ENVIRONMENTAL ENGINEERING

The 8th International Conference
May 19–20, 2011, Vilnius, Lithuania
Selected papers

ISSN 2029-7106 print / ISSN 2029-7092 online
ISBN 978-9955-28-829-9 (3 Volume)
ISBN 978-9955-28-827-5 (3 Volumes)
http://enviro.vgtu.lt

MODELS OF FACTORS INFLUENCING THE REAL ESTATE PRICE

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Abstract. The real estate is an integrate part of the economic development of the country. Essential economic changes have direct impact on the real estate market. In recent years that saw the economic crisis there occurs a need to analyse the factors that exert impact on the real estate price. The authors of this article analyse the factors that have impact on the real estate price. The article reviews the global analysis of the factors that influence the real estate market and gives a glimpse of the conceptual model of Lithuania's real estate market development in 2000-2009. The research part of the article presents the public poll carried out in Vilnius concerning the real estate as one of the main social factors as well as one of the factors reflecting the quality of life.

Keywords: real estate, housing price, market, public opinion poll, factor analysis.

1. Globalisation impact on the real estate market

The increasing opening of the national economy triggers the expansion of the fields of intensive knowledge and technology application and the transformation of public consciousness and ways of thinking. These changes are less scary for skilled people with the greatest intellectual potential; usually such people live in the largest towns and surrounding districts (Burinskienė, Rudzkienė 2004; Zavadskas et al.; 2007). All these processes have caused changes in the previous systems of towns, districts and villages, as territorial units, and disturbed their balance. Regardless the efforts of the states to promote sustainable development, in many cases the emerging phenomena condition the development of some districts and the lagging behind of other districts and even the occurrence of socially negative locations.

In any case, maintaining balance and harmony of processes during the changes in economic relations is not easy. Although according to the open economy concept it is considered that external factors have positive influence on the development of individual countries, this impact is uneven and controversial, especially with regard to the transition economies (Čiegis, Gineitienė, 2008; Burinskienė, Rudzkienė 2007). Economic, social and ecological processes take place in a complex context of globalisation, competition and climate changes, and it is not easy to assess the impact of these processes on the environment and people.

One of the main elements of this transition economy reform is land privatisation, which resulted in the lower land use intensity and large areas of land lying waste. Alongside the structural economic changes characteristic of the modern post-industrial world, such as falling agricultural and industrial production and increasing share of services, this determines the negative economic and social outcome. Even so, it is obvious that the decreasing impact of human activities on the natural environment and live nature produces positive outcome: falling production results in reduced agricultural pollution and in the expansion of protected areas. For example, in Lithuania the forest area has been annually increasing by about 1%, while timber volume has been annually increasing by nearly 1.5%. The areas of protected and protective forests have expanded by about 1.8% of their total volume.

2. Classification of the factors that have impact on the real estate market

In Central and Eastern Europe the reasons for the rapid real estate price variantions are usually looked for by analysing the following fundamental factors: interest rate decrease, loan availability, housing supply and demand ratio, changes in housing market participants' expectations, administrative restrictions of supply, etc. These factors have varying degree of impact on the real estate market of any country. Very abrupt rise in the real estate prices usually predetermines the development of financial markets conditioned by loans for housing acquisition. Works dedicated to the real estate market analysis group the factors that have impact on that

market with regard to different profiles. For example, S. Vanichvatana (2007) singles out the following macro- and microenvironment factors: macroeconomic – GDP and employment, loan rate and foreign exchange rate, stock price indexes, geo-factors (population, age); while macroeconomic factors are mostly related to construction environment, i.e. the issued construction permits and the number of built houses, the construction price indexes, etc. It is obvious that most of these group factors are inter-related.

R. J. Schiller (2005), who thoroughly analysed global financial markets and their fluctuation, carried out an exhaustive analysis of the housing price fluctuation. Analysing housing market fluctuation dynamics in USA since 1890 he noticed that the well-known rational housing price factors, such as loan rate, construction prices or population growth, sometimes failed to correspond to the housing price fluctuations. Carrying out his analysis he found out some other factors that had impact on the fluctuation of securities and housing prices.

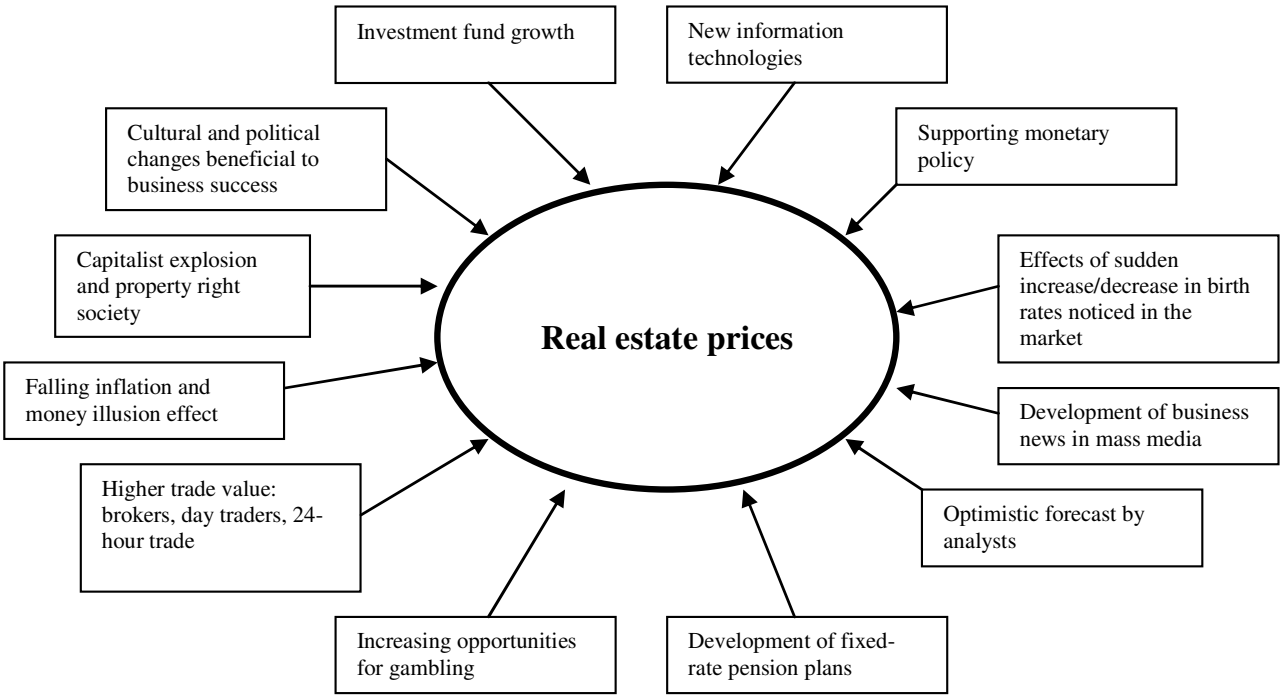

Fig 1. Indirect factors that have impact on the real estate prices (according to Schiller, 2005)

V. Azbainis and V. Rudzkienė (Azbainis, Rudzkienė, 2011) carried out research on theoretical integration of the real estate market development approach with the empiric variable analysis, and constructed a conceptual model of Lithuania's real estate market development in 2000-2009. The authors distinctly singled out two factors; the first of those factors could be called the rational factor related to the real prices of housing, while the second of them could be called the irrational factor reflecting consumers' expectations. The first factor consists of 4 variables: loans issued to bank clients, the total number of constructed apartments, the average price of a large panel apartment in a residential district of Vilnius, and the average annual inflation. The main variable of this group is the average price of large panel apartments, and together with other variables it exerts impact on the first factor. The second factor consists of three variables, and the most important one of them is the derivative or irrational indicator, i.e. the consumer confidence index. Based on the obtained result, the model of the real estate market development was produced (Figure 2).

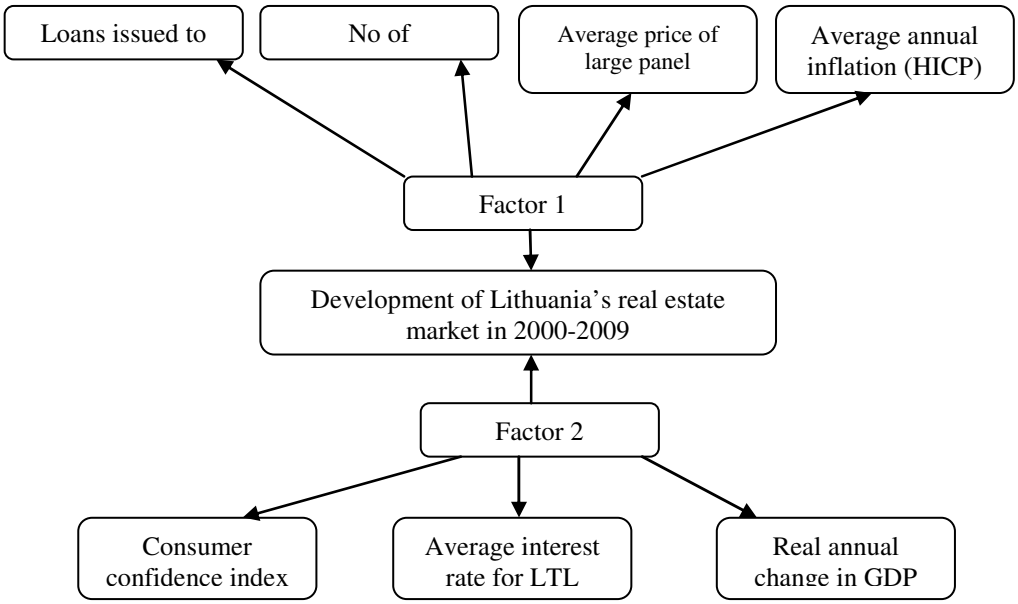

Fig 2. The model of Lithuania's real estate market development in 2000-2009

3. Review of the factors that have impact on the real estate prices in Vilnius

Rapid development of modern technologies gradually changes human consciousness, priorities and estimation of quality of life. The fact that the idea of a prestigious apartment changes is reflected in the apartment price changes. Apartment prices are one of the main indicators that reflect the level of the economic development of towns and districts and the quality of living (Burinskienė, Rudzkienė, 2004, 2005). The set of properties that characterise the apartment could be divided into two groups, namely: individual properties characteristic of an individual apartment and general properties characteristic of an individual district of the town (Burinskienė, Rudzkienė, 2005). According to Jarmalavičius (2005), the main criteria based on which newly built apartments are purchased are the following:

- location
- price
- quality of work
- neighbourhood
- feedback and general reputation
- financial transparency, visibility of the construction company and information available about the company

S. Raslanas (2004) also analysed the market of apartments located in multi-storey buildings in Vilnius; and he found out that the number of factors that have impact on apartment prices is enormous. The main factors that have the greatest impact on the apartment purchase/sale prices were selected, namely:

- the price is mostly influenced by location and its prestige; people want the environment to correspond to their social status and to highlight it; depending on prestige of a district the price may differ by some 25%;
- the next important factor of the housing price is the age of a building. Apartments located in newly built houses cost more than similar apartments in old houses. The price of renovated old buildings located in prestigious districts of the town is also higher;
- type of the house (constructions of external walls). Prices depend on the construction of the house walls;
- criminality rate of a district;
- ecological state of a district (air pollution and noise level) comparison of the apartment prices of the same district reveals that apartments in the houses located close to the main street are lower than those of other apartments in the same district (Zavadskas et al. 2007)
- other factors (location and state of the house, number of storeys, number of rooms, total useful area, kitchen area, etc.).

Assessment of the quality of life in different districts of Vilnius resulted in the model of 1 square meter price in a micro-district of the town. It showed that where the job density increased by one, the 1 square meter price increased by about 20 litas, the price was about 127 litas lower in those cases where houses were more than 1 km away from the downtown area (Burinskienė M.; Rudzkienė V.; 2006).

This research tries to produce a model of the public opinion on the factors that have impact on the real estate prices in Vilnius.

4. The public opinion poll in Vilnius

In January-February 2005, to add some new data to the Vilnius general plan database that were not provided by official statistics sources and to identify the public opinion on the residential space, activity possibilities, reasons for potential migration and other matters, a representative poll was carried out in Vilnius. (Report on the questionnaire poll carried out in Vilnius by UAB Rait in 2005) 2575 permanent residents of Vilnius (16-74 years old) assessed environment of 41 residential districts of Vilnius. In the five-point scale residents gave positive assessment to 22 affirmations describing the quality of a residential district, namely: 1) close to the downtown area; 2) abundant supply of commercial services; 3) close to a school; 4) close to a kindergarten; 5) abundant supply of recreation objects; 6) clean air; 7) nice surroundings; 8) safety; 9) good transport services between the district and the downtown area; 10) good transport services between the district and work; 11) well maintained surroundings; 12) no noise; 13) no drug addicts; 14) close to polyclinics; 15) close to a pharmacy; 16) good sport facilities; 17) lots of culture establishments; 18) no alcoholics on streets; 19) no homeless people; 20) close to work; 21) nice architecture; 22) well maintained parks.

So, choosing those 22 factors, the Roger model and other models that had home, work and recreation fields singled out were referred to. In the research, each of these fields were characterised by certain features, namely:

- field *Home* was reflected by 5 variables: abundant supply of commercial services, close to a school, a kindergarten, polyclinics and a pharmacy;
- field *Work* was reflected by 2 variables: good transport services between the district and work, the district is located close to work;
- field *Recreation* was reflected by 4 variables: abundant supply of recreation objects, good sport facilities, lots of culture establishments, well maintained parks.

The remaining and the largest group of 11 features consisted of general type environment quality variables: close to the downtown area; clean air; nice surroundings; safety; good transport services between the district and the downtown area; good transport services between the district and work; well maintained surroundings; no noise; no drug addicts; no alcoholics on streets; no homeless people; nice architecture.

The first task to be solved when producing the research model was to reduce the amount of data. For that purpose the method of factor analysis could be applied.

When analysing the variables, the data (variable) pertinence to the factor analysis was verified applying Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO).

KMO of variables of the group *Home* was equal to 0.76, so this group was pertinent to the factor analysis. The analysis of eigenvalues singled out one distinct factor explaining 78% of total variance.

Applying the regressive least square method, the factor scores were calculated:

$$F_j^{'} = \sum_{i=1}^{n} b_{ij} z_i, \ j = 1,...,m; \qquad (1)$$

where - $F_j^{'}$ - value of the j^{th} factor, z_i – standardized value of i^{th} variable, b_{ij} – regression coefficient estimates.

Accordingly, variables of the field *Work* were also replaced by a single variable, explaining 93% of total variance. Variables of the field *Recreation* were also replaced by a single variable, explaining 69% of total variance.

Variables of the field *Environment* were pertinent to the factor analysis (KMO=0.748) but here two factors explaining 69% of total variance were singled out. Applying the rotation operation, the pattern of variable arrangement became clear (Table 1).

According to Table 1, the first factor consists of 6 variables (clean air, safety, no noise, no drug addicts, No alcoholics on streets, No homeless people on streets) and this factor relates to health and safety.

The second factor consists of 4 variables (close to the downtown area, good transport services between the district and the downtown area, well maintained surroundings, nice architecture). This factor reflects attractiveness of the downtown area and aesthetic features of the district.

Theoretically, all these variables may have impact on the real estate price of residential districts in question, so the following model of the factors that have impact on the real estate price was produced (it expresses the opinion of the residents of Vilnius) (Figure 3).

Table 1. Variable correlation with the singled out factors

Rotated Component Matrix[a]

	Component	
	1	2
Close to the downtown area	-,311	,780
Clean air	,783	-,150
Safety	,882	-,178
Good transport services between the district and the downtown area	-,375	,843
Well maintained surroundings	-,070	,673
No noise	,861	,003
No drug addicts	,851	-,260
No alcoholics on streets	,694	,047
No homeless people on streets	,689	-,482
Nice architecture	,404	,754

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

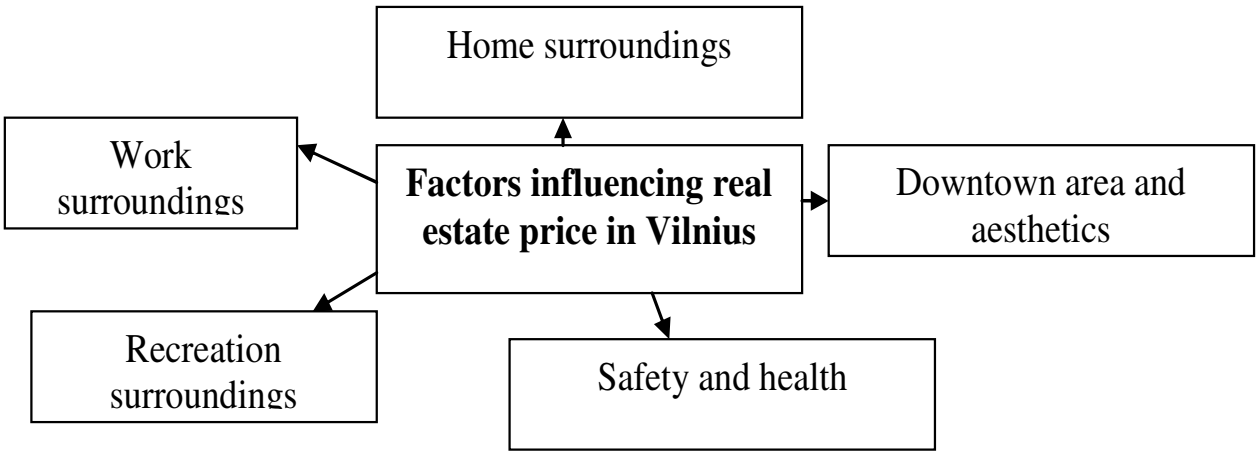

Fig 3. The theoretical model of factors that have impact on the real estate prices in Vilnius

5. Conclusions

1. Sudden changes in the real estate prices, price rise, its impact on national economy, and price bubble analysis are all important for the real estate theory and practice. As real estate is used not only for the direct needs (often it serves as an investment), there is a need to analyse the factors that have an impact on the real estate market. Analysing the factors that possibly had impact on the Lithuania's real estate prices in 2000-2009 seven main factors were singled out, namely: loans issued to bank clients, billion LTL; the total number of apartments built, pcs.; consumer confidence index; the average interest rate on loans issued in litas (%); the average price of large panel apartment in a residential district of Vilnius; the real change in GDP (%); the average annual inflation (HICPs) (%).
2. Evaluating Vilnius with regard to sustainable development, the article was based on the data of the representative public poll where residents had evaluated the quality of life against 22 affirmations; the evaluation was performed within the five-point scale. The following factors were grouped into three fields characterised by similar features: the field *Home* is reflected by 5 variables, the field *Work* – by 2 variables, the field *Recreation* – by 4 variables. The remaining and the largest group of 11 features consisted of general type environment quality variables.
3. To reduce the amount of data, the factor analysis method was applied, and it allowed replacing the information contained within many factors by one variable. The eigenvalue analysis resulted in one distinct factor singled out in the three groups – Home, Work and Recreation. The variables of the largest group – quality of environment – were singled out into two factors. The first was related to health and safety, while the second reflected the attractiveness of the downtown area and the aesthetical values of the district.
4. Thus, five factors were singled out of the available data: home, work, recreation, safety and health, the downtown area and aesthetics. Based on that, the model of factors that have impact on the real estate price was produced. The model reflects the opinion of the residents of Vilnius and it will be used for further research on the real estate market.

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