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Reindustrialization, International Practices, and the Opportunities of Ekaterinburg (the case of the Uralmash district)

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Abstract. The article deals with the international practices of industrial areas renovation in the US and Spain. The main positive trends of the countries' development are described. The article also presents the theory of Mazayev, G.V. regarding the ranking of technological paradigms and their interconnection with a modern city. The city of Ekaterinburg is reviewed as a multi-paradigm city that includes industrial areas of the III technological paradigm. Considering the renovation from the point of view of the international practices and Mazayev's theory, a conclusion regarding Russia, particularly, Ekaterinburg, the Uralmash district, is made. The optimal path of developing the area of Uralmashzavod, PJSC, is presented. The conclusions regarding Ekaterinburg and, particularly, the Uralmash district are made based on the foreign countries' experience: the best scenario for the area of Uralmashzavod, PJSC will be transformation into a technology park with the advantages stated herein.

1. Introduction

The development of the city of Ekaterinburg has led to the necessity to change the urban planning. One of the important aspects of urban planning is the issue of industrial areas located within the city. The necessity to reduce the adverse impact on the environment leads to several conclusions, the main ones being transformation of the industrial area in order to give it a different function; and create conditions for the industry's development.

The article reviews the international practices of industrial areas renovation illustrated by an example of the US and Spain and the possibility to apply these methods in Russia, in particular, in Ekaterinburg, in the area of the Uralmash district.

2. International Practices

2.1. *The US*

The 2008-2009 world financial crisis led to the following conclusions regarding the reindustrialization in the US: "the industry is a consumer and a source of innovations, as well as the source of the increase in labour productivity, so these achievements should be applied to other sectors of the economy, which is easier to perform having its own industry". The main reasons for returning productions are as follows:

- Labour costs;



- Proximity to customers;
- Product quality.

One of the drivers of reindustrialization is the relative cheapening of labour as compared to China alongside the lowest energy prices among the world industrial leaders. [2]

According to the report “The Reindustrialization of the United States” [5], the authors define the reasons of reindustrialization commencement as follows:

- in the US, the labour costs per unit produced are some of the lowest among the world’s major economies;
- low energy prices due to large amounts of shale gas;
- quite low cost of capital due to the policy of the Federal Reserve System;
- competitive export in the majority of the US traditional export markets due to relative weakness of the US dollar;
- start of the slow growth of the real estate market.

2.2. Spain

Over the last decades, Barcelona has turned into an urbanistic experiment ground that has yielded positive results. The comprehensive approach to changing the city is the basic approach. Currently, the main task is to return to a productive city, creating a new economy using urban planning means, and revival of industrial areas. Thus, the reconstruction in the city is taking place at several stages, locally, which contributes to gradual transformation of the city. The Barcelona development concept provides the main idea that there is no need to rebuild the existing infrastructure completely, that new functions should be implemented gradually, and that the functions of the area should be changed if necessary.

Great examples of this approach are the urban renewal area 22@, reorganization of the Sants district, and reconstruction of the Plaça Cerdà area.

3. Theory of G.V. Mazayev

Cities created by the industrial revolution when production changed from the manufacturing system to the industrial one began to be built according to the “live near work” principle. Thus, cities should be classified by several aspects, one of the most important being the main function of a city [8].

Mazayev believes that the most important aspect is the main function of a city [8]. In the modern economics, the main concept that characterizes the development of the economy both on a country’s level and on a region’s level is the concept of a “technological paradigm” [9].

“Technological paradigm is a complex of technologies that are characteristics for a certain level of production development; due to the scientific advance, as well as the technical and technological advance, there is transition from lower-level paradigm to higher-level ones” [10].

A brief characteristics of each technological paradigm according to the theory of Mazayev is presented in Table 1 below.

Table 1. Technological Paradigm Ranking according to the theory of Mazayev, G.V.

Technological Paradigm	Technology	Urban Planning
First	Water energy	Cities and towns were located near water bodies that provided the energy component
Second	Steam energy	Near constant access to water
Third	Electricity energy (ferrous metallurgy, heavy engineering, electric engineering, chemical industry, non-ferrous metallurgy)	Industry is an integral part of a city
Fourth	Electricity energy (automobile manufacturing, heavy weapons’)	Closed administrative-territorial formations appear

	production, aircraft engineering)	
Fifth	Development of microelectronics, informatics technologies, and gas extraction, processing and refinement)	Clean productions near residential areas
Sixth	Development of nano- and biotechnology, genetic engineering, clean energy industry, and high-speed transport systems	Appearance of superagglomerations (utopia)

According to the theory of Mazayev, G.V.: “the technological paradigms do not replace each other but mutually ensure the stable existence of the whole economic system: the “lower” paradigms ensure functioning of the “higher” paradigms that cannot develop, while the “lower” technological paradigms can exist without the “higher” ones and existed for a long time before” [9]. The master plan of the city and the prevailing technological paradigm are interrelated. They form the complex planning system that includes residential, social, transport, and infrastructure subsystems. Changing one element of the system leads to issues in other elements that are inseparably associated with it [9].

The change of the production trend in several major economies is considered as a factor of transition to the post-industrial society. In Russia, however, reduction of the industry’s share is mostly caused by degradation and destruction [11].

Russia cannot move its industrial base that corresponds to technological paradigms III and IV to third countries – that would mean a national catastrophe and loss of statehood. Preserving these technological paradigms means preserving the corresponding cities’ planning systems.

Another trend of changing the industrial areas of technological paradigms III and IV in Ekaterinburg (which is only a project so far) is dividing large industrial areas of the city with transport networks. The city’s master plan provides for dividing the territory of the Uralmash plant with two city highways from the North to the South that would improve the connection of the northern part of the city and the city centre.

In a multi-function city, such as Ekaterinburg, industrial areas of the technological paradigm III are formed on the basis of the areas of the technological paradigm II. The majority of such areas are transferred to the category of lands for constructing business centres and residential buildings. As a result, the city’s master plan is changed which deteriorates the living standards: the time of access to workplaces, as well as load on the transport systems, is increased. Thus, substantial change in the occupational structure occurs: occupation in production decreases, while occupation in the sphere of commercial services provision, social sphere, and management sphere grows; an industrial city is transformed in a multi-function centre of providing services.

4. Application in Ekaterinburg

Ekaterinburg is one of Russian industrial and business centres that is transforming from an industrial city into a post-industrial one. Initially, the city was built as an industrial centre, the so-called “city-plant”. According to the theory of Mazayev, G.V., Ekaterinburg corresponds to the third technological paradigm, that is, industry is the main factor of the city’s development. Business and service spheres do not provide such economic development as production.

Uralmashzavod, PJSC can be considered a production base that provides immediate increase of the economic component of the city and the whole region. Anyway, an industrial area cannot be reviewed separately from the city cluster. According to Josep Acebillo, the Barcelona’s architect: “Industrial cities were clearly divided into zones and transport systems that connected the residential and the industrial areas of the city. Such a system will not work in post-industrial cities since the conditions and the economy have changed substantially. Nowadays, we do not live in one place and work in another, and buildings and districts have a lot more intertwined functions than several decades ago”. Thus, the plant should be considered together with the Uralmash district, being its integral part.

Initially, the Uralmash district was planned to be a separate cluster having its own infrastructure provided by Uralmashzavod, PJSC. This area started to grow from the territory of the plant and gradually became a complete district with its own historical and cultural heritage. Architectural features, dominant elements, and the points of attraction of the district were formed under the plant's influence, as well as the transport system that provided not only for transportation of the people but also for the transport accessibility of the plant.

Currently, when passing to a post-industrial city, one cannot disrupt the combination and hybridity of the district's functions. At this stage, everything is interrelated within the territory of the Uralmash district – road networks are located so as not to prevent simultaneous usage of the city's transport network and industrial area's network. All this has been forming for more than one decade. Now the plant can without any difficulty assemble some equipment within its territory and easily transport it to its place of destination without using the city's transport structure.

If one of the radical methods applied in the US were used, namely, transferring the area outside the city's boundaries, the crisis that erupted in the US would not be long in coming. This would also inflict damage on:

- the district's transport accessibility;
- people losing their jobs due to the impossibility to work during the period of re-establishment and moving;
- the Uralmash district would become a "ghetto" as the territory would not have the main point of attraction – the plant.

According to the opinion of Acebillo, one of the best urban planning specialists, "one should deal with transformation of the existing buildings, as with any other urban planning operation, with the greatest care – first one should define the future intended use of buildings and then perform partial reconstruction preserving their main architectural features. The advantage of this approach is that this provokes implementing new functions to the existing fabric of the city. No complete renovations".

By 2035, the rate of population increase in Europe will amount to 0 % and in Russia, less than 1 %. Thus, Josep Acebillo asks: "Do you need vast territories in the periphery, or you can use the existing infrastructure anew?"

At the current stage, there is a problem of re-functioning of Uralmashzavod, PJSC. It is assumed that the most rational step will be transforming this area into a so-called technology park. A technology park is a territorial, scientific, technological, and technical base for implementing innovative projects; a complex uniting R&D institutes, industrial facilities, business centres, exhibition areas, educational institutions, and service facilities (transport means, access roads, residential settlements, and security). The International Association of Science Parks and Areas provides its own definition of an object of innovative infrastructure.

Thus, this will provide the possibility for the territory to become an innovation centre having its comfortable infrastructure both inside the plant and within the district. This will contribute to the revival of the existing district and will not disrupt the transport infrastructure that is formed as direct passage from home to work; it will also contribute to gradual transition from the third technological paradigm to a higher level.

Two main advantages of technology parks are:

- Exemption from property tax.
- The profit tax is reduced from 20 % to 13.5 %.

The technology park based on Uralmashzavod, PJSC may have prospective young partners located within the territory of the future technology park.

5. Conclusion

Based on the international practices, the conclusions regarding Ekaterinburg and the Uralmash district can be made. The territory should be considered as a whole and one should presume the advantages and drawbacks that each method may have regarding the urban planning and economic component, as well as the impact on people living in this district. Thus, one can conclude the optimal path for the

territory of Uralmashzavod, PJSC, is transformation into a technology park with the above-stated advantages.

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