Development of the system of quality indicators for multi apartment building surrounding grounds

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***Abstract*— Building surrounding grounds in a great measure create quality of urban environment, necessary for every resident, and are one of the main sources of its development. Nowadays the qualitative assessment of building surrounding grounds is subjective and not complete enough. Regulatory and legal framework doesn't contain qualitative and quantitative reference points understandable for population. There is no unified regulatory document establishing obligatory quality indicators of beautification and maintenance of building surrounding grounds. It makes it hard for owners and tenants of residential premises to verify fulfillment of agreement commitments and impedes the possibility of applying economic sanctions. A methodological approach has been proposed, the system of quality indicators of multi apartment building surrounding grounds has been developed. The practical significance of obtained results lies in usage of quality indicator system in order to develop standards of housing and utilities services quality assurance organization. It will allow to build up more effective contract relations of homeowners and tenants with managing authorities, make efficient use of financial resources, satisfy demand for high quality housing services more perfectly. The developed system of quality indicators of multi apartment building surrounding grounds was evaluated by managing authorities of Primorsky region during creation of organization standards.**

Keywords—quality indicators; building surrounding grounds; housing services; management organization; multi-apartment building

I. INTRODUCTION

Once leaving their homes, people find themselves in the public micro-space – in the building surrounding grounds which used to be normally called a yard. The building surrounding grounds largely contribute to the generation of the level of urban environment which is necessary for all residents, and serve as one of the main sources of its development. Now that the micro- and macro-spaces of cities are occupied by cars, no proper landscaping is available, yards are poorly lit, intra-block roads and sidewalks are broken, and the maintenance and improvement of the building surrounding grounds often require an individual approach, the qualitative assessment of the building surrounding grounds by management organizations, owners and tenants is becoming ever more relevant.

The analysis of existing methods and techniques for qualitative assessment of multi-apartment building surrounding grounds [1-7] showed that while being quite complex in use, they do not provide any opportunity to fully and objectively assess the quality of the building surrounding grounds due to the absence of any clear qualitative and quantitative criteria stipulated in regulatory documents. In addition, the existing extensive regulatory framework in the sphere of maintenance and improvement of building surrounding grounds [9-22] is fragmented, unstructured and uncoordinated. Some documents contain vague and incomplete terms for qualitative assessment of building surrounding grounds like "proper maintenance", "improper quality". Therefore, at present there is no uniform regulatory document which would establish the criteria of quality in accordance with mandatory standards of improvement and maintenance of building surrounding grounds.

As a result, at the stage of entry into management agreements the management organizations are unable to take into account all applicable statutory requirements. This largely eliminates any verifiable public control over performance of contractual obligations and the ability to apply economic sanctions. Until this approach is developed and introduced into contractual practice, the contractors' corrupt practices in tampering with the scope, volume and quality of housing services remain a strong possibility.

The relevance of this problem is also evident from the fact that pursuant to Federal Law of the Russian Federation dd. July 21, 2014 No. 209-FZ "On the state information system of housing and communal sector" [23, 24], the management organizations are obliged to notify the residents of their activities, including the quality and frequency of the works for maintenance of the common facilities of multi-apartment building being performed by them, and of presence of any deviations from the quality indicators and values of such deviations.

In this context, the reasonable need for development and implementation of the uniform system of quality indicators for the multi-apartment building surrounding grounds is growing more relevant.

II. Setting a task

A. Purpose of study

was to develop the system of quality indicators for the multi-apartment building surrounding grounds.

B. Objectives

According to basic principles of qualimetry [24], quality of building surrounding grounds should be treated as a system forming a hierarchical structure (properties tree). Each property is described by a numerical value (absolute index), which may be measured in some way or another. In this connection, in order to achieve the purpose of study, we need to solve a complex of related tasks:

- to analyze regulatory framework in the sphere of improvement of building surrounding grounds in terms of objective assessment of quality;

- to develop a structural flowchart of quality indicators of improvement and maintenance of milti-apartment building surrounding grounds;

- to assign a standard value to each single quality indicator.

III. Theory

It is commonly known that the assessment of quality of any object represents a set of operations which includes selecting of the list of quality indicators, setting their numerical values, as well as values of basic, relative and composite indicators [25, 26]. In order to give a comprehensive description of the quality of building surrounding grounds, we used the multi-level structure of quality indicators – "properties tree" as some most generalized, complex property of a product. As a result of analysis of statutory framework in the sphere of improvement of the building surrounding grounds [8-15] we have identified 5 first-level group indices: state of sidewalks and access roads, maintenance of grounds, state of outdoor lighting, state of landscaping, sanitary condition (Figure 1).

The hierarchical structural flowchart of quality indicators of a multi-apartment building surrounding grounds which has been created by us serves as a system representing a whole composed of a set of elements (quality indicators) interrelated and interconnected between themselves which form a certain entirety.

Each generalized first-level indicator represents the total of simple individual indicators obtained by sequential decomposition of each more complex property into a series of less complex ones. For instance, the groups of quality indicators representing composite second-level indicators are divided into subgroups – the third-level indicators. Third-level indicators are the individual indicators for assessment of the quality of building surrounding grounds.

Pursuant to GOST 15467-79 [27], a required condition for an objective assessment of quality of an item is the quantitative characteristic of its properties. The regulatory documents establish the standard values of indicators for quality of improvement and maintenance of multi-apartment building surrounding grounds (Table I) which are determined using the methods applied in qualimetry, such as instrumental (metric), organoleptic, registration, mixed, expert and sociologic methods [24].

The structure of quality indicators developed by us is universal, as it may serve as a basis for qualitative assessment of building surrounding grounds of various types. The specific indicators are chosen on the basis of numerous factors, such as season (summer or winter period), size of building surrounding grounds, availability of grounds, number of cars belonging to the residents of the multi-apartment building etc.

IV. Practical relevance

Practical relevance consists in development of the system of indicators for assessment of quality of the building surrounding grounds which system can be used to create more productive contractual relations between owners and tenants of residential premises in multi-apartment buildings with management organizations, to make efficient use of financial resources, to more fully meet the homeowners' need for high-quality public utilities, as well as in their possible use to assess the quality of the whole complex of housing services in the sphere of improvement of the multi-apartment building surrounding grounds.

The quality indicator system developed by us was tested in the building surrounding grounds of the multi-apartment buildings in the cities of Primorsky region. The testing consisted in assessment of the quality of building surrounding grounds by specialists of management organizations (experts) on the basis of identification of compliance of each indicator with its standard value: 1 score – for compliance, 0 score – for non-compliance. For the same purpose, the conventional questionnaire-based survey among the residents of these buildings was conducted.

The results of comparative analysis of the obtained data and findings of questionnaire-based survey among the residents (Figure 2) showed that in general the experts and residents positively assess the quality of building surrounding grounds. The significance difference in the assessment on "State of landscaping" and "Maintenance of grounds" made by experts who used the newly developed system of building surrounding grounds quality indicators and by the residents demonstrate the residents' inability to make an objective assessment due to unavailability of information about the nature of indicators and standard values serving as a basis for assessment of building surrounding grounds.

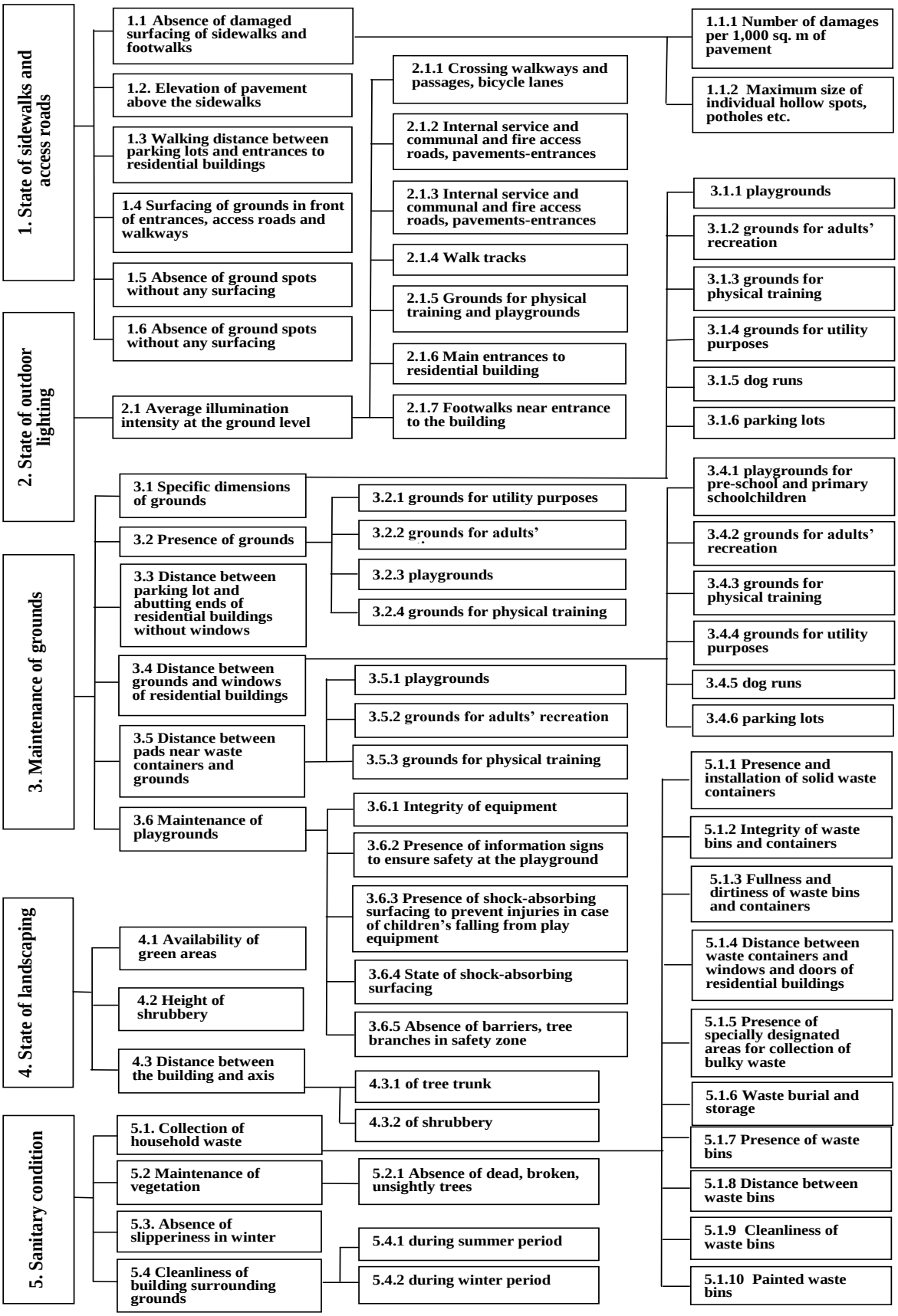

Fig. 1. Hierarchical structural flowchart of quality indicators of a multi-apartment building surrounding grounds

TABLE I. A FRAGMENT OF TABLE OF STANDARD VALUES FOR QUALITY INDICATORS OF IMPROVEMENT AND MAINTENANCE OF A MULTI-APARTMENT BUILDING SURROUNDING GROUNDS

Group index	First-level index	Second-level index	Standard value	Note	Statutory document
3. Maintenance of grounds	3.1 Specific dimensions of grounds, sq. m/person:	3.1.1 playgrounds	0.7	The specific dimensions of playgrounds, grounds for adults' recreation and grounds for physical training may be reduced (but no more than by 50%) in climatic subdistricts IA, 1Б, 1Г, IЦ, ИА и IVA, IVI", in districts with dust storms (subject to creation of closed premises), grounds for utility purposes (in case the residential buildings have 9 or more floors), grounds for physical training (if a single centre of physical training and recreation for schoolchildren and residents is created	8
		3.1.2 for adults' recreation	0.1		
		3.1.3 for physical training	2.0		
		3.1.4 for utility purposes	0.3		
		3.1.5 dog runs	0.3	Construction and arrangement of dog runs is permitted by agreement with relevant authorities in accordance with the established procedure	9
		3.1.6 parking lots	0.8		8
	3.2 Presence of grounds	3.2.1 for utility purposes	Yes	For drying and cleaning of clothes, carpets and other household items. The ground must have poles with mechanism for drying of clothes, rods for drying of clothes, hangers, box with sand, waste bin and a table with benches. The ground should be hedged.	9
		3.2.2 for adults' recreation	Yes		
		3.2.3 playgrounds	Yes	With landscaping and required hardscaping for summer and winter recreation of children	
		3.2.4 for physical training	Yes		
	3.3 Distance between parking lot and abutting ends of residential buildings without windows, m		10	With number of cars equal to: 10 or less	8
			10	11-50	
			15	51-100	
			25	101-300	
	3.4 Distance between grounds and windows of residential buildings, m	3.4.1 playgrounds for pre-school and primary schoolchildren	12		8
		3.4.2 for adults' recreation	10		
		3.4.3 for physical training	10-40		
		3.4.4 for utility purposes	20		
		3.4.5 dog runs	40		
		3.4.6 parking lots	10	With number of cars equal to: 10 or less	
			15	11-50	
			25	51-100	
			35	101-300 Minimal distance between the slab residential houses and open spaces accommodating 101-300 cars arranged along the longitudinal facades should be taken as equal to 50 m.	

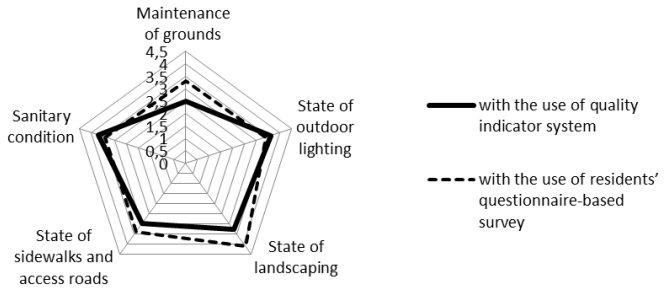

Fig. 2. Results of comparative analysis of building surrounding grounds improvement assessment made with the use of quality indicator system and by questionnaire-based surveying of residents

The analysis of obtained results of the study helped to identify the following problems in improvement and maintenance of building surrounding grounds:

- demolition (or absence) of sidewalks and access roads;

- vehicles parked on sidewalks;

- scanty vegetation;

- non-compliance with standards for planting trees (high trees grow less than in 5 meters from walls and windows of the buildings), which results in appearance of dampness in the apartments, diseases and excessive consumption of electricity due to inadequate insolation;

- absence of playgrounds or major non-compliance with requirements for their safety and landscaping (no shock-absorbing surfacing is present, equipment is broken, landscaping is inadequate, presence of plants hazardous for children's health);

- non-compliance with hygienic standards in the form of loose-lying garbage beyond specially designated places;

- total absence of hardscaping или its improper appearance in the territories of some buildings.

A number of specific recommendations was proposed to solve the identified problems.

Conclusions

As can be seen from the above, we have developed the system of quality indicators for assessment of building surrounding grounds, which is composed of several subordinate levels, at which the indicators relatively independent of each other are arranged. For each indicator, there is a standard value allowing to competently identify these indicators and to take their properties into account in assessment of quality of improvement and maintenance of multi-apartment building surrounding grounds.

Use of the quality indicator system developed by us for assessment of quality of building surrounding grounds provides an opportunity to identify the principal problems of improvement and to give to management organizations, homeowners and municipal authorities reasonable recommendations for integrated resolution of such problems.

This system is an open-end system and can be supplemented by new indicators and corresponding standard values in accordance with regional specific features, such as climate, local topography, type of housing system etc.

The quality indicator system developed by us may serve as a basis for creation of a methodology for assessment of quality of multi-apartment building surrounding grounds.

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