

# Assessment Of The Urbanized Territory Improvement Rate

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**Abstract.** The urbanization process is inevitable for any city-planning system. Despite all its benefits, urbanization has an adverse effect on the visual image of an existing city-planning system. The urbanization process results in an unbalanced style of the architectural layout of the settlement, as well as disrupts the balance in the natural environment. But the said process cannot be avoided, as it is necessary for the development of the city-planning system itself. It is required to work out a complex of measures, aimed at the improvement of the city-planning system performance and creating favorable living conditions for the population of this system. The work presents the findings of the theoretical research based on the scientific assessment of urban amenities. With the qualimetry approach being applied, the weight coefficients were assigned to the factors, reflecting the improvement of urbanized environment. The use of the weight coefficients, presented in this work, will make it possible to identify the most changeable components and develop a complex of measures intended to create a favorable urbanized environment.

## 1. Introduction

Urban improvement is a broad notion. As specified in legislative documents urban improvement includes landscaping, lighting, non-fixed hardscaping and other engineering arrangements aimed at enhancing functional, health-based, ecological and esthetic characteristics of the urban environment. The listed elements shall be accounted for as a design is developed. As the urban territory is urbanized (developed), the functions of urban system become busier, transport and recreation infrastructure may fail to meet the increasing volume of community needs. Besides the urban environment elements provided by design are subject to deterioration. The deterioration can be not only physical and functional, but also external. Repair cycles are worked out in conformity with that deterioration. Repair works include the refurbishment of building elements and structures of the urban area, but they do not involve the upgrade of the existing elements with due regard to the community needs. At the stage of the development of city-planning environment one can specify the improvement degree by the availability of urban environment elements in the design. In the course of use, the urbanized territory improvement degree can be estimated based on its perception by population. This work presents the findings of the investigation of urban improvement perception by population.

## 2. The identification of the main elements of urban environment, having the major effect on human under the conditions of urbanization

As the urbanization goes on, the city improvement rate declines for the following reasons: normal deterioration of city environment elements; the failure to conform to increased consumption and needs



of population; the violation of the architectural style caused by urban densification which most likely takes place. [1]. In the first place those factors exert a detrimental effect on psychoemotional state of people. [2, 3, 4]. A combination of the above mentioned factors affects human health on the whole, as the urbanization process itself leads to the environmental misbalance. [5, 6, 7, 8, 9, 10]

In order to improve urban living conditions and create a favorable city-planning environment as a constituent of the social well-being system for a modern cosmopolitan centre, it is necessary to identify the detailed characteristics, which allow estimating the degree of comfort of the urbanized territory. The standard defines the elements of urban environment, which ensure a required level of territory improvement in conformity with the time period when the standard is worked out. During the time when the standard is valid, demands rise, urban infrastructure develops, construction density increases. All these processes are connected with other processes of urban maintenance [11]. There emerges a necessity to raise and develop the degree of comfort of the urbanized territory. The available urban environment elements meant to ensure territory improvement often are not perceived by population as being in place. Ensuring a visual perception of a required level of urban improvement will make the citizens satisfied when they perceive said environment, and create comfortable conditions of life in this environment. [12].

The work [13] considers estimating the development of the urban improvement sphere from the viewpoint of the city-planning infrastructure level. Many researchers consider urban improvement with regard to the availability of plantation, developed recreation areas, [14, 15, 16, 17, 18], but it is not enough to ensure desired perception of urbanized environment by the city population from the viewpoint of its improvement. Residential improvement can be estimated according to the development of engineering and communal infrastructure [19]. However this sphere is much broader, it includes the improvement of urbanized territories and requires an integrated assessment of the urbanized environment elements, making the level of territory improvement. This work presents a complex approach of assessing the improvement level of an urbanized system based on visual perception thereof.

### **3. The assessment of urbanized environment element significance using the qualimetry approach in order to define the territory improvement rate**

To define the characteristics, influencing the quality and livability of the city-planning area, three main elements of city-planning environment have been identified: buildings, recreation areas and ecological characteristics of this environment. Buildings are main and prevailing elements of a city-planning system. Buildings in a city-planning system can be residential, office and industrial [20, 21]. Recreation areas of the city-planning system are the main system element, characterizing the territory improvement rate. Recreation areas include plantation of public- and restricted-use areas. Ecological characteristics of urbanized environment define the degree of the established system of human protection from the exposure to the elements of this environment (transport, industrial plants and wastes).

Based on the detailed analysis of the first level initial characteristics, described above, 5 levels of indicators, describing the rate of urban territory development, have been identified. A «tree» of indicators reflecting the interdependence of urbanized environment elements, was worked out. 58 factors influencing the urbanized environment improvement rate were defined (Table 1). Based on the qualimetry approach and with account of the scientific assessment, weight coefficients were assigned to the factors of the city-planning system improvement rate. Resulting coefficients show urban improvement indicator relevancy from the perspective of visual perception of a considered territory by experts. The most significant first level factors as decided by experts are recreation areas, the weight coefficient for this parameter being 36%, buildings and ecological parameters - 33 и 30% correspondingly.

**Table 1.** The values of the weight coefficient, characterizing the territory improvement rate.

No.	Description	Value
1	Design hardscape used for the improvement of residential areas	0,4
2	Design hardscape used for the improvement of the territory adjacent to industrial buildings	0,3
3	Species composition of plantation at the territory adjacent to industrial buildings	0,4
4	Utility hardscape used for the improvement of the industrial facility territory	0,4
5	Design hardscape used for the improvement of the territory adjacent to office buildings and malls	0,5
6	Walking accessibility of industrial buildings	0,5
7	Utility hardscape used for the improvement of the territory adjacent to office buildings and malls	0,6
8	Vehicle accessibility of industrial buildings	0,6
9	Species composition of plantation at the territory adjacent to office buildings and malls	0,6
10	Obsolescence of façade elements of office buildings and malls	0,6
11	Utility hardscape used for the improvement of the territory of residential districts	0,7
12	Ornaments used at facades of industrial buildings	0,7
13	Vehicle accessibility of office buildings and malls	0,7
14	Walking accessibility of office buildings and malls	0,7
15	Style combination of office buildings and malls with the surrounding settlement (assessed by visual perception)	0,7
16	Configuration of industrial buildings	0,8
17	Species composition of plantation at the territory adjacent to residential buildings	0,8
18	Walking accessibility of residential buildings	0,8
19	Style combination of industrial buildings with the surrounding (adjacent) territory	0,8
20	Lighting used for the decoration of industrial building facades	0,8
21	Vehicle accessibility of residential buildings	0,8
22	Ornaments used for the decoration of facades of office buildings and malls	0,8
23	Configuration of residential buildings, characterizing their performance	0,9
24	Plantation condition at the territory adjacent to office buildings and malls	0,9
25	Utility hardscape along walkways	1,0
26	Obsolescence (external depreciation) of residential building façade elements	1,0
27	Building illumination	1,0
28	Building facade ornaments	1,0
29	Plantation condition at the territory adjacent to industrial buildings	1,0
30	Industrial building façade color scheme	1,0
31	Configuration of office buildings and malls	1,0
32	Style combination	1,1
33	Color scheme used at residential district buildings	1,2
34	Color scheme of the facades of office buildings and malls	1,2
35	Plantation condition at the territory adjacent to residential buildings (courtyard decoration)	1,2
36	Proportionality of dimensions of office buildings and malls	1,2
37	Façade illumination at office buildings and malls	1,3
38	Proportionality of dimensions (length, height, width) of residential buildings	1,3
39	Proportionality of dimensions (length, height, width) of industrial buildings	1,5
40	Systematic character of recreation areas, connection with an adjacent territory, green corridors available	1,6
41	Obsolescence of industrial building façade elements	1,6

**Table 1.** The values of the weight coefficient, characterizing the territory improvement rate.

42	Availability of different public transport routes and the number of routes, going through a given recreation area	2,0
43	Parking areas near a recreation territory	2,0
44	Public transport stops in place	2,1
45	Condition (external depreciation) of roads and pathways within a recreation area	2,3
46	Making sanitary and protective gaps based on an industrial plant type	2,6
47	Making protective shields along the perimeter of an industrial plant	2,8
48	Making protective shields along a streetway	3,0
49	Making gaps between a highway and urban environment elements depending on the vehicle density	3,2
50	Protective plantation along the perimeter of an industrial plant	3,5
51	Protective plantation along highways	3,6
52	Functionality of the recreation area, its being in conformity with the site plan	3,8
53	Utility hardscape used inside a recreation area	3,9
54	Species composition of plantation used for the improvement of a recreation area	4,4
55	Watering system inside a recreation area in place	4,4
56	Design hardscape used inside a recreation area	4,2
57	Visual condition of plantation system inside a recreation area and around it	4,8
58	Waste collection at a considered territory	11,6

#### 4. Conclusion

Proposed factors reflect the urbanized environment improvement rate to the fullest extent. The weight coefficients identified on the basis of the conducted theoretical research inclusive of working out a “tree” of indicators characterize the factor relevancy in the general assessment of urbanized environment improvement. These factors will make it possible to hold a visual assessment of the improvement rate for given urbanized territories. It seems necessary to develop assessment criteria and specify the range of assessment for each of the introduced factors, aimed at preventing the subjectivity of expert opinion. At the same time natural and climatic features of the assessed territory should be also kept in mind. Such assessment will offer an opportunity to highlight missing elements, as viewed by experts, with regard to how the improvement of assessed urbanized environment is perceived. To discover low rate improvement elements, it is required to work out an action plan aimed at the upturn of this factor as an assessment criterion and a more positive perception of urbanized environment improvement in general. The main advantage of the described weight coefficients is that they are universal and adaptable to any urbanized territory.

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