

An Analysis of the Spatial Changes of Urban Environment in Mashhad Metropolis Using the Natural Step Future Study Approach

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Extended abstract

1. Introduction

Since the main theme of any geographical analysis is the emphasis on space and its environmental concepts, any change in the relationship between humans and the urban environment can be considered as the final product of the human desire to change their settlement areas to overcome the environmental and spatial nature of the city. In this context, spatial change in the urban environment can be considered as a socio-economic, environmental, political and spatial policy function that in different periods of time, according to its various conditions, have had different impacts on the urban space and it will provide the concepts of space and urban environment with fundamental changes. On this basis, paying attention to the urban environment challenges and trying to solve them are of essential importance. The Natural Step has pioneered a "Back casting from Principles" approach which means to advance society towards greater sustainability (Whole-systems thinking and back casting from sustainability principles form the basis for numerous applications and tools to plan and redesign organizational strategy, organizational processes, product/service innovation, and business models). Therefore, the most important research aims will be as follows:

1. Identification of the most important variables affecting the urban environment in Saqqez city through strategic studies.
2. Developing the most important environmental scenarios in Saqqez City to achieve sustainability.
3. Understanding the most important environmental key forces of Saqqez city.

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2. Theoretical Framework

There are few conducted studies done on the urban environmental crisis with attention to the future and strategic studies. For the first time, Lefebvre (1996) considered the urban environment space transformation discussion in the philosophical scale by the expression of space dialectic. Phdungsilp (2006) has analyzed the urban environment in view of strategic planning and sustainable city approach and he has mentioned three models of Robinson pattern, natural step and technological planning to access the sustainable form of the city in terms of environment parameters.

3. Methodology

The applied methodology based on its strategy is analytical and in term of result is practical. In addition, descriptive-analytical studies, document and questionnaires in the framework of Delphi, and cross-impact matrix analysis were employed using Micmac and scenario wizard software tools. In the first step, after collecting data and identifying basic variables in the Delphi model, 50 questionnaires were distributed among 30 municipal executives and 20 academic elites with expertise and experience in urban management and environmental issues. Data were analyzed with a 78×78 matrix, by which data were included into the cross impact matrix followed by closing the CIM. After this classification, the experts were asked to evaluate the affecting variables (direct, indirect or potential) by scoring 0-3 with P values (0 = null, 1 = weak, 2 = average, 3 = strong, P = potential effect). Finally, a list of variables was obtained as the key driving forces, which were incorporated in the amidst cross impact method in the form of a scenario planning software. At this point, the expert can only describe the hypothesis realization probability on a scale from 1 to 5 (weak to high probability), hence, avoiding any lack of precision on the expert's side. It is more helpful to see all as conditional probabilities, i.e. the realization of a hypothesis in relation to other ones. Score 6 means the hypothesis is independent. Measuring the direct and indirect influence of variables was not just in the Delphi model framework, but, at the same time, to measure the various dimensions of the impact-dependence of each variable (obvious and hidden layers), it has been used for the strategically related software.

4. Results and Discussion

The results showed that the obtained fill rate is equal to 95.79% with two data iteration which represents the high level of variables influencing each other. Also, having relied on the findings, integrated urban environmental management index (ME4) with 188 scores had the most direct impact on other variables and the development and promotion of urban recycling regulations index with 5,585,944 rows calculated values had the most indirect impact on other variables. Finally, the research scenarios were presented in the frame of three main scenarios and 21 predicted situations about Mashhad metropolis environmental challenges using TNS approach.

5. Conclusion and Suggestions

By considering the method of variables distribution in the direct and indirect impacts and dependencies analysis, and also by explaining the key driving forces, it should be noted

that the urban environment system in Mashhad's system is experiencing severe instability. Hence, below, we have suggested some solutions:

1. Preparing Mashhad's environmental comprehensive plan and identifying its horizons and perspectives.
2. Considering the developed scenarios in preparing Mashhad's urban environment development plans and strategies. The following propositions are presented as some safe ways:
 - Preparing the urban environmental strategic plan with regard to the urban nature-oriented approaches;
 - Rebalancing the urban environment's capacity and the citizen uses;
 - Giving more roles to the citizens for improving the urban environment indicators;
 - Developing local and regional urban recycling centers through long term plans.
 - Giving more importance to the direct and indirect impacts on developing environmental scenarios.
 - Trying to achieve the optimal scenarios for effective management of the urban environment.

Keywords: Spatial analysis, Urban environment, Future studies, Natural step, Scenario planning.

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