Ranking of Housing Market Sustainability in Selected European Countries

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Abstract: - The aim of this paper is to compare housing markets of selected European countries: the Baltic States, Spain and industrialized European countries with special reference to Estonia. The ranking of selected countries is based on concerns about the excessive home ownership which evidently is not consistent with economic development and acts as a barrier to increasing the quality and volume of the housing stock. An integrated analysis of housing market sustainability was performed using Multiple Criteria Decision Making Method (MCDM). A Decision Support System for Housing Sustainability Assessment (DSS-HS) was developed. The analysis of the ranking and assessment results allows recommendations to be made for improving the indicators in order to increase housing market sustainability. The case study presents an example of practical application to three Estonian counties.

Key-Words: - COPRAS method, home ownership, MCDM, sustainability of housing market.

1 Introduction

In the process of transition to a market economy, the authorities of the Baltic States decided to privatize the existing rental housing stock in the hope that private home ownership would be the best way to maintain the dominantly old and shabby housing stock and, on the other hand, to redistribute housing wealth. This decision was supported by the EU Housing Policy Guidelines [1] and world-wide housing policy trend to increase home ownership [2, 3].

We are convinced that housing as a human right contains also freedom of choice of the tenure, as incomes do not support the affordability of universal owner occupation. Besides, the shadow rental sector increases the affordability problem as housing prices can influence rents [4].

Housing affordability is, from one side, dependent on economic development of a country (or region) and reflects the ongoing cost of housing related to the household income. The ongoing cost of housing is either rents or monthly mortgage payments [5]. As the population of a country, city or county consists of different households in different locations with different social status and having different incomes, the questions to answer are: affordable to whom, on what standard of affordability and for how long [6]?

Is a housing market with a high owner-occupancy rate sustainable? Recent research revealed that the housing markets of the Baltic States are not sustainable in comparison with those of more developed European countries. The home ownership rate consistent with general economic indicators should be approximately 70% [7]. Any average indicator of a country does not reveal the heterogeneous nature of the agents.

Three counties of Estonia are chosen to compare the sustainability of their housing markets with the Estonian average. The similar research was carried out by Tyrdon showing that regional economic and social disparities have widened in the Visegrad group of countries [8].

2 Housing Policy in Europe and the US

A neo-liberal approach influenced the policy of privatization both in Eastern and Western Europe. The results of privatization are desirable to those who were able to purchase, but it created a greater concentration of poverty. During the 21st century, new entrants have experienced increased difficulties with affordability and access to the owner occupied market [9].

In 2013 Levitin and Wachter argued that whereas, for years, the overall housing policy in the US was focused on increasing home ownership which conveniently covered the lack of coordination of housing policy and finance, now it is not clear if it should be targeted at maximizing home ownership, maintaining home ownership at a particular level or facilitating rental stock [3]. Their arguments are supported by Wyly who finds that neo-liberalization pushes working-class and middle-class households to struggle into home ownership while borrowing to the limit to buy as much real estate as possible [10].

Policy to increase homeownership led to indebtedness and housing deprivation. According to Scanlon et al. policies to encourage mortgage lenders were general macroeconomic policies increasing the money supply and reducing interest rates, but in 2009 policy turned towards assisting borrowers in payment difficulties. These policies were reductions in interest rates, temporary government assistance with mortgage payments on behalf of the unemployed, freezing payments, changing the terms of loans, etc. [11].

Along with tenure split, housing policy is concerned with housing assistance. Subsidies can be classified in the manner in which they are provided, whether they are targeted to housing consumers or producers, to renters or owners. Yates sees government assistance as market–supplementing and market-supporting actions [12]. Multiple approaches are reasoned why government might intervene in the housing market.

Broadly, government assistance is classified as demand-side or supply-side intervention. From the demand side, governments might try to increase incomes by using some sort of income supplement, subsidizing consumption of housing, making credit cheaper and available, introducing tax allowances for interest payments or a combination of these policies.

Supply-side approaches involve subsidies, which are usually given with conditions. In Germany, social housing subsidies have been available to a variety of private and public-sector landlords. In the UK, subsidies have gone to support local authority housing and thus large municipal landlords have been the main suppliers of social housing. However, in 1990, there was a strong shift from social housing construction to housing allowances. This move away from supporting the supply towards supporting the demand was most visible in the UK [13].

In Greece and Spain, social housing subsidies have supported owner-occupation, not social renting [14]. In Denmark, housing allowances recipients are families with children and pensioners. In Finland, there are general housing allowances, allowances to pensioners and students. In Sweden, general housing allowances and allowances to pensioners.

To conclude the subchapter, it can be said that though neo-liberal housing policy supports home-ownership, it always leaves space for households not able to fulfill their housing needs and home-ownership at any cost may lead to indebtedness and social exclusion.

3 Housing Affordability

A key question of housing market sustainability is affordability and housing cannot be sustainable unless it is affordable. Affordable housing is defined in the Housing Europe Review as: "generally housing that is available for purchase or rent at a market value affordable for the majority of the population", but the term is also used to describe housing provided at sub-market prices to households on low income [15].

Broadly, affordability means the ability to acquire a housing unit and sustainability refers to the capacity to pay for it over the longer period (mortgage length). Housing affordability is dependent on the economic development of a country (or region) and reflects the ongoing cost of housing in relation to household income. The ongoing cost of housing is either rents or monthly mortgage payments [5]. A broad definition of sustainable housing is that everyone, including everyone today and in future generations, has a decent place to live [16]. So sustainability starts with affordability and housing cannot be sustainable unless it is affordable. Usually house price variations influence the choice between renting and buying and the strategic decision of property investment. However, emerging markets are extremely inefficient and buyers continue to purchase houses regardless of their rising price [17]. Buying as an investment reduces the purchasing power of people in lower income classes and forces prices upwards. Reza Kazemi et al. confirmed that house price fluctuations and house price rises mainly occur in economic downturns resulting in investors` tendency to invest in the housing market as in capital merchandise [18].

To defend borrowers from negative consequences, Strouhal suggests that qualified board oversight and robust risk management is not limited to financial institutions [19] and in a more controlled financial environment it might be possible to directly restrict the loan to value ceiling in the US to 80-85% as is typical in continental Europe [20]. Kallakmaa-Kapsta suggests a loan-to-value ratio of 2/3 but this is questionable as the loan–to-value ratio is not crucial in the light of the price trend [21]. Most crucial is insolvency caused either by illness, death or unemployment of one family member and even divorce.

Lack of affordability is not the only form of housing deprivation, in addition there could be a variety of forms – the housing fails to meet physical standards of decency, apartments are overcrowded, unsafe or are in an inaccessible location. All these forms of deprivation more or less characterize Estonian housing in comparison with other EU countries.

Kallakmaa-Kapsta [21] constructed a housing affordability index for the Estonian housing market (mortgage payment restriction as 30% of a households' net income) and made conclusions that, since 2009, an average household can afford to by an average two-room flat in Tallinn. Findings by Nuuter and Lill revealed that the average ratio of house price to income in Estonia was 4.1 in 2008; 2.8 in 2009; 2.9 in 2010 and 3.0 in 2011. In 2011 the figure for the lowest income quartile was 8.1; for the

second - 4.8 and for the third - 3 [22]. Suhaida et al. classify median home price to median household ratio as follows: Severely Unaffordable $\geq$ 5.1; Seriously Unaffordable 4.1–5.0, Moderately Unaffordable 3.1–4.0; Affordable $\leq$ 3.0. It corresponds with housing policies in many developed countries, where affordability is the relationship between the housing cost and incomes, with no more than a certain specified percentage of income (ranging between 25% and 35%) [23, 24]. A preferred measure of affordability is the ratio of lower quartile owner-occupied house price to lower quartile household earnings [5, 25].

If the commonly accepted share of housing cost from households' spending is about 30% and house price to income ratio is 3.0, the average ratio does not reflect the full complexity of housing affordability.

Fig. 1 represents the housing affordability of income quintiles. Calculations are made according to the yearly available income, area per resident 30.3 m2 and household of 2.3 members. According to the calculations, only fourth and fifth income quintiles can really afford owned housing units. In reality, composition of households differs and large families encounter more difficulties. Usually large families occupy less area than necessary and, in rural areas, houses are without basic services. Even average affordability is extremely volatile.
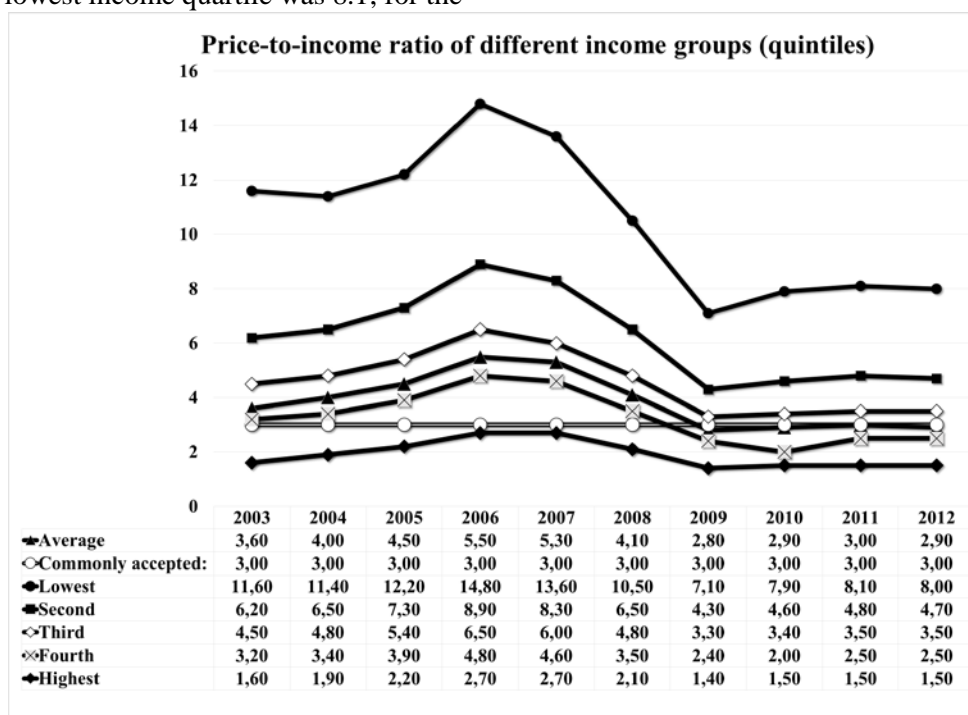

Price-to-income ratio of different income groups (quintiles)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Average	3,60	4,00	4,50	5,50	5,30	4,10	2,80	2,90	3,00	2,90
Commonly accepted:	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
Lowest	11,60	11,40	12,20	14,80	13,60	10,50	7,10	7,90	8,10	8,00
Second	6,20	6,50	7,30	8,90	8,30	6,50	4,30	4,60	4,80	4,70
Third	4,50	4,80	5,40	6,50	6,00	4,80	3,30	3,40	3,50	3,50
Fourth	3,20	3,40	3,90	4,80	4,60	3,50	2,40	2,00	2,50	2,50
Highest	1,60	1,90	2,20	2,70	2,70	2,10	1,40	1,50	1,50	1,50

Fig. 1 Price-to-income ratio of different income groups in Estonia

The share of the housing cost in total spending reflects the same financial burden as the house price to income ratio. The housing cost does not include mortgage repayments. First and second income quintile are paying twice as much as the highest income group.

As affordability is highly questionable, we suggest multiple criteria analysis using the Multiple Criteria Proportional Assessment method - COPRAS.

4 Multiple Criteria Assessment of Sustainability

There are many Multiple Criteria Decision Making (MCDM) methods that can be used for the multiple criteria assessment of alternatives, for example: COPRAS, EVAMIX (Evaluation of Mixed Data), TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution), VIKOR (VIšekriterijumsko KOmpromisno Rangiranje), AHP (Analytic Hierarchy Process), etc. Most recently AHP and TOPSIS methods were used by Poledníková to rank Visegrad regions. Analysis was performed using only 8 indicators [26]. Calculations using over 30 indicators is much more time consuming. Chatterjee *et al.* [27] have compared all these methods as shown in Table 1.

The comparison of the presented methods leads to the conclusion that the COPRAS method, developed by Zavadskas and Kaklauskas in 1996 [28], has noticeable advantages over the other methods. Calculation time is very short, the same as VIKOR. The COPRAS method can be easily implemented to any program source code. Understanding and result checking is straightforward. Calculation results can be easily visualized and interpreted. For these reasons, for assessment of housing market sustainability in the selected countries, the COPRAS method was chosen.

An extensive review of the MCDM methods was performed by Zavadskas et al. [29]. The authors list COPRAS as one of the methods that has rapidly developed and been applied to solve real life problems. In former research Tupenaite performed ranking by SAW, TOPSIS and COPRAS method and performance of those alternatives showed that all the methods resulted to the same best alternative. From the analysis results it can be stated that although SAW method is simple to apply and is widely used in the scientific research, some disadvantages should be noted. The major disadvantage of the SAW method is that it is only possible to compare attributes with a uniform scale. The MCDM method TOPSIS is based on an aggregating function representing "closeness to the ideal". The basic principle of the TOPSIS method is that the chosen alternative should have the "shortest distance" from the ideal solution and the "farthest distance" from the "negative-ideal" solution. The TOPSIS method introduces two "reference" points, but it does not consider the relative importance of the distances from these points. The COPRAS method proved to be efficient for application to various housing related problems and gives possibility to make suggestions to improve situation [30]. For example, Kildiene *et al.* [31] used this method for the comparative analysis of the European country management capabilities within the construction sector in the time of crisis. Kaklauskas *et al.* – for quantitative and qualitative analyses of passive houses, and Mulliner et al. – to assess the affordability of different housing alternatives in the UK [32, 33].

One of the shortcomings of COPRAS method is that it uses comparative data for one year, so data processing by any method for example X-Square Test and t-student test are not relevant. We presume that data from EUROSTAT and national statistics is uniform and processed.

Table 1 Performance of some multiple criteria evaluation methods

Method	Calculation time	Simplicity	Transparency	Possibility of graphical interpretation	Information type
COPRAS	Less	Very simple	Very good	Very high	Quantitative
EVAMIX	Moderate	Moderately critical	Reasonable	Low	Mixed
TOPSIS	High	Moderately critical	Good	Low	Quantitative
VIKOR	Less	Simple	Reasonable	Low	Quantitative
AHP	Very high	Very critical	Low	Good	Mixed

In our previous research [7] on multiple criteria assessment of the sustainability of housing market six groups of criteria were proposed, namely: general economic, housing stock, housing affordability, population and social conditions, housing quality and environmental quality indicators. Housing markets of nine European countries with different backgrounds (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Spain, Sweden and UK) were compared. By overall criteria, Estonia ranked seventh. Sweden received the highest ranking by general economic indicators followed by Germany and Denmark. In the group of general economic indicators, Estonia ranked ninth, Lithuania eight, Latvia sixth and Spain seventh. The

private home-ownership rate is below 70% in all the countries ranking in the top three by overall criteria and general economic indicators. Germany ranked first by housing affordability and at the same time there is high variation in real interest rates [34]. It evidently makes buying less attractive.The Estonian ranking by economic indicators was recently confirmed by Křupka and Provazniková, as Estonia ranked last among Eurozone countries [35], Lithuania and Latvia were not included in their calculations.

The results of housing stock, housing quality and environmental quality assessments are presented in Fig. 2.
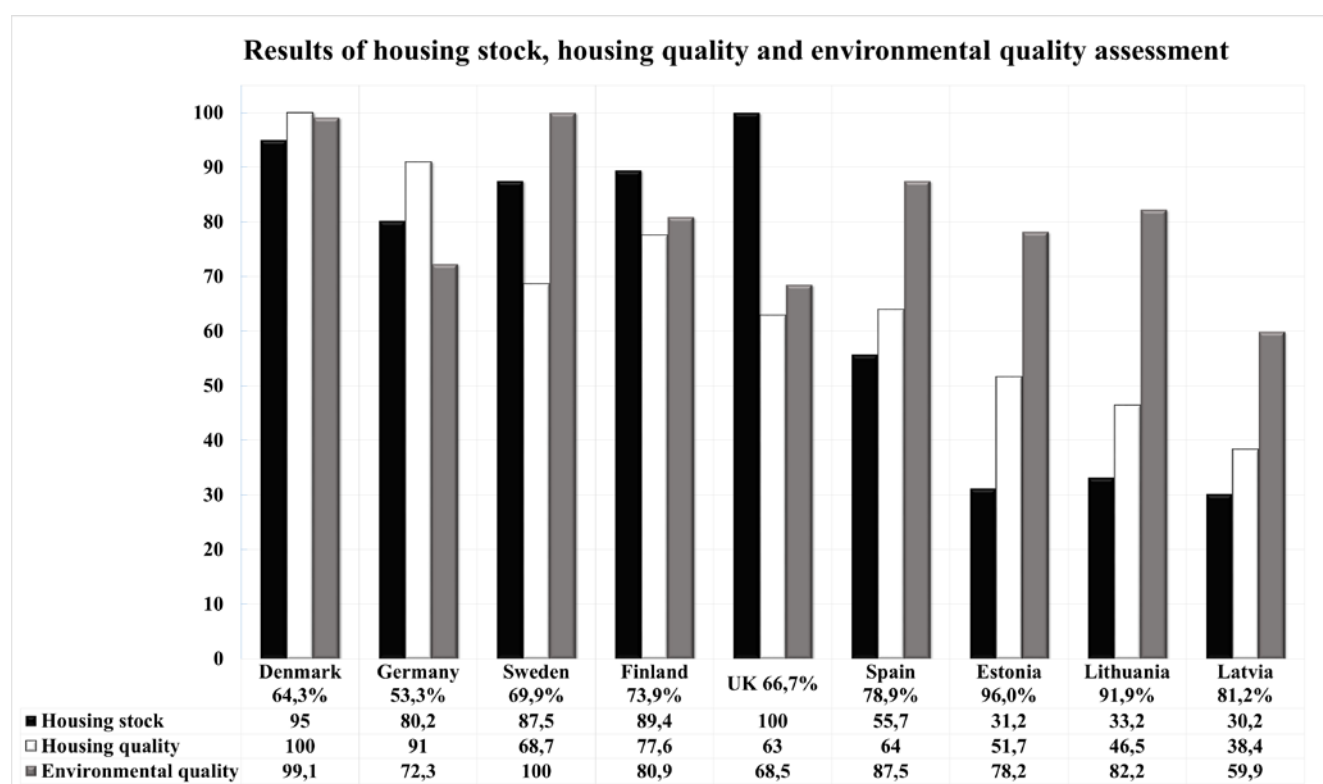

Results of housing stock, housing quality and environmental quality assessment

	Denmark 64,3%	Germany 53,3%	Sweden 69,9%	Finland 73,9%	UK 66,7%	Spain 78,9%	Estonia 96,0%	Lithuania 91,9%	Latvia 81,2%
■ Housing stock	95	80,2	87,5	89,4	100	55,7	31,2	33,2	30,2
□ Housing quality	100	91	68,7	77,6	63	64	51,7	46,5	38,4
▣ Environmental quality	99,1	72,3	100	80,9	68,5	87,5	78,2	82,2	59,9

Fig. 2 Results of housing stock, housing quality and environmental quality assessments

According to the income diversity and justification by the multiple criteria assessment, an economically sustainable share of home ownership for Estonia would be approximately 72.8%, for Lithuania 73.3% and for Latvia 75.2%. Housing policies should be aimed to assist social housing and the rental sector which act as buffers for those who have lost their homes or do not qualify for mortgage loans. The multiple criteria assessment methodology and the Decision Support System of Housing sustainability (DSS-HS) system developed (Fig. 3) can be adapted to different regions and cities, as

unemployment rate, income and area per resident vary.

It provides a valuable tool to assess the sustainability of housing in different regions and to revise policies so that every resident can live in a decent home. The data available and criteria can be treated flexibly as some criteria might be interdependent [36]. For example, an Estonian problem in some regions is unemployment and available jobs at the same time.
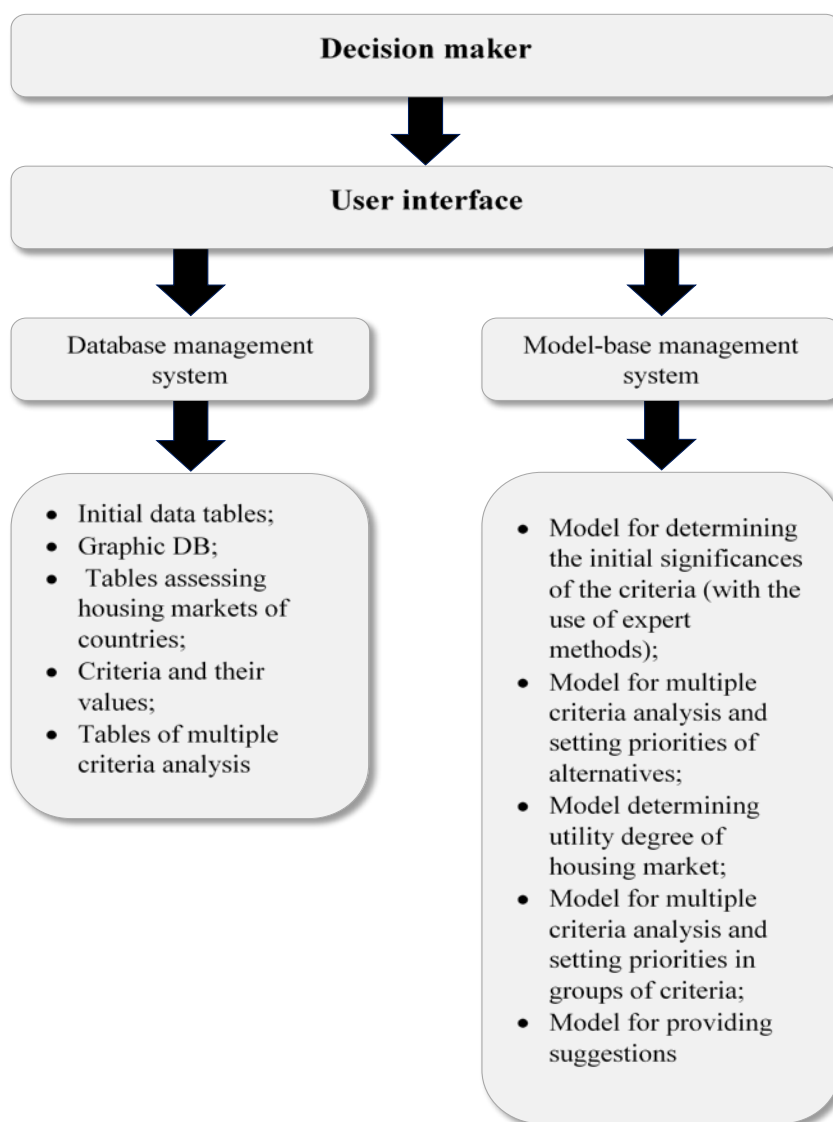
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- Initial data tables;
- Graphic DB;
- Tables assessing housing markets of countries;
- Criteria and their values;
- Tables of multiple criteria analysis

- Model for determining the initial significances of the criteria (with the use of expert methods);
- Model for multiple criteria analysis and setting priorities of alternatives;
- Model determining utility degree of housing market;
- Model for multiple criteria analysis and setting priorities in groups of criteria;
- Model for providing suggestions

Fig. 3 Components of Decision Support System for Housing

4.1 Comparison of Estonian counties

To identify sustainability of different regions, three Estonian counties were chosen: Läänemaa, the Western region, Ida-Virumaa, the Eastern region and Viljandimaa as the Southern region (Fig. 4).

Fig. 4 Estonian counties compared

Unfortunately, not much data is available for counties in Estonia. General economic indicators, housing quality and social criteria were partly found from the statistics and partly calculated by the authors.

4.2 Calculation results

General economic and social indicators revealed that Viljandimaa ranked second (utility degree 46.8%), Läänemaa third (utility degree 29.4%) and Ida-Virumaa last (utility degree 25.0%). Housing indicators revealed that the best situation is in Ida-Virumaa (utility degree 93.7%), which is understandable, as many families have left the region searching for jobs. Viljandimaa and Läänemaa had similar utility degrees corresponding to 79.7% and 76.8%.

Results of general calculations ranked Viljandimaa second (utility degree 57.2 %, Ida – Virumaa third (utility degree 49.4%) and Läänemaa fourth (utility degree 47.1%). The results imply that housing markets in selected counties are not well off and need improvement even more than in Estonia on average.

These findings correspond with results of Tvrdon, who found that regional economic and social disparities have widened in the Visegrad group of countries [8].

These results give some insight, but it is evident that multiple criteria analysis is applicable for all the cities and regions of Estonia. Criteria could be modified according to the aims of decision makers, but the problem with the availability of data should be overcome. The calculation results are presented in Fig. 5.

General economic and social indicators

Criteria describing the alternatives	*	Units	Weight	Quantitive and qualitative information pertinent to alternatives			
				Compared alternatives			
				Estonia general	Ida Virumaa	Läänemaa	Viljandimaa
GDP per capita in PPS (EU28=100)	+	%	0,4	0,3578	0,0293	0,0043	0,0086
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
Unemployment rate	-	%	0,3	0,0683	0,1145	0,0696	0,0475
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
Population at risk of poverty or social exclusion	-	%	0,3	0,0794	0,1018	0,0747	0,0441
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
The sums of weighted normalized maximizing				0,3578	0,0293	0,0043	0,0036
The sums of weighted normalized minimizing				0,1477	0,2163	0,1443	0,0916
Significance of the alternative				0,4967	0,1241	0,1465	0,2326
Priority of the alternative				1	4	3	2
Utility degree of the alternative (%)				100	24,99	29,49	46,82

Housing indicators

Criteria describing the alternatives	*	Units	Weight	Quantitive and qualitative information pertinent to alternatives			
				Compared alternatives			
				Estonia general	Ida Virumaa	Läänemaa	Viljandimaa
Total dwelling stock	+	number*1000	0,1	0,0837	0,0111	0,0019	0,0033
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
Number of dwellings per 1000 inhab	+	Number per	0,1	0,0221	0,0256	0,0279	0,0244
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
Private ownership rate as indicator of shortage of affordable (rental)	-	%	0,3	0,0753	0,075	0,0749	0,0749
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
Social rental stock as % of total housing stock	+	%	0,1	0,025	0,025	0,025	0,025
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
Number of social rental dwellings per 1000 inhab.	+	Number per	0,1	0,0075	0,0657	0,0045	0,0244
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
Share of housing costs in disposable income	-	%	0,2	0,0503	0,0608	0,0411	0,0479
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
Average household size	-	Number of	0,1	0,0268	0,0244	0,0244	0,0244
				AVG MIN	AVG MIN	AVG MIN	AVG MIN
The sums of weighted normalized maximizing				0,4961	0,1567	0,0636	0,0837
The sums of weighted normalized minimizing				0,3001	0,3765	0,2847	0,2388
Significance of the alternative				0,7882	0,3896	0,3715	0,4508
Priority of the alternative				1	3	4	2
Utility degree of the alternative (%)				99,99	49,43	47,13	57,19

*- The sign "+/-" indicates that a greater (less) criterion value corresponds to a greater significance for a user (stakeholders)

Fig. 5 Calculations of general economic, social and housing indicators of three Estonian counties

4 Conclusion

The analysis and calculations revealed that the housing markets of the Baltic States are far from being sustainable.

Diversity of income and, correspondingly, housing stock, does not always guarantee social order and massive developments in the outskirts of cities may not be the best land use.

Though Estonia is small, regional differences are considerable. Every city and county has different problems. The system created allows the ranking of all the regions according to the sustainability of their housing markets on the precondition that the availability of statistical data will be improved.

There is an evident need to present more data on a regional basis, to harmonize rules for data gathering and processing. The principal choices for the government are to lead the country to economic prosperity or to increase the share of (public) rental housing. In the current, politically fragile, situation, the economic prosperity of any European country in the near future is highly doubtful.

It is up to the government to decide how to create a rental sector: public housing or non-profit landlords or to assist private landlords. In any case, sub-letting, mostly representing the shadow economy, does not solve the problem. Sub-letting does not guarantee the security of tenants and sometimes that of the owners too.

References:

[1] Housing_Policy_Guidelines, "The Experience of ECE with Special Reference to Countries in Transition," ed New York: UN, 1993.

[2] E. Jowsey, Real Estate Economics: Palgrave Macmillan, 2011.

[3] A. J. Levitin and S. M. Wachter, "Why Housing?," *Housing Policy Debate,* vol. 23, pp. 5-27, Jan 1 2013.

[4] B. Manganelli, P. Morano, and F. Tajani, "House prices and rents. The Italian experience," *WSEAS Transactions on Business and Economics,* vol. 11, pp. 219-226, 2014.

[5] C. Leishman and S. Rowley, "Affordable housing," in *The SAGE Handbook of Housing Studies*, D. F. Clappham, Clark, W. A. V., Gibb, K., Ed., ed: SAGE Publications Ltd, 2012, pp. 379-396.

[6] M. E. Stone, "What is housing affordability? The case for the residual income approach," *Housing Policy Debate,* vol. 17, pp. 151-184, 2006.

[7] T. Nuuter, I. Lill, and L. Tupenaite, "Comparison of housing market sustainability in European countries based on multiple criteria assessment," *Land Use Policy,* vol. 42, pp. 642-651, 2015.

[8] M. Tvrdon, "Cohesion policy, Convergence and regional disparities: the case of the european Union," *WSEAS Transactions on Business and Economics,* vol. 9, pp. 89-99, 2014.

[9] C. M. E. Whitehead, "Planning policies and affordable housing: England as a successful case study," *Housing Studies,* vol. 22 (1), pp. 25-44, 2007.

[10] E. K. Wyly, "Why (Not a Right to) Housing?," *Housing Policy Debate,* vol. 23, pp. 29-34, Jan 1 2013.

[11] K. Scanlon, J. Lunde, and C. Whitehead, "Responding to the Housing and Financial Crises: Mortgage Lending, Mortgage Products and Government Policies," *International Journal of Housing Policy,* vol. 11, pp. 23-49, 2011/03/14 2011.

[12] J. Yates, "Housing Subsidies," in *The SAGE Handbook of Housing Studies*, D. F. Clappham, W. A. V. Clark, and K. Gibb, Eds., ed London, 2012, pp. 397-418.

[13] M. Lux, "Public Housing Policies: Economic and Social Perspectives. Local Government and Housing," in *Housing policy: an end or a new beginning?*, M. Lux, Ed., ed Budapest: Open Society Institute, 2003, pp. 5-43.

[14] M. Oxley, Economics, Planning and Housing: Palgrave Macmillan, 2011.

[15] Housing_Finance, "Key concepts and terms." vol. ECE/HBP/102, ed New York; Geneva: United Nations. Economic Commission of Europe, 1998.

[16] H. Li and Q. Shen, "Supporting the decision-making process for sustainable housing," *Construction Management and Economics,* vol. 20, pp. 387-390, 2002.

[17] I. C. Tsai, "Housing affordability, self-occupancy housing demand and housing price dynamics," *Habitat International,* vol. 40, pp. 73-81, Oct 2013.

[18] R. Kazemi, H. Nourbakish, V. Javadian, and S. M. A., "House Price Market Fluctuations in Tehran as a Case Study," *5th WSEAS International Conference on Management, Marketing and Financing, Playa Meloneras, Gran Canaria, Canary Islands, Spain*, 2011, pp. 297-306.

[19] J. Strouhal, C. G. Bonaci, and E. A. Matis, "Corporate Governance Lesson Taught by the Financial Crisis: A Research Note," *Computers and Simulation in Modern Science,* vol. 5, pp. 688-695, 2011.

[20] R. Laslett, T. Wilsdon, S. Biggar, and D. Butterworth, Managing the Housing Market. London: Charles River Associates, 2001.

[21] A. Kallakmaa-Kapsta, "Before and after the boom: changes in the Estonian housing market," *Baltic Journal of Economics,* vol. 13, pp. 115-116, Spr 2013.

[22] T. Nuuter and I. Lill, "Pitfalls of Excessive Owner Occupied Housing," *Procedia Engineering,* vol. 57C, pp. 830-836, 2013.

[23] E. Mulliner and V. Maliene, "Criteria for Sustainable Housing Affordability," *Environmental Engineering, Vols 1-3,* pp. 966-973, 2011.

[24] M. S. Suhaida, N. M. Tawil, N. Hamzah, A. I. Che-Ani, H. Basri, and M. Y. Yuzainee, "Housing Affordability: A Conceptual Overview for House Price Index," *2nd International Building Control Conference,* vol. 20, 2011.

[25] G. Meen, "Housing and the economy," in *The SAGE Handbook of Housing Studies*, D. F. Clappham, W. A. V. Clark, and K. Gibb, Eds., ed London: SAGE Publications Ltd, 2012, pp. 251-273.

[26] E. Poledníková, "Comparing regions` ranking by MCDM methods: The case of Visegrad Countries," *WSEAS Transactions on Business and Economics,* vol. 11, pp. 496-507, 2014.

[27] P. Chatterjee, V. M. Athawale, and S. Chakraborty, "Materials selection using complex proportional assessment and evaluation of mixed data methods," *Matherials &Design,* vol. 32, pp. 851-860, 2011.

[28] E. K. Zavadskas and A. Kaklauskas, Pastatų sistemotechninis įvertinimas (Multiple criteria evaluation of buildings). Vilnius, 1996.

[29] E. K. Zavadskas, Z. Turskis, and S. Kildienė, "State of art overviews on MCDM/MADM methods," *Technological and Economic Development of Economy,* vol. 20, pp. 165-179, 2014.

[30] L. Tupenaite, "Multiple Criteria Assessment of the Built and Human Environment Renovation Projects," PhD Doctoral dissertation. Technological Science civil engineering (02T). Vilnius Gediminas Technical University, Vilnius, 2010.

[31] S. Kildiene, A. Kaklauskas, and E. K. Zavadskas, "COPRAS based comparative analysis of the European country management capabilities within the construction sector in the time of crisis," *Journal of Business Economics and Management* vol. 12, pp. 417-434, 2011.

[32] A. Kaklauskas, L. Kelpsiene, E. K. Zavadskas, D. Bardauskiene, G. Kaklauskas, M. Urbonas, and V. Sorakas, "Crisis management in construction and real estate: Conceptual modeling at the micro-, meso- and macro-levels," *Land Use Policy,* vol. 28, pp. 280-293, Jan 2011.

[33] E. Mulliner, K. Smallbone, and V. Maliene, "An assessment of sustainable housing affordability using a multiple criteria decision making method," *Omega-International Journal of Management Science,* vol. 41, pp. 270-279, Apr 2013.

[34] M. Lopreite and A. Scarpino, "Housing Market and Financial Crisis," *WSEAS Transactions on Business and Economics,* vol. 7, pp. 424-433, 2010.

[35] J. Křupka and R. Provazniková, "Analysis of standard of living models based on multiple criteria decision analysis," *International Journal of Economics and Statistics,* vol. 2, pp. 40-50, 2014.

[36] J. Mazurek, "A new model for multiple criteria decision making with ordinal rankings of criteria and alternatives," *International Journal of Economics and Statistics,* vol. 2, pp. 75-82, 2014.