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THE POTENTIAL FOR INDUSTRIAL TOURISM DEVELOPMENT IN UKRAINE: KRYVYI RIH CASE STUDY¹

Abstract: The aim of the article is to investigate the industrial tourist potential of the city of Kryvyi Rih based on the identification and description of its industrial heritage. The potential for industrial tourism development in Kryvyi Rih as a city with a powerful base of active industrial facilities and heritage sites is revealed. Attention is focused on the importance and necessity of using its this potential for tourism development by declaring this goal in medium and long-term development programs and strategies. Examples of using the city's industrial heritage as tourist attractions are given. Problems and prospective directions for industrial tourism development in Kryvyi Rih are highlighted.

Keywords: industrial potential, industrial tourism, industrial heritage, urban tourism, Kryvyi Rih.

1. INTRODUCTION

Given its significant resource potential, the tourism industry in Ukraine is able to ensure the implementation of economic, social and humanitarian functions, namely, improving the standard of living of the population, increasing the share of tourism revenues in GDP, along with revenues from tourism activities in budgets at all levels. The importance and relevance of tourism development in Ukraine is emphasized in:

strategically oriented state policy, the main task of which is to determine tourism as one of the main priorities of the state, the introduction of economic and legal mechanisms for the successful conduct of the tourism business, investment mechanisms for the development of tourism infrastructure, information and marketing activities to form the tourist image of Ukraine (Kabinet ministriv Ukrainy, 2017).

At the same time, having all the conditions for the proper development of the economy through tourism, Ukraine lags far behind the leading countries in the world in terms of the development of its infrastructure and the range of quality tourism services. The need for specific diversification of the tourism services proposed and the tourism product in order to meet variable

demand and the tourism needs for both domestic and inbound visitors, smoothing seasonal fluctuations while increasing the competitiveness of the tourism industry in both European and national tourism space, encourages the use of the existing industrial potential and heritage for development.

A powerful industrial educational and cultural center in Ukraine is the city of Kryvyi Rih, whose main industry is the mining and metallurgical complex. The prospects for the development of industrial tourism in Kryvyi Rih are determined by the significant concentration in the city of industrial facilities that are of interest to tourists. The city has a number of unique, and world-famous, industrial enterprises and can offer potential tourists an acquaintance with a powerful mining and metallurgical complex, the largest both in the Dnipropetrovsk region and in Ukraine. On the other hand, industrial tourism helps to reduce the single-industry nature of the urban economy and deepen its diversification while promoting local economic development, stimulating market relations, and actively influencing the development of related sectors of the economy (hotel and restaurant business, transportation, etc.), construction, leisure and the production of consumer goods. It also promotes

employment, works to protect historical and cultural monuments and improves the cultural level of citizens (Kryvorizka miska rada, 2015).

Considering the above the main aim of the research is to investigate the experience of Kryvyi Rih in the realization of its industrial potential and industrial heritage for tourism development.

2. LITERATURE REVIEW

2.1. INDUSTRIAL TOURISM

The theoretical understanding of the phenomenon of industrial tourism in all its versatility has been carried out by researchers from many countries. Since the early 1980s, the American tourism school has been actively developing and its main representatives are MacCannel, Dodd, Véronique, Gustafson, Swarbrooke and Macionis.

Thus, in the United States, MacCannel, the American theorist, anthropologist and professor at the University of California, is considered the founder of the theory of industrial tourism. In the 1970s, a general analysis of tourism from semiotic, anthropological and social points of view was conducted. MacCannel (1976) notes that industrial tourism is a visit to sites that demonstrate a special type of knowledge in general about the past, present or future (excursions to banks, telephone companies, industrial plants, etc.). Other representatives of the American school, Dodd and Véronique (1997, p. 47), describe industrial tourism as “consumer visits to places of the production process and may include educational excursions, tasting of manufactured products”. In the definition the authors focus on the discovery of industrial tourism sites that are accessible and attractive to tourists. Other American academics adhere to a similar position in the interpretation of industrial tourism. Swarbrooke (1995, p. 51) saw it as “visiting working factories, the opportunity to see industry in action”, Macionis (1996, p. 269) as “visiting vineyards, wineries, wine festivals and shows”, McBoyle (1994, p. 517) described it as “the process of observing and understanding the activities of other people at workplaces”.

In the United States, the academic understanding of industrial tourism took place in a single direction: “Traditional for the American school was the study of natural, cultural and historical resources, and the resource and tourism potential for the development of industrial tourism in certain areas” (Gustafson, 1996, pp. 899–918).

A significant contribution to the study of industrial tourism development was made by academics of the European school, including Soyez, Otgaar, Mitchell, Orwig and others. The center of the European school

was the University of Cologne in Germany. Since the 1980s, works by Professor Soyez (1986; 1993) have appeared and become a significant academic heritage in the field of industrial tourism. They analyze the motives for choosing to holiday in old industrial areas and the consequences of tourism for the surrounding natural and cultural landscape. Soyez (1993) interpreted industrial tourism as tourist flows associated with the desire to visit industrial areas and sites caused by their special attractiveness. A similar position is held by the Dutch academic Otgaar (2010) who defines industrial tourism as visits that inform people about economic activities in the past, present and future. Ksouri, Marcon and Preuillh (2000) characterize industrial tourism as “economic discoveries” and interpret it as visiting places that inform visitors about innovations in economic activity in the past, present and future. A continuation of the idea of Soyez “industrial tourism – industry as a tourist attraction” was reflected in the studies of the English researchers Harris (1989) and Hospers (2001).

Some academics of the Western European tourism school consider industrial tourism as an economic phenomenon and its impact on the economic situation of a region, city or enterprise. This point of view is shared by Otgaar et al. (2010) and a supporter of this approach is Azevedo (2004), who notes that industrial tourism is a tool for branding regions, cities and companies. A similar position is shared by Mitchell and Orvig (2002), who characterize industrial tourism as an active tool for advertising activities which ensure the promotion of goods or services of an enterprise and the creation of a company brand. Simonson (1974) interprets industrial tourism as trips to a place of production in order to familiarize, select and possibly taste a product for possible purchase.

In general, the attention of the Western European school of tourism was directed to the study of tourism in regions, cities and enterprises. Their articles studied the economic aspects of the development of industrial tourism, the formation of supply and demand, its impact on employment, along with the economic development of a region and country.

Modern works dealing with industrial and post-industrial tourism explore the issues of defining and characterizing the main types of business model that can be found at tourism heritage sites converted from former industrial sites, or have recently been created to convey heritage values (Szromek, Herman, Naramski, 2021). Szromek and Herman (2019) identify three basic types of business transformation in post-industrial heritage sites, in the context of changes in business models (general model of post-production enterprise, post-production enterprise model and general model of a production and tourist enterprise). An example of a regional business model that utilizes post-industrial facilities for the development of a business partnership

between facilities on a tourism route, sites located in the vicinity, as well as the participants on such a route is described in Józwiak and Sieg's (2021) work. The authors attempted to define the development of postindustrial facilities using the example of a thematic trail located in Bydgoszcz, as well as to assess the impact of this route on the attractiveness of the city.

Considerable interest is directed to thematic studies of the development of industrial and post-industrial tourism using examples of specific cities and areas. Assessment of the development potential of post-industrial areas in terms of social, economic and environmental aspects of the Wałbrzych Region (Poland) are given in the work of Raszka, Dzieżyc and Hełdak (2021). Researchers emphasize the special role of municipal authorities in developing their potential. The study of Guerra et al. (2022) aims to explore the impact of perceived authenticity on the future intentions of the community of São João da Madeira (Portugal) in relation to industrial heritage tourism sites. The authors' findings suggest that perceived heritage plays a significant role in residents' attitudes towards support for tourism development, their own participation ideals, and their attachment to the place. Cudny, Jolliffe and Guz (2022) through the case of Dymarki Swietokrzyskie, a historical reenactment event celebrating traditional iron production in Nowa Slupia (Poland), examines the role of a re-enactment or re-creation of a historical event in creating an attraction for tourists and in particular for heritage tourists. Salt mines in different European countries, Wieliczka in Poland, Campina de Cima in Portugal and Turda in Romania; a significant category of local, regional, national and/or European underground heritage in becoming attractive tourism destinations, are examined by Kimic, Costa and Negulescu (2021). The study of Oktay Vehbi et al. (2022) aims to examine the tourism potential of post-mining heritage sites as part of a strategic approach and tool for planning that encourages local development through the case of the Cyprus Mining Cooperation, a derelict copper mining area in Lefka, North Cyprus.

2.2. INDUSTRIAL TOURISM IN UKRAINE AND KRYVVI RIH

Theoretical and practical aspects of industrial tourism development in Ukraine are devoted to research by academics mainly from an economic or geographical profile. Thus, the fundamental issues of the organization of industrial tourism in Kryvyi Rih were considered by Patsiuk (2008a, 2008b, 2011, 2014) who developed theoretical and methodological foundations for the socio-geographical study of industrial tourism in its region. Karpenko's research (2021) is devoted to

the use of the landscape-technogenic component of the regional eco-network in tourism activities in the old industrial region of Kryvyi Rih (Karpenko, Lakomova, 2020). The issues of organization of technogenic and industrial tourism in the Kryvyi Rih district are covered in the works of Lakomova and Kazakova who studied the historical landscapes of industrial areas in a system of new technogenic tourism (Lakomova, 2011; Lakomova, Kazakova, 2020). Roik and Starova (2022) explore the features and role of technogenic tourism organization in Kryvyi Rih in the current conditions of reindustrialization of the national economy, while determining and justifying the key strategic priorities for the organization of technogenic tourism in Kryvyi Rih. The importance of the tourist image formation of the Dnipropetrovsk region on the basis of an analysis of its industrial tourism development is presented in the work of Meshko and Karpliuk (2015). They come to conclusions on the benefits of industrial tourism for the successful development of companies and communities. Analysis of changes in the industrial tourism services market in Ukraine, the level of its development and a list of sites is reflected in the work of Sorochan (2015). The main problems of industrial tourism development in Ukraine are found in the work of Sardak and Vlasov (2018) which focuses on the existence of problems associated with the licensing of organizations involved in industrial tourism promotion: the lack of high-quality advertising and information materials, the lack of specialized tour operators and guides, and low incomes from industrial tourism activities in Ukraine.

3. MATERIALS AND METHODS

3.1. THE STUDY AREA

Kryvyi Rih city and Kryvyi Rih district were chosen as the study area. Kryvyi Rih is a city of oblast status in Dnipropetrovsk oblast, located in the steppe zone of Ukraine at the confluence of the Inhulats and Saksahan rivers that flow into the Dnipro. Its area is 431.4 sq.km, length 126 km and width 20 km. Kryvyi Rih is located in the central part of the Ukrainian 'crystalline' core and it is one of Ukraine's richest regions in terms of mineral resources. The basin stretches to the north and northeast over a 100-km long strip, which is up to 6 km wide (Figure 1a, p. 28) (*Stratehichnyi plan rozvytku mista Kryvoho Rohu na period do 2025 roku*, 2015). Kryvyi Rih district is part of Dnipropetrovsk Oblast in central Ukraine whose administrative center is located in the city of Kryvyi Rih. After the reform in July 2020, the district consisted of 15 hromadas (Figure 1b, p. 28) (Ministry for Communities and Territories Development of Ukraine, 2022).

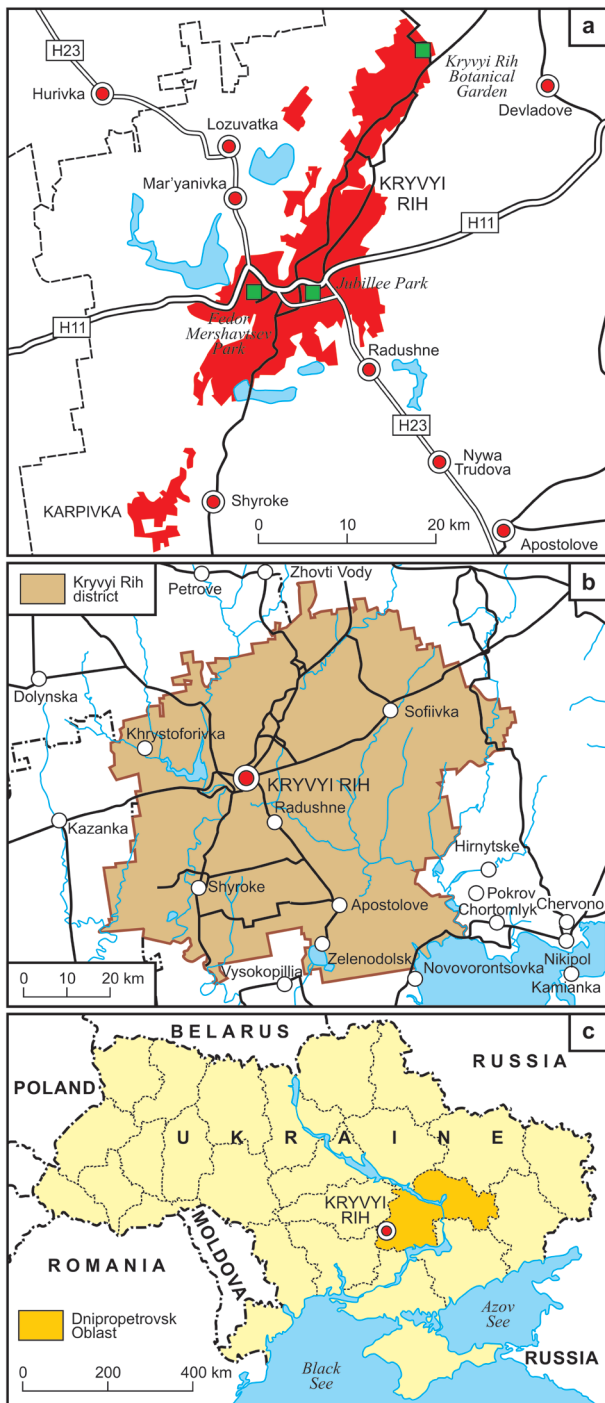


Figure 1. Location of the study area: a) map of Kryvyi Rih city; b) map of Kryvyi Rih district; c) location of Kryvyi Rih in Dnipropetrovsk Oblast and Ukraine

Source: based on Google Maps (2022); Ministry for Communities and Territories Development of Ukraine (2022); Wikivoyage (2022)

3.2. DATA

In this study, data on industrial tourist sites and industrial heritage sites of Kryvyi Rih city and Kryvyi Rih district are given as of February 23, 2022 and

do not take into account possible quantitative and qualitative changes that have occurred during active hostilities on the territory of Ukraine. The study is based on secondary data from open sources which can be divided into three groups: (a) data from the state authorities of Ukraine; (b) data from Kryvyi Rih city; (c) data from enterprises in Kryvyi Rih city and Kryvyi Rih district. The source of information at the national level is the Ministry for Communities and Territories Development of Ukraine (2022), data of urban and regional significance are mainly obtained from the materials of the Kryvyi Rih City Development Institution (2022) and enterprises (JSC Yuzhnyi Gok, 2022; PJSC ArcelorMittal Kryvyi Rih, 2022; PJSC Tsentralnyi hirnycho-zbahachuvalnyi kombinat, 2022; PJSC Pivnichnyi hirnycho-zbahachuvalnyi kombinat, 2022). The main body of information that allows the strategic vision of industrial tourism development in Kryvyi Rih to be described is contained in Kryvyi Rih Strategic Development Plan till 2025 (*Stratehichnyi plan...*, 2015), Action plan for the implementation in 2020–2022 of the Kryvyi Rih Strategic Development Plan till 2025 (*Plan dii z realizatsii...*, 2020), Action plan for the implementation in 2016–2019 of the Kryvyi Rih Strategic Development Plan till 2025 (*Plan dii z realizatsii...*, 2016), Kryvyi Rih Industrial Tourism Development Program for 2013–2015 (Kryvorizka miska rada, 2013), Kryvyi Rih Industrial Tourism Development Program for 2016–2024 (Kryvorizka miska rada, 2015). The main sources of information about industrial facilities and the industrial heritage of Kryvyi Rih city and Kryvyi Rih district are analytical materials from the Kryvyi Rih City Development Institution (2022), industrial enterprises (PJSC ArcelorMittal Kryvyi Rih, 2022; PJSC Pivnichnyi hirnycho-zbahachuvalnyi kombinat, 2022; JSC Yuzhnyi Gok, 2022; PJSC Tsentralnyi hirnycho-zbahachuvalnyi kombinat, 2022) and the author's own observations and research.

3.3. METHODS

To achieve the goal and tasks of the research a mixed-method approach is used which combines qualitative and quantitative research methods. The literature review allowed the theoretical framework and methodology of the study to be developed and identify issues that require further study. In discovering what has been written on the topic and in synthesizing the extant literature was conducted by following both (a) industrial tourism and (b) industrial tourism in Ukraine and Kryvyi Rih. The case study method allows concrete and contextual examples from the Kryvyi Rih experience to be explored realizing its industrial potential as a resource for tourism development. Qualitative observation allows the identification of

successful practices of strategic planning for industrial tourism development in an urban environment and at the same time recognizes the problems and constraints of its growth. Quantitative research was used to calculate the growth in the number of tourists and the number of excursions to Kryvyi Rih after the implementation of the Kryvyi Rih Industrial Tourism Development Program for 2013–2015 (approved by the decision of the city council dated January 30, 2013, No. 1680) (Kryvorizka miska rada, 2013), and Kryvyi Rih Industrial Tourism Development Program for 2016–2024 (approved by the decision of the city council of December 24, 2015, No. 29) (Kryvorizka miska rada, 2015), determining the general trend.

Academic tasks set for goal achievement:

- to investigate the theoretical bases for the understanding of industrial tourism;
- to study Ukraine's experience in using its industrial potential as a resource for tourism development (based on the examples of Kryvyi Rih city and Kryvyi Rih district);
- to study the experience of declaring the industrial potential of the city for tourism development in medium and long-term programs and strategies for Kryvyi Rih city as a goal;
- to provide a concise description of the industrial tourist facilities of Kryvyi Rih city and Kryvyi Rih district;
- to identify the problems and constraints of industrial tourism development in Kryvyi Rih city and Kryvyi Rih district.

4. RESULTS

4.1. BRIEF DESCRIPTION OF KRYVYI RIH'S INDUSTRIAL POTENTIAL

Kryvyi Rih is a large industrial and cultural center in Ukraine and the largest city which is not of regional status. The Kryvyi Rih basin contains about 50 kinds of metallic and non-metallic minerals of industrial importance of which the most important are ore deposits, and deposits of brown coal, marble, dolomite (40 per cent of Ukraine's reserves), roofing slates, scandium, vanadium, and 40 other elements from the periodic table, and more. Kryvyi Rih region is also rich in mineral waters, both for drinking and medical use.

By volume of industrial production Kryvyi Rih's share is about 8% of the general index for Ukraine, while in exports it is 8.6%, mining and processing industries dominate the Kryvyi Rih economy. Ferrous metallurgy is the main sector and this sustainably determines its profile in the division of labor, mining and metallurgy specifically make up 86% of total

industrial production. The explored reserves of iron ore in Kryvyi Rih, according to different studies, amount to between 18 and 32 billion tonnes, while 8 out of 11 enterprises in Ukraine for the production and processing of iron ore, and those servicing it, are here. Kryvyi Rih is a powerful manufacturing complex including mining and metallurgical integrated works, four mining and processing complexes, two iron ore plants as well as others. In Kryvyi Rih one of the world's largest enterprises, PJSC ArcelorMittal Kryvyi Rih, is found.

The city has more than 50 construction companies, most of which specialize in industrial facilities, more than 20 organizations specializing in designing and approving projects for construction, reconstruction, replanning and thorough overhaul of premises, and industrial production.

Kryvyi Rih has a significant share of mining landscape (48.8%) and their size is constantly growing due to the continuation and expansion of mining operations. At present, the area under quarries is 4,200 hectares, spoil heaps – 7,000 hectares, sludge storage – 5,500 hectares, with landslide zones at 3,400 hectares.

The rich industrial heritage of Kryvyi Rih consists of the remains of more than 250 industrial facilities, railways, hydraulic structures, bridges, fragments of ancient mining landscapes, working settlements and cemeteries.

All of the above confirms the fact that Kryvyi Rih has significant potential for industrial tourism development, as it has a strong base of active industrial facilities, heritage facilities and so on which determine prospects for development.

4.2. STRATEGIC VISION FOR INDUSTRIAL TOURISM DEVELOPMENT IN KRYVYI RIH

Despite the fact that the current economic structure of the city has a certain 'safety margin', the reduction of employees at the enterprises of mining and metallurgical industry continues. A lack of new workplaces in other sectors may lead to a growth in unemployment and outflow of those of working-age from the city, above all the young. There is a need to increase the share of industries that depend on the city and region that will prevent a growth in unemployment and given existing opportunities, tourism, namely industrial tourism, can become a sector that can diversify the city's economy and become a source of additional revenue for the local budget.

The importance and necessity of using the industrial potential of Kryvyi Rih for tourism development is emphasized by this goal being declared in the medium- and long-term development programs and strategies for the city.

Since 2013, separate programs for the development of industrial tourism have been operating in Kryvyi Rih,

namely: Kryvyi Rih Industrial Tourism Development Program for 2013–2015 (approved by the decision of the city council dated January 30, 2013, No. 1680) (Kryvorizka miska rada, 2013), and Kryvyi Rih Industrial Tourism Development Program for 2016–2024 (approved by the decision of the city council of December 24, 2015, No. 29) (Kryvorizka miska rada, 2015). The main goal of program development is defined as:

the creation of a competitive tourism product, and an increase in sites and subjects of tourism activity which will lead to a decrease in the 'monoculture' of the urban economy and deepening its diversification (Kryvorizka miska rada, 2015).

The result of the implementation of the program was the establishment of Kryvyi Rih as a new tourist center offering a wide range of entertainment and recreational services, a leader in industrial tourism and in the future one of the leaders in active festival and conference tourism in Ukraine with a well-developed tourist infrastructure oriented towards a wide range of Ukrainian and foreign consumers.

In addition, on March 1, 2013, an industrial tourism department was created at the Kryvyi Rih City Development Institution (2022). The priority activity of this department is the implementation of activities approved by the Kryvyi Rih Industrial Tourism Development Program for 2016–2024.

Currently, the development of industrial tourism in Kryvyi Rih is declared as a strategic vision of the city in the Kryvyi Rih Strategic Development Plan till 2025 and defined as

Kryvyi Rih in the future will be a powerful industrial center with a diversified economy, upgraded mining and metallurgical complex, high-tech mechanic engineering, a regional center of academic and technological development, a leader in attracting investment and in industrial tourism (*Stratehichnyi plan...*, 2015).

The detailed place of industrial tourism in the structure of the Kryvyi Rih Strategic Development Plan till 2025 is visualized in Figure 2.

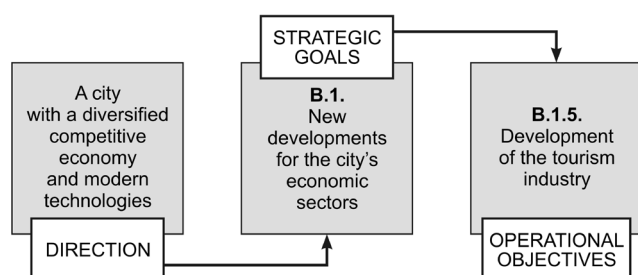


Figure 2. The place of industrial tourism development in the Kryvyi Rih Strategic Development Plan till 2025

Source: based on *Stratehichnyi plan rozvytku mista Kryvoho Rohu do 2025 roku* (2015)

In order to ensure implementation of operational objectives, strategic goals and directions an Action plan for the implementation in 2020–2022 of the Kryvyi Rih Strategic Development Plan till 2025 (*Plan dii z realizatsii...*, 2020) and an Action plan for the implementation in 2016–2019 of the Kryvyi Rih Strategic Development Plan till 2025 (*Plan dii z realizatsii...*, 2016) were approved. The plans contain a detailed description of projects aimed at ensuring the implementation of certain goals and directions. A description of projects aimed at ensuring the development of industrial tourism is presented in Table 1.

The expected results of the implementation of these projects are:

- the creation of a system for the most efficient use of the city's tourism potential;
- an increase in the number of tourists travelling to the city;
- improving the quality provided in accommodation, trade, catering and consumer services;
- ensuring the coordination and harmonization of the activities of all economic entities aimed at industrial tourism development, regardless of the form of ownership;
- attraction of capital investments for the development of tourism and related sectors of the city's economy;
- creation of a tourist product capable of maximally satisfying the needs of the population in active cognitive recreation, and involvement in industrial culture;
- the transformation of tourism into one of the most profitable areas of the city's economy which will provide a contribution to its socio-economic development by increasing the revenue side of the budget through tax from tourism and tourism-related business entities.

Without a doubt, current active hostilities on the territory of Ukraine will make changes to the plans and strategies of city development in general and tourism in particular. At the same time, uncertainty, a rapidly changing external environment and a high degree of unforeseen circumstances that are arising do not allow the many factors that affect development in medium and long-term projects, plans and tasks for the implementation of the strategy, as well as the likelihood of their implementation, to be taken into account. Considering the foregoing, the author sees it appropriate to follow the sequence of actions to make changes and adjustments to current medium and long-term strategies and plans for the industrial tourism development after the end of active hostilities to ensure their fullest implementation:

- analysis of the state of the external environment at the macro level and its impact on the future (PESTLE analysis);
- analysis of external and internal factors affecting the development of industrial tourism in the city (SWOT analysis);

Table 1. Projects are aimed at the development of industrial tourism in Kryvyi Rih

Project name, implementation period	Inclusion of Kryvyi Rih on the list of UNESCO World Heritage Sites (2017–2019)
Expected result of implementation	Inclusion of the city's leading industrial facilities as a UNESCO World Heritage Site. A significant increase in tourism and the formation of a positive tourist image for the city through the creation of a high-quality tourism product. The growth in well-being of the inhabitants of Kryvyi Rih on the basis of integrated development, the realization of its socio-economic interests, and the provision of employment in the field of tourism
Tasks	
<ol style="list-style-type: none"> 1. Inclusion of sites in the state register of 'immovable' monuments in Ukraine 2. Improvements to the sites 3. Preparation of the nomination dossier of sites 4. Submission of an application by the National Commission for UNESCO 5. Assistance in attracting investments for the development and promotion of the cultural and natural heritage of Kryvyi Rih district 6. Accompanying the inclusion of industrial heritage sites of Kryvyi Rih district on the UNESCO World Heritage List 	
Project name, implementation period	"Open Door" (2016–2019)
Expected result of implementation	Expansion of tourist facilities for active industry. Development and implementation of new excursion routes on existing industrial enterprises
Tasks	
<ol style="list-style-type: none"> 1. Attracting city business to cooperate in the tourism sector 2. The signing of memoranda between the city council executive committee and business entities 3. Development of new excursion routes with the inclusion of industrial facilities 4. Conducting an information campaign to promote new partners in the development of industrial tourism 	
Project name, implementation period	Joining the European Route of Industrial Heritage (ERIX) and the International Committee for the Conservation of the Industrial Heritage (TICCIH) (2017–2019)
Expected result of implementation	Increasing tourism and the formation of a positive tourist image of the city. Ensuring the development of a tourism infrastructure
Tasks	
<ol style="list-style-type: none"> 1. Formation of a list of sites for inclusion in ERIX and entry into TISIN 2. Registration of membership on the ERIX website 3. Work on databases of potential tourists 	
Project name, implementation period	Positioning the city as a center of industrial tourism in Ukraine, strengthening the positive image of the mining and metallurgical industry (2016–2020)
Expected result of implementation	Increasing the flow of tourists. Popularization and increase in the sale of Kryvyi Rih souvenirs by local business entities
Tasks	
<ol style="list-style-type: none"> 1. Establishment of new partnerships between industrial enterprises of the city, museums, exhibition halls and tourist operators in the field of industrial tourism development 2. Conducting geological festivals, forums and conferences on the topic of industrial tourism 3. Implementation of information activities to promote industrial tourism 4. Development, information content, publication and distribution of printed materials about the city 5. Establishing partnerships with industrial cities in Europe and the world 6. Promoting the use of souvenirs by the city's business entities during various events in order to promote industrial tourism and support local producers 	
Project name, implementation period	Development of a tourism cluster (2020–2022)
Expected result of implementation	Ensuring a more efficient distribution of the local tourism product. Increase in the number of city visitors. Creation of a positive tourist image for the city
Tasks	
<ol style="list-style-type: none"> 1. Creation of a mobile application "Tourist Kryvyi Rih". Ensuring its functioning 2. Implementation of the "Open Door" project 3. Cooperation with the ERIH Association 4. Inclusion of industrial sites of Kryvyi Rih in the State Register of 'Immovable' Monuments in Ukraine 5. Development of event tourism 6. Creation of a center for tourist service provision 7. Development of the Kryvyi Rih Tourism Development Strategy 	

Project name, implementation period	Creation of a tourist base for children (2020–2022)
Expected result of implementation	Improving the image of the city through the tourism component. Creation of new economical hospitable accommodation for the temporary stay of children and students
Tasks	
<ol style="list-style-type: none"> 1. Holding meetings on creating a tourist base for children 2. Carrying out indicative calculations for the creation of a tourist base 3. Development of design estimates for creating this tourist base 4. Overhaul/reconstruction of accommodation for children 5. Media coverage of this process 	

Source: Action plan for the implementation in 2016–2019 of the Kryvyi Rih Strategic Development Plan till 2025 (*Plan dii z realizatsii...*, 2015), Action plan for the implementation in 2020–2022 of the Kryvyi Rih Strategic Development Plan till 2025 (*Plan dii z realizatsii...*, 2020).

- elaboration of the results of the SWOT analysis and development of a primary set of solutions;
- detailed planning of new projects and programs to achieve the strategic goals or making adjustments to existing ones, taking into account the results of the previous analyses;
- planning, the adjustment of resources necessary for the implementation of projects and plans;
- synchronization of plans and projects for industrial tourism development in Kryvyi Rih with the development strategy for the city and the region.

4.3. THE USE OF INDUSTRIAL FACILITIES AND HERITAGE FOR THE DEVELOPMENT OF TOURISM IN KRYVYI RIH

Kryvyi Rih has a set of prerequisites for industrial tourism development: powerful and diversified enterprises, the presence of unique ‘mountain’ landscapes, historical and cultural sites of industrial heritage. The use of the industrial potential of the city for tourism development is implemented in three areas: the creation of industrial tourist attractions, the development of festival tourism using industrial potential, the development and testing of tourist routes.

According to the Kryvyi Rih City Development Institution (2022), 131 tourist routes have been developed, tested and improved in Kryvyi Rih. The presence of a diversified offer of excursion and tourist routes, and the implementation of the city positioned as a center for industrial tourism in Ukraine, has led to a rapid increase in tourists (Figure 3a) and excursions (Figure 3b).

At the same time, the global trend of reduced tourist activity as a result of COVID-19 and quarantine restrictions has had a negative impact on tourism development in Kryvyi Rih, reflected in the rapid reduction in the number of excursions and tourists. In 2020, the number of excursions decreased by 84.99% and the number of tourists by 85.85%.

The creation and promotion of tourist attractions using industrial heritage and existing industrial

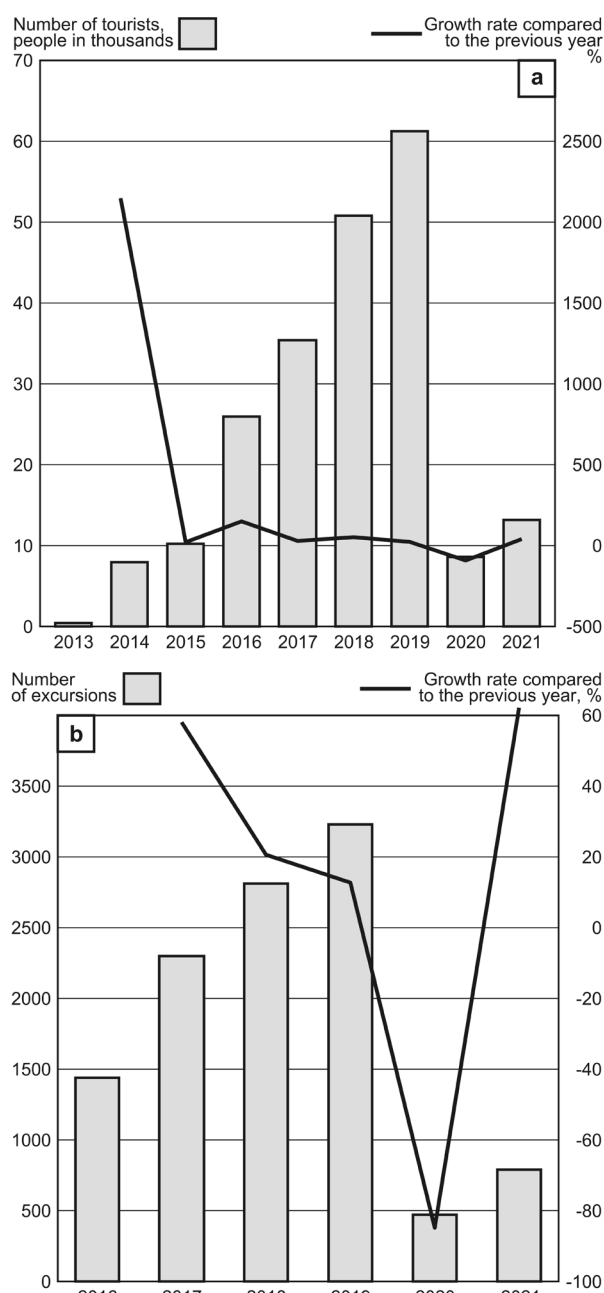


Figure 3. Changes in the number of tourists (a) and excursions (b) in Kryvyi Rih
Source: Kryvyi Rih City Development Institution (2022)

facilities is one of the main tools for tourism developing. Kryvyi Rih City Development Institution divides the city's industrial tourist attractions into the following groups (Kryvyi Rih City Development Institution, 2022; "Planeta" – Kryvyi Rih, 2022):

1. The iron ore quarries. The operating iron ore quarries of Kryvyi Rih are not only places to extract minerals: ferruginous magnetite quartzite, hematite-martite ores or brown iron ores. They are also an unbelievable sight that is astonishing in its scale. Since 1953 roughly 1.55 billion tonnes of iron ore has been extracted from the Pivdennyi mineral processing mine (3 kilometers long, 2.65 kilometers wide and 429 meters deep). The total area of the quarry is triple the area of a country such as Monaco. Many colors can be witnessed at the gigantic Gleiuivatsky quarry of the Tsentralnyi mineral processing plant. The longest (5.8 kms) quarry of Kryvyi Rih is for the Gannivskyi mineral processing plant. The deepest in Ukraine is Pershotravnevnyi quarry of the Pivnichnyi mineral processing plant (470 meters deep, 3 kms long, 2.5 kms wide). Not far behind in scale is the quarry of the Inhuletskyi mineral processing plant at 460 meters deep, 2.1 kms wide, 3.35 kms long.

2. The iron ore mines. Kryvyi Rih is the "deepest" city in Europe. Precisely due to the incessant hard work of miners we have an "underground miner's city" that consists of eight operating mines and four industrial plants which are Public Joint Stock Companies: "Kryvyi Rih Iron Ore Complex", "ArcelorMittal Kryvyi Rih"; and Private Joint Stock Companies – "Sukha Balka", "Central Mining and Concentration Complex". There are 2,500 kms of underground passages including cross-cuts, drifts and mining chambers.

In Kryvyi Rih are the deepest mines in Europe: "Hvardiyska" (1620 meters), "Ternivska" (1605 meters), "Rodina" (1570 meters), "Yuvileyna" (1530 meters) and "Oktyabrsk" (1490 meters). In addition to these are mines which are not that deep, but no less significant: "Frunze" (1293 meters), "Artem-1" (1135 meters), and "Ordzhonikidze" (527 meters).

On the territory of the city and the outskirts, pre-revolutionary mines have been preserved. The most famous is the old Kochubeyvsky mine located on the northern outskirts of Kryvorizhia from the beginning of the twentieth century. There an iron ore quarry with its spoil heap has been preserved where brown iron ore was mined. The underground world of the mine includes seven adits of a total length of more than 200 m, three underground chambers with a height at the level of a three-story building and where bats live. The underground of the Kochubeyvsky mine shows almost all the features of the workings of the old and modern mines of Kryvyi Rih region.

3. The headframe mines. Headframes are structures which are placed above the shaft of mine, where devices for skips are set (vessels, with the help of which 25–50 tonnes of iron ore can be lifted from underground) and cages (elevators for human transportation).

Kryvyi Rih iron ore was used for the building of the Eiffel Tower in Paris and recently the local headframes have been named the "Eiffel Tower of Kryvyi Rih". They are wonderful observation sites and the height of some reaches 100 meters above ground. From the top of the headframes a marvelous view of the industrial city can be enjoyed, and its parks and woods in warm seasons like a green island in the middle of the Ukrainian steppes.

Headframes can be both towers made of reinforced concrete or can be wholly of metallic construction. The heights of the headframes of the largest mine of Kryvbas: "Gigant-Gliboka" – 102 m, "Klitova Kirova" – 64 m, "Shidna" – 108 m, "Rodina" – 102 m, "Zorya" – 64 m, "Yuvileyna" – 106 m, "Gvardiyska" – 102 m and "Ternivska" – 102 m. The headframes of such mines as Artem (78 m), Frunze (78 m), Ordzhonikidze, "Oktyabrsk" and many others are of metallic construction.

4. "Lakes of Kryvyi Rih". 23 lakes have appeared in Kryvyi Rih as a result of numerous industrial activities in locations of former mines. After the end of working the quarries filled with spring, ground and rain water and as a result lakes were formed. Quarry lakes are divided by the type of mineral:

– iron ore quarries, for example, Pastuhovski (begun in 1908), Vizirka lake (1964–1974), Starodobrovoilsk (1937), "Kryvyi Rih Baikal" (since the end of 1980);
– granite quarries – Karachunivskyi (from second half of the 1990s), Oktyabrskiy, in the micro district of Zarichnyi (since 1999).

There are several lakes in Kryvyi Rih which were formed at the bottom of quarries that are blocked by clay. None of them are explored sufficiently, but names have already given to some such as 'Black' and 'Bowl'. Formerly, Kryvyi Rih was not a region of lakes but it has now become one with ponds of natural-anthropogenic origin.

5. The "mountains" of Kryvyi Rih are waste heaps of spoil that were formed as a result of the accumulation of material from quarries, mines, dressing plants and blast furnaces. The total area of Kryvyi Rih "mountains" is 12,500 hectares, from 1885 to today.

Burshchyskyi spoil heap is situated in the southern part of the city as a result of the operation of the former Novokrivorizkiy Mining and Concentration Complex. The heap rises above the historical part of the city and the best panorama at night is seen from this place.

Petrovskyi spoil heap is located in the central part of the city, on the site of a former Petrovskyi mine which finished its activity at the end of the 1950s.

The spoil heaps of Pershotravnevyi quarry of the North Mining and Concentration Complex are unique. They were planted with Crimean pines as an experiment and these trees grow in conditions for successful expansion outside the artificial plantings which is why these heaps recall the Crimean Mountains.

The most massive heaps are from the South Mining and Dressing plant and have been named the "Grand Canyon of Kryvyi Rih" because of their considerable height, and dimensions. They closely approach both sides of the Inhulets river.

6. Subsidence landscapes. The subsidence zones of Kryvyi Rih region appeared as a result of the collapse of many mining tunnels. The deepest zones reach a depth over 200 meters and the most magnificent are located on the territory of "Kryvyi Rih Arizona" in the northern part of the city within the district of the "Gvardiyska" and "Ternivska" mines. A chain of subsidence is located behind the "Yuvileyna" mine and in the district of Galkovskiy old mine. The unique characteristic of the subsidence is its significant depth with slopes as steep as on a mountain, and an impressive red color forming an exposed spoil of the 'iron bowels' of the Earth.
7. The industrial heritage of Kryvyi Rih. Industrial heritage is everything that has remained in modern Kryvyi Rih from industrial sites whose history started in 1881. There are more than 800 such in the city: industrial, transport, hydrotechnical, residential, recreation and memorial. The sites which have been saved in the best condition are:
 - industrial: pump-house of Gdantsivka iron plant (1892), electric power station of the Galkovskiy mine (1914);
 - mining-industrial: dozens of old quarries and spoil heaps from the 1870s, galleries;
 - transport: building of the railway station of Kryvyi Rih-Golovy (1882), culverts and overpasses (built in 1884-1904), buildings of the Kryvyi Rih-Zahidnyi and Kryvyi Rih-Golovnyi stations, residential accommodation for the staff (from 1884); bridges over the Inhulets and the Saksahan rivers (built in 1884-1927);
 - agricultural: stables and water mill of landowner Ivan Harin in the former village Novopavlivka, water mill in the village Veseli Terny (end of 19th century);
 - hydrotechnical: buildings of entry and outgoing portals of the Saksagan underground tunnel with an underground waterfall of 24 meters;
 - residential: miners' villages of many Kryvbas mines from the end of the 19th century to the 1950s.

The architecture of some buildings has local styles, the Kryvyi Rih architectural stone sub-style, as these sites were built from Kryvyi Rih red and brown minerals in combination with multi-colored bricks.

These buildings are unique because such building materials are not used elsewhere in Europe.

8. Museums. As Kryvyi Rih is an industrial center the city museum is dedicated to its industrial sphere.

The most unique museum is the Academic-Research Geological and Mineralogical Museum of Kryvyi Rih National University which has one many awards. The geological collection of this museum was included into the State Register of Academic Sites of National Heritage with 19,500 specimens including those from Ukraine and many foreign countries.

The industrial plants of the city have created their own museums, among which the most visited are those of the South Mining and Concentration Complex and ArcelorMittal Kryvyi Rih. Modern, innovative and interactive technologies of exhibit presentation are used in these museums.

The aviation-technical base of the Kryvyi Rih faculty of the National Aviation University has been transformed into a museum of planes and attracts many visitors.

The general history of the city and region is represented in the municipal historical museum and its branch with a 3D-video gallery showing films on the development of the Kryvyi Rih region in a modern format.

The city is famous for its outdoor museums: mining machines near the Recreation Center of the North Mining and Concentration Complex; outdoor geoparks (near the sightseeing platform of the North Mining May 1st quarry; and, on the territory of Inpuletskiy Mining and Dressing plant, in parks named after Fedor Mershavtsev and Ivan Savitskiy).

4.4. PROBLEMS AND CONSTRAINTS FOR THE DEVELOPMENT OF INDUSTRIAL TOURISM IN KRYVYI RIH

Kryvyi Rih has a powerful base and complex of prerequisites for industrial tourism development which include powerful and diverse enterprises, a system of unique 'mountain' landscapes, with historical and cultural sites of industrial heritage.

To date, these resources have been poorly exploited in the tourism industry, not using the full potential of a set of measures that can be directed to the development of industrial tourism, its infrastructure, the system of routes, excursions and tours, the training and use of experienced personnel, and profit from tourism activities. The problems of industrial tourism development in Kryvyi Rih district are inextricably linked with the fact that the city has limited fame as a center of industrial tourism and is not sufficiently positioned in the tourist market of Ukraine and Europe.

The main problems that hinder the development of industrial tourism in Kryvyi Rih and have a negative impact include:

- the low level of promotion and awareness of industrial tourism resources and the unique local flavor of Kryvyi Rih at national and international levels;
- the lack of funding sources for industrial tourism promotion in the city and district;
- difficulties in obtaining access to industrial facilities of interest to tourists, since not all enterprises of Kryvyi Rih are going to increase cooperation in the development of industrial tourism;
- difficulties (both technical and administrative) in creating observation platforms on spoil heaps, headframes of mines and other industrial facilities; the city has a considerable number of tourist attractions but access to them is complicated by the lack of equipped sites, and the inability to ensure a constant flow of tourists to them;
- the lack of a cheap offer for accommodation which leads to a lack of satisfaction for the demand of the budget price segment of potential consumers of Kryvyi Rih tourist products;
- the lack of a developed tourist infrastructure in the city.

Directions for solving these problems and the factors preventing industrial tourism development are presented in the city's development programs and strategies.

5. CONCLUSIONS

The tourism services market plays an important role in national economic development due to its ability to ensure the implementation of economic, social and humanitarian functions, and create prerequisites for the accelerated growth of related sectors. Taking into account the existing potential and resources, industrial tourism development in Ukraine is gradually gaining a mass character, stimulating the economic and social development of cities, regions and destinations. The research conducted allows us to state the presence of positive shifts in this sense in the territory of Kryvyi Rih city and Kryvyi Rih district.

The strategic vision for industrial tourism development in Kryvyi Rih is declared in the medium- and long-term programs and strategies for development in general and industrial tourism in particular, namely *Kryvyi Rih Industrial Tourism Development Program for 2013–2015*, *Kryvyi Rih Industrial Tourism Development Program for 2016–2024*, *Kryvyi Rih Strategic Development Plan till 2025*. These programs and strategies correlate and contain a detailed scheme for industrial tourism development. As a result of the implementation of specific strategic goals and objectives for the comprehensive positioning of the city as a center for industrial tourism in Ukraine,

they have led to a rapid increase in the number of tourists and excursions.

The main tool for city tourism development remains the creation and promotion of tourist attractions using industrial heritage and existing industrial facilities. Kryvyi Rih City Development Institution conditionally divides the industrial tourist attractions of the city into eight groups, each of which has different tourist magnets. At the same time, the problems of developing industrial tourism in Kryvyi Rih are inextricably linked with the fact that the city has limited popularity as a center for industrial tourism and is not sufficiently positioned in the tourist market of Ukraine and Europe. It should be noted that how to solve the problems highlighted, and reducing the factors that prevent industrial tourism development, are also declared in the programs and strategies.

The lack of complete and reliable data on the partial or complete destruction of industrial tourist sites and industrial heritage in the city of Kryvyi Rih does not allow an assessment of the damage to the industrial tourism potential caused by active hostilities. This determines the focus of further research on the post-war state of the industrial tourism resources of Kryvyi Rih, as well as determining the directions for reducing the consequences of the war for tourism in Ukraine, taking into account the components of security.

ENDNOTES

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