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Perception of Residential Environment in Cities: a Comparative Study

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Abstract

This paper deals with the issues relating to the quality of the residential environment and its perception by the population. The aim of the research was to identify the key indicators perceived by residents as the most significant from the perspective of the quality of the residential environment. A comparative study analyzing a set of 22 assessment indicators has been conducted for three cities: Brno, Prague and Ostrava. Data was collected using a web-based survey and processed in terms of indicator grades and weights. It was concluded that the significance of individual indicators affecting the quality of living in individual cities is generally similar, but when viewed in detail, partial differences can be observed. Research outputs may be utilized for municipal decision-making in relation to achieving satisfaction with the residential environment and sustainable development of cities.

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1. Introduction

The population in cities is constantly increasing due to the fact that large urban areas provide many benefits to inhabitants such as better employment opportunities and a wider spectrum of available services or leisure activities. On the other hand, high population density is closely related with several negative aspects (noise, pollution, heavy traffic, low level of safety on streets) that may significantly affect quality of life. Responsible city government

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should therefore observe how residents perceive various aspects affecting their satisfaction with life in certain locations. Continuous monitoring and evaluation of the key aspects promotes achieving sustainable development of the residential environment if appropriate measures are implemented timely.

Therefore, the research aim of this paper is to identify the most significant indicators that people strongly perceive as influencing elements of quality of their life in cities. In particular, this research explores and compares the three largest cities in the Czech Republic: Brno, Prague and Ostrava. The comparative study evaluates whether there are significant differences between those cities, or whether the perception of the individual indicators by inhabitants is universal regardless of the specifics relating to particular locations.

The authors begin by introducing the research background. Then, a methodology used for the purpose of realization of this research is explained. As a next step, the results are presented and finally discussed with a view to providing urban decision-makers with useful information that could help guide their work in accordance with sustainable development principles and promote public satisfaction.

2. Research Background

The issues of quality of life in cities, public satisfaction and sustainable development are the subject of intense attention of researchers worldwide. As examples the following references can be named: studies for Nigeria [1], Malaysia [2], China [3], Czech Republic [4], Estonia [5], France [6], UK [7] and South Korea [8]. Some of these studies deal with a specific population group (e.g. migrant workers [3] or elderly people [4]), while others focus on a narrow phenomenon, e.g. on police [8] or distance from highways [9].

The problem is how to measure and evaluate satisfaction with residential environment and/or sustainable development of urban areas, as there is no general consensus among experts. The literature identifies a number of different approaches based on a heterogeneous set of indicators. The variety of approaches related to the measurement of sustainability and satisfaction of residential areas is presented in Table 1. The above results from the assertion that built environment does not constitute a tightly structured system, rather it is an arena where a certain various interactions and actors become visible [10].

Table 1. Approaches to measuring sustainability and satisfaction (list of examples)

Research source	Aspect	No. of indicators
[1]	Satisfaction	31
[2]	Satisfaction	45
[3]	Satisfaction	36
[6]	Satisfaction	23
[11]	Sustainability	15
[12]	Sustainability	22
[13]	Satisfaction	2

The crucial factor is whether the issue of residential satisfaction encompasses both housing and neighborhood satisfaction [13]. From this perspective some negative impacts can be reduced by individuals (e.g. by using quality sound insulation in wall structures [14] – housing satisfaction), while others, such as outdoor noise, should be addressed in another way (e.g. by implementation of noise barriers by the authorities – neighborhood satisfaction). Although there are some serious housing phenomena (e.g. aspect of healthy buildings [15] and indoor air pollution [16]), in this study, we focus solely on neighborhood satisfaction, which is primarily within the purview of authorities.

In many cases, neighborhood satisfaction and environment are significantly affected by construction projects. For example, transportation projects such as underground railways may cause vibration [17], urban highways are related to noise and pollutants [18] and execution of construction works creates e.g. dust (in this context type of material used is important [19]). Since relevant socio-economic benefits and costs also affect economic efficiency of transport infrastructure project [20], the influence of these projects cannot be neglected. In addition, transport infrastructure may have significant spatial impact since they may cause segregation. However, such spatial

segregation does not always have only negative effects, because the town gets new features e.g. in the form of opening of new educational institutions or spontaneous public spaces [21]. From the perspective of sustainability of the build environment, also the performance of energy efficient buildings should be addressed properly [22].

Unfortunately, the responsible municipal authorities often do not know what ails their inhabitants. Therefore, the purpose of this paper is to provide them with information identifying areas in which they should take measures supporting the improvement of the residential environment.

The authors of this study have already completed the first part of the related research focusing on the identification of the most important indicators influencing the quality of residential environment with potential for implementation in the decision-making process [23, 24]. The second published study [24] compared three cities at an international level: Brno (Czech Republic), Rijeka (Croatia) and Podgorica (Montenegro) by using a set of 22 predefined assessment indicators. The results showed that citizens of Brno and Rijeka perceive these indicators in a more similar way than do citizens in Podgorica. As a second step, a comparison at national level was performed and is presented in this paper. An identical set of indicators is also applied in this study. This set of assessment indicators is designed in such a way it can take into account various types of aspects, e.g. spatial, technical, environmental, esthetic and traffic aspects.

3. Methodology

This paper aims to identify and compare the most significant indicators perceived by residents as elements that influence the quality of their life in the cities of Brno, Prague and Ostrava (Czech Republic). Disparities in the requirements of the residents were examined through a set of 22 predefined indicators. The choice of these indicators was made during an expert panel discussion, and the process is described in detail in a previous research [24] (see above).

Study Area: The three largest cities in the Czech Republic have been selected to explore the residential requirements on neighborhood satisfaction. Basic data on the cities examined is given in Table 2.

Brno is the second largest city in the Czech Republic, characterized as the seat of judicial authority, a municipality with a high concentration of universities and a famous exhibition center. The city is located in the southeastern part of the country, at the confluence of the Svatka and Svitava rivers.

Prague is the political, cultural, and economic center of the country, a well-known tourist destination with significant historical attractions. Prague is situated on the Vltava river in the center of the Bohemian Basin.

Ostrava is located in the northeastern part of the country close to the Polish border. The historical development of the city is related to the exploitation and processing of high-quality black coal, and the city therefore still has a strong industrial character with a highly polluted environment.

The differences between the examined cities can be illustrated by the population, rate of unemployment or average wage.

Table 2. Basic description of study area

Data character	Brno	Prague	Ostrava
Population [no. of residents] [25]	377,508	1,243,201	295,653
Total area [km ²]	230 [26]	496 [27]	214 [28]
Population density [no. of residents / km ²]	1,641	2,506	1,382
Elevation [m]	190 to 425 [26]	230 (average) [27]	193 to 336 [28]
Geographic coordinates	49° 12' N. lat., 16° 34' E. long. [26]	50° 05' N. lat., 14° 27' E. long. [27]	49° 48' N. lat., 18° 14' E. long. [28]
Rate of unemployment [%] [29]	8.8	4.6	11.0

Survey and data: Data was collected in a web-based survey. The study population consisted of the inhabitants of the respective cities, in order to ensure sufficient personal knowledge of the residential environment examined. The survey consisted of 22 assessment indicators (see Table 3) that have been identified as relevant in a previous part of

this research [23, 24]. To allow for a potential future comparison of data from different locations, no changes have been made in the set of indicators.

Respondents were asked to give their opinion on a 5-point Likert scale to each indicator (1 – negligible indicator, 2 – indicator of little significance, 3 – significant indicator, 4 – very significant indicator, 5 – key indicator). Respondents were also asked for additional data (age, place of residence within the city and the type of housing: whether house or flat). In total, 595 questionnaires were collected, of which 219 were for Brno, 236 for Prague and 140 for Ostrava.

Evaluation of data: As a first step, data was evaluated by means of average grades. Since the overall grades for examined cities are different, such values cannot be compared directly, and therefore it is necessary to express them by means of their weight in the total set. This normalization has been conducted by using the following equation:

$$w_i = \frac{g_i}{\sum_{i=1}^{22} g_i} \quad (1)$$

where w_i = weight of the i -th indicator, g_i = grade of the i -th indicator.

4. Results

In this phase of research, evaluation of the additional data is not performed. The comparative study is based exclusively on the assessment of indicators made by the study population. Overall grades for examined cities were 70.078, 73.233 and 74.243 for Brno, Prague and Ostrava respectively. Normalized data in the form of indicator weights, according to formula (1), are stated in Table 3.

Table 3. Indicator weights

Indicator	Indicator name	Brno	Prague	Ostrava
C1	Distance to the city center	0.0465	0.0448	0.0405
C2	Availability of free parking space	0.0447	0.0478	0.0481
C3	Clean air	0.0486	0.0471	0.0490
C4	Safety	0.0579	0.0554	0.0548
C5	Good public transport connection with the city center	0.0573	0.0568	0.0498
C6	Well maintained surroundings (environment)	0.0491	0.0493	0.0471
C7	Noise (traffic, close manufacturing, etc.)	0.0530	0.0529	0.0509
C8	Presence of drugs in neighborhood	0.0520	0.0529	0.0536
C9	Drinking alcohol in public places	0.0447	0.0428	0.0438
C10	Homeless people on the street	0.0508	0.0499	0.0466
C11	The architectural appearance of the neighborhood	0.0403	0.0392	0.0386
C12	Availability of services (shops, hairdressers, etc.)	0.0487	0.0491	0.0481
C13	Distance to school	0.0460	0.0428	0.0485
C14	Distance to kindergarten	0.0414	0.0414	0.0469
C15	Distance from health facilities	0.0418	0.0433	0.0472
C16	Distance from recreation areas (parks, forests, water areas, etc.)	0.0456	0.0473	0.0451
C17	Distance to cultural institutions	0.0371	0.0386	0.0380
C18	Distance to workplace	0.0483	0.0467	0.0465
C19	Distance to pharmacy	0.0369	0.0374	0.0384
C20	Sporting opportunities (courts, sports halls, pools, etc.)	0.0372	0.0380	0.0401
C21	Barrier-free solution for neighborhood	0.0310	0.0324	0.0351

issues, in particular the problem of noise. In addition, also the problem of accessibility should be properly addressed, due to the predominance of private transportation in certain cities [31]. However, this accessibility should also be provided for pedestrians through walkable areas and support people in leading more active and healthy lifestyles [32] in greenery [33]. Municipal representatives should therefore take into account the interaction of the population, built environment and habitat aspects (so called “demoecosystem”) [34].

Based on the presented data it can be argued that prioritization of the decision-making process should respect the specific characteristics of locally relevant phenomena in order to promote achieving residential satisfaction. Therefore, local authorities should conduct ongoing investigation so that current data remains available and support the implementation of appropriate measures in time.

6. Summary

The research presented in this paper was focused on perception of the residential environment in cities. The objective was to identify and compare the most significant indicators of residential environment quality in Brno, Prague and Ostrava. Data on 22 indicators was collected in a web-based survey and evaluated by means of indicator weights. It has been found that there is a strong correlation between the perception of assessment indicators in Brno and Prague, while residents in Ostrava have assessed their significance in a slightly different way. Therefore, it can be concluded that local specificities must be properly taken into account.

This research has two main limitations. Firstly, the presented results express only the weights of particular indicators in the whole set. At this stage of research, the authors had no ambition to identify the causes of indicators being assessed as significant or insignificant.

Secondly, the authors had no ambition to deal with proposals for appropriate measures, the implementation of which would help improve the perception of the individual indicators.

Future research should address specific causes of dissatisfaction with the residential environment in relation to the most significant indicators identified, and it should also explore whether the size of the city (measured e.g. by means of the population figures) is in some way correlated with the weights of particular indicators.

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