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## Article

The anticipation of changes in housing prices in urban distressed areas after implementation of renovation projects using grey method (case study: Majd Project, Mashhad Municipality district 2)

## Provided in Cooperation with:

Iran Urban Economics Scientific Association, Tehran

*Reference:* Soltani, Sahar The anticipation of changes in housing prices in urban distressed areas after implementation of renovation projects using grey method (case study: Majd Project, Mashhad Municipality district 2).

This Version is available at:

<http://hdl.handle.net/11159/316>

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# **The Anticipation of Changes in Housing Prices in Urban Distressed Areas after Implementation of Renovation Projects Using Grey Method**

## **(Case Study: Majd Project, Mashhad Municipality District 2)**

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**Received: 2014/05/12**

**Accepted: 2015/08/19**

**Abstract:** Mutual connection between the structure of cities and economic factors often leads to economic feedbacks which caused by structural intervention. This intervention usually affects decisions in urban land use through reducing or increasing economic costs or benefits of urban activities. The purpose of this study is prediction and identification the changes in housing prices until completion of Majd project. Grey Theory was used to predict the future price of real estates. Data were collected by documentry survey method during 2009 to 2013. The results showed that the prediction of economic and structural developments in studied area may result in the changes of real estate nominal prices. The results of the Grey Theory represented that current increasing trend in real estate prices will continue in future in a way that until to the project completion time, the nominal prices of real estate in that area would increase in comparison to 2013. Eventually, some recommendations such as reforming local prices offered to exploit the economic benefits of increased prices of real estate.

**Keywords:** Urban Economics, urban distressed areas, real estate prices, Majd Project, Grey Theory

**JEL Classification:** R11, R30, R51, R52

The Scientific-Research  
Quarterly Journal  
ISSN: 2345-2870  
Indexed in: ISC, SID,  
Noormags, RICEST, Ensani,  
Magiran  
www.Iueam.ir  
Vol. 3, No.12  
Fall 2015

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## 1- Introduction

City is a complex and dynamic phenomenon which always changes with physical, social, economic developments over time. Today, urban areas have been proposed prominently as the basic the international economic spatial units. In the shadow of restructuring global economy, development process of cities changed fundamentally during recent century. Its unique feature was determining role of economic factors in the system of construction, production and urban construction activities. Today, the cities are the most important organized artifacts in geographic area providing the necessities of lives, activities, and human livelihood needs, but their infrastructures deteriorate and wear out because of the dynamicity of equipment (Davoudi and Jalali, 2010). Urban decay is one of the serious and inevitable problems that urban management faces it in all countries of the world. The consequence of decay is identifiable in different forms such as reduction or lack of viability and safety conditions, and also physical, social, economic and installations' disorders (Khani, 2004). Currently, more than 10 percent of the country's urban areas are distressed. Holy Mashhad with 2292 hectares distressed area is the third city in the country ranked after Tehran and Tabriz. Distressed area in holy Mashhad is 0.08 and 519852 people live there. On one hand, urban distressed areas suffer physical, functional, environmental, and traffic problems and they counted as a serious threat for the total area of the city, on the other hand they are the most important potential for cities for using

land to accommodate the population, economic heart of the city, providing open spaces and services as well as improving the environment (Mousavi, 2006). Although the issue of urban decay has not been a priority in the field of urban management policies in the past decades, it has been considered as one of the important topics of national planning and development documents in all aspects since last decade. One of the problems of distressed areas is that heterogeneous texture in the blocks is in a way that none of owners can construct high buildings since it needs area with suitable size and it requires integration of several houses and agreement with other owners. On the other hand the issues such as street width and the impossibility of automobile entry or exit into the building results in decreasing the value added of construction case in distressed areas. If several owners renovate their buildings, economic value of the project will be decreased because of the possibility of not doing the similar activities by other neighbors. Value added in distressed areas is low to the extent that owners are not willing to renovate their buildings despite the allocation of long-term loans with low interest and exemption from payment of real estate license as much as possible; therefore, one of the solutions of such areas is renovation and rehabilitation them cumulatively in the form of a block by the investment of large firms so that a company or a consortium of several companies turn into one block (Nadim, 2009).

The main purpose of this study is investigating economic repercussions

arising from physical planning (the implementation of renovation project of Majd distressed area in holy Mashhad district 2). It is one of the oldest areas in holy Mashhad. Economic recovery means boosting appropriate and coordinated economic activities whether to strengthen existing activities or to attract new economic activities, as a significant and important strategy for some of the problems of distressed area in this district, but side effects of these measures should be predicted and examined in the city.

Majd investment project, with an area of over 8.6 hectares and infrastructure of more than 400 thousand square meters, is one of the biggest renovation plans of urban distressed areas in the country. The most important physical change predicted in this project is building north to South Boulevard that facilitates the access to this area.

On the other hand, one of the main concerns of municipalities is achieving sustainable revenues. One of the sustainable revenue resources is renovation dues calculated based on regional prices. Since regional prices follow different factors such as the quality of the area, the implementation of renovation projects will result in physical changes near the project and increase added value of housing in that area. The most important tangible physical effects after the implementation of Majd project is reopening of the boulevard and increasing residents' access, and increasing business function due to the utilization of specialized commercial projects. This will lead to change in the social and economic position around the project and improve

the investment climate in the coming years.

The anticipation of the economic indicators will help to create a clear picture of the economy in these areas and it will illustrate economic consequences of implementing such plans for residents and tradespeople. One of the most studied indicators in the housing sector is trading value of real estate and the area (Azizi, 2004); therefore, the main economic indicators in this study is trading value of real estate and its anticipation by the year of completion of the project.

## **2- Literature Review**

Studies showed that even though some articles examine the economic effects of urban distressed areas, none of them addressed the quantity of these effects and the anticipation of relevant indicators in long-term.

Ayini (2010) in an article entitled "rehabilitation and renovation of urban distressed areas from the perspective of economic issues" stated that urban rehabilitation and renovation in urban contexts, particularly central context, lead to drop in prices, maintain motivation to invest in them, and also maintain tissue in the cycle of economic life of the city. On the other hand, as the density indicator of persons per hectare promotes, land use is done in a better way. In fact, as land decreases, we will achieve to more efficiency in the field of housing and urban development.

Rahnama (2008) addressed the effects of implementing renovation plan in Mashhad city center on early residents of this neighborhood. The results showed

that the owners had to leave their place and migrate to other urban areas because of implementing this project. Also, the distance average between workplace and living place increased and the dependency of occupation to their houses among owners and people with free jobs decreased as well. Generally, more than 95 percent of owners were not satisfied with implementing such plans, and the effect of the project on their lives has been negatively evaluated by them. Owners suggested buying their properties in a fair price, using different methods for agreement, and profiting from future benefit of the plan.

Rahnama (2008) believes that investigating new policies of renovation of old and distressed contexts in Iran shows delayed following of isolated patterns in 1940 to 1970 in western countries in urban development plans, but further government involvement in the destruction of urban centers and lack of attention to social and economic conditions of the residents of central neighborhoods of the cities leads to compulsory appropriation of citizens' property and the revival process of urban centers have been confronted with serious problems.

Fathi Biranvand in a research in 2007 stated that economic values of distress area are determined by identifying located centers in the area, performance scale, exchange rate, Rial volume, turnover, and public and private investments in the context. Financial ability and residents' revenue level are the other indicators that play an important role in the study of economic qualities, opportunities, and

threats of that context. The results show low level of land price in these contexts compared to other urban areas, lack of suitable access, lack of providing public services and infrastructures, population movement, creating social context organized from rural residents, and rental housing. It has a direct impact on the low price of land and house in distressed area. Rehabilitation and renovation of these contexts can be influential in the improvement of each condition and mentioned indicators and the effects of this type of activity are reflected in the indicators and features.

Ardehshiri (2004) believes that interventions in physical context of cities usually affect people's decision-making, private companies, and public organizations in using lands and urban properties by decreasing or increasing cost or economic benefits of urban activities. The results showed that economic reflections of these kinds of involvement include change in land price, change in transport cost, the impact on the benefits of gathering, change in relative advantage in urban areas, and change in the cost of urban activities. No study has been done in Iran in the field of using Grey Theory 1 for predicting the cost of properties. Studies in other countries are as follows:

Jianming et.al. (2013) in a research on "house price prediction based on Marcov3 Grey Theory" stated that stabilizing the housing market, regulating and monitoring housing prices, and understanding a method to predict housing prices for the Chinese government have been of great importance by rapid

growth of house price. Although the prices of business units have fluctuated, it has had increasing process in general. Based on the current process in the prices of business units, this paper uses Markov Gray model to predict the prices of these units. Gray theory GT (1, 1) simulated the long-term development of housing prices well. In addition, the Markov model has increased forecast accuracy by removing the volatility of the data from housing prices.

Haitao et.al. (2007) used anticipation Grey Theory for predicting the price of properties in China. Researchers utilized the indicator of the price of properties in China in the anticipation and analysis theory of property prices during 1999 to 2004. The results could reflect the direction of changes for the price of properties well in this country.

Oztaysi et.al (2013) in a research on "Forecasting real estate index using grey forecasting: an application in Turkey" stated that real estate has been proposed as one of the issues of investment decisions and therefore there is an extensive research background regarding the anticipation of price index and housing. In this study, time series data were used for forecasting the price of properties in Turkey. Forecasting Grey Theory was estimated with different parameters and compared with models of moving average and multiple regressions. The accuracy of prediction of models was measured by using two indicators of mean absolute percentage error and the error of normalized root mean square. According to the results, Grey theory

presented a better prediction than other theories.

Liu & Zhang (2014) designed and tested the anticipation of GT (1,1) in a study by using data related to the sale of commercial space in Panjin for the demand of commercial properties in this city. According to this, the level of precision of theory was 2. The demand for commercial real estate was forecasted for 2012-2015 by using GT (1, 1) and some suggestions were presented for the development of commercial real estate.

### **3- Theoretical Principles**

#### **The Relationship between Physical Features and Economic Components**

This relationship leads to achieve economic goals through physical planning or solving economic issues by implementing economic planning. For example, although building a commercial center in city is mainly a physical project, some economic needs in the field of employment or urban revenue can be fulfilled through it. Despite increasing attention to the close relationship between the physical construction of cities and economic capacities, still the share of cities in economic development is not known completely. One of the reasons of lack of understanding can be attributed to the manner of contacting economics and urban planning fields to the society issues, because on one hand economists are less concerned with spatial dimensions and they investigate economic issues abstractly, in some cases they attend to the real world and investigate the location of institutions and certain industries, on the other hand, some urban planners do

not have enough knowledge for examining the economic reflection of such changes (Ardeshiri, 2004).

Another reason of lack of understanding between physical changes and economic evolution is lack of integration of physical planning and economic planning. The problem of integrating these two types of planning is different levels of physical and economic planning. Physical planning usually occurs at local level in detail, but the economic development plans are prepared at national level with holistic attitude.

Mutual relationship between the physical construction of cities and economic components lead most interventions in the physical context of cities to be associated with economic reflections. They in turn reflect on physical context of cities and they will be followed by periodic changes. Interventions in physical contexts of cities usually affect people's decision-making, private companies, and public organizations in using lands and urban properties by decreasing or increasing cost or economic benefits of urban activities (Ardeshiri, 2004). Some of the economic benefits of rehabilitation and renovation of distressed area include:

**Change in the price of land:** It is one of the most evident economic reflections of intervention in physical context of cities. Generally, conscious and planned changes in physical contexts of cities are accompanied with increase in land price. It is achieved by increasing demand as a result of access improvement to urban land or by improving the quality of the environment and access to urban services (Ardeshiri, 2004). In addition, urban

rehabilitation and renovation in urban contexts, particularly central contexts, result in drop in prices in the context, maintaining the motivation of investment in them, and also maintaining context in the economic life cycle of the city. This leads to avoid exiting human factor as a builder at the level of mentioned contexts and reduce urban decay (Aeini, 2010).

**Multiple use of land (improving the efficiency of urban land):** Urban land is renewable and valuable commodity. Generally, urban land is provided through the preparation place of undeveloped, developed, and partly agriculture lands, gardens around the city, and building new cities away from main cities. Urban land is obtained by the operations of leveling, excavating, paving the hills, constructing streets, and creating Facilities and equipment for municipal services such as water, electricity, gas, wastewater, and etc. on raw land and building roads to reach new cities. It means imposing high costs to the government and people. As the indicator of the density of person per hectare improves, the efficiency of urban land will increase too (Aeini, 2010).

**Reducing the cost of settlement:** The cost of providing infrastructure and service network of current urban contexts including green space, access, and some others, 40 percent less than preparation cost of new lands such as providing product cost of required infrastructures, future costs including the main internal network services, water, electricity, green space, training, and etc. Horizontal expansion of cities imposes surplus costs on the government and from government

to the people, as a result current urban poverty will be increased (Aeini, 2010).

Change in the cost of transportation: Another economic reflection of intervention in the physical context of cities is change in the cost of transport. This can lead to increase or decrease of transport cost through creating new routes, changing the place of some urban land uses, affecting behavioral model in the intercity trips, and etc. These changes influence on the people and economic institutions' decisions and it increases or decreases the area near the market and performance field of urban activities trying to create the maximum relationship with other activities with the lowest cost; therefore, change in their performance field can lead to their development (in case of cost decline) or move the place of activity 9in case of cost increase) (Ardeshiri, 2004).

Change in the comparative advantage of urban areas: One of the other economic components relating to the efficiency of urban performances is the relative advantage of the location. Comparative advantage refers to the characteristics of a place leading to better performance of some economic activities in that place. These features are either naturally in the place such as proximity to the seaside, or they are created artificially like creating infrastructures services.

Urban activities, regarding economic factors arising from the comparative advantage of a place, try to choose the best place; therefore, they increase their competitive ability in the market. Intervention in physical contexts can change the comparative advantage of a

place and it can change the economic efficiency of current activities or their attractions to eliminate suitable activities. Identifying comparative advantages of urban areas and planning in order to create new capacities are the most important duties of urban planners to provide the grounds for creating new activities (Ardeshiri, 2004).

The other effects of intervention in distressed areas include changing in the cost of urban activities, impacting on gathering benefits, impacting on economic factors arising from the scale, reducing the cost of the per capita of maintaining cities because of population density increase, reducing security costs, decreasing energy consumption and pollution, helping to maintain the environment and natural resources, and helping to optimal allocation of national resources (Aeini, 2010; Ardeshiri, 2004).

In general, intervention in distressed areas can prepare the ground for the presence of foreign investors in these contexts and absorb urban activities. It leads to decrease population density and activities in the city center. Moreover, creating economic opportunities in these contexts results in value added.

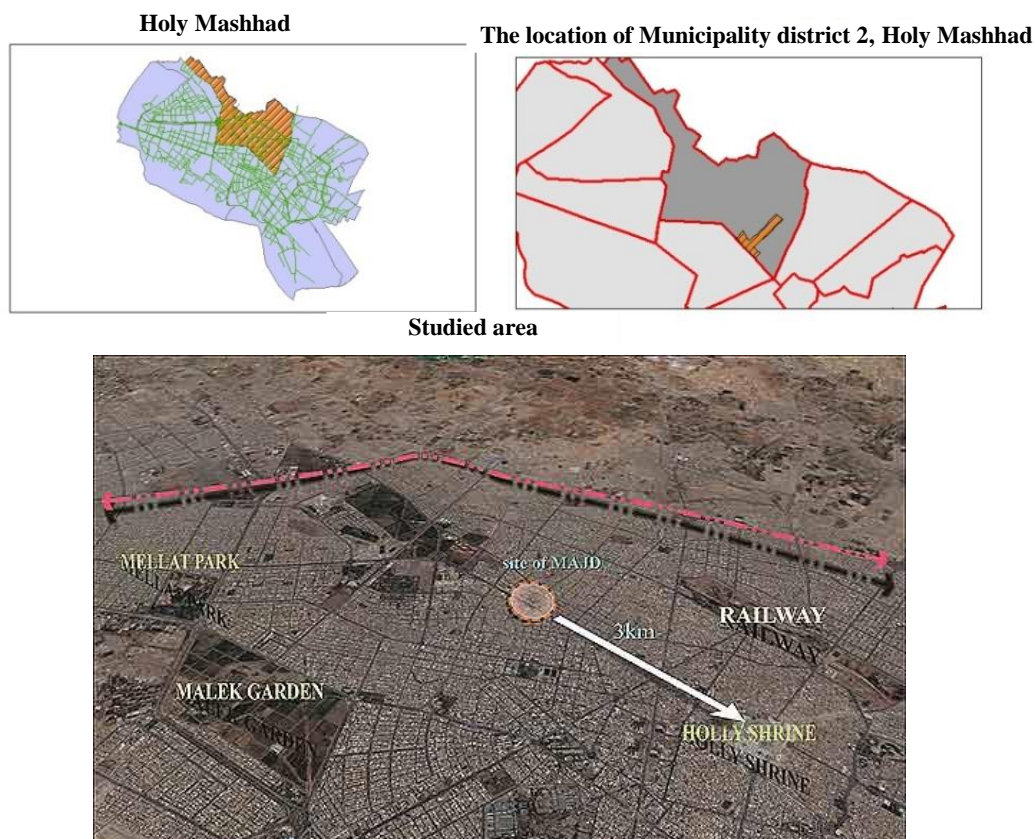
#### **4. Research Method**

The goal of this research is predicting the changes of house price in urban distressed areas after implementing renovation projects. In other words, the main purpose is forecasting the value of real estate transactions around the studied area, as a main variable, by using Grey Theory. The data used in this research were collected by documentary-survey method. It means that part of required



data for predicting the price of real estates in that area were extracted by referring to the real estate agents and reviewing set buying and selling documents during 2009 to 2013 and another part were collected on the basis of experts' ideas and current documents in municipalities. It is necessary to mention that 2009 was considered the beginning of statistical period as the unavailability of required

information for 2007 and 2008 (The early years of the project). Finally, prediction of house prices was accomplished by utilizing Grey anticipation system during 2014 to 2018. The sphere of influence of Majd project was divided into four areas (it is specified in map 1 like T-shaped enclosed area) and the prediction of real estate price was accomplished for these areas.



**Map1. Location of studied area in the holy city of Mashhad and municipality 2**  
Source: (Mashhad municipality of district 2)

It is noteworthy that despite the data of transactional value of real estate and its function in much analysis of urban economics and housing economy, no continuous monitor and record have been done by the municipality so far, and access to these kinds of data is possible

only via referring to the experts and real estates. The impacts of implementing this project were examined only in the sphere of influence for selecting studied area. According to the urban planning experts, the maximum sphere of influence for investment projects such as Majd project

is 2 km. The results of pre-questionnaire showed that the sphere of influence of the project identified and finalized by the experts was less than 2km because of implementing other mega projects around Majd project. Finally, the sphere of influence of Majd project was divided to four areas and the data for estate prices were collected shown briefly in tables entitled one to four areas. These areas have been defined as:

Area 1: the distance between Meydanbar and Abou Taleb (Qarani Street) crossroads

Area 2: Horr Ameli Boulevard (the distance between Amel crossroad and Abou Taleb Square)

Area 3: Karimi Blvd.

Area 4: Honarvar Blvd.

#### Anticipation Models

There are several methods for anticipating different indicators. One of them is considering the average growth rate of each indicator. In this case indicator growth is calculated in different years and the anticipation of indicator is accomplished on the basis of the growth rate for the coming years. As this method is not scientific, it has not been used in this research. Another method is using autoregressive integrated moving average (ARIMA) counted as one of the valid scientific methods and it is used in many studies. The required minimum time-series data is fifteen years for this model while available data for real estate were five years. Another method presenting acceptable prediction of different indicators is Grey Prediction Theory (Huang.,et al,2007) used in this research.

#### Grey Prediction Theory

In order to predict the price of real state in our study, Grey Prediction Theory (GT) has been used. Gray theory first was introduced by Professor Ju Long Deng in 1982. In this theory, an information system is classified into three parts: white system, grey system, and black system. If system data are totally unknown, it will be called black. Totally known data are white, and a system between black and white is called grey. As an advantage than experimental statistical models, grey systems only need a limited number of data for estimating the behavior of an unknown system (Deng, 1987). To put in a nutshell, the main purpose of GT is focusing on the relationship between analysis of model structure and conditions such as lack of trust, multi-function input data, discrete data, and lack of data to make predictions and decisions.

In order to use Gt, these steps should be followed:

1- Introducing main series-data (in this step related data to real estate in previous years should be used):

$$X^{(0)} = (x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(n)), n \geq 4 \quad (1)$$

$X^{(0)}$  is a non-negative sequence and “n” is the size of sample data. A GT model can be formed and launched by using four data (Lee, 2001).

2- Producing cumulative data:

$$X^{(1)}(k) = \sum_{i=1}^k x^{(0)}(i) \quad k=1,2,3,\dots,n \quad (2)$$

3- Producing  $z^{(1)}(K)$  series: generator average sequence  $z^{(1)}$  (produced series of continuous neighbors of  $X^{(1)}$  is defined as:

$$Z^{(1)} = (z^{(1)}(1), z^{(1)}(2), \dots, z^{(1)}(n)) \quad (3)$$

$z(1)(K)$  is the average value of consecutive data. For example:

$$z(1)(K) = \frac{1}{2}x^{(1)}(k) + \frac{1}{2}x^{(1)}(k-1) \quad k=2, 3, \dots, n. \quad (4)$$

The estimation of minimum squares sequence (1, 1) is expressed as follows (Deng, 1989):

$$x^{(0)}(k) + a z^{(0)}(k) = b \quad (5)$$

Therefore, Whiteness equation is:

$$\frac{dx^{(1)}(t)}{dt} + ax^{(1)}(t) = b \quad (6)$$

$[a, b]$  is a sequence of parameters that can be expressed as follows:

$$[a, b]^T = (B^T B)^{-1} B^T Y \quad (7)$$

In which:

$$Y = [x^{(0)}(2), x^{(0)}(3), \dots, x^{(0)}(n)]^T \quad (8)$$

$$B = \begin{bmatrix} -z^{(1)}(2) & 1 \\ -z^{(1)}(3) & 1 \\ \vdots & \vdots \\ -z^{(1)}(n) & 1 \end{bmatrix} \quad (9)$$

According to equation 9, we have:

$$x_p^{(1)}(k+1) = \left[ x^{(0)}(1) - \frac{b}{a} \right] e^{-ak} + \frac{b}{a} \quad (10)$$

Using predicted value of preliminary data in  $(k+H)$ , inverted operator collector uses grey model in equation 11:

$$x_p^{(0)}(k+1) = \left[ x^{(0)}(1) - \frac{b}{a} \right] e^{-ak} (1 - e^a) \quad (11)$$

Based on mentioned points, following model is used for calculating predicted value for preliminary data in  $(k+H)$ :

$$x_p^{(0)}(k+H) = \left[ x^{(0)}(1) - \frac{b}{a} \right] e^{-a(k+H-1)} (1 - e^a) \quad (12)$$

MATLAB software was used as well to estimate this model.

## 5- Research Findings

The results have been presented in two parts. In the first part, the current process of transactional value of real estate of defined areas were investigated for presenting an image of the growth of nominal and real prices of real estate from the beginning year of the implementation of the project to 2013. In the second part, transactional value of real estate was predicted by GT from 2014 until 2018 (the time of completion of the project) and its growth rate was calculated compared to 2013.

### Studying the Current Process of Transactional Value of Real Estate in the Study Area

Transactional value of real estate is different according to the deed of property and it is examined into two main categories. Like other urban areas, some real estates had deeds, mandates, or preliminary agreements. Properties with deeds were bought and sold with higher price. The difference between properties with deeds and preliminary agreements in 2012 and previous years was about 300 thousand Tomans in each squared meter and in the spring of 2013 was about 500 thousand Tomans. The above results are based on theoretical and objective available evidences.

As indicated in Table 1, the growth rate of nominal prices of properties with deed and mandate fluctuated between 8.30 to 61.5 percent during this period. The most annual growth rate (61.5%) was for 2013 among all areas. It should be

noted that this area will be affected by reopening the new boulevard in Majd project and North-South access route will be provided for the residents of the area. In other words, indicators such as the improvement of environment quality and access to municipal services would be more influential after implementing this project in area 3 more than other areas. This important factor will justify the relatively high growth of the prices in this area.

The nominal price of properties experienced a sudden increase in all areas of the study in 2013. The sudden rise of inflation rate in the last two years, political, economic evolution and related issues at national level such as sanctions and consequently the sharp rise in prices of construction materials and its effects on the price of real estate over the past few years are the reasons of increase in nominal prices.

**Table1. Nominal price of each square meter of housing in the area of Majd Project during 2009-2013 (based on Tomans)**

Price/growth rate	Year	Deeds				Mandates			
		Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4
Nominal price	2009	800	800	700	600	600	600	500	400
	2010	900	900	800	750	650	650	600	500
	2011	1100	1100	1000	900	900	900	800	700
	2012	1500	1500	1300	1200	1200	1200	1000	900
	2013	2400	2250	2100	1700	1900	1750	1600	1200
Annual growth rate of nominal price	2010	12.5	12.5	14.29	25	8.33	8.33	20	25
	2011	22.22	22.22	25	20	38.46	38.46	33.33	40
	2012	36.36	36.36	30	33.33	33.33	33.33	25	28.57
	2013*	60	50	61.54	41.67	58.33	45.83	60	33.33
	Average growth	27.90	26.66	28.50	28.87	28.10	26.45	31.62	31.24

**Source: (Housing experts and researchers' findings)**

Real price of houses were calculated for the years of this study in order to eliminate the effect of inflation on the price. It should be mentioned that price index of real estate, renting and business activities have not been given in the producer price index (PPI) in the Central Bank reports from 2007. Therefore, in order to calculate the real price of house, PPI of construction during 2009 to 2013 (An index of the Central Bank of the Islamic Republic of Iran, 2004=100) was used.

Investigating annual growth rate of real prices of properties during the years of the study in four areas (table 2) showed

that the growth rate of real price was negative in 2010 and 2011 and the real price of houses has decreased in these years. The annual growth rate of real prices was positive in 2012 and 2013 in four areas for properties with deed and negative for properties with mandate only for area 3 and area 4 in 2012.

After 2011, economic effects of implementing Majd project on the price of real estate in four areas have been more visible. In other words, predict a rise in prices by owners and estate agents has showed the most increasing influence in the first season of 2013. Real prices of real estate of defined areas has increased

45% over the previous year on average by approaching the time of operation of new boulevard, connecting Karimi Blvd to Majd Blvd (2014), setting up some commercial towers of the project.

Most of the real price growth rate during these years was related to 2013 for each of four areas. In this year, the project has increased 27 to 54 percent per cubic meter price of house in the studied areas. The least growth rate of real price was for properties with mandate in area 4 and the highest growth rate was for properties with deed in the areas of case study. As the growth rate of real estate prices in four areas shows, sudden rise of prices in these areas is influenced by another factor without considering inflation. As mentioned before, change in the land price is one of the most obvious economic reflections of intervention in physical context of cities. Conscious and planned changes of physical context of cities are accompanied with the increase in land price. Increase in demand as a result of improvement of access to urban lands and improving environment quality and access to municipal services are the reasons for this phenomenon (Ardeshiri, 2004). Accordingly, it can be stated that also about the area of case study, one of the reason of sudden increase in the house price in 2013 is the improvement of physical indexes and residents' access to other areas because of the project.

Studying time process of areas' prices indicated that main streets (Karimi and Qarani boulevards) were influenced

greatly and this rate of this impact reduces by getting away from main streets.

As the economic theory suggests, the price of housing sector is subject to various factors such as inflation, investment in infrastructure and expectations. In this research, the expectations of economic activists led to form a flow in the house prices because of obvious physical changes as a result of implementation of Majd investment project in the mentioned area. This flow has become visible in significant rise in prices of residential units in those areas in the first year of exploiting the project (2013) than previous years. Therefore, the effect of mentioned area because of the reopening of new boulevard, the growth of business performance due to the operation of commercial complexes and specialized markets defined in the project, and improving the quality of the area have resulted in forming expectations of increase in house price.

The results of economic reflections of the intervention in the physical context of cities correspond with few studies carried out in the country such as Ardeshiri (2004). According to the results, implementing the underpass project of Zand Street in Shiraz led to decrease the access to Vakil Bazaar in Shiraz and disrupt the performance of this market. According to researcher, by reducing visits from all parts of the city and limiting the performance of Vakil Bazaar, it is expected that its performance is reduced gradually and its role will be diminished to a local market.

**Table2. Real price of each square meter of housing in the area of Majd Project during 2009-2013 (based on Tomans)**

Price/ Growth Rate	Year	Deeds				Mandates			
		Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4
Real price	2009	465.9	465.9	407.7	349.4	349.4	349.4	291.2	233.0
	2010	429.6	429.6	381.9	358.0	310.3	310.3	286.4	238.7
	2011	340.2	340.2	309.3	278.0	278.4	278.4	278.4	216.5
	2012	358.0	358.0	310.3	286.4	286.4	286.4	238.7	214.8
	2013	545.5	511.4	477.3	386.4	431.8	397.7	363.6	272.7
Annual growth rate of real price	2010	-7.80	-7.80	-6.33	2.45	-11.21	-11.21	-1.65	2.45
	2011	-20.80	-20.80	-0.19	-22.24	-10.28	-10.28	-13.60	-9.28
	2012	5.22	5.22	0.31	2.88	2.88	2.88	-3.55	-0.79
	2013	52.36	42.84	53.83	34.91	50.78	38.87	52.36	26.97

Source: (Researcher's findings)

### **The Anticipation of Transactional Value of Real Estate in the Area of Case Study Using GT**

The transactional value of real estate was predicted as one of the indexes influencing the economy near the project in the area in another part of the study. As mentioned before, GT was used due to a few data in this study. It should be mentioned that different anticipation techniques were used in order to estimate the future price of housing sector. GT is a new step in predicting house price at city level in holy Mashhad. Anticipation time horizon of the study was the completion

year of Majd project in 2018. Based on the above subjects, by considering 2007 as the beginning year of the project, and consequently the start of physical changes in the field of case study and forming expectations to increase prices in future years, major part of increase in housing sector in the area is related to the implementation of Majd project. Accordingly, time series data of house price in the area of case study were collected from 2009 to 2013. GT was used in order to predict the price in the coming years. The summary of the results are presented in table 3:

**Table3. The anticipation of real transactional value of real estate in four areas of case study until the completion of the Majd project based on thousand Toman**

Year	Deeds				Mandates			
	Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4
2009	800	800	700	600	600	600	500	400
2010	900	900	800	750	650	650	600	500
2011	1100	1100	1000	900	900	900	800	700
2012	1500	1500	1300	1200	1200	1200	1000	900
2013	2400	2250	2100	1700	1900	1750	1600	1200
2014	3200	2800	2600	2200	2600	2200	2000	1600
2015	4500	3700	3500	2900	3600	3000	2700	2000
2016	6300	5000	4800	3800	5100	4000	3700	2600
2017	8600	6600	6400	5000	7000	5300	4900	3300
2018	11700	8500	8400	6500	9500	7000	6500	4300
Growth rate in 2018 compared to 2013 (percent)	29	24	25	24	29	25	25	23

Source: (Researchers' findings)

What can be concluded from this table is that the maximum increase in the value of real estate transactions will be equal to 29% in the coming years that will be occurred in area1, (around Qarani boulevard). This area is of higher quality than others and results show that the growth rate of the price range is more than three other areas for properties with deed or mandate.

Karimi Boulevard in area 3, with growth rate of 25%, has the highest rate of growth in the value of real estate transactions. The results confirm the experts' experimental predictions which they considered major impact in the increase of house price around Karimi Boulevard. According to the prediction results, 2 and 4 areas, Hor Ameli Boulevard and Honarvar Boulevard, had the same growth rate and in 1397 to 1392, price growth will be 24%. This trend is somehow the same about the prices of mandate documents. The highest growth rate is dedicated to Qarani Boulevard. Karimi and Hor Boulevards have the same growth rate and Honarvar has the least accordingly.

It goes without saying that price index is needed for predicting real; prices based on nominal ones presented in the above table which calculated by the Central Bank annually. Therefore, real prices for the above table will be possible in the coming years after achieving to price index. The anticipation of economic and physical evolution around the case study, such as reopening the new boulevard facilitating the access to the intended area, has resulted in the formation of a flow in the prices of

properties in this range which is explained in economics partly by adaptive expectations in such a way that if economic activists' expectations occurs under this hypothesis, economic factors will apply all available data such as money growth in forming the inflation expectations. In other words, economic activists in the field of housing form their expectations regarding the prices of real estate around the project by considering experimental indicators such as project advance and implementation year of new boulevard which plays undeniable impact on the quality of the area and easier access to it and most of these expectations would become a reality because there are smart factors in social system unlike the physical system trying to predict political measures and doing optimal reaction to it according to their prediction.

In general, it is understood that in the first place what is visible and understandable as the implementation impacts of revival project for distressed area is its physical impacts of implementation and economic ones will be occurred with a time lag accordingly. The results show that implementation of mega renovation project of distressed area has led to the economic effects of the increase in value of real estate prices after a four-year hiatus and this effect will continue until the completion year of the project. Another result inferred in this study is that the areas with more physical impact by the implementation of Majd Project have experienced more changes in the economic variables. Although created physical changes have resulted in the increase of social rank and the value of

the real estate in all the studied areas, the results showed that the areas which had higher transactional value before implementing the project will experience higher nominal price in the future years (1 and 2 areas).

The implementation of revival projects in distressed areas, such as any investment project in the city, will be followed by economic, social, and physical developments, but the degree of influence of these developments around the project will depend on different factors such as project size, the implementation time of the project, social context of the area, and other factors. Increase in the quality of the area may result in providing long-term economic interests in the area with the following two methods:

- Increase in the municipality's revenue due to the possibility of the increase in the area prices determined by the municipality

- Increase in absorbing huge investment because of more justified investments in the area

One of the important issues of municipalities, as an urban management institution, is creating sufficient revenue resources and providing the cost of municipal services in order to create a healthy city with desired quality of life for citizens. In this regard, the major part of providing credits for the municipalities is revenues from public events and building violations. Area price (transactional value of properties) is one of the parameters for calculating dues which becomes criterion for determining

the paid amount by builders and owners (Rahnama, 2014).

Therefore, studies like this will provide an instrument for planners to apply different regional prices after implementing renovation projects in distressed areas and in proportion to different regional development. Thus, municipalities will benefit from added value of these projects. In this regard, following suggestions have been presented in line with increasing economic benefits of implementation of investment projects in distressed areas for municipalities and providing relevant data with housing economy:

One of the most important effects of implementing the project on the economy of Mashhad Municipality district 2 is increase in transactional value of properties in this area. The Municipality of district 2 can increase its tax revenue by reforming regional prices in areas which had more growth in added value in urban land. Therefore, it is suggested to check regional prices of properties located in Karimi, Honarvar, and Hor Ameli Boulevards and the areas around Majd Project after at least two years from the reopening of new boulevard.

Identifying time delay for economic effects of implementing a mega investment project will help a lot to policymakers for determining and timing new regional prices and other decisions. Thus, studies in the field of identifying time for economic consequences of implementing investment projects or renovation projects in distressed area can be proposed as the subjects of future studies.



Due to lack of sectional and documented information, access to any types of economic data in this study needed to a lot of time and energy. Setting up an efficient and regular data base in the municipality structure responsible for annual or monthly monitoring and recording economic variables of the area, such as house price in different areas, can help to do research projects and increase the accuracy of such studies. It is obvious that creating a data base for the prices of properties in the area, both commercial and residential separately, will lead to provide a suitable instrument for analyzing housing economy.

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