Information Support for Industrial Area Redevelopment Projects

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Abstract. Urban development is not only driven by higher residential density, taller buildings in business quarters, and intensive infrastructure development, but also by individual urban areas being repurposed. Industrial areas account for the highest potential in terms of area development within a city. Historically, such manufacturing conglomerates formed on the outskirts of cities, but the development of any urban community is tied to its area expanding. Thus manufacturing facilities once located on the outskirts have come to be in the central parts of large cities where they create an excessive burden on the environment; and make products at inevitably higher costs due to additional expenditure because of the high cadastral value of land and buildings within a city, high wages that have to be paid to specialists living in large cities, and other factors. Decisions on the renovation of industrial areas are made by municipal authorities and the main goal of an investor at the initial stage of entering a project is to form the structure of information support for a project making it possible to design, manage, and launch a redevelopment project.

1. Introduction
Despite high-density development in large cities all over the world, virtually unused areas still exist. So-called industrial areas stretch over dozens of hectares. Most of them ceased production years ago and have turned into chaotic warehouses and dumpsites.

One of the most important aspects of urban development is the comprehensive renovation of a city’s built-up areas with the aim of creating favourable living conditions and efficient use of the production, engineering, scientific, and other kinds of potential of the construction sector [1-4].

2. Materials and methods
The main factor driving renovation growth rates is the fact that many large cities have by now exhausted their internal territorial resources and experience a serious deficit of territorial reserves fit for large-scale development. The problem of rational location of a city’s industrial facilities with the aim of increasing land resources faced Moscow authorities as far back as the end of the previous century: a list of several hundred facilities for relocation outside Moscow was drafted then. The perestroika prevented the plan from being fully implemented, but the process gained momentum [2;3]. Nowadays the importance of such reorganization has grown immeasurably because the construction boom that began in the late 1990s has almost exhausted spare land resources available for large-scale development in the capital. Analysis
of the Moscow territory showed that about 17% of the city is occupied by industrial areas – more than 70 estates most of which are not used for production and are partially leased out [2-4].

Figure 1. Industrial areas in Moscow as of 2014

Reorganization of industrial areas is an important matter for the city requiring active participation of investors. The main problem when they are redeveloped is that these areas often have several owners whose plans differ. [2]. Some actively try to find ways to reorganise their plots; others, for instance, simply earn money by leasing their own plot [3].

Federal Law No 373-FZ signed by the President of Russia on 3 July 2016 provides conditions for the comprehensive development of territories within city borders.

For the purpose of efficient management of city territory and creation of a favourable and comfortable environment for citizens, the law expands the four legal frameworks set forth in the Town Planning Code for developing territories based on contracts (development of a built-up area; comprehensive development of territory; development of a territory with the aim of building economy housing; comprehensive development of territory with the aim of building economy housing) with another two legal frameworks [4]:
- comprehensive development of territory on the initiative of owners of land plots and (or) properties located thereon;

- comprehensive development of territory on the initiative of a local authority to enable a city to pass a decision on reorganising one or another site and cause the owner to take action.

To begin redevelopment (reorganization) of any industrial area, either changing its purpose or keeping its manufacturing function, high-quality design documentation has to be drafted that will encompass all specifics of building this kind of facilities [5].

The importance of drafting high-quality design documentation is impossible to overestimate. Along with standard solutions, a more expensive but tailored and professionally produced design will lay the groundwork for the success of the entire project taking the quality of the product to a whole new level, bringing additional competitive advantages, shortening the construction time, and cutting direct and indirect costs [5].

Support is provided and approvals are obtained for a project allowing for specifics of federal and regional legislation. For example, projects to adapt or renovate cultural heritage objects (CHO) usually require a lot of regulatory approvals. While they are obtained, the original design solutions may undergo serious changes negatively affecting the functionality of the properties, their cost, and deadlines. When a project implementation model suggests that changes be made to functional zoning of an area, prior to making a serious investment one needs to find out if that change is feasible at all, then obtain appropriate permissions, and develop a project to lay out the area. One should draft the future project’s parameters under a pessimistic case scenario [6].

3. Results and discussions
To improve the reliability of design solutions to reorganise industrial areas, i.e. decrease the ratio of failed projects to successful ones, it is necessary to assess the performance of design organizations and create an organizational and technological model for project development when redeveloping industrial facilities in Russia. This process must use modern theories and ground-breaking works by Russian and international scholars on design and redevelopment of industrial areas; as well as Russian laws and regulations that determine the composition and contents of design documentation [7].

To ascertain the quantitative assessment of design a mathematical model for assessing the performance of design organizations can be used. Mathematical means enable systematising empirical data, discovering and formulating quantitative dependencies and regularities. For a model to be operational, it must comply with a number of requirements: inherence, simplicity, adequacy [8].

Prior to attributing a quantitative characteristic to the performance indicator of design organizations, it is necessary to decide what “design quality” is and what parameters influence it. The required indicator depends on a certain set of parameters. In this case, the quality of design documentation implies such development of each project section that passed design decisions comply with all applicable regulatory documents; site survey reflects the actual construction site situation; all sections are interrelated and, as a consequence, the number of errors and drawbacks discovered during construction and assembly is minimal [9].

4. Conclusions
Finding key performance indicators of design organizations engaging in industrial facility conversion and the subsequent creation of a mathematical model will make it possible to assess the strengths and weaknesses of design organizations directly involved in redevelopment of industrial areas and to determine methods for improving the quality of design documentation.
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