensive-rational planning and purely physical planning and pursuit of economic, social and cultural goals and the combination of planning and management.
In summary, the systemic approach in three ways has had a major impact on the development and evolution of urban planning:
A) Systemic approach as a basic theory in planning.
B) Systemic approach as a planning strategy.
C) Systemic approach as "modeling" in planning.

Systemic approach as modeling

One of the achievements of "general systems theory" is the use of "simulation method" and modeling to study systems and intervene in them. Accordingly, in the 1960s, there was a kind of "systemic planning" in the West, based on the simulation of reality as a "model" through which the behavior of a particular system is directed towards the desired goals.The objectives of modeling in general are to know the exact structure and function of a system in order to help solve its problems and ultimately to modify or reconstruct the system.

Models are divided into several main types based on different goals: cognitive (descriptive) models, predictive models, decision making models, and normative models.

Despite the growth of computer software and the development of statistical studies techniques, the use of simulation and quantitative methods and mathematical models in the 1960s and 1970s has not been very successful in public planning, including the city system.In general, modeling for social systems has some basic limitations, including the fact that it faces information constraints, is influenced by field experts, and necessarily tends to limit variables and simplify systems.It is obvious that the validity and efficiency of models usage in different fields such as "descriptive models", "predictive models" and "planning models" are not the same and are much more limited, especially in terms of future predictions of targeted and dynamic systems such as city systems.

Scenario planning

The scenario is a description of a possible future based on a set of factors that are compatible with a particular set of assumptions and includes quantitative and qualitative factors.Scenario-based programming uses existing information as well as facts from the natural sciences, sociology, economics, etc. to compile several logical and coherent stories about the world to come. Scenario planning is one of the common methods to deal with uncertainty in the environment (Shifa et al.[1], 2015).

Futures studies

It includes a set of efforts that, by searching for resources, patterns, and factors for change or stability, embody potential futures and plan for them. The futures study is a reflector of how the reality of "tomorrow" arises from the change (or stability) of "today."The futures study is the same as the Latin phrase "Futures Study". The plural term Futures is used because, using a wide range of methods and instead of

[1] Shiffa, M., Jianhua, H., Feng, L., & Yan, Y.

imagining "only one future", systematic and rational assumptions are made about not only "one future" but also "several imaginary futures." Futures study subjects include the types of "possible", "probable" and "desirable" to change from the present to the future (Zoghi, 1393).

B) Literature review

1. Internal history

Arkhi (1394) - Predicting the trend of spatial land use changes using LCM model in GIS environment: The purpose of this study is to monitor land use changes in the past and to examine the possibility of predicting it in the future using land change modeling (LCM) in Sarabolehcity in Ilam province.In this study, satellite images of TM 4 sensorlandsat in 1367, ETM Landsat 7 in 1380 and TM Landsat 7 in 1390 were analyzed.Images of all three periods were classified into five categories: forest, rangeland, barren land, agricultural land, and residential areas. The forecast of land use situation for 1390 was done using land use maps of 1367 and 1380 with the help of LCM model and based on artificial neural networks and Markov chain analysis.For this purpose, spatial variables of distance from road, distance from residential areas, distance from forest edge, forest rupture index, height, slope and direction were used as factors affecting changes in artificial neural network. According to the results, during the period 1367-1390, 14691 hectares of forest have been destroyed.Also, barren lands have been developed in the amount of 9874 hectares compared to their initial level. The results of modeling the transmission force using artificial neural network in most of the sub models showed high accuracy (60 to 86%). The total error in modeling for 1390 was 12.84%, which indicates the high coincidence of the predicted image of the model with the terrestrial reality image and the acceptability of the model.Also, the forecast results showed that the area of forest lands in 1400 will decrease compared to 1390 and barren lands will increase.

Mohammadi (1394) Modeling and investigation of land use changes in Ramian city: Today, land use change and land cover has become an important challenge in many countries. These changes have a direct impact on the components of the environment, including soil, water and the atmosphere. Therefore, the study of land use changes plays a key role in global environmental studies.On the other hand, modeling and simulating land use changes play an important role in resource management and help managers do better plan for land use. In this study, first the method of integrated land use classification in Ramian city located in Golestan province was evaluated. Then, use changes between 2000 to 2012 were identified using remote sensing techniques. Land use demand for the coming years was calculated based on extrapolation of past land use changes.Using logistic regression, the role of factors affecting land use was investigated. Finally, the land

use pattern in Ramyan was simulated for 2030 based on actual land use maps in 2000 and 2012 using the CLUE-s location allocation. The results showed that the integrated classification method is anappropriate way to prepare a land use map. The findings also showed that the most important land use change in Ramyan was the conversion of forests and pastures into agricultural and residential areas.

Salarian (1394) - Analysis of the dispersed growth effect on land use change: The process of changing the use of agricultural and garden lands to built-up lands since 1340 has been increasing and has led to an imbalance between the use of urban and natural lands in urban areas of Iran.As a result of this trend, land use pattern in central region of Mazandaran, including Sari urban area, under the influence of urbanization process, population expansion and increase in migration, has moved to a new direction and caused change in agricultural and garden land use in lands around the city.The continuation of this process has led to a pattern of discontinuous and decentralized development and has ultimately caused dispersed growth.Thus, the present study is dedicated to the analysis of the dispersed growth effect of urban land use change,and prediction of the trend of land development and land use transformations until 1410.

The research method is descriptive-analytical and attempts have been made to first predict the built-up lands using the GEOMOD method and then to estimate the trend of land use changes in Sari urban area based on the Markov chain model.In the final stage, using GIS, by combining the mentioned models, the interaction of built-up lands and land use was analyzed in order that the distribution and spatial distribution of land use in the research vision to be specified.The results show that land use change in agricultural, garden and rangeland lands will decrease by -1.43% growth rate in 1410, and in line with this trend, the built-up lands are increased by 4.85% growth rate.Spatial distribution of built-up land in the north of studyurban area has been concentrated, but has also increased in the eastern and western parts of the region.The reason for this spatial distribution can be found in the spatial orientations of individuals living in a single-family model in lands around the city that have low prices. Such a trend is based on the intensification of dispersed growth in Sari urban area and requires appropriate orientation in future urban and regional development planning.

Kao et al.[1] (2015) simulated future land use changes based on the optimal ecological model. In recent decades, planners have faced a new problem called dispersed growth.To deal with this problem, a variety of solutions have been proposed. One of the main ways is to take an ecological approach to land use and

[1] Cao, K., Batty, M., Huang, B., Liu, Y., Yu, L., & Chen, J.

the proper use of natural resources.In this study, relying on the same approach, an attempt is made to first draw an optimal model for how to use lands based on an ecological approach.Then, using this model and with automatic cell model (CA) and artificial neural network (ANN), three scenarios 1. Radical ecological development, 2.Moderate ecological development and 3.Continuation of development of the current situation for 2030 are drawn.The results of the study showed that the studied urban complex does not have much capacity for development and in total about 1000 square kilometers of its lands can be ecologically developed.In the first scenario, while retaining much of the green land, the simulated development area for 2030 was calculated to be 1,100 square kilometers. In the second scenario, an area of 1,200 square kilometers will be developed and Finally, the third scenario, which was simulated based on the continued growth of the current situation, will lead to the formation of 1,300 square kilometers of developed land and the destruction of 300 square kilometers of agricultural land. The continued growth of the current situation will have irrecoverable effects and consequences in the region.

Shifa et al.[1] (2015) One of the most important and complex issues for urban planners is deciding on suitable locations for future urban expansion and determining suitable lands for development.The complexity and frequency of the factors influencing the desirability of land for urban development requires the use of technologies for optimal management and prevention of urban sprawl.The main purpose of the present article is to identify and determine suitable locations for the future expansion of residential and activity spaces within the Falkum urban complex. For this purpose, multi-criteria analysis methods based on hierarchical analysis have been used to produce and analyze maps and different layers of land use.During this process, first the required and effective natural and human indicators in the form of 15 indicators have been identified, prepared and used, and finally the final map of suitable lands for development has been produced based on pso algorithm.According to the research findings, out of the total area of 31/8/2015 hectares of the study area, about 36% are suitable and relatively suitable lands for development and 28.37% are unsuitable and relatively unsuitable lands for development.Also in terms of spatial distribution, suitable lands for further development are located in the central parts to the south and unfavorable lands are located in the eastern and northern parts to the northwest.

[1] Shiffa, M., Jianhua, H., Feng, L., & Yan, Y.

Balling et al.[1] (2013), Bayesian-based methods are among the methods that are widely used today in various fields of statistics, artificial intelligence and engineering.This method is based on continuous learning based on prior knowledge and the current state of the system. To achieve its goals, this method uses a set of sciences related to statistics, probability and artificial intelligence, and genetic algorithms.In this study, an attempt has been made to examine the scientific and theoretical aspects of Bayesian-based methods. Then, based on the knowledge gained from this topic, we will examine and research this method on the genetic algorithm.Because the use of these methods requires the required knowledge in the field of sampling of distributions obtained during the calculation of models, the characteristics and capabilities of different sampling methods of the obtained distributions have been investigated.And finally, a proposed method for bayesian-based learning is presented.This method is a combination of two sampling algorithms that can provide optimal results for setting the parameters of a neural network. Also, the results of the proposed solution are examined.
Coello[2](2013) , Due to the high complexity of the land use optimization problem, both in terms of the number of goals and the size and timing of the problem solving, the problem solving of land use allocation relies on meta-heuristic algorithms.Two hybrid meta-heuristic algorithms based on TabuSearch and Non-dominated sorting genetic algorithm have been developed to solve the problem of optimal land use allocation.

Methodology

This research is a combination of documentary based and survey methods in terms of research. The nature of the research is based on futures studies science, analytical and exploratory new methods that has been made using a combination of quantitative and qualitative models. and it is intended to be an applied research. After selecting the sample, using the variables (economic, social and physical dimensions) and also changing the urban uses as a variable of the objective function, the hypotheses were tested through the method of operations research and using the Lingo and SenarioWizard software. The statistical population at the time of the study was estimated at 15 people. With regard to the size of the statistical population and based on the judgmental and purposive approach, 15people were determined as the sample size.The data of this study are collected through a

[1] Balling, R. J., Taber, J. T., Brown, M. R., & Day, K.

[2] Coello

questionnaire in the first stage with the help of experts.In the second stage, by designing the questionnaire, the data related to the OR matrix are collected from the same experts and used in the analysis of the case.
Using a cross-impact matrix that can provide a suitable model for changing urban uses. To do so, it is done as below:
1. Descriptives extraction (economic, social, physical) and their qualitative variables, analysis structure.
2. Enter the cross-impact data in this structure or load the data file.
3. Analysis structure and cross-impact data form the cross-impact matrix (cim).
4- Evaluating the cross-impact matrix by calculating the set of answers (consistent scenarios, weights, etc.).
5- Performing more evaluations if necessary.
6. Saving data and results.

Findings

The research components and variables are prepared for analysis in the Lingo operations research software. The goal is to find values for the model variables that, given all the limiting conditions applied to the variables, produce the best value for the objective function.

Table-3-4-information entry

```
sets:
landuse_PRGRESS-tehran
 /ECO-prog,PH-prog,SOC-prog / : include,weight,rating ;
endsets
data:
weight rating =
24    38
42    46
28    33
;
SPATIAL=12 ;
enddata
max = @sum (landuse_PRGRESS -TEHRAN: rating * include);
@sum (landuse_PRGRESS -TEHRAN: weight * include) <= SPATIAL;
@for (landuse_PRGRESS -TEHRAN: @gin (include));
```

In the above-mentioned program, first the name of the variable, i.e. the land use change variable, and then the components affecting it, including the economic, social, and physical dimensions of the city of Tehran, are entered.
In the next section, the weight of each component is entered into the software based on the values of importance and influence.Also, the variable weight of the obstacles is entered into the software based on its influence. In the next step, the research limitations are entered by the relevant functions. Using the Solve option, the final answer of Simplex will be as follows:

The Objective value indicates that the effective value of the objective function is 48.

Table-4-4 information analysis output

```
Global optimal solution found.
  Objective value:                              48.000000
  Objective bound:                              48.000000
  Infeasibilities:                              0.000000
  Extended solver steps:                               0
  Total solver iterations:                             0


                     Variable           Value        Reduced Cost
SPATIAL          12.00000            0.000000
                INCLUDE(ECO-prog)        0.000000           -38.00000
                INCLUDE(PH-prog)         0.000000           -46.00000
                INCLUDE(SOC-prog)        0.000000           -33.00000
                 WEIGHT(ECO-prog)        24.00000            0.000000
                 WEIGHT(PH -prog)        42.00000            0.000000
                 WEIGHT(SOC-prog)        28.00000            0.000000
                 RATING(ECO-prog)        38.00000            0.000000
                 RATING(PH -prog)        46.00000            0.000000
                 RATING(SOC-prog)        33.00000            0.000000

                          Row    Slack or Surplus      Dual Price
                            1        48.000000           1.000000
                            2        12.00000            0.000000
```

Value gives the value of the variable in the model effect rate.

Therefore, the impact of spatial and geographical barriers is 12, and the impact of other factors affecting land use change as barriers is zero.

Reduced Cost The variable coefficient at the zero line of the table gives the effect rate. The reduced cost of each base variable should be zero.For a non-base variable xj, the reduced cost is such that if xj is added to 1 unit, the effect rate is reduced (while the rest of the non-base variables remain zero).At the Lingo output for the current research problem, the reduced cost for the components of economic dimensions is -38. This means that if the component of economic dimensions wants to increase one unit (1 + 38), the land use change will also increase by one unit and its cost will decrease by one unit.

Given the negativity of the other answers, it can be expressed that the effect will be positive. For the rest of the effective components on the land use variable, we also have:

Table-4-5final answer of the model

final answer	abbreviation	variable
-38	ECO-prog	economic dimensions

-46	PH-prog	physical dimensions
-33	SOC-prog	social dimensions

Slack or Surplus in this study shows the amount of shortage due to geographical and spatial barriers ofurban land use change in the optimal response. So there will be 12 units in term of shortage.

According to the obtained values, the components of social dimensions have the greatest impact (-33) on the change of use of urban lands. The rest of the components, as described in the table below, affect the urban land use change:

Table 4-6: Ranking of variable components of urban land use change

final answer	effective rank	Variables
-38	2	economic dimensions
-46	3	physical dimensions
-33	1	social dimensions

So far, it has been specified that at present which economic, social, and physical dimensions are most effective in changing the use of urban lands. At this stage, we examine the appropriate ways to change the use of urban land with regard to the results based on scenarios that provide a new strategy and model for urban land use change based on urban standards in the future.

The interrelated factors in the branches of economic and spatial models are used to describe the state of urban land use change. Then a set of alternative quality components that describe the possible states of the descriptors is defined as descriptive variables. The number of these variables will vary depending on the descriptor.

Now, based on the subject literature, an interview with experts, or appropriate research about the effect of the xi variable of X descriptor on yi variable of Y descriptor should be judged. Only direct effect is considered in this judgment. Indirect effects are created by the software.

The following qualitative scale is used for judging:

Extremely restrictive effect = -3

Medium limiting effect = -2

Weak limiting effect = -1

Ineffectiveness = 0

Weak strengthening effect = 1

Medium strengthening effect = 2
Severe strengthening effect = 3
Continuing this procedure will create the CIB matrix.

Among the compatible scenarios, which have a wide variety of models affecting land use change in Tehran, 3 high-impact scenarios are extracted.
These scenarios were developed as a suitable model for changing land use in Tehran in the future to improve the continuation of the current trend, which are as follows:

Table 4-7-Compatible scenarios of the research model

Consistent scenarios of CI matrix **landuse_PRGRESS-TEHRAN**.scw:
Strong consistency
==========
Scenario No. 1
Consistency value : 0
Total impact score: 6

A- physical .A7 facilities and services
B-social .B1 transportation
==========
==========
Scenario No. 2
Consistency value : 0
Total impact score: 4

A- economic .A1employment
B- social .B3 social coherence
==========
==========
Scenario No. 3
Consistency value : 0
Total impact score: 5

A- economic .A9 income
B- physical .B3 housing
==========

The best model is the first scenario. This scenario [A7 B1], with an effective score of 6, has the highest effective score. This means that in order to change the land use of Tehran in the future, the best solution is to use the model component of facilities and services from the physical variable and the component of the transportation network from the social dimension variable, which also are complementary to each other.

Results

One of the basic components in sustainable urban development and intergenerational justice is fair access to land and its optimal use. Today, the concept of land and urban space has changed qualitatively, both naturally and

physically, and economically - socially. As a result, the dimensions and purposes of using urban lands have become very wide and rich. From this point of view, which forms the axis of sustainable development, the use of land and space as a public, vital and universal wealth resource should be planned in principle. Taking into account the results obtained from the analysis of this research, the transport component includes the working hours of public vehicles, the number of public transportation, public transportation and the component of facilities and services that include the quality of roads and intersections, energy network, Shopping and office centers should be at the forefront of Tehran management land use change planning. As can be seen, the proposed scenario of the research replaces the high current land use changes with the proportion of current land use in Tehran, which is also in line with the objectives of the comprehensive and detailed plans of the city. In the way that instead of creating highways, streets and widening roads, etc., the urban management proposes to manage the field of transportation, such as improving the quality of roads and intersections in Tehran instead of their quantity, or increasing working hours and number of public transportation, increasing the quality of public transport, to facilitate traffic to urban areas such as shopping malls or office centers.

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