COMPARATIVE ANALYSIS OF NEWLY-BUILT HOUSING QUALITY IN POLAND AND LITHUANIA

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Abstract

The Presented research aims to analyze the Lithuanian and Polish housing markets in terms of the quality of life in new residential buildings. The article presents the concept of customer satisfaction in construction and criteria that define the quality of dwellings; the benefits, consequences, merits and demerits of the assessment of customer satisfaction are also named. A survey of customer satisfaction helps to evaluate the quality of dwellings according to their technical and functional parameters, as well as the degree of cooperation between customers and developers/contractors. The customer satisfaction index (CSI) was calculated for both countries. The results are useful for developers, contractors, facility management companies and building users.

1. Introduction

Construction is generally known as an activity with many specific features which differs from other industries; construction activities have always been closely connected with the social and economic activities of every country (LOVRENČIC BUTKOVIC et al. 2014).

Some major concerns to the construction industry on the whole, include the decreasing quality and productivity of end products, labor shortages, occupational health and safety, and allowing work to be performed where people cannot do (KAMARUDDIN et al. 2016). The construction industry is large, pervasive and acts as the bellwether of economic growth. The construction process requires the contribution of many different stakeholders and involves various processes, different phases of work, and a great deal of input from both the public and private sectors. Many researches around the world have been carrying out studies in the field of construction quality (EROL 2016; PRICE and OCHIENG 2016; ŠUBIC-KOVAČ 2016).

The construction sector contributes directly to the GDP of any country by entering the national accounts as a component of investment (ALIGADIDE 2012). Analysis in many European countries (SUN et al. 2013) shows that construction shares (as a percentage of GDP) varied greatly before and during the recent economic crisis. However, construction shares increased, some to very high levels, during the boom period. During 2000–2008, the real estate (RE) boom in Ireland, Spain, and Cyprus was synonymous with the construction boom, which boosted growth. In emerging Europe, similar overheating also took place in the Baltic countries, and to a lesser extent in Croatia. Higher construction activity prior to the crisis was associated with a lower unemployment rate. CHIA et al. (2014) analyzed economic development and construction productivity in Malaysia, which is classified as an upper middle-income country according to the World Bank's classification of countries. The authors based their research on the hypothesis that the productivity of the construction industry had a significant effect on national economic growth, and examined the relationship between construction productivity and economic fluctuations using the partial correlation method, so as to establish the underlying factors driving the change in construction productivity. The results of analysis conducted for three significant construction cycles showed that fluctuations in construction cycles were more pronounced than in the general business cycle.

HE and WU (2016) made a study on housing construction quality in China. PANUWATWANICH and NGUYEN (2017) analyzed the influence of total quality management on performance of Vietnamese construction firms. KAMARUDDIN et al. (2016) in their article analyzed barriers and the impact of mechanization and automation in construction to achieve better quality products in Malaysia. LEPKOVA et al. 2016 analyzed the Lithuanian housing market carrying out a study on customer satisfaction with living conditions in new apartment buildings in Lithuania.

Recently the necessity to improve the degree of customer satisfaction and quality in construction has arisen. Companies connected with construction have started emphasizing the importance of customer satisfaction. The traditional measuring techniques, such as regulated product quality, are too simple to assess the environment and the result of a construction project. The concept of customer satisfaction states that a project can be successful only when it satisfies the needs of current and future customers, the main of these needs being quality, time and cost effectiveness.

The management of customer satisfaction in construction is not straightforward and direct, mostly because the construction industry is distinct: temporary, unique, specific and exclusive (KÄRNÄ et al. 2009; LEPKOVA et al. 2016). This industry differs from others in the eyes of customers, because each construction project is mostly exclusive, hence similar examples are harder to come by and referring to a previous survey of customer satisfaction in the future is not easy either (KÄRNÄ et al. 2004; LEPKOVA et al. 2016).

The presented research aims to analyze the Lithuanian and Polish housing markets in view of the quality of life in new housing buildings. The article presents the concept of customer satisfaction in construction and the criteria that define the quality of dwellings.

2. Customer satisfaction in construction

2.1. The concept of customer satisfaction

Effectively managing customer service satisfaction and enhancing customer loyalty have been addressed by marketing practitioners and researchers (BLUT et al. 2015; RUST and CHUNG 2006; ZEITHAML et al. 1996). Various studies have found that a higher level of customer satisfaction ultimately leads to greater customer loyalty and word of mouth recommendations (YOO et al. 2015; GUO et al. 2009; LAI et al. 2009; KASIRI et al. 2017)

The end user in construction can be the buyer of products and services. Customers in construction differ from those in other industries and their main disadvantage is the lack of experience. During construction, a customer lacks proper conditions, experience and skills to assess the physical quality of

structures and is, therefore, forced to assess only the quality of the provided services and the final product. Even then, however, the customer focuses on the assessment of the functional rather than technical parameters (FORSYTHE 2008).

Customer satisfaction measures the loyalty and quality of customers for a firm, thus customer satisfaction equates to how a firm's products and services meet customer expectations (XIE et al. 2017). Customer satisfaction (CS) is a frequently misused and abused expression. Many organizations use it casually in order to state that their customers are happy and satisfied with the levels of service rendered and the products and services purchased, though they have never actually tried to measure that satisfaction (ZAIRI 2000). However, if a company takes its customers seriously, it should not behave in such a manner, considering that the results of customer satisfaction measurements provide significant information for modern management processes and a warning signal about future business results. This enables an understanding of how customers perceive the organization, i.e., whether its performance meets their expectations, identifies priorities for improvement, benchmarks the performance of the organization against other organizations and increases profits through improved customer loyalty. Through the process of creating a customer supplier chain at all levels, a better focus can be achieved and, ultimately, all the work carried out will be of value. This customer supplier communication will help to ensure quality and thus customer satisfaction (FEČIKOVA 2004; ZAIRI 2000; LEPKOVA ŽŪKAITĖ-JEFIMOVIENĖ 2012).

According to KUJALA et al. (2001), construction companies implement total quality management methods to improve their performance; the construction industry, however, is lagging behind other industries, because of its failure to determine the precise customer requirements and use them in construction projects.

2.2. Evaluation of customer satisfaction

Customer satisfaction measurement has become one of the most common prescriptions recommended to managers and organizations, and comes from a wide variety of sources (LEPKOVA, ŽŪKAITĖ-JEFIMOVIENĖ 2012). Every company should constantly measure the degree of customer satisfaction to assess the level of customer satisfaction. Companies in construction commonly learn about the degree of customer's satisfaction too late, when a construction project is already underway. Meeting customer needs is the most relevant in residential construction; the importance of customer satisfaction in the case of housing depends on the market intensity. When a company is aware of the features of its product or service that best meet the customers' needs, it can make marked changes in its services and products and thus drive up customer satisfaction (KÄRNÄ 2004). A survey of customer satisfaction is the main tool for assessing the quality of project implementation, determining customer attitudes and getting feedback (RONDEAU et al. 2006).

Some companies get feedback about customer satisfaction through the percentage of complaints and some through non-systematic surveys; others, however, do not measure customer satisfaction at all because "the system would not add anything useful and is very time-consuming" (CHOTIPANICH 2004; LEPKOVA, ŽŪKAITĖ-JEFIMOVIENĖ 2012).

Customer needs can be determined through marketing research, customer surveys, analyses of customer concerns or involving customers in all processes of projects underway. Customer satisfaction is measured using a range of quantitative (direct or indirect surveys) and qualitative (secret buyer, complaint management, target groups) criteria. Customer feedback through a questionnaire survey can be a very appropriate source of data. Disappointed customers often willingly name all reasons of their discontent and any defects (KOSKELA 2002).

Summarizing the customer satisfaction survey results means determining the customer satisfaction index. The Customer Satisfaction Index (CSI) is a mathematical expression of customer satisfaction through an indicator within the reviewed period. The index shows customer satisfaction in services and products as a percentage, with 100% meaning complete satisfaction. The Customer Satisfaction Index tends to be higher for products than services.

The Customer Satisfaction Index Formula (1) is as follows (KOSKELA 2002):

$$\text{CSI} = \sum_{i=1}^{n} w_i c_i \; ; \tag{1}$$

where, CSI is the customer satisfaction index, n is the number of quality parameters, w_i is the importance of a given parameter and c_i is the evaluation.

The concept of customer satisfaction has several key drawbacks: satisfaction is not constant, it changes with new experiences; satisfaction is complex and is the result of series of experiences before, during and after the assessment; satisfaction operates in a social context and is, therefore, versatile and shifting, and can be unpredictable or indefinable; the reasons for satisfaction can be difficult to express, while determining the reasons of discontent can be easier; the inability to understand the causes of satisfaction poses a risk of construing "good results" as an excuse to change nothing (THIJS et al. 2008; LEPKOVA et al. 2016).

But, more importantly (ANDERSON et al. 2001; LEPKOVA et al. 2016), the measurement of customer satisfaction in construction also has benefits, as it reveals customer loyalty, the declining impact of prices on decisions, customer opinions and opportunities to improve them, means of improving competitiveness, and competitor strengths and weaknesses.

3. Analysis of the residential real estate market in Lithuania and Poland

Housing is the second most important human need and also a considerable national asset. Good quality housing is the basis for a solid society and social coherence, while conveniences, problems and quality of dwellings are closely interrelated with urban development and the national economic situation (OLADAPO 2006, ŹRÓBEK et al. 2015, ŹRÓBEK-RÓŻAŃSKA A., 2016).

The article presents an analysis of customer satisfaction with living conditions in new apartment buildings in Poland and Lithuania. For comparison of the customers' opinions, the residents of 2 large cities (Szczecin and Vilnius) were surveyed from February 2017 to April 2017.

3.1. Residential market in Szczecin, Poland

Szczecin is the capital city of the West Pomeranian Voivodeship in Poland. Located near the Baltic Sea, it is a major seaport and Poland's seventh-largest city. As of December 2016, the population was 404,878 (https://bdl.stat.gov.pl/BDL/dane/teryt/tablica).

In Poland, a quality dwelling implies that it meets the key requirements and corresponds to customer needs under Construction Law. It should be noted that a builder is liable for the quality of a house certified for occupancy and provides warranty services which expire after three years. In Poland, a developer in bankruptcy is no longer liable to provide warranty services. On 31 December 2015, the useful floor area of dwellings in Poland amounted to 1,039.1 million m^2 of useable floor area (612.3 million m^2 – in urban, 426.7 million m^2 – in rural areas). Private property accounted for 45.1%, state and municipal property – for 14.7 per cent of the total stock of dwellings, housing cooperatives - for 36.2%, companies - for 1.4 per cent, State Treasury - for 0.5 %, and public building societies - for 1.6 per cent. The average useable floor area per capita amounted to 27.0 m^2, (26.4 m^2 in urban areas and 27.9 m^2 in rural areas). The dwelling stock in the country comprised 14 million 119.5 thousand dwellings, i.e. 367.3 dwellings per 1000 population. The dwelling stock in Poland during the period of 2010-2015 has been shown in Table 1.

Table 1

Dwelling stock in Poland 2010-2015 (Central Statistical Office of Poland, 2016)

	2010	2011	2012	2013	2014	2015
Average useful floor area per capita, m^2	25.3	25.6	25.9	26.3	26.7	27.0
Dwellings, total, thous.	13,470.43	13,587.44	13,722.79	13,852.90	13,983.04	14,119.45
Average useable floor area per dwelling, m^2	72.3	72.6	72.8	73.1	73.4	73.6
Dwellings, %	100.0	1000	100.0	100.0	100.0	100.0
Urban areas	67.5	67.4	67.4	67.4	67.4	67.4
Rural areas	32.5	32.6	32.6	32.6	32.6	32.6

Source: Central Statistical Office of Poland, 2016 (https://stat.gov.pl/).

3.2. Residential market in Vilnius- Lithuania

Vilnius is the capital of Lithuania and its largest city, with a population of 542,664 as of 2015. The city is located in the southeast part of Lithuania and is the second largest city in the Baltic States. It is the seat of

the main government institutions of Lithuania, as well as of the Vilnius District Municipality (WIKIPEDIA 2017).

In Lithuania, a quality dwelling means that it meets the key requirements and corresponds to customer needs under the Construction Technical Regulation. Quality standards are in place to prevent discrepancies in production throughout the construction process. The bottom-line in the Lithuanian standard of procedures ISO 9001: 2015 (LST EN 9001:2015) is an approach applied to all operations of an organization (LST… 2015). Thus, a construction company follows the model of a quality management system and can control the quality of design, manufacturing, products and services. It should be noted that a builder is liable for the quality of a house certified for occupancy and provides warranty services until the term expires. On the other hand, a builder in bankruptcy is no longer liable to provide warranty services. Customers remain protected only if the builder was insured, as the insurance company then takes over the liability for the building. If a new building is not certified for occupancy, it cannot be used and an occupier can only file complaints about the defects or poor quality to institutions in charge of certification for occupancy, and must specify the defects to be removed before such certification. It must be noted that even when certified for occupancy, a building is not necessarily of good quality from the customer perspective and does not necessarily meet customer needs (LEPKOVA et al. 2016).

Statistical information on the dwelling stock is based on data of the State Enterprise Centre of Registers. Records on the dwelling stock are kept by form of ownership and location. Stock of dwellings refers to living quarters in residential and non-residential buildings. The dwelling stock does not include hostels, hotels, summerhouses, garden cabins, hunters' cottages, leisure establishments, sanatoriums and other structures intended for temporary lodging (STATISTICS LITHUANIA, 2016).

On 31 December, 2015, the dwelling stock amounted to 89.3 million m² of useable floor area (56.2 million m² – in urban, 33.1 million m² – in rural areas). Private property accounted for 98.2 and state and municipal property – for 1.8 per cent of the total. Living quarters in individual houses amounted to 45.5 million m², or 50.9 per cent of the total dwelling stock. Useable floor area in blocks of flats amounted to 43.8 million m², or 49.1 per cent of the total dwelling stock. The average useful floor area per capita amounted to 30.9 m² (28.9 m² in urban areas and 35 m² in rural areas). The dwelling stock in the country comprised 1 million 321.5 thousand dwellings, i.e., 457 dwellings per 1,000 population. Most of these were two- and three-room dwellings: in urban areas – 38.7 and 25.4 per cent and in rural areas – 25.5 and 32 per cent, respectively. The average size of a dwelling was 67.5 m² (61.5 m² in urban areas and 81.2 m² in rural areas. The average size of a private dwelling was 68 m² (61.9 m² in urban areas and 81.6 m² in rural areas). Public dwellings were smaller; the average size of a public dwelling was 48.8 m² (45.4 m² in urban areas, and 59.5 m² in rural areas (STATISTICS LITHUANIA, 2016). The dwelling stock in Lithuania during the period of 2010-2015 has been shown in Table 2.

Table 2

Dwelling stock in Lithuania 2010-2015 (Statistics Lithuania, 2016)

	2010	2011	2012	2013	2014	2015
Average useable floor area per capita, m²	27.4	28.4	28.9	29.5	30.1	30.9
Dwellings, total, thous.	1270.0	1282.5	1289.1	1298.0	1308.7	1321.5
Average useable floor area per dwelling, m²	65.9	66.4	66.6	66.9	67.2	67.5
Dwellings, %	100.0	100.0	100.0	100.0	100.0	100.0
Urban areas	69.8	69.7	69.6	69.4	69.3	69.2
Rural areas	30.2	30.3	30.4	30.6	30.7	30.8

Source: Statistics Lithuania 2016.

4. Study of customer satisfaction with living conditions in new apartment buildings

4.1. Research data

The questionnaire method (online questionnaire survey) was selected in the study as a research method for the analysis of customer satisfaction with new apartment buildings. This method guarantees low

survey costs and quick research results. The questionnaire included 28 main questions. It aimed to assess customer satisfaction with their dwellings and the quality of dwellings in new apartment buildings (constructed in 2006 or later) in Vilnius - the capital of Lithuania and in Szczecin -the capital city of the West Pomeranian Voivodeship in Poland. The target group for the research were adults (18 years or older) living in new apartment buildings; 35 respondents from Lithuania and 55 respondents from Poland took part in the survey. The research focused on the following key areas: the quality of dwellings (technical and functional aspects, economy), customer satisfaction with warranty services and the builders' readiness to cooperate, customer expectations, and the assessment of overall customer satisfaction and its consequences (customer complaints, customer loyalty, recommendations). A diagram of the research has been shown in Fig. 1.
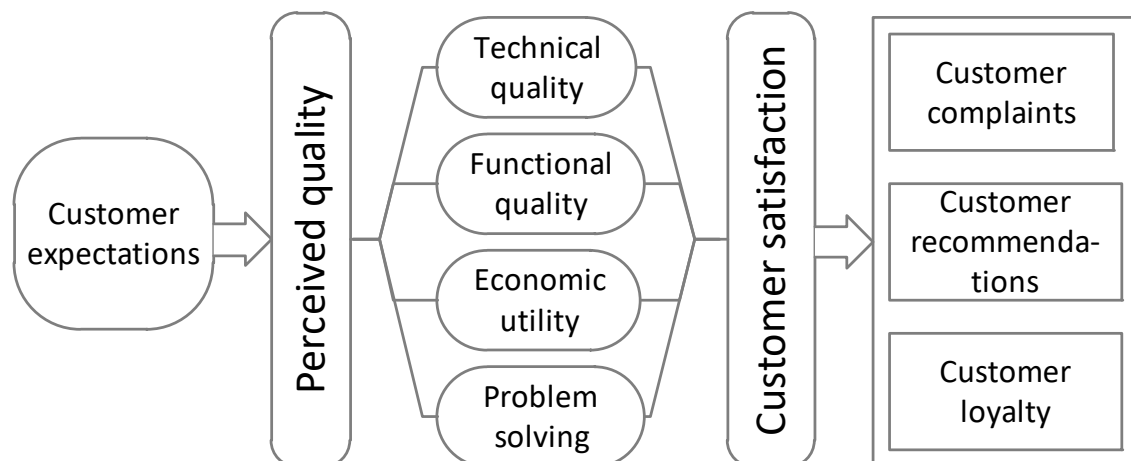
Fig. 1. Components of customer satisfaction. *Source:* Own study.

4.2. Analysis of respondents and apartment buildings

The customer survey revealed that the respondents are mostly young people aged between 21 and 44 (80.1% in Lithuania and 74.55% in Poland) (Fig. 2). The respondents were also found to be mostly living in their new dwellings for less than 1 year (32.73% - Poland, 20% - Lithuania) or between 1 and 5 years (40% - Poland, 42.9% - Lithuania). Some of respondents (14.55% - Poland, 25.7% - Lithuania) had lived in their new dwellings for 9-10 years (Fig. 3).
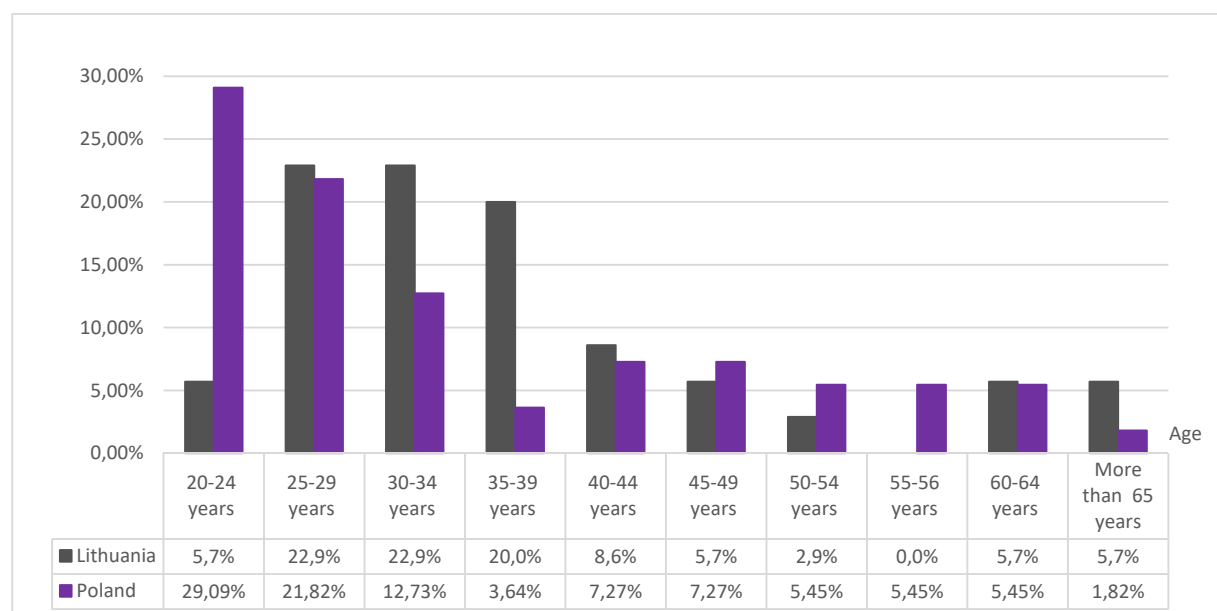
	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45-49 years	50-54 years	55-56 years	60-64 years	More than 65 years
Lithuania	5,7%	22,9%	22,9%	20,0%	8,6%	5,7%	2,9%	0,0%	5,7%	5,7%
Poland	29,09%	21,82%	12,73%	3,64%	7,27%	7,27%	5,45%	5,45%	5,45%	1,82%

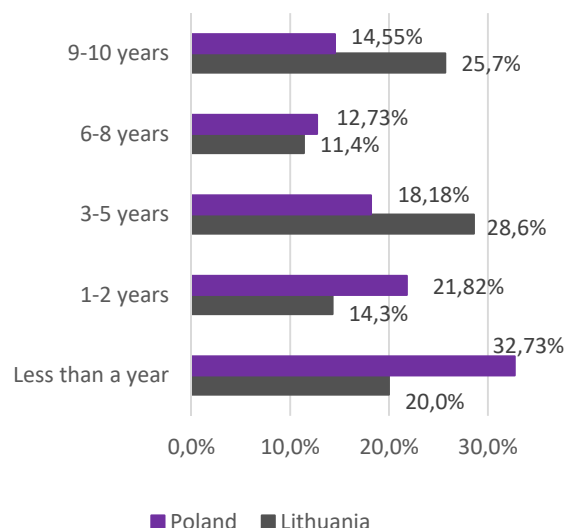**Fig. 2.** Age of respondents. *Source:* Own study.

Fig. 3. Duration of residence. *Source:* Own study.

4.3. Quality assessment of new apartment buildings

The quality of residence in new buildings in this study was assessed from the perspective of economy (e.g., low maintenance costs), technical quality (e.g., energy efficiency, sound and thermal insulation, absence of defects) and functional quality (e.g., layout, location, accessibility, environment, etc.). In the selection of new dwellings, the customers based their choices on the following expectations (Fig. 4):

- Modern living conditions (35% - Poland, 27.9% - Lithuania);
- Better building quality (23.3% - Poland, 28% - Lithuania);
- Lower heat energy consumption (16% - Poland, 29.1% - Lithuania);
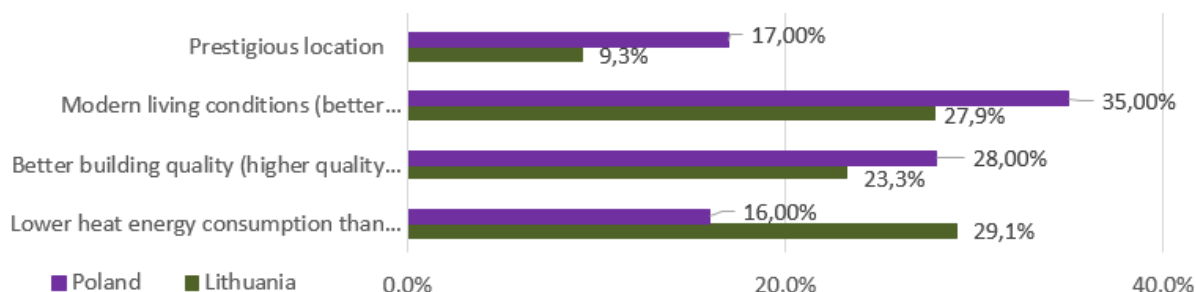- Good location, prestigious area (17% - Poland, 9.3% - Lithuania)

Fig. 4. Reasons for choosing to live in newly-constructed dwellings. *Source:* Own study.

The choice of a new dwelling was, in most cases determined by the living conditions, functional and technical characteristics, and to a lesser extent - by economy. Other reasons include good location of the building, prestigious location and the arranged environment.

The respondents were asked to assess the importance of three groups of indicators by weighting then on a scale from 1 (least important) to 5 (most important) (Table 3). A summary of priorities has been shown in Table 4. The analysis of each quality indicator has been presented in separate subsections.

Table 3

Importance of quality indicators

Points of importance	Technical quality		Functional quality		Economical utility	
	Poland	Lithuania	Poland	Lithuania	Poland	Lithuania
1	1.85%	0.00%	1.85%	0.00%	1.82%	0.00%
2	5,.56%	2.90%	9.26%	2,.90%	5.45%	5.70%

3	22,. %	11.40%	25.93%	5.70%	32.73%	11.40%
4	35.19%	14.30%	42.59%	28.60%	29.09%	31.40%
5	35.19%	71.40%	20.37%	62.90%	30.91%	51.40%
Average points	3.963	4.542	3.704	4.513	3.818	4.286
Weights/ Importance	0.345	0.340	0.322	0.338	0.332	0.321
Priority by country	1	1	3	2	2	3

Source: Own study.

Table 4

Summary of priorities

	Technical quality	Functional quality	Economical utility
Importance Poland	**0.345**	**0.322**	**0.332**
Priority Poland	1	3	2
Importance Lithuania	**0.340**	**0.338**	**0.321**
Priority Lithuania	1	2	3

Source: Own study.

4.3.1. Technical quality

Customers consider the technical quality of their dwelling as the most important aspect, but continue to be unsatisfied with the technical condition of the buildings. Respondents mentioned mainly the appearance of cracks in walls and ceilings (15-20%), poor sound insulation (14-18%), poor ventilation (10-11%) and condensation on windows (6-15%) (Fig. 5).
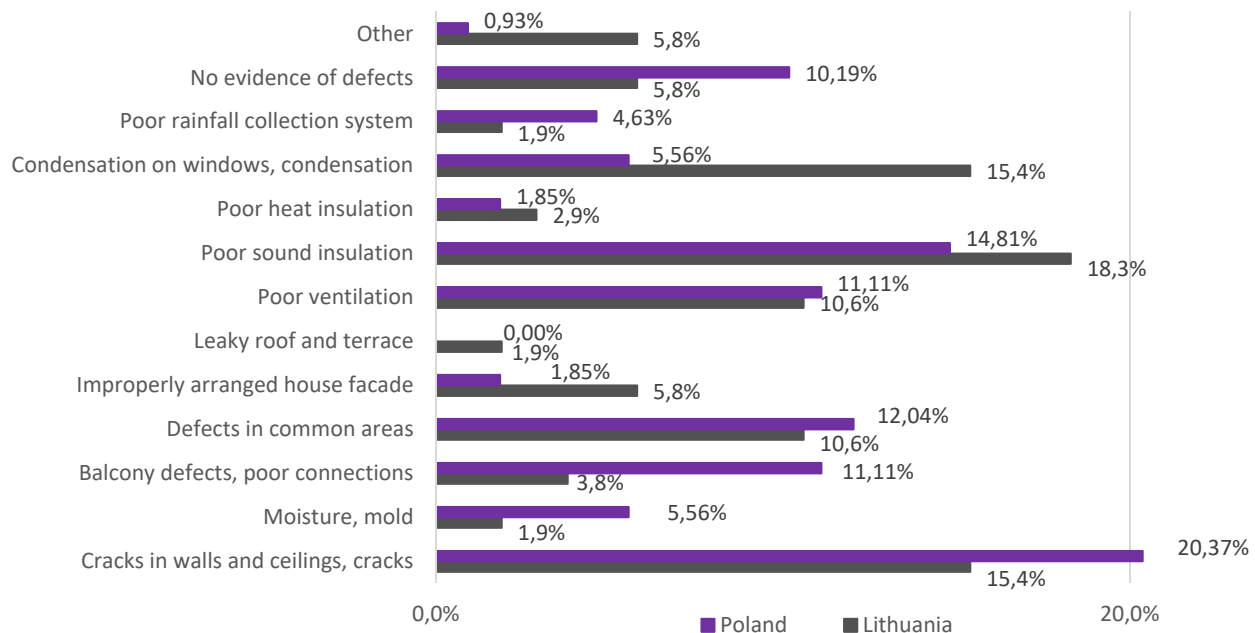

Fig. 5. Visible defects of dwellings. *Source:* Own study.

The technical quality of housing was assessed considering customer satisfaction with various properties of building structures. The main parameters of technical quality assessed by respondents were envelope heat insulating properties, envelope sound insulation properties, and defects in building constructions. Respondents used a point scale from 1 (dissatisfied with the technical quality)

to 5 points (very satisfied with the technical quality). The average amount of points awarded to the technical aspect by all customers was 3.638 (Lithuania) and 3.401 (Poland).

4.3.2 Functional quality

The functional quality of housing was assessed considering customer satisfaction with properties of building common areas, surroundings and infrastructure. The main parameters of functional quality assessed by respondents were the layout of the premises, location within the city, parking lots, infrastructure and transport accessibility, and greenery in the surroundings. Respondents used a point scale from 1 (dissatisfied with the functional quality) to 5 points (very satisfied with the functional quality). The average of points awarded to the functional aspect by all customers was 4.074 (Lithuania) and 3.666 (Poland).

The majority of the respondents are satisfied with the layout of the premises, location and accessibility. Only about 3% of respondents feel that the location is bad. Most customers are satisfied with the accessibility and infrastructure. Only a few respondents claimed to be absolutely discontent (3% - Lithuania). Notably, the percentage of residents dissatisfied by the accessibility and infrastructure in Poland is rather high (18.87% of respondents awarded only 1 or 2 points). The same distribution of responses appears in the assessment of parking places. The issue of car parking remains important.

Respondents also mentioned some unsatisfactory functional features of the buildings, e.g. small parking lots (18-25%), small distance between neighboring houses (14-21%), few green areas near the building (18-24%) and small courtyards (5-11%) (Fig. 6).

The survey revealed that respondents treat safety measures in their apartment buildings more as average (47.27% - Poland, 51.4% - Lithuania) than good (45.45% - Poland, 37.1% - Lithuania).
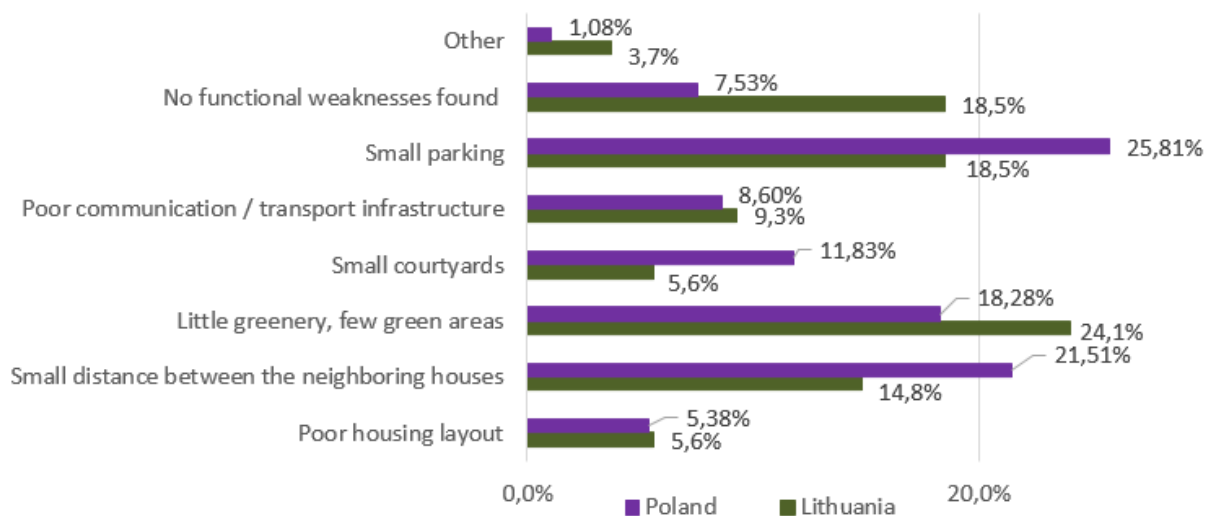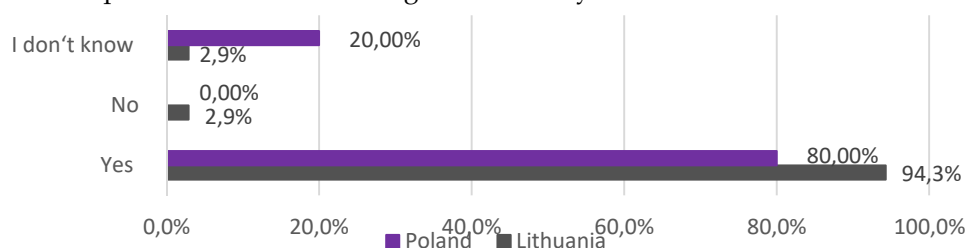

Fig. 6. Unsatisfactory functional features of building. *Source:* Own study.

### 4.4. Evaluation of warranty services and builders' readiness to cooperate: the case of new apartment buildings

The buildings should still be covered by warranty if, of course, the buildings were certified for occupancy and the permission to use building was issued by local authorities.

Fig. 7. The distribution of answers to the question: "Is the permission to use the building issued by local authorities?" *Source:* Own study**.**

The majority of buildings (80% - Poland, 94.3% - Lithuania) have obtained a permit for use (Fig. 7), nevertheless, residents still have complaints regarding the quality of the premises (Fig. 8). During the building warranty period, builders have to provide the warranty period maintenance and ensure repair works to fix any defects. However, the responses of the respondents in this regard were unfavorable (Fig. 9).
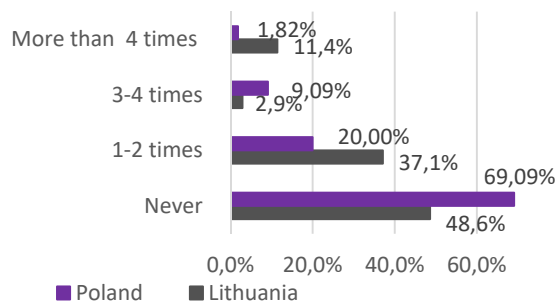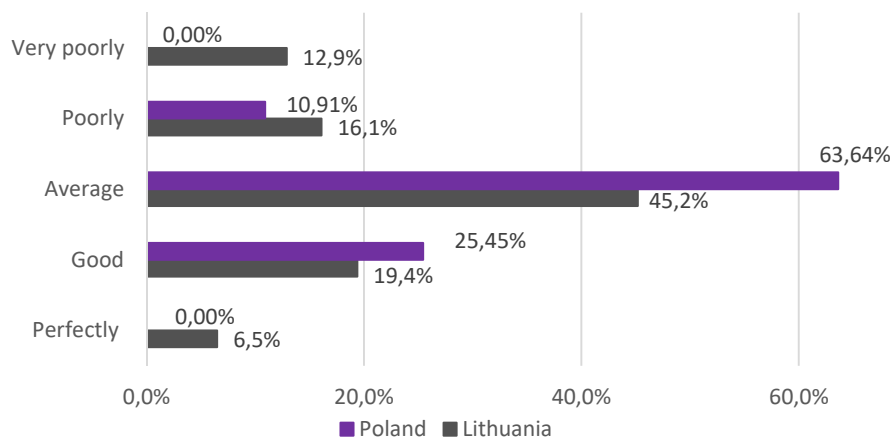

Fig. 8. Complaints about poor quality, defects, needed repairs, times/year. *Source:* Own study**.**
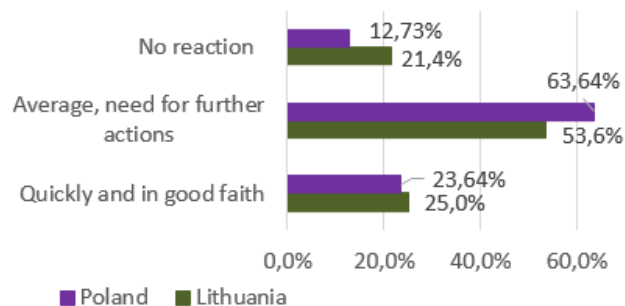
Fig. 9. Builders' response - promptness to complaints. *Source:* Own study.

The overall evaluation of builders' warranty maintenance, repair works on defects and problem solving was average (Fig. 10).

Fig. 10. Evaluation of builders' warranty maintenance, repairs of defects and problem solving. *Source:* Own study**.**

4.5. Calculation of the customer satisfaction index and loyalty measurements

The Customer Satisfaction Index (CSI) was calculated by using the residents' evaluations and Equation (1)**.** All interim indices and the final index of customer satisfaction are given in Table 4. Residents assessed their satisfaction for each indicator on a scale from "excellent" to "very poor". The ranking was given in points from 1 to 5, with 1 being the lowest and 5 – the highest. Importance was calculated using a score from 1 (least important) to 5 points (most important).

Table 4

Customer Satisfaction Index

	Lithuania	Poland
Technical quality parameters		
Envelope heat insulation properties	3.970	3.500
Envelope sound insulation properties	3.372	3.509
Defects in building constructions	3.571	3.192
Average CSI_T	3.638	3.401
Importance, w_{it}	0.340	0.345

	Weighted CSI$_T$	1.238	1.173
Functional quality parameters			
Layout of premises		4.143	4.094
Location in town		4.113	3.873
Parking		4.141	3.434
Infrastructure (transport)		4.313	3.585
Greenery		3.658	3.346
	Average CSI$_F$	4.074	3.666
	Importance, w$_{if}$	0.338	0.321
	Weighted CSI$_F$	1.378	1.178
Parameters of economic utility			
Energy consumption for heating and hot water		4.314	3.259
Costs of utilities (services)		3.656	3.132
Other additional costs (security and etc.)		3.400	2.865
	Average CSI$_E$	3.790	3.086
	Importance, w$_{ie}$	0.321	0.332
	Weighted CSI$_E$	1.218	1.026
Total customer satisfaction, CSI		**3.834**	**3.377**

Source: Own study.

The highest satisfaction was observed for the functional quality of dwellings, while the technical quality and economic utility was assessed with average scores. On a 5-point scale, average customer satisfaction would score 3 points. This means that a calculated total Customer Satisfaction Index (CSI) of slightly over 3 points shows average satisfaction of customers with the dwellings in new apartment buildings. Despite this, the majority of residents (72.73% - Poland, 60% - Lithuania) have no intention of changing dwellings. This, however, does not prove the loyalty of residents. About 30% of respondents in both countries do not find it possible to change dwellings; 46% of Lithuanian and 36% of Polish respondents stated that loyalty is not appropriate, and only 20% of Lithuanian and 28% of Polish respondents marked that they are loyal to the builder of the dwelling.

The study shows the satisfaction of residents to be higher than average (CSI$_{LT}$=3.834, CSI$_{PL}$=3.377), though the respondents provided some recommendations for improvements in housing quality. The examples are the installation of a building management system, property protection measures, more shared space, an enclosed yard and others (Fig. 11).
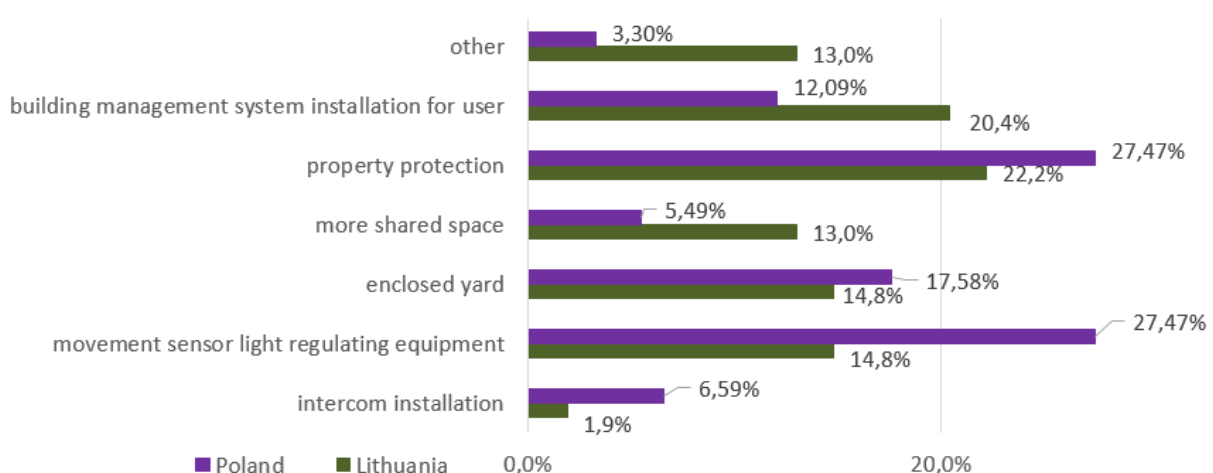

Fig. 11. Suggestions for improving housing quality. *Source:* Own study**.**

5. Conclusions

The survey of customer satisfaction with new apartment houses via an online questionnaire in Lithuania and Poland showed economic motives, as well as the functional and technical properties of dwellings, to be the most important when choosing a dwelling. The main parameters of technical

quality assessed by respondents were envelope heat insulation properties, envelope sound insulation properties, and defects in building construction.

The average amount of points given to the technical aspect by all customers was 3.638 (Lithuania) and 3.401 (Poland). The survey revealed that more respondents treat safety measures in their apartment buildings as average (47.27% - Poland, 51.4% - Lithuania) than good (45.45% - Poland, 37.1% - Lithuania). The highest satisfaction was observed with the functional quality of dwellings, while technical quality and economic utility obtained average scores. The majority of residents (72.73% - Poland, 60% - Lithuania) have no intention of changing dwellings. However, this does not prove the loyalty of residents; 46% Lithuanian and 36% Polish respondents stated that this statement is not appropriate, and only 20% Lithuanian and 28% Polish respondents marked that they are loyal to the builder of their dwelling, thus proving that they satisfied with the quality of building and warranty services.

The conducted research is original because the authors presented a comparative analysis of construction quality of new housing in Poland and Lithuania. The authors calculated the customer satisfaction index and, in the future, are planning to conduct deeper research regarding customer satisfaction with newly-built housing using different methods of calculating the customer satisfaction index. The analysis will be based on questionnaire results, taking a lager customer group in Poland (several cities) and in Lithuania.

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