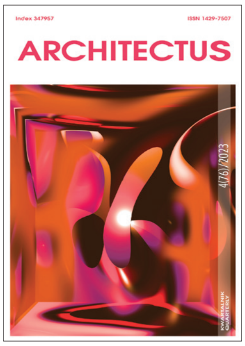

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Parametric assessment of the quality of the housing environment of selected areas in the small towns in the Subcarpathian Voivodeship using the integrated quality indicator

Introduction

The subject of this study is an original method of assessing housing environment quality, which can be characterised as an objectified method. The reason for developing this method was the necessity to take action to improve the housing environment, especially in the context of the current, low standards of urban planning solutions that it is often accompanied by. Minimising the distance between buildings, taking up open green spaces for development, limiting daylight access in shared urban interiors, etc., are common phenomena that accompany often visually attractive residential development.

Furthermore, it should be emphasised that the housing environment is the area with which one feels connected. It is therefore important to strive to make it have the highest possible quality. Making changes to one's area of residence, including those for the better, requires a prior diagnosis of the area, hence the method of its assessment is extremely important.

The subject is also worth discussing and relevant due to contemporary efforts to develop a highly universal method for assessing housing environment quality. This poses a significant research problem. Limitations in this area are further highlighted by changing tendencies in how the housing environment is designed, which often contributes to its long-lasting transformation, adapted to new social needs.

The research methodology adopted in this study is a result of numerous analyses carried out by the authors in selected housing areas of small towns in the Subcarpathian Voivodeship. The analyses were aimed at assessing external conditions and focused on urban planning solutions, as does this method of housing environment quality assessment.

The method was based on an on-site visit to assess selected residential areas in the central zones of 38 small towns in the Subcarpathian region and, before that, in three other cities. Such a large amount of material allowed a proper selection of the elements of the housing environment to be assessed and, at the same time, the formulation of objective conclusions in the thematic scope discussed for smaller cities and towns. In addition to the expert assessment of the quality of the housing environment, a total of 3,300 interviews were conducted in each of the cities covered by the study. Among other things, respondents identified the elements of the housing environment that they considered to be the most important and which have an impact on its quality. The results corroborate the findings of urban analyses for the evaluation of spatial solutions that affect the physical health of residents and their mental and psychological well-being. This sizeable material allowed for an extensive and objective outlook on the problem under investigation.

The available literature on methods for assessing the quality of the housing environment refers to analysing its standard in only a limited substantive scope.

One example is the Building for a Healthy Life [1] system, which assesses issues related to population health

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and sustainability more broadly. This method, which is also a tool for designing friendly places, signifies the importance of the natural environment and the accessibility of public infrastructure, including transport and street architecture. It also takes into account the need for mobility, air quality and biodiversity.

Another method, which is limited to the assessment of residential development – houses – the Home Quality Mark [2], utilises three accepted assessment criteria: cost, well-being and usable floor area.

In turn, the Housing Quality Indicators [3] system focuses on existing development and is also a design tool to assess and indicate the potential of existing development. The elements it uses to determine the quality of the housing environment fall into three categories including location, design, and the efficient use of the layout. It distinguishes the following factors that can be considered essential to a good housing environment, namely location, the openness of a space, accessibility, layout size, spatial layout, access to services and daylight. Low energy consumption, minimising noise pollution, use efficiency and the use of sustainable solutions are also relevant here.

The SEL (Système d'évaluation de logements) housing evaluation system is a tool that assists in the design and comparative analysis of residential buildings. It determines their utilitarian value, and considers the location of the buildings, their qualities and also the attractiveness of their immediate surroundings. Priority is given here to usability and added value for residents.

NF Habitat [4] is another assessment method. It is used to certify houses and flats. Their assessment takes into account, among other things, health-related conditions, safety and the control of expenses associated with maintaining the home through the appropriate choice of thermal and acoustic insulation.

The assessment method proposed in this study utilises the Integrated Quality Index (IQI) and is only concerned with urban planning conditions. It does not take into account architectural and technological solutions. The focus on spatial solutions stems from the need to revise currently used urban planning indicators such as the share of biologically vital surface area.

In our opinion, when assessing housing areas, one should note urban-planning conditions that shape a housing environment's quality and thus affect its comfort of use.

It should be noted that certification schemes often come down solely to the assessment of urban solutions, although there are also widely used building certification systems, such as BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design) [5].

From the point of real-estate development project planning onwards, a Life Cycle Assessment (LCA) system is helpful to analyse the full life cycle of a building [6]. POE (Post Occupancy Evaluation) is also used for this purpose. The criteria adopted for this assessment include issues of individual user needs and the need to implement a retrofitting process compliant with sustainability principles.

Crucially, this assessment of urban conditions is site-specific, and they are characterised by distinct specificities resulting from, among other things, natural conditions, including climate, but also regional and cultural conditions, as described by Mi-Hyang Lee et al. [7], who presented an original research method based on AHP (Analytic Hierarchy Process). Similarly, the research method presented in this paper, based on the IQI can be seen as an important tool to objectively assess spatial conditions. The assessment method proposed is universal, while AHP refers primarily to the Modernized Hanok complex in Korea.

Regardless of site-specificity, there is an increasing focus on the availability of green spaces and the need to transform cities that strive to meet public expectations. It should be highlighted that greenery, including the size of biologically vital surface areas, as well as water, affect the microclimate of the surroundings (the housing environment), including its thermal conditions. Proximity to green spaces is an important element of sustainable design in line with the idea of sustainable development and the principles of green urbanism. These were discussed more extensively by e.g. Dayi Lai et al. and Steffen Lehmann [8], [9], who noted the need to respect the tenets of the green economy.

Lili Zhang et al. [10] also wrote about the need to design and organise parks in urban spaces. Among other things, they pointed out that a park's outdoor thermal comfort is an important factor that can attract people to it and encourage them to stay. Using field meteorological monitoring and surveys, they investigated the outdoor thermal comfort of different types of landscape spaces in urban parks in Chengdu, China, in winter and summer.

Analysing numerous issues (including those listed above, associated with green area access) that either directly or more indirectly affect thermal comfort and housing environment quality, gives us a broader perspective on this problem, which can contribute to its in-depth, objective analysis. This reason distinguishes the proposed parametric method of housing environment quality assessment based on IQI from other methods.

Contemporary trends in architectural and urban design are largely based on adapting architectural solutions to environmental conditions. Among others, proper building siting, development density of distribution and the geometry of the urban interiors in which buildings are located are important in this context [11]. The importance of the compactness of the development and street canyon parameters were demonstrated by Angelika Chatzidimitriou and Simos Yannas, among others [12]. These elements are important for maintaining the thermal comfort of urban interiors, including the quality of the housing environment.

In addition to their academic value, the observations that form the state of the art may be of relevance to design and planning practice [13].

In addition, the current state of research indicates that there have been many recent publications on the housing environment, its problems and the prospects for its change in the near future. In contrast, publications on research methods themselves have been few. The analysis of the subject matter in question, including the current state of the art, leads us to believe that the proposed method can be considered universal since it can be applied in any research area.

The Integrated Quality Index makes it possible to designate areas in need of re-urbanisation and improvements to broadly understood infrastructure. When at a low value, it indicates a necessity to take action to improve housing environment quality in a scope defined by the given factor selection. The lower the IQI value, the greater and more urgent the need for change, which also makes it possible to define an action plan with the designation of priority projects.

Based on an analysis of the state of research on housing environment assessment methods, it should be noted that the selection of elements for assessment is always subjective. We decided on the selection of criteria for the method proposed after performing numerous urban studies and sociological surveys. As mentioned, 3,300 interviews were conducted in which residents themselves identified the elements and factors they felt were most important for building the quality of the housing environment.

Given the above information, it is possible to hypothesise that the IQI-based method proposed here allows for an objectified assessment of the quality of the housing environment and a comparative analysis of the areas under investigation. This method can also contribute to improving the functional and spatial solutions of the selected areas and to taking desirable and effective practical action within them by decision-makers with a direct influence on the scope of the necessary interventions.

The proposed method can therefore, in addition to its academic value, also be used effectively in the field of spatial planning. In doing so, it should be noted that the scope of research using the IQI may also include residential or commercial interiors that are an integral part of the housing environment, taking into account the relevant assessment factors. It must also be highlighted that the selection of elements for assessment in the method's development is closely linked with society's pursuit of attaining increasingly higher standards. However, in order for this aspiration to be effective, it is necessary to define what a high standard is, and identify contemporary trends and the factors that influence it. We understand a high housing environment standard as a housing environment that meets requirements concerning having an urban layout composition that ensures spatial order and comfortable microclimate conditions, and thus thermal comfort. In addition, a high-quality housing environment should be characterised by the aesthetics of functio-spatial solutions and accessibility to natural areas – water features and greenery. In doing so, it is important to identify the type of greenery, its diversity, size and scale of occurrence. This affects the well-being of the area's users, the aesthetic qualities of the surroundings, but also their climatic conditions (thermal comfort, insolation, humidity, wind flow, which is directly relevant to the drive to minimise energy consumption and the use of renewable energy sources). Equally important is the selection and definition of the type of heating, energy, HVAC (Heating, Ventilation, and Air Conditioning) services that affect the thermal comfort in a building (mechanical ventilation, air conditioning). In turn, the proximity to natural elements is directly linked to an attractive view from the window, interesting development of common spaces, the aforementioned mesoclimate, and thus also the insolation of urban interiors and their ventilation potential. The proximity of services and pleasantly used spaces, including providing access to essential services such as educational facilities, culture centres, healthcare facilities, sports facilities, transport services and playgrounds is a separate issue.

A quality housing environment should also provide intimacy and peacefulness, security, opportunities for social interaction in the shaping of the common spaces and opportunities for their shared management.

All of these quality-building elements were further designated with numbers in a survey and included as IQIs.

Method

The assessment of the housing environment and its quality can be done using a descriptive and parametric method. Our analysis found that the descriptive approach poses difficulty in comparing housing environment quality when faced with differing ratings of the same factors when referenced to different housing areas (cities). In the second case, the comparison is easier as factor ratings are done using a point-based scale. In addition, we are used to numerical ratings because they are concrete. However, these ratings apply separately to each factor. This is where the difficulty in general assessments stems from. In order to make this possible, we introduced the IQI into our proposed research method, as it combines ratings of all factors by residents themselves and, most importantly, the weights of these ratings.

Our proposed IQI-based method can be implemented in expert field analyses (inspections) and sociological studies, as their substantial enhancement. It should be noted that the use of several research methods simultaneously is effective in formulating objective conclusions.

This paper uses the results of an urban analysis and a sociological study, which confirmed the findings of field research and present the opinions of respondents on their areas of residence, and allowed for procuring results on the weights of specific factors for the assessment.

For the interviews, we used forms with a set of 28 elements, selected subjectively, but justified by the current state of the art and research findings. The set was compiled based on earlier studies by Justyna Kobylarczyk [14]. The research described in these studies was conducted in small towns of the Subcarpathian Voivodeship [15] as well as in other publications on the subject. Among the elements considered in the study, all those listed below and marked with a number were taken into account. They were characterised in the introduction of the paper when defining the high quality standard of the housing environment. These elements are: 1 – urban layout composition, 2 – aesthetics of functio-spatial solutions, 3 – type, variety and amount of greenery, 4 – attractive view from the window, 5 – site development of common spaces, 6 – mesoclimate, 7 – insolation of urban interiors, 8 – ventilation hygiene, 9 – access to essential services, 10 – access to educational facilities, 11 – access to culture centres, 12 – access to healthcare centres and pharmacies, 13 – access to sports centres, 14 – access to transport services, 15 – availability of playgrounds, 16 – use programme of playgrounds, 17 – proximity to green areas, 18 – utility programme of green areas, 19 – intimacy and peacefulness, 20 – security, 21 – proximity to water features, 22 – access to and size of the courtyard, 23 – proximity to integrative spaces, 24 – proximity to natural elements, 25 – view from the window featuring natural elements, 26 – proximity to monuments, 27 – possibility of social interaction in shaping common spaces, 28 – potential for joint management of the housing environment.

The attribution of significance (weight) to individual factors is very important and should therefore be as objective as possible. As the territorial scope of the survey covered 38 cities and the sample size itself was large (3,300 questionnaires), the survey results can be considered representative.

Sufficient sample size is crucial for obtaining objective results. Obviously, the larger the respondent count, the more accurate the assessment. Based on the results of the fundamental studies reported in papers [14], [15], it can be concluded that with ten and more responses, the average value does not change significantly. Thus, the number of 10 samples was considered a minimum in the study in order for the average values to be sufficiently precise.

The paper presents calculations using the IQI developed by the authors for selected cities (Dukla, Iwonicz-Zdrój, Rymanów, Boguchwała, Dynów, Tyczyn, Kolbuszowa, Lubaczów, Ustrzyki Dolne). The IQI was determined on the basis of algebraic formulas.

The proposed method consists of two parts. The first relates to the formulation of general formulas used to calculate the value of the IQI, and the second to the acquisition of data to determine its specific value.

Based on the results of the survey, each factor was assigned a significance determined by a rating score on a scale of 1–5, denoted as a_i.

The sum of the scores for all factors is equal:

$$\Sigma a_i = A$$

where:
A – sum of all factors,
a – factor rating,
i – factor number.

Hence, the weight of an individual factor w_i is:

$$w_i = a_i / A = a_i / \Sigma a_i$$

where a_i stands for factor i. Factor weight thus calculated is expressed in dimensionless numbers. If we multiply it by 100, we get the weight in percentage. Denoting it as w_{pi} we will obtain:

$$w_{pi} = 100\ w_i$$

The following conditions must also be met:
$\Sigma w_i = 1{,}00$
$\Sigma w_{pi} = 100\%$

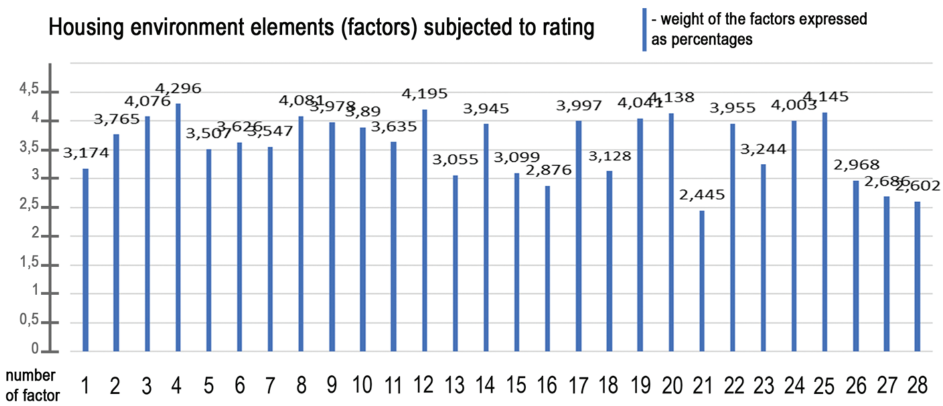
For practical reasons, it is better to use percentage weights.

The ratings given by respondents to the individual m_i factors are needed to calculate the IQI value. Thus, the IQI value will be:

$$ZWJ = \Sigma\, m_i\, w_i$$

It is proposed to rate the individual factors on the following scale: 1 – very poor, 2 – poor, 3 – acceptable, 4– good, 5 – very good.

The “0” has been omitted from the rating scale and it starts at 1. This is because none of the indicators examined received a weight of 0. This means that, according to respondents, all factors are important, albeit to varying degrees. The average values from the results are summarised in Figure 1. The numerical values given can be directly considered as w_{pi} percentage weights, and if divided by 100, we obtain weights expressed in dimensionless numbers.



factors: 1 – urban layout composition, 2 – aesthetics of functio-spatial solutions, 3 – type, variety and amount of greenery, 4 – attractive view from the window, 5 – site development of common spaces, 6 – mesoclimate, 7 – insolation of urban interiors, 8 – ventilation hygiene, 9 – access to essential services, 10 – access to educational facilities, 11 – access to culture centres, 12 – access to healthcare centres and pharmacies, 13 – access to sports centres, 14 – access to transport services, 15 – availability of playgrounds, 16 – use programme of playgrounds, 17 – proximity to green areas, 18 – use programme of green areas, 19 – intimacy and peacefulness, 20 – security, 21 – proximity to water features, 22 – access to and size of the courtyard, 23 – proximity to integrative spaces, 24 – proximity to natural elements, 25 – view from the window featuring natural elements, 26 – proximity to monuments, 27 – possibility of social interaction in shaping common spaces, 28 – potential for joint management of the housing environment

Fig. 1. Weight of factors expressed as percentages (elaborated by J. Kobylarczyk)

Il. 1. Waga ocenianych czynników wyrażona w procentach (oprac. J. Kobylarczyk)

The proposed parametric method, due to its numerical scale that relates to the individual factors, allows comparing the results of a varied assessment within the same factors assessed in different housing areas. The calculations presented here can be used in any housing area. This means that the method can be considered universal, and that it has applicative value in addition to academic value, and can be useful in determining the direction of development and necessary interventions in specific urban areas.

Nevertheless, specific cities located in the Subcarpathian Voivodeship in its various regions were selected for analysis: Dukla, Iwonicz-Zdrój, Rymanów (towns located in the southern part of the voivodeship), Boguchwała, Dynów, Tyczyn (towns located in the central part of the voivodeship), Kolbuszowa, Lubaczów and Ustrzyki Dolne (county towns located in different areas of the voivodeship). These are towns with populations lower than 30 thousand. Considering the size in terms of population, they can be considered small.

Table 1. Results of the study for towns from group I (A – Dukla, B – Iwonicz-Zdrój, C – Rymanów) (elaborated by J. Kobylarczyk)
Tabela 1. Wyniki badań dla miast z grupy I (A – Dukla, B – Iwonicz-Zdrój, C – Rymanów) (oprac. J. Kobylarczyk)

Factor no.	Area analysed			w_i	$m_i\ w_i$ values		
	A	B	C		A	B	C
1	3.034	3.059	3.333	0.0317	0.096178	0.09697	0.105656
2	3.484	3.269	3.793	0.0376	0.130998	0.122914	0.142617
3	3.969	3.827	3.879	0.0407	0.161538	0.155759	0.157875
4	4.097	3.857	3.719	0.0429	0.175761	0.165465	0.159545
5	3.483	3.125	3.492	0.0350	0.121905	0.109375	0.12222
6	2.962	3.417	3.362	0.0362	0.107224	0.123695	0.121704
7	3	3.306	3.411	0.0354	0.1062	0.117032	0.120749
8	3.714	3.7	3.857	0.0408	0.151531	0.15096	0.157366
9	3.793	3.558	4.000	0.0398	0.150961	0.141608	0.1592
10	3.452	3.314	3.828	0.0389	0.134283	0.128915	0.148909
11	2.968	3.176	3.696	0.0363	0.107738	0.115289	0.134165
12	3.935	3.654	4.103	0.0419	0.164877	0.153103	0.171916
13	2.968	2.981	3.424	0.0305	0.090524	0.090921	0.104432
14	3.621	3.269	3.78	0.0394	0.142667	0.128799	0.148932
15	2.484	1.961	3.203	0.0310	0.077004	0.060791	0.099293
16	2.2	1.922	3.119	0.0287	0.06314	0.055161	0.089515
17	3.875	3.49	3.831	0.0399	0.154613	0.139251	0.152857
18	3.065	2.94	3.421	0.0313	0.095935	0.092022	0.107077
19	3.968	3.49	4.102	0.0404	0.160307	0.140996	0.165721
20	3.656	3.519	4.068	0.0414	0.151358	0.145687	0.168415
21	2.161	1.686	2.864	0.0244	0.052728	0.041138	0.069882
22	3.871	3.077	3.678	0.0395	0.152905	0.121542	0.145281
23	2.679	2.918	3.31	0.0324	0.0868	0.094543	0.107244
24	3.667	3.49	3.78	0.0400	0.14668	0.1396	0.1512
25	3.552	3.827	3.759	0.0414	0.147053	0.158438	0.155623
26	2.931	3.045	3.069	0.0297	0.087051	0.090437	0.091149
27	2.517	2.077	2.776	0.0268	0.067456	0.055664	0.074397
28	2.448	2.019	2.724	0.0260	0.063648	0.052494	0.070824
Σ	91.554	81.147	99.013	1.0000	3.352063	3.188569	3.603314

Table 2. Results of the study for towns from group II (A – Boguchwała, B – Dynów, C – Tyczyn) (elaborated by J. Kobylarczyk)
Tabela 2. Wyniki badań dla miast z grupy II (A – Boguchwała, B – Dynów, C – Tyczyn) (oprac. J. Kobylarczyk)

Factor no.	Area analysed			w_i	m_i w_i values		
	A	B	C		A	B	C
1	3.52	2.679	2.931	0.0317	0.111584	0.084924	0.092913
2	3.778	3.413	3.462	0.0376	0.142053	0.128329	0.130171
3	3.593	3.59	3.591	0.0407	0.146235	0.146113	0.146154
4	3.519	3.873	3.844	0.0429	0.150965	0.166152	0.164908
5	3.24	3.163	3.063	0.035	0.1134	0.110705	0.107205
6	3.24	3.057	3.106	0.0362	0.117288	0.110663	0.112437
7	3.28	3.241	3.213	0.0354	0.116112	0.114731	0.11374
8	3.577	3.389	3.317	0.0408	0.145942	0.138271	0.135334
9	4.038	3.531	3.424	0.0398	0.160712	0.140534	0.136275
10	3.808	3.102	3.369	0.0389	0.148131	0.120668	0.131054
11	3.37	2.752	3.197	0.0363	0.122331	0.099898	0.116051
12	3.852	3.37	3.439	0.0419	0.161399	0.141203	0.144094
13	3.407	2.49	3.015	0.0305	0.103914	0.075945	0.091958
14	3.889	3.101	3.554	0.0394	0.153227	0.122179	0.140028
15	3.222	1.878	2.015	0.031	0.099882	0.058218	0.062465
16	3.148	1.687	1.776	0.0287	0.090348	0.048417	0.050971
17	3.667	3.337	3.143	0.0399	0.146313	0.133146	0.125406
18	3.16	2.538	2.619	0.0313	0.098908	0.079439	0.081975
19	4.037	3.73	3.672	0.0404	0.163095	0.150692	0.148349
20	4	3.69	3.545	0.0414	0.1656	0.152766	0.146763
21	3.407	2.044	1.862	0.0244	0.083131	0.049874	0.045433
22	3.556	3.598	3.203	0.0395	0.140462	0.142121	0.126519
23	3.12	2.841	2.672	0.0324	0.101088	0.092048	0.086573
24	3.269	3.596	3.439	0.04	0.13076	0.14384	0.13756
25	3.269	3.59	3.578	0.0414	0.135337	0.148626	0.148129
26	2.778	2.194	2.297	0.0297	0.082507	0.065162	0.068221
27	2.741	2.196	2.016	0.0268	0.073459	0.058853	0.054029
28	2.538	2.226	2	0.026	0.065988	0.057876	0.052
Σ	96.063	83.89	84.362	1.0000	3.472	3.0814	3.0967

Results

The paper presents only those research results that are most relevant to the issue addressed.

Three groups of cities were considered when analysing the weights of all factors. Three cities were included in each group. The results of the analysis are given in Tables 1–3.

Group I includes towns in Krosno County, located in the southern part of the province. These are: Dukla, Iwonicz-Zdrój and Rymanów. Group II includes towns in Rzeszów County, located in the central part of the voivodeship. These are: Boguchwała, Dynów and Tyczyn. In Group III, county towns from different areas of the voivodeship were included. These are: Kolbuszowa, Lubaczów and Ustrzyki Dolne.

The factor number is presented in the *Method* section of the paper, as are the m_i w_i values.

Based on our results, as summarised in Tables 1–3, it can be concluded that the IQI values ($IQI = \Sigma\, m_i w_i$) for the different cities vary. This is due to the different ratings of the individual factors in the cities selected for comparison

Table 3. Results of the study for towns from group III (A – Kolbuszowa, B – Lubaczów, C – Ustrzyki Dolne) (elaborated by J. Kobylarczyk)
Tabela 3. Wyniki badań dla miast z grupy III (A – Kolbuszowa, B – Lubaczów, C – Ustrzyki Dolne) (oprac. J. Kobylarczyk)

Factor no.	Area analysed			w_i	m_i w_i values		
	A	B	C		A	B	C
1	2.985	3.073	3.155	0.0317	0.094625	0.0974141	0.100014
2	3.564	3.406	3.54	0.0376	0.134006	0.1280656	0.133104
3	3.755	3.516	3.854	0.0407	0.152829	0.1431012	0.156858
4	3.903	3.669	3.755	0.0429	0.167439	0.1574001	0.16109
5	3.336	3.258	3.376	0.035	0.11676	0.11403	0.11816
6	3.23	3.041	3.286	0.0362	0.116926	0.1100842	0.118953
7	3.222	3.068	3.198	0.0354	0.114059	0.1086072	0.113209
8	3.515	3.596	3.86	0.0408	0.143412	0.1467168	0.157488
9	3.845	3.865	3.71	0.0398	0.153031	0.153827	0.147658
10	3.503	3.676	3.554	0.0389	0.136267	0.1429964	0.138251
11	3.389	3.623	3.307	0.0363	0.123021	0.1315149	0.120044
12	3.839	3.994	3.673	0.0419	0.160854	0.1673486	0.153899
13	3.329	3.274	3.208	0.0305	0.101535	0.099857	0.097844
14	3.571	3.574	3.19	0.0394	0.140697	0.1408156	0.125686
15	3.121	2.968	3.11	0.031	0.096751	0.092008	0.09641
16	2.856	2.779	2.9	0.0287	0.081967	0.0797573	0.08323
17	3.695	3.256	3.792	0.0399	0.147431	0.1299144	0.151301
18	3.18	3.032	3.204	0.0313	0.099534	0.0949016	0.100285
19	3.874	3.547	3.51	0.0404	0.15651	0.1432988	0.141804
20	3.879	3.859	3.899	0.0414	0.160591	0.1597626	0.161419
21	2.626	1.974	3.248	0.0244	0.064074	0.0481656	0.079251
22	3.683	3.289	3.24	0.0395	0.145479	0.1299155	0.12798
23	3.218	3.034	2.929	0.0324	0.104263	0.0983016	0.0949
24	3.674	3.404	3.663	0.04	0.14696	0.13616	0.14652
25	3.761	3.441	3.737	0.0414	0.155705	0.1424574	0.154712
26	2.589	2.429	2.693	0.0297	0.076893	0.0721413	0.079982
27	2.878	2.359	2.31	0.0268	0.07713	0.0632212	0.061908
28	3.058	2.44	2.33	0.026	0.079508	0.06344	0.06058
Σ	95.078	91.074	92.832	1.0000	3.448257	3.295225	3.38254

and, in addition, to the use of different weights for each factor. The lowest average IQI values were obtained in cities from Group II, i.e. from the county whose capital has the largest population (Rzeszów). This, however, may not be the rule.

The results of the analysis show that there are greater differences in the values of the IQI between cities in the same county than in cities located in different counties. The average IQI value for Group I cities was 3.38, while for Group II cities it was 3.22 The same average IQI value was obtained for the county towns in Group III as for those in Group I, i.e. 3.38. This is, of course, a coincidence, as ratings of the various factors varied. It should be noted that the differences in IQI values are not significant. This applies to the cities in groups I and II. Only the difference in the average IQI value for Group III cities was smaller than for the cities in groups I and II. There was no significant correlation between the mean value of the IQI and the size of the city (population count) and its location. The status of the city (county town or not) also appeared to be of no significance.

Discussion

Assessing a given housing environment using inspections and environmental studies facilitates its spatio-functional diagnosis. When performing such an assessment, one can evaluate factors that shape the space under analysis and specify problem phenomena and identify place-based potential.

The research method proposed must be improved, as it is subjective, for instance due to the subjective selection of factors to be assessed.

In addition, the factors to be rated are measurable (quantifiable) and non-measurable (non-quantifiable). For measurable factors, it is possible to rate them unequivocally, precisely and indisputably. In the case of non-quantifiable factors, their rating can vary. This is because it is difficult to measure the aesthetics of a space, the sense of intimacy and peacefulness, etc. This results in a heterogeneous rating, which is chiefly qualitative and not quantitative [14].

The diversity of residents' needs and ambitions, the goals they want to pursue in their housing environment and their preferred lifestyle, including their mode of communication, their leisure activities, their current living conditions and their requirements for the future are also a problem in achieving a homogeneous assessment. They can change, just as the selection of factors for rating can change. This is due to progress, changing trends and emerging issues.

It should be noted that the ratings given by the respondents in the surveys were often different, although they concerned the same area, the same elements and factors. The needs of the residents are also different, as a result of the housing conditions they currently have, the wealth of the people doing the rating, and their education. The lifestyle they lead is also significant. It is most likely that persons whose current housing conditions are high standard, allowing them to engage in their preferred lifestyle, will have higher demands. With this in mind, it is important in such studies to ensure that the sample is representative.

It should be added that since present-day urban spaces are characterised, among other things, by an increase in integration, diversity and cohesion while maintaining harmony in every area, it is extremely important to select the factors to be taken into account in spatial planning on the basis of an integrated system [16]. For example, by increasing the area of green space, we improve the microclimatic conditions and also provide opportunities for physical activity to residents.

Conclusions

This paper presents a new method for the comprehensive assessment of the quality of the housing environment. To this end, an Integrated Quality Index was proposed and defined, which takes into account all the relevant quality determinants. Its value depends on the individual rating of each factor and the weight assigned to it. As an innovative research tool, the proposed method brings new values to research, but can also be useful in design and planning practice.

The calculation of the IQI value allows objective conclusions to be formulated regarding the assessment of the quality of the residential environment. The calculations also enable comparative analysis of areas so as to delineate sites that are deficient in terms of their housing environments, and to make proper decisions on necessary interventions. The proposed research method is therefore important not only for its academic value, but can also be applied in practice, in determining the necessary and priority corrective actions.

The implications of the research findings may be particularly helpful for decision-making bodies in setting courses of action for the development and improvement of the housing environment. Specific indicator values can denote courses of action. A low value of a given factor's rating signals the need to change site development, which is specifically a task for real-estate developers, city councils and resident councils.

Determining the numerical values of weights assigned to each factor is a very important element of the proposed method. These values were determined on the basis of the results of an original study carried out in 38 cities in the Subcarpathian Voivodeship. A total of nearly 3,300 respondents took part in this survey. Thus, the study can be regarded as authoritative and the weight values as reliable.

The weights attributed to each factor were shown to influence the final assessment of housing environment quality. In the cases analysed, the geographical location of a city and its size (expressed in terms of population), as well as its status (county capital or not), were found to have no significant impact. This further indicates the objectivity of the assessment of housing environment quality as based on the IQI.

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Abstract

Parametric assessment of the quality of the housing environment of selected areas in the small towns in the Subcarpathian Voivodeship using the integrated quality indicator

This paper presents a method of assessing housing environment quality using the Integrated Quality Index (IQI) defined and tested by the authors. This method complements the previously used descriptive and/or parametric methods. Both methods are not fully effective in a comparative diagnosis of areas and in determining which of them can provide higher quality. This is due, among other things, to the different weighting of the individual factors that are rated and which make up the final (resultant) assessment.

The aim of the study was to demonstrate that by using a single comparative indicator, defined by the authors as the IQI, it is possible to obtain an objectified assessment that takes into account parametric ratings of all the factors analysed with appropriate weights. This removes the ambiguity in the comparison of quality ratings of different housing areas. A higher IQI value means a higher quality housing environment. This indicator makes it possible to assess the quality of the human housing environment to a greater extent than with a descriptive and parametric assessment separate for each factor. For this reason, in addition to its academic value, the method presented in this paper also has a practical value – it facilitates unambiguous conclusions and, consequently, the pursuit of improved housing conditions, which has an undeniable impact on further research into the topic under discussion.

Key words: housing environment quality, parametric assessment, integrated quality indicator, research method

Streszczenie

Parametryczna ocena jakości środowiska mieszkaniowego wybranych obszarów zamieszkania w małych miastach województwa podkarpackiego z wykorzystaniem zintegrowanego wskaźnika jakości

W artykule przedstawiono problematykę związaną z metodą oceny jakości środowiska zamieszkania wykorzystującą zdefiniowany i sprawdzony przez autorów zintegrowany wskaźnik jakości (ZWJ). Metoda ta stanowi uzupełnienie dotychczas stosowanych metod – opisowej lub/i parametrycznej. Obydwie metody nie są w pełni skuteczne w diagnozie porównawczej obszarów ze wskazaniem, który z nich zapewnia wyższą jakość. Wynika to między innymi z różnej wagi poszczególnych czynników podlegających ocenie, a składających się na jedną ocenę końcową (wynikową).

Celem pracy jest wykazanie, że przy wykorzystaniu jednego wskaźnika porównawczego, zdefiniowanego przez autorów jako ZWJ, możliwe jest uzyskanie zobiektywizowanej oceny uwzględniającej oceny parametryczne wszystkich analizowanych czynników z odpowiednimi wagami. Dzięki temu porównanie wyników oceny jakości różnych obszarów mieszkaniowych jest jednoznaczne. Większa wartość ZWJ oznacza wyższą jakość środowiska zamieszkania. Wskaźnik ten pozwala w większym stopniu ocenić jakość środowiska zamieszkania człowieka niż w przypadku oceny opisowej i oceny parametrycznej oddzielnej dla każdego czynnika. Z tego powodu przedstawiona w pracy metoda poza wartością naukową ma też wartość praktyczną – ułatwia jednoznaczne wnioskowanie i w konsekwencji dążenie do poprawy warunków zamieszkania, co ma niepodważalny wpływ na dalsze badania w zakresie omawianej tematyki.

Słowa kluczowe: jakość środowiska mieszkaniowego, ocena parametryczna, zintegrowany wskaźnik jakości, metoda badawcza