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# Investigating the Effect of Construction of Subway System on Land Supply Pattern (Case Study: Golshahr Metro Station, Karaj)[1]

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## Abstract

**Background and Objective:** Metro, as one of the main infrastructures of the city, can have a significant impact on the urban development system. The present study also seeks to investigate the effects of constructing a metro network on the land supply pattern (case study: 45-meter Golshahr station, Karaj) because the metro public transportation system is one of the most efficient forms of public transportation in today's cities.

**Methodology**: The present study has been evaluated in the form of two parts: inferential statistics and multi-criteria decision-making. The pattern governing the research is strategic in terms of approach; cognitive in terms of nature; applied in terms of purpose; descriptive-analytical in terms of method; cross-sectional in terms of time; and quantitative and qualitative in terms of data type. Considering the research questions, which are of the cause-effect type, four hypotheses were introduced. The statistical population of the study includes residents of the Golshahr neighborhood of Karaj, and the Cochran formula was used to determine the sample size using an online calculation method, and it was determined as 384 people. Also, 20 experts were consulted for the multi-criteria decision-making section.

**Results and Findings** In the first step, the importance of the criteria of building and space quality, accessibility, desirability of environmental landscapes, economic benefit, and land value were determined and ranked based on the votes of citizens living in the Golshahr neighborhood of Karaj. Based on the Likert spectrum coefficient and identification of the indicators affecting them, the criterion of space and building quality was ranked first, which is due to the importance of the indicators of "overall satisfaction with infrastructure facilities and neighborhood relations" in the Golshahr neighborhood; while the index of the impact of the metro on commercial use is also of the greatest importance from the perspective of the respondents. Also, examining the hypotheses using a one-sample t-test showed that in the four aforementioned criteria, the positive effect of the construction of a 45-meter metro station on the surrounding areas can be seen in the Golshahr neighborhood of Karaj. In the next step, the elements affecting the integration of the effectiveness of public transport systems and related land areas and uses were evaluated using the Analytic Hierarchy Process technique to prioritize criteria and indicators. Based on the results, transport, economic, social and environmental criteria are of the highest to lowest importance, respectively.

**Keywords**: Metro network, land supply, public transportation system, Golshahr, Karaj.

[1] This article is an extracted from a MA dissertation titled " Investigating the Effect of Construction of Subway System on Land Supply Pattern (Case Study: Golshahr Metro Station, Karaj," first author, supervisors: second authors, advisor: third author, Tehran Science and Research Branch, Islamic Azad University, Tehran, Iran.

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# EXTENDED ABSTRACT

## Introduction

Today, one of the most important topics in urban planning is the optimization of urban systems in the sense of matching urban transport networks with land supply. Urban transport is one of the most fundamental issues in urban planning, because a transport system can have different spatial impacts, either point-wise or longitudinally, and sometimes combined, on surrounding properties and land and their use. He public transit-led development approach began in 1993 with the publication of Peter Calthorpe's book America's Next Capital .Calthorpe and his colleagues based their theory on the ideals of the garden city movement.

## Methodology

The present study is evaluated in two parts: a) inferential statistics and b) multi-criteria decision making. Inferential statistics refers to a set of methods that use data from a sample to infer the characteristics and characteristics of a larger population or group; in other words, inferential statistics allows us to estimate the characteristics of a population by studying smaller groups using an inductive method (reasoning from part to whole) (Kafashi, 2012). Multi-criteria decision making refers to a set of methods and techniques that help the decision maker choose the best option when faced with complex problems that include several conflicting criteria and goals The pattern governing this research is strategic in terms of approach; cognitive in terms of nature; applied in terms of purpose; descriptive-analytical in terms of method; cross-sectional in terms of time; and quantitative and qualitative in terms of data type. Considering the research problem and questions, which are of the cause-effect type.

### Results and Findings

In the first step, the importance of the criteria of building and space quality, accessibility, desirability of environmental views, economic benefit, and land value were determined based on the votes of citizens living in the Golshahr neighborhood of Karaj. Based on the Likert spectrum coefficient and identification of the indicators affecting them, the criterion of space and building quality was ranked first, which is due to the importance of the indicators of "overall satisfaction with infrastructure facilities and neighborhood relations" in the Golshahr neighborhood; in addition, the indicator of the impact of the metro on commercial use is also of the greatest importance from the perspective of the respondents. Also, the hypothesis analysis using a one-sample t-test showed that in the four aforementioned criteria, in the Golshahr neighborhood of Karaj, the positive effect of the construction of a 45-meter metro station on the surrounding areas can be seen. In the next step, the elements affecting the integration of the effectiveness of public transportation systems and related land areas and uses were evaluated using the analytic hierarchy process technique to prioritize criteria and indicators.

## Conclusion

The construction of metro stations in neighborhoods can create a lot of potential in these neighborhoods and itself as a central core to become the center of the neighborhood, in addition to all other aspects, including increasing the accessibility of public transportation. Increasing economic and land productivity, increasing the level of access to services, improving the environmental landscape, etc. have a positive effect An attempt has been made to study the effect of constructing a subway network on the land supply pattern in order to identify the different dimensions and extent of their impact and to explain their positive and negative impact from the residents' point of view. The benefits of this type of development lead to neighborhoods. The results of the studies have been measured in different dimensions, so that according to the test of hypotheses, it has been shown that in the four dimensions studied (quality of buildings and spaces, desirability and environmental landscape, accessibility, economic interest and land value) in the neighborhood Golshahr Karaj, we can understand the positive effect of the construction of Golshahr metro station on Golshahr neighborhood, so that in all four dimensions, the average effects were higher than the assumed average.

# Declarations


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There is no funding support for this study.


### Authors' Contribution

Authors contributed equally to the conceptualization and writing of the article. All of the authors approved the content of the manuscript and agreed on all aspects of the work declaration of competing interest none.

### Conflict of Interest

The authors declare no conflict of interest.


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