# A Strategy for Sustainable Development in Urban Areas

**Mohammad Rahim Rahnema[1], Mohammad Ajza Shokuhi[1], Behrooz Shakiba[2],
Ramezan Ali Naderi maivan[2], Ataollah Zafaranloo[2]**

[1] Professor of Geography Department, Humanities and Literature Faculty, Ferdowsi University of Mashhad
International Branch Mashhad, Iran
[2] Ph.D Student in Geography and Urban planning, Ferdowsi University of Mashhad International Branch,
Mashhad, Iran

## ABSTRACT

This paper using the concepts of linear programming, tried to provide a heuristic method for determining the most appropriate strategy. In this paper, strategies have divided into three levels of national strategy, provincial strategies and urban areas strategies, and the main objective was limited to urban areas strategies. In this paper the main target strategy has been chosen among 11 defined strategies. The most appropriate strategy selected was modeled based on the data and the methods described for data extraction. Initially strategies introduced in sustainable development of urban areas were extracted and listed and then variables were determined based on available literature on common principles in urban development programs. Defined variables include housing prediction, social - cultural and recreation facilities, reducing losses due to population density in urban centers, distribution of new investments in the region, and preventing uncontrolled expansion of cities. Strategies were limited into growth pole strategy and development centers, small and medium cities strategy, new towns strategy, development of backward areas strategy, resources identification strategy, relative preferences strategy, domestic judicial sector balancing strategies, strategy for decentralization in decision making particularly in the field of regional development, strategies to attract foreign technology and capital investments, strategy for tourism industry development and its spatial reflection, strategies to compliance with environmental issues and achieve sustainable development in the country. In the modeling process, regardless of the unique definitions of strategies, variables were considered identical for all applied strategies.
**KEYWORDS:** Sustainable development strategy, urban development strategy, stability and instability.

## INTRODUCTION

Raise of sustainable development strategy led to improve the perception of researchers in urban planning and urban management and in many ways transferred the focus from operational management to strategic management. The concept of synergistic or complementary measures of sustainable development is important in the strategic management. Coordination between development strategy in one hand and on the other hand various systems in urbanization are emphasized in strategic management of sustainable development in urban areas. In fact sustainable development strategy plays an intermediary role between sustainable development and urbanization and turns the orientation of metropolises' urban planners to instruction and projects. Strategic management of sustainable development in urban areas emphasizes on the performance of authorities as a dependent variable. While traditional management of cities generally focuses on results. One of the key issues in this area which remains unclear is understanding of processes and mechanisms through which, metropolitan management measures affect the performance of planners. On the other hand most of the planners instead of adopting a comprehensive and single strategy, use a set of related strategies that each are proposed in a separate level. These major strategy levels in most of the metropolitans with diverse service sectors include,
1 - The national strategy,
2 - The Provincial Strategy,
3 - The urban strategies,
It is important that in the design of these strategies their coordination are considered, so that each strategy level must be appropriately coordinated with its higher level of strategy, otherwise planners cannot efficiently achieve their goals [1].
Sustainable development means moving on the human-environment center, and development of economic opportunities according to environmental considerations affects social justice. Sustainable Development was

**\*Corresponding Author:** Mohammad Rahim Rahnema, Professor of Geography Department, Humanities and Literature Faculty, Ferdowsi University Of Mashhad International Branch Mashhad, Iran

introduced after the problems caused by economic development after World War II, when uncontrolled development led to class antagonism and severe environmental problems, in which the process of development valued social and environmental dimensions less than economic dimensions. By daily development of urban areas, concepts of sustainable development entered in human life, and thus sustainable development of urban areas is the product of new social, special and environmental justice looks toward cities. In 2020 cities will accommodate 75 percent of the total population of the world which will have approximately 2 percent of the urban space. This strange and unprecedented density of population and the public needs to absorb substantial resources will lead to unnatural exploitation of resources. Effects of this development continue with the unpredictable remains of cities, and more pollution and disease and new marginal living species would be the product of this development. Sustainable urban development as part of sustainable development is based on rational use of natural resources and in this kind of development the three environmental, social and economic considerations will be together. Thus sustainable urban areas have emerged from the developmental process that enables continuous improvement of social-economic health of the city and regions and convert this mindset to reality.

## 2 - Theoretical foundation and research background

Theoretical foundation of the research and research background are respectively offered in this section.

### 2-1 - Theoretical Foundations

The background of strategy concepts returns to 340 years before Christ. The oldest traces in this case are theories of a Chinese general called Sun Tzu. In his book he described the concept of strategy to overcome enemy. But the beginning of today form of strategic planning is 1960s. World War II was the context of several strategic decisions for involved countries. After the war, the American Defense Department developed these experiences in the form of "strategic planning" and placed it in the training of senior officers. Applying these ideas by prominent military commanders in industries found the way to the business world and was the origin for important developments in this field. In 1962 Alfred Chandler, a professor at Harvard University published his study on American large enterprises and described the process of strategic decision making of senior managers. Chandler showed that how strategic decision making technique can lead to better business environment. Three years later, Kenneth Andrews another professor of Harvard University published a paper based on the idea of Chandler in which offered the importance of organizations' attention to their own strengths and weaknesses. With the help of his colleagues he offered the SWOT analysis method and introduced it as a tool to achieve the best possible match between the external and internal conditions [2]. In the same year Igor Ansoff applied Chandler ideas for company planning and achieved considerable success. These achievements attracted managers, organizations and academic circles to this approach. 1960s and 1970s was the blossoming of strategy classical approaches. In this period, various tools and methodologies such as the BCG analysis, the GAP analysis and SWOT analysis was presented. Numerous articles were published on strategy and these concepts found their way in college courses. In 1980s major developments in the global economy began. In this decade, the economic hub of the world transferred from the United States to East Asia, especially Japan, and the business environment faced rapid and consecutive changes of technological and economical factors. In these conditions the classical approaches that were designed for a semi stable environment were not able to respond. Strategy theorists in the 1990s returned with different ideas and before anything questioned classic approaches. Henry Mintzburg introduced the distinction between analytical processes (such as what is done in planning) and mental synthesis (what makes strategies) and denied the basis of "strategic planning" and said that principally the planning process cannot create strategic [2]. Hamel and Prahalad in their papers introduced the creation of new paradigm as the foundation of successful strategies and proposed "making strategic" instead of "strategic planning". The effectiveness of these theories in practice and compliance with environmental conditions was acceptable and welcomed by business and professional circles. However, due to lack of consensus and generally acceptable ideas, it was not very successful in academic circles. Jeanne Liedtka, a professor in Darden University can also be considered as one of the experts of new approaches to strategy. Besides his academic activities, he has accumulated valuable experience by presenting in professional circles and in industry consultation area, and in the late 1990s has proposed a model for "strategic thinking" which was widely welcomed. Each of these theories can be considered as an origin of change in strategy approaches, a development which was required for this approach to compliance with the circumstances of the new era [3].

Most of the planning based on rational approach has form (ideals and objectives, plans and actions, required resources). In these models, first ideals and goals are formulated, then needed plans and actions are determined and finally required resources are estimated. Changes in environmental conditions, policies, attitudes, views, structures, and systems . . . are factors that influenced the ideals and objectives of planning and finally cause changes in the program. In the above rational form, planning has not the capacity and ability to cope with such changes and will lead to failure. These circumstances promoted this idea that in planning, according to changes the direction of

organization shall be changed and a new direction and behavior shall be taken. This attitude underlies the development of strategic planning. Unlike traditional programming in which the ideals and goals are determined, the objective of strategic planning is strategy explanation and formulation. Depending on the type, variety and nature of the changes in the environment, a combination of traditional planning and strategic planning can be used. Different definitions are presented for strategy. Here a definition is provided that can define its concept in strategic planning. Program strategy is a position, behavioral pattern, perspective, policy or decision that shows the direction of views. Since a strategy can be short-term or long-term, strategic planning can be a short-term or long-term planning, but is different from them. The word "strategic" includes everything related to strategy. The word "strategy" comes from the Greek word "Stratagus" which means leadership. Strategic Planning is a structured attempt to adopt fundamental decisions and action which shape and direct the nature of organization, the type of activities and their reasons for the organization. This paper requires an acceptable model to design a strategy for sustainable development in urban areas. The model popular among urban planners and experts this field is the Bryson model which is described below. Bryson model is the result of characteristics review of previous models, which overcomes their weaknesses in application. This model includes a continuous process (in accordance with the definition of planning) and is reproducible, starts before adoption of any decision and continues after the decision is executed. Here this process is described in ten steps. One of the characteristics of this process is that the results of each stage can be used to revise or supplement earlier stages.

The stages of strategic planning process in Bryson model are as follows:

1. The initial agreement: at this stage the necessity of strategic planning for the target planned organization is reviewed and a familiarity with this type of planning is achieved. Those who should be involved in planning are determined and explained. Steps in planning are described. Planning method, the timing, regulations for the meetings and reporting requirements are identified. Resources and facilities are determined.

2. Duties Determination: formal and informal functions are "musts" that planners are faced. The purpose of this stage is that the organization and individuals identify the tasks that are assigned to them by the competent authorities.

3. Analysis of beneficiaries: beneficiary is a person, group or organization that can affect attitudes, resources or outputs or be affected by outputs. Beneficiaries' analysis is valuable revenue for the organization's mission statement because the key to success in the public and nonprofit sector is satisfaction of key beneficiaries of the organization.

4. The organization's mission statement: Mission Statement is sentences and phrases that identify the final objectives, philosophy, values, behaviors, and ways to meet beneficiaries' needs. In addition to these cases, it overcomes differences and paves the context for constructive and effective discussions and activities.

5. Understanding the environment: the basis of a strategic act is recognition of circumstances. External environment in terms of political, economic, social and technological circumstances are studies and their strengths and weaknesses are identified. Internal environment is also studied in the form of inputs, outputs, processes and performance.

6. Determination of strategic issues ahead: this stage is the heart of the strategic planning process. Strategic decisions are fundamentally political decisions which affect mandate, mission, values, provided product or service, clients or users, costs, financing or management. The purpose of this step is to determine the choices that planners are faced.

7. Determination of strategies: to address each of the strategic issues ahead, some actions should be taken which are expressed in the form of programs, goals, plans and ... These actions are called strategies. In fact strategy is the mold of goals, policies, programs, activities, decisions or resource allocation that determine what is program, what is done and why they do it.

8. Explanation of plans and actions: This stage can be conducted in the previous step, determination of strategies, but this distinction has been made since strategic planning ends with determining strategies and the prepared plan is implemented in the form of plans and measures and strategic management definition.

9. Design prospects for future organizational planning: at this stage, future circumstances are described in condition of applying formed strategies and using all forces and resources. This description is called the prospect of success of the organization in which a description of the mission, key strategies, performance measures, some decision making rules and ethical standards are presented.

2-2 - Annual operational Plan: In this step, using information compiled on the eighth stage and based on the determined priorities, an operational program in provided and based on it plans and actions are managed and controlled.

Basic problem in this model and other models of strategic planning is lack of an identical operational program and problem-solving method. In principle, these models have only theoretically explained the strategy concepts and calculation methods or forming operational plans have been put to the planners.

## 2-2 - Research Background

In this section research background is studied under two topics of strategic planning and sustainable development in urban areas. Abbaspour, **2002**, new approaches in human resource management functions [4], Soltani, **2005**, strategic thinking of managers, the substruction of promotion and excellence on organizations [5], Vafaee, **2005**, Strategic Management [6], Khalili, **2006**, ideology and strategy; conceptual measurement of ideological attitudes and strategic thinking [7], Bagheri and Delpasand, **2008**, design and set the pattern for Strategic planning at Mission-oriented Universities [8], Peter Senge, **1990**, The art and practice of the learning organization [9], Liedtka, Jeanne M., **1998**, Strategic Thinking: Can it be thought? [10], Collins et al, **2006**, High-Performance Leadership at the Organization Level. [11], Acur, Nuran and et.al, **2006**, Assessment of strategy formulation: How to ensure quality in process and outcome [12], Baraldi et al, **2007**, Strategic thinking and the IMP approach: A comparative analysis [13], Vila, Joaquim and et.al, **2007**, Strategic Thinking: Strategy as a Shared Framework in the Mind of Managers [14].

**Table (1) periodical comparison of studies**

| Row | Researcher name | Year | Study subject |
|---|---|---|---|
| 1 | Ghaffarian, Vafa and others | 2002 | Modern strategy approaches |
| 2 | Ghaffarian, Vafa and others | 2001 | Effective strategy |
| 3 | Abbaspour, Abbas | 2002 | New approaches in human resource management functions |
| 4 | Soltani, Iraj | 2005 | strategic thinking of managers, the substruction of promotion and excellence on organizations |
| 5 | Vafaee, Hossein | 2005 | Strategic Management |
| 6 | Khalili, Reza | 2006 | ideology and strategy; conceptual measurement of ideological attitudes and strategic thinking |
| 7 | Bagheri, Mesbaholhoda and others | 2008 | Design and set the pattern for Strategic planning at Mission-oriented Universities |
| 8 | Senge, Peter M. | 1990 | The art and practice of the learning organization. |
| 9 | Liedtka, Jeanne M. | 1998 | Strategic Thinking: Can it be thought? |
| 10 | Collins, Doris B. and et.al | 2006 | High-Performance Leadership at the Organization Level. |
| 11 | Acur, Nuran and et.al | 2006 | Assessment of strategy formulation: How to ensure quality in process and outcome. |
| 12 | Baraldi, Enrico and et.al | 2007 | Strategic thinking and the IMP approach: A comparative analysis. |
| 13 | Vila, Joaquim and et.al | 2007 | Strategic Thinking: Strategy as a Shared Framework in the Mind of Managers. |

## 2-3- The necessity for research

The rapid growth of cities has caused the need to develop a strategic vision in different managerial, social, economic, physical and etc. aspects for cities. In addition, cities now are faced with issues that did not existed previously or were of low importance. Lack of adequate coordination among organizations and involved institutions in different aspects of city management led to waste in urban costs. Hence it seems necessary to have a strategic plan for urban development management and movement in the path of excellence. City development strategic planning CDS in nature is a macro planning with an approach to rhythmical and harmonious implementation of plans and programs in different parts of the city. So strategists pay attention to comprehensive, detailed and structural planning and influence them in macro- strategies of city development.

Strategic planning is the optimum use of economic, social and cultural resources for development of cities and their needs in the future. Although each city has a special strategy and in this respect is not comparable to other cities, there is an overall framework for the formulation of city development strategy based on which each city can execute development planning according to its own characteristics. All cities seeking to develop such programs have focused on some important issues which are known as underlying for development of strategic planning. Topics such as improving livelihoods level, environmental quality, spatial structure, infrastructure structure, financial resources and city administration (management). Urban development strategy appropriate for each city is able to change the direction of city's development. Preparation and implementation of this strategy demands the cooperation of three major sectors as public sector, private sector and urban population. Urban population is discussed as the most important element in the preparation stages of development strategies. Objective observations in different parts of the world have shown that the economic transformation of cities occurs in a period between 10 to 20 years. If additional policies in the urban sector which are adopted by governments and in national levels are also aligned with the city development strategy, development prompts and will be more effective. Hence forming a strategy for sustainable development in urban areas is one of the most important problems of sustainable development planning.

## 3 - RESEARCH METHODOLOGY

This research in terms of purpose is an applied research and in terms of data collection is a library research and used mathematical methods.

### *3-1 - Research Methodology*

This article by designing the research plan tried to collect data on the subject of sustainable development strategies in urban areas and then by designing a pattern for sustainable development strategy in urban areas, provide a model for strategy formulation.

### *3-2 - Principles of Strategic Planning*

3-2-1- **Definition**

Regional planning is a regular attempt to choose the best available methods to achieve a certain goal in an urban area, and is an attempt to elevate levels of living, maximize use of available scarce resources, planning for humans, activities and the area in which human activities are formed. In this case urban area is all or part of one or several states with the properties defined in the definition of area. Area is least one or more cities with homogenous geographic and natural features, and economically and socially has active reciprocal connections. Regional planning is an activity which uses other scientific areas such as economy and geography and even mathematical models, network principles and methods of and resources allocation in urban locating and planning.

### 3-2-2- **Purpose**

The Regional Planning can aim civil construction and development of regions, create complete and fundamental transformation in people's lives and utilization of material and natural resources of the area, reducing inequalities, reducing the urban and rural difference level and sustainable development, structural adjustment, economic and social development of the region, rising per capita income, increasing technical and economical performance, environmental improvement and protection. Thus, the variables in the strategic planning of sustainable development can be divided into five general variables of housing prediction, social - cultural and recreation facilities, reducing losses due to population density in urban centers, distribution of new investments in the region and prevention from irregular spread of cities.

### 3-2-3- **The planning stages**

The planning process can be divided as follows.

1 - The macro level, The first step is called the macro level, including general purpose and macro program.

2 – The partial level, At this stage, the result of decisions already taken in relation to a particular purposes, are more clear and may need to be revised. The partial level means that practically the available resources should be partially divided and these resources shall be allocated to different ministries.

3 - The interregional level, At the interregional level, various goals and regional programs should be distributed across regions. At this level adopted policies at the national level directly affect the regions.

4 - The regional level The regional level is mainly related to the preparation of comprehensive regional development programs which have been prepared in the interregional stage and focuses on planning and horizontal allocation of multilateral projects and plans. In fact many of the regional policies are caused by decisions which have been adopted at national level.

5 - The micro level, At the micro or project level, specific projects are prepared and evaluated to be included in the program. The important functions of this level are to determine responsibilities and the project schedule to ensure maximum benefits.

### 3-2-4- **Various strategies for sustainable development in urban areas**

The regional planning comes from within the region, but regional planning strategies are set in relation to national programs. Thus the balance between planning and interregional relations should be determined on a national program scale. The difference between business / management strategies and sustainable development strategies in urban areas is in their calculation, in a way that the business / management strategies according BCG Matrix divided into four main groups of Cash cows, Dogs, Question marks and Stars [15], but developmental strategies are determined based on the planning and budgets approved in urban development programs. The first group is affiliated to the competitive environment and the environment within the enterprise. The second group is affiliated to government policy, funding and welfare issues. Regional strategies which are generally set as the criteria are as follows [16]:

- Strategy for growth poles and growth centers.
- Strategy for small and middle cities.
- Strategy for new cities.
- Strategy for backward areas development.
- Strategy for resources identification.
- Strategy for relative preferences.
- Strategy for balancing the domestic judicial sector.
- Strategy for decentralization in decision making, particularly in the field of regional development.
- Strategy for foreign technology attraction and capital investments.
- Strategy for development of tourism industry and its spatial reflection.
- Strategy for compliance with environmental issues and achieving domestic sustainable development.

### 3-2-5- Planning Models

Planning models are both qualitative and quantitative. When discussing quality models, various regional development ideas can be named such as the theory of growth poles, growth centers, growth and development, development of backward areas, the relative superiority, resources allocated and etc. Quantitative models include mathematical models such as Input - Output Model, share change model, locative coefficient, coefficient of variation, employment creation, activity, employment and unemployment coefficients, growth models, investment models, models of regional inequality, models for measuring the degree of development, model of standardized scores, population forecasting models including linear, combination, economic, linear programming model, the basic economic model, entropy model, the added-value model, the value of products and efficiency, the cost – benefit model, evaluation models, plans and projects, models to compare revenue and expenditure, investment and overall revenue model, the model  determine the optimal location and migration estimation models. This paper tries to present a model based on linear programming to select an appropriate strategy.

### 4- The conceptual relationship between variables and strategies for sustainable development in urban areas

In this paper, the variables for choosing strategy include housing prediction, social - cultural and recreation facilities, reducing losses due to population density in urban centers, the distribution of new investments in the region, prevention from uncontrolled expansion of cities, which are displayed with the symbol $x_1, ... x_5$. Strategies are limited to strategy for growth poles and growth centers, strategy for small and middle cities, strategy for new cities, strategy for backward areas development, strategy for resources identification, strategy for relative preferences, strategy for balancing the domestic judicial sector, strategy for decentralization in decision making, particularly in the field of regional development, strategy for foreign technology attraction and capital investments, strategy for development of tourism industry and its spatial reflection, strategy for compliance with environmental issues and achieving domestic sustainable development. Strategies are displayed with the symbol $y_1, ... y_{11}$.

#### Table (2) show the relationship between variables and strategies

| | | Strategies | | | | | | | | | | |
| | | $y_1$ | $y_2$ | $y_3$ | $y_4$ | $y_5$ | $y_6$ | $y_7$ | $y_8$ | $y_9$ | $y_{10}$ | $y_{11}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| variables | $x_1$ | $wa_{11}$ | ..... | | | | | | | | | $wa_{111}$ |
| | $x_2$ | $\vdots$ | | | | | | | | | | |
| | $x_3$ | | | | | | $wa_{36}$ | | | | | $\vdots$ |
| | $x_4$ | | | | | | | | | | | |
| | $x_5$ | $wa_{51}$ | ..... | | | | | | | | | $wa_{511}$ |

In which the decision variables include,
$x_i$ variables for any restrictions.
$y_j$ defined strategies.
$a_{ij}$ values for the $i^{th}$ variable in the $j^{th}$ strategy.
*w* variable parameter.

### 4-1 - The stages to determine strategy

This paper provides a method for determining the proper strategy which is completely exploratory and applied. Thus the Pearson correlation coefficient is used to determine the technical coefficients of each strategy. Then the correlation coefficient is normalized for the integration of the weight and importance coefficient of strategies. The

calculated results are used to rank strategies and also the correlation coefficient of strategies would be ineffective. Finally, according to the data in table two a mathematical modeling is provided to determine the appropriate strategy.

**4-2- Pearson correlation coefficient**
The following table presents the results of the research sub-hypothesis test.

**Table (3) Pearson correlation coefficients normalized for the defined strategies**

| Normalized | Correlation coefficient | Strategies |
|---|---|---|
| 0.106066 | 0.563 | Strategy for growth poles and growth centers |
| 0.084401 | 0.448 | Strategy for small and medium cities |
| 0.096458 | 0.512 | Strategy for new cities |
| 0.089299 | 0.474 | Strategy for backward areas development |
| 0.071402 | 0.379 | Strategy for resources identification |
| 0.102864 | 0.546 | Strategy for relative preferences |
| 0.115298 | 0.612 | Strategy for balancing the domestic judicial sector |
| 0.137151 | 0.728 | Strategy for decentralization in decision making, particularly in the field of regional development |
| 0.05633 | 0.299 | Strategy for foreign technology attraction and capital investments |
| 0.049736 | 0.264 | Strategy for development of tourism industry and its spatial reflection |
| 0.090995 | 0.483 | Strategy for compliance with environmental issues and achieving domestic sustainable development |
| 1 | 5.308 | Total |

**4-3- Mathematical modeling**
      According to the Pearson correlation coefficients and ineffective coefficients in Table 3, the model for strategy selection is developed. To determine the appropriate strategy, the objective function should be maximized according to the most optimal strategy chosen for sustainable development in urban areas. Max θ  Constraints according to the sum of coefficients of each variable for each strategy shall be calculated less or equal to the numerical value of each strategy. Numerical value of each strategy are calculated included in the models according to the compilation of the determined budget, run-time, variables developed in this paper (housing prediction, social - cultural and recreation facilities, reducing losses due to population density in urban centers, distribution of new investment in regional level, prevention from uncontrolled expansion of cities), the ineffective coefficient and other variables unique to each strategy. It is mentioned that variables with negative nature such as cost and wasted time should be reversely (1 / x) entered into the model. Furthermore the coefficient of each variable (w) can be calculated based on normalized values for the nature of each variable (Table 3). Other methods such as quantitative ranking methods, modeling, etc. are also used in making the original model. To determine the values of the variables (a) heuristic methods must be used for entering numbers in the model. For example, to determine the housing prediction, Forecasting methods or statistical data of urban development programs available in governor-general or municipal offices. The numerical value of cultural and social facilities should be extracted from urban development plans that are not assigned to the contractor yet. Obtaining the variables data in any society depends on the availability of data and information and specific recommendations in this area are not presented in this paper. Since the methods of variables values determining are outside the framework of this paper, only the main model is presented to determine the most appropriate strategy. b values  are achieved from Table 4, the budget.

$\sum wa_{ij} \leq b$  ($i = 1 ... 5, j=1 ... 11$)

Finally, all variables must be positive thus no variable is zero.

$$x > 0 \ \forall i$$

The model for appropriate strategy determination is follows.
Max θ
$\sum wa_{ij} \leq b$  ($i = 1 ... 5, j=1 ... 11$)
x> 0 ∀ i
In which θ is the appropriate strategy, *w* is coefficient for each variable, $a_{ij}$ is the $i^{th}$ variable of the $j^{th}$ strategy and b is the determined value of each strategy according to the defined data.

**Table (4) values for budget of defined strategies**

| Budget (*b*) | Strategies |
|---|---|
| 38010126958 | Strategy for growth poles and growth centers |
| 30246069053 | Strategy for small and medium cities |
| 34566936061 | Strategy for new cities |
| 32001421275 | Strategy for backward areas development |
| 25587634311 | Strategy for resources identification |
| 36862396659 | Strategy for relative preferences |
| 41318290760 | Strategy for balancing the domestic judicial sector |
| 49149862212 | Strategy for decentralization in decision making, particularly in the field of regional development |
| 20186550551 | Strategy for foreign technology attraction and capital investments |
| 17823576406 | Strategy for development of tourism industry and its spatial reflection |
| 32609043198 | Strategy for compliance with environmental issues and achieving domestic sustainable development |

Now, according to Table 4, the numerical example of this paper is as follows.

*Max θ*

$$0.106066\,x_1 + 0.106066\,x_2 + 0.106066\,x_3 + 0.106066\,x_4 + 0.106066\,x_5 \leq 38010126958$$
$$0.084401x_1 + 0.084401\,x_2 + 0.084401\,x_3 + 0.084401x_4 + 0.084401x_5 \leq 30246069053$$
$$0.096458x_1 + 0.096458x_2 + 0.096458\,x_3 + 0.096458x_4 + 0.096458x_5 \leq 34566936061$$
$$0.089299x_1 + 0.089299x_2 + 0.089299\,x_3 + 0.089299x_4 + 0.089299x_5 \leq 32001421275$$
$$0.071402x_1 + 0.071402x_2 + 0.071402x_3 + 0.071402\,x_4 + 0.071402x_5 \leq 25587634311$$
$$0.102864x_1 + 0.102864x_2 + 0.102864x_3 + 0.102864x_4 + 0.102864x_5 \leq 36862396659$$
$$0.115298x_1 + 0.115298x_2 + 0.115298x_3 + 0.115298x_4 + 0.115298x_5 \leq 41318290760$$
$$0.137151x_1 + 0.137151x_2 + 0.137151x_3 + 0.137151x_4 + 0.137151x_5 \leq 49149862212$$
$$0.05633x_1 + 0.05633x_2 + 0.05633x_3 + 0.05633x_4 + 0.05633x_5 \leq 20186550551$$
$$0.049736x_1 + 0.049736x_2 + 0.049736x_3 + 0.049736x_4 + 0.049736x_5 \leq 17823576406$$
$$0.090995x_1 + 0.090995x_2 + 0.090995x_3 + 0.090995x_4 + 0.090995x_5 \leq 32609043198$$
$$x_1 ... x_5 > 0$$

In which,
The first variable ($x_1$) = housing prediction,
The second variable ($x_2$) = social - cultural and recreational facilities,
The third variable ($x_3$) = reduce losses due to population density in urban centers,
The fourth variable ($x_4$) = distribution of new investments in the region,
The fifth variable ($x_5$) = prevention of uncontrolled expansion of cities.

## 5 - Conclusion

This paper using the concepts of sustainable development in urban areas and forming a strategy, tried to provide a heuristic method for determining the most appropriate strategy. Obviously, the main limitation of this paper is considered as choosing only one strategy between 11 strategies. Future research can chose several ranked options in the modeling based on the principles of linear programming defined as constraints, or consider other conditions such as the ratios of each variable to other variables or the prerequisite of each strategy compared to other strategies. In this paper, the only purpose is to choose the most appropriate strategy based on existing data. Accordingly, the strategies initially in Internet search were listed and extracted. Then were variables set according to common principles in urban development programs in the available articles. According to the definition of variables and without regarding the special limitations in mathematical modeling, the model for appropriate strategy selection was presented.

**6 – Recommendations**

According to the mathematical model for choosing an appropriate strategy in this paper it is recommended that;
1 - After determining the proper strategy and funding of strategy, based on sustainable development programs through minimizing the mathematical modeling, costs may be reduced to the minimum.
2 – In the scheduled execution of operational plans network techniques such as GERT shall be used for each strategy, and then by the help of network algorithms, the time period shall be under control and minimized.
3 - In developing the budget for each strategy, financial engineering techniques should be used in the decision-making to reduce losses due to delays and cost of operating the programs.
   4 - If the above recommendations have been done, more accurate data can be collection to form the strategy selection model and based on the principles of linear programming, the model shall be improved.

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