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QUALITY MANAGEMENT AND INDUSTRIAL SAFETY AT COAL MINING ENTERPRISES IN THE CONTEXT OF INDUSTRIAL TOURISM

Annotation. *This article examines how quality management and industrial safety influence the development of industrial tourism at coal mines. This topic is relevant given the growing interest in industrial tourism: such sites are becoming not only venues for educational tours but also platforms for career guidance, fostering a positive corporate image, and promoting blue-collar jobs. At the same time, allowing visitors to enter operating production facilities requires strict adherence to safety requirements. The aim of the study is to demonstrate the importance of quality management and industrial safety as key factors in the tourist appeal of coal mines. The paper argues that tourist interest is determined not only by the industrial specifics of the facility but also by the company's streamlined internal processes, standardized procedures, prepared infrastructure, and effective risk management. The study is theoretical and is based on a targeted analysis of 15 scientific and regulatory sources published mainly between 2010 and 2024. Qualitative content analysis, comparison, synthesis, and structural-functional analysis were used to identify the principal requirements for admitting visitors to operating coal enterprises. The main result is an author-developed readiness model comprising five components: organizational, safety, infrastructural, informational, and reputational readiness. A preliminary scoring procedure and an integrated readiness index are proposed for assessing these components. The study concludes that controlled routes through designated safe zones, supported by formal access procedures, visitor briefings, trained personnel, and continuous supervision, represent the most appropriate format for industrial tourism at operating coal enterprises.*

Keywords: *industrial tourism, regional enterprises, quality management, industrial safety, tourist attractiveness, industrial heritage, risk management.*

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Introduction

Today, as tourism products become more diverse and interest in educational leisure options grows, industrial tourism is becoming increasingly prominent. It offers visitors the opportunity to explore active and historically significant industrial facilities. This approach is important not only for promoting industrial heritage but also for fostering public interest in the industrial development of regions, their industrial culture, technological capabilities, and socioeconomic role. Therefore, exploring the potential for incorporating coal industry enterprises into industrial tourism is particularly important, as these sites possess high industrial, historical, and educational value.

The topic's relevance stems from the fact that coal mining companies continue to play a vital role in the industrial economy, supporting the energy, metallurgy, and other key industries. Today, they are increasingly perceived not only as production facilities but also as part of the industrial landscape, attractive for tours, educational outreach, and the development of the region's image. Production sites, process routes, control rooms, coal mining and processing facilities, corporate museums, archives, and elements of industrial infrastructure can become sites for industrial tourism if the necessary organizational conditions are created and a high level of safety is ensured.

Coal mines are particularly important for industrial tourism because they showcase the region's industrial development, real-life technological processes, and give visitors a more complete understanding of the scale, complexity, and social role of coal mining. Unlike traditional tourist attractions, these mines combine elements of industrial heritage, a functioning production space, and an educational platform. They offer a visual representation of the industry's history, work organization, technical equipment, environmental responsibility issues, and changes in production processes. This allows coal mines to be used not only for educational tourism but also for career guidance, corporate communications, and fostering a positive public image of the industry.

At the same time, developing industrial tourism at coal mines requires consideration of their specific characteristics. Unlike many other industrial facilities, coal mining enterprises are associated with increased production risks, complex technological processes, hazardous factors, and strict occupational health and safety requirements. In such conditions, not only the ability to allow visitors onto the premises is important, but also the overall level of organization of internal processes. This determines the orderliness of operations, compliance with standards, production control, and the sustainability of the enterprise. Therefore, quality and industrial safety management are becoming key factors in the tourist appeal of coal mines.

The role of good management in this case lies in the company's need to ensure a well-organized production environment, clear rules, well-designed travel routes, reliable information support, staff training, and adherence to internal standards when interacting with visitors. The better established and standardized internal processes are, the easier it is for the company to adapt its infrastructure for tours and educational visits. Industrial safety, in turn, is the foundation for organizing any visit to the production facility. It determines whether tourists are allowed to attend the facility, what restrictions must be observed, how escorts should be organized, which areas can be open to visitors, and how credible the facility itself is as an industrial tourism destination.

Thus, the tourist appeal of a coal mine is determined not only by its unique production capabilities and significance to the industry, but also by its ability to provide safe, understandable, and meaningful interactions with visitors. If a mine lacks an effective quality and industrial safety management system, the full development of industrial tourism becomes difficult. Conversely, a high level of organization in these areas allows the mine to be viewed not only as a production facility but also as an important part of the region's tourism, educational, and image-building infrastructure.

The problem with this research is that quality management and industrial safety remain understudied as factors that influence not only a company's internal operations but also its tourism potential. Most scientific studies examine industrial tourism in relation to territorial branding, industrial heritage, excursions, and the expansion of tourist routes. Issues of management quality and safety, by contrast, are typically analyzed separately – as part of production management and occupational safety. Consequently, the connection between these areas remains understudied, particularly in coal mining companies, where the level of safety and management organization is crucial.

The practical problem is that, despite interest in industrial sites and a growing demand for educational tourism, many coal mining companies are not yet ready to combine production and tourism functions. The main difficulties relate to the lack of safe display areas, specially organized routes for visitors, inadequate infrastructure, inadequate tour guidance standards, and the need to mitigate technological, organizational, and reputational risks. Therefore, a well-founded approach is needed to determine how quality management and industrial safety systems can be used to develop industrial tourism at coal mining companies.

The purpose of the article is to show the role of quality management and industrial safety in shaping the tourist attractiveness of coal enterprises, and to propose approaches to their use in the industrial tourism system.

To achieve this goal, the article sets the following objectives: to demonstrate the significance of industrial tourism at the current stage of development of the tourism industry; to examine coal enterprises as objects of industrial heritage and educational tourism; to analyze how the quality of management and industrial safety influence the possibility of organizing tourist visits; to identify the main limitations and conditions for the inclusion of such enterprises in tourism activities; to propose general directions for the integration of production, security and tourism functions in the industrial tourism system.

The scientific novelty of the study lies in the integration of quality management and industrial safety requirements into a unified conceptual model for assessing the readiness of operating coal enterprises for industrial tourism. Unlike previous studies that mainly examine industrial heritage, tourism routes, quality management, or mining safety separately, the proposed approach combines five interrelated components: organizational, safety, infrastructural, informational, and reputational readiness. These components are operationalized through an author-developed assessment matrix and an integrated readiness index. The proposed model can be used for the preliminary screening of coal enterprises before the design and testing of controlled visitor routes.

Materials and methods of research

This study was designed as a theoretical and conceptual investigation of the conditions under which operating coal enterprises can be included in industrial tourism. The study did not examine a particular coal enterprise and did not use primary operational, financial, accident, or visitor data. Therefore, the results should be interpreted as a conceptual framework rather than as an empirical assessment of the effectiveness, profitability, or payback period of a specific tourism project.

The source base comprised 15 scientific and regulatory publications included in the bibliography. The academic sources were published between 2010 and 2024 and were identified through a targeted search of Scopus, Web of Science, Google Scholar, and the websites of relevant publishers and international organizations. The search combinations included the following terms: “industrial tourism,” “coal mining heritage,” “mining tourism,” “operating industrial enterprises,”

“quality management,” “industrial safety,” “visitor risk management,” and “industrial tourism route.”

The sources were selected according to three criteria: direct relevance to industrial tourism or industrial heritage; consideration of mining, coal, or other hazardous industrial sites; and discussion of quality management, risk control, visitor access, or organizational readiness. Publications dealing exclusively with general tourism development without reference to industrial sites, as well as narrowly technical mining studies unrelated to visitor safety or management, were excluded.

The analytical corpus included 11 scientific publications on industrial tourism, industrial heritage, mining territories, and the reuse of coal-related sites [1–11], as well as four regulatory and methodological documents concerning quality management and occupational and industrial safety [12–15]. ISO 9001 and the ISO quality management principles were used to identify process-management requirements [12; 13]. The ILO and ICMM documents provided the basis for analyzing risk control, access restrictions, emergency preparedness, and safety requirements at mining facilities [14; 15].

The selected materials were analyzed using qualitative content analysis, comparison, synthesis, and structural-functional analysis. The analysis was conducted in three stages. First, the recurring requirements for organizing visits to industrial and mining sites were identified. Second, these requirements were grouped according to their management function. Third, the identified groups were integrated into a conceptual model of coal-enterprise readiness for industrial tourism.

As a result, five interrelated readiness components were distinguished: organizational, safety, infrastructural, informational, and reputational readiness. These components formed the basis of the author-developed assessment matrix presented in Table 1. Each component may be assessed on a three-point scale: 0 points indicate that the required procedures or resources are absent; 1 point indicates partial implementation; and 2 points indicate that the requirements are documented and consistently implemented.

The integrated industrial-tourism readiness index is calculated as follows:

$$R_{IT} = \frac{C_{org} + C_{safe} + C_{infr} + C_{info} + C_{rep}}{10} \cdot 100\%$$

where C_{org} is organizational readiness, C_{safe} is safety readiness, C_{infr} is infrastructural readiness, C_{info} is informational readiness, and C_{rep} is reputational readiness. Equal weights were used because the proposed model is at the conceptual stage and has not yet been empirically validated. The index is intended for preliminary screening and does not replace statutory industrial safety inspections, risk assessments, or official authorization to admit visitors to an operating facility.

Literature review

In academic studies, industrial tourism is typically understood as a field that integrates tourism, regional economics, industrial heritage studies, and management. The authors note that it develops not only through the use of industrial heritage sites but also through the inclusion of existing enterprises in excursions and educational activities. This approach views industrial tourism as a means of highlighting a territory, creating a unique tourist product, and strengthening ties between the enterprise, the city, and the local community [1–4].

A large body of research is devoted to industrial heritage as a basis for the tourist use of former and existing industrial sites. The authors emphasize that such sites have not only industrial but also cultural and historical significance, reflecting stages of technological development, the labor history

of the territory, and the characteristics of local identity. In this understanding, industrial heritage is viewed as a resource for the creation of excursion routes, thematic museums, interpretive spaces, and educational programs. At the same time, the researchers note that the mere presence of an industrial site is not sufficient for its successful inclusion in tourism activities: this requires institutional support, a well-thought-out management system, spatial adaptation, and a visitor-friendly content presentation [5; 6].

Another area of research concerns the transformation of industrial and post-industrial territories into tourist destinations. Studies devoted to the sustainable development of industrial tourism note that the reorientation of former industrial zones toward tourism can support a region's economy, promote the preservation of tangible heritage, and define new ways of using the territory [5; 9]. However, the authors also point out the limitations of this approach: industrial tourism often remains a niche product that requires precise positioning, high-quality service, and integration into a broader tourist context [4–6]. For existing enterprises, this means that it is no longer sufficient to be guided solely by production logic, as they must develop a more service-based model of interaction with visitors [4; 7].

Mining and coal heritage occupy a special place in the literature. Researchers note that former and active coal territories may be attractive for industrial tourism, as they combine technological expressiveness, historical memory, landscape features, and high educational potential [8–11]. Using materials from coal regions of Indonesia, China, and European post-coal territories, it is shown that the attractiveness of such sites is determined not only by the fact of their existence, but also by the degree of heritage preservation, the quality of routes, the participation of the local community, the public image of the territory, and the ability to present the "coal" identity not only as an industrial one, but also as a cultural and educational one [8–11]. Of particular interest are digital methods of presenting coal heritage, which make the tourist product more accessible and richer in content [11].

At the same time, numerous publications note that the inclusion of mining sites in tourism activities is associated with serious risks. This concerns not only the environmental impacts of past or current mining, but also safety issues, the technical condition of infrastructure, contamination of the area, difficulty of access, and restrictions on the use of certain areas. Systematic reviews and applied research emphasize that the reuse of mining heritage sites is possible only after a preliminary risk assessment, engineering and organizational adaptation of the space, and ongoing monitoring of hazardous factors [10; 12]. This is of particular importance for coal enterprises, since the development of the tourism function here is impossible without compliance with industrial safety and labor protection requirements [14; 15].

Another important area of literature concerns quality management. Research and regulatory documents in this area demonstrate that stable organizational performance is built on a process-based approach, management engagement, risk management, continuous improvement, and consideration of the interests of all stakeholders [7; 12].

For industrial tourism, this means that a company's appeal to visitors depends not only on the uniqueness of the production facility itself. Equally important are clear internal regulations, trained personnel, route control, accessible information for guests, and the company's ability to organize visits in a safe and understandable manner. Therefore, quality management systems can be viewed as a foundation that helps connect a company's production objectives with its tour function [12; 13].

In the field of industrial safety, research and international recommendations primarily focus on preventing serious incidents, risk-based management, and monitoring the most hazardous areas and processes. Risk assessment, occupational health and safety systems, emergency preparedness, clearly

delineated access zones, and the development of a sustainable safety culture are particularly important for open-pit mining.

This is particularly important for industrial tourism, as visitors can only be admitted to the production site when the hazard management system is truly operational, not just a theoretical one. In other words, safety at a coal mine should be viewed not as an external constraint on tourism, but as its fundamental organizational requirement [14; 15].

Thus, a literature review reveals that scholarly works have already adequately addressed issues of industrial heritage, the tourist reimagining of post-industrial spaces, the regional positioning of coal mining areas, and general approaches to quality and safety. However, the relationship between quality management, industrial safety, and the tourist appeal of operating coal mines has not yet been fully explored.

Basic provisions

Industrial tourism is currently considered one of the most promising areas for regional tourism development. It is based on operating enterprises and historic industrial sites, which can be used for tours, career guidance, and the promotion of a positive image of the region. However, for an enterprise to be suitable for visitors, industrial or historical value alone is not enough. It is also important that it be well-organized, have adequate infrastructure, and ensure safety.

This issue is particularly important for coal companies. On the one hand, such sites are of interest as part of industrial heritage and can be used to showcase production processes. On the other hand, the coal industry is associated with increased technological and production risks. Therefore, the suitability of a coal company for industrial tourism is determined not only by its industry specifics, production scale, or visual appeal, but primarily by the company's management system, the streamlining of its internal processes, the development of its infrastructure, and the reliable provision of industrial safety.

Today, the scientific literature has already studied the issues of industrial tourism, industrial heritage, the positioning of industrial sites, and quality and occupational safety management quite thoroughly. However, the relationship between management quality, industrial safety, and the tourist appeal of operating coal mines has not yet been fully explored. Therefore, it is important to study such a mine from two perspectives: as a production facility and as a potential tourist attraction.

This problem must be addressed in light of the actual operating conditions of coal mines. Although interest in industrial tourism is growing, many sites still lack established visitor routes, safe display areas, adequate infrastructure, a clear escort system, and clear rules for accessing production facilities. Developing a tourism industry under these conditions is challenging, and in some cases, this can lead to additional organizational difficulties, operational disruptions, increased technological risks, and reputational damage.

The study shows that management quality and industrial safety should be considered the foundation of a coal mine's tourist appeal. They determine whether a visit to such a facility can be organized at all and how safe and understandable it will be for visitors.

Quality management helps streamline the internal operations of a facility: streamline processes, establish rules, train personnel, coordinate the actions of different departments, and make interactions with visitors more organized and predictable. Industrial safety addresses another, equally important, issue: it determines whether tourists can be admitted to the facility, where safe zones are located, how the route should be organized, what briefings are needed, and what protective measures should be implemented.

The study concluded that the most suitable industrial tourism option for coal mines is not free visits, but specially organized and partially supervised tours. This format best accommodates the specifics of the existing production and safety requirements.

It typically includes pre-designed, safe routes, museum and demonstration areas, observation decks, and informational and educational elements. Digital tools can also be used to better illustrate

production processes. This approach allows for the simultaneous combination of several objectives: avoiding disruption to the plant's core operations, adhering to safety requirements, and simultaneously developing tourism.

In other words, the tourist appeal of a coal mine does not develop in isolation, but depends on how well its management, infrastructure, communications, and security systems are structured. Moreover, the quality of management and industrial safety play a key, not secondary, role, as they largely determine whether a mine can become part of the industrial tourism ecosystem.

Results and discussion

Since the study is theoretical, its results represent a structured synthesis of the literature and regulatory documents rather than measured changes at a particular coal enterprise. No conclusions are made regarding actual cost reductions, investment returns, accident-frequency changes, or visitor demand.

The content analysis identified five recurring groups of requirements that determine whether an operating coal enterprise can be considered for industrial tourism. These groups comprise organizational readiness, industrial safety, infrastructure, information support, and reputational readiness. Their integration constitutes the author-developed coal-enterprise readiness model. The model reflects the conclusion that tourist attractiveness at a hazardous industrial facility depends not only on the visual or historical value of the site but also on the enterprise's ability to regulate access, control risks, prepare infrastructure, communicate production processes, and assume responsibility for interaction with visitors.

The study's results reveal several important points. First and foremost, coal mining enterprises can indeed be attractive as industrial tourism destinations. This is due to the scale of production, the spectacular nature of their technological processes, their historical significance for industrial regions, and the opportunity to show visitors how the industry operates. The greatest interest is typically generated by quarries, transport infrastructure, control towers and control rooms, museum areas, industrial history sites, and demonstration areas where visitors can see individual stages of coal mining and processing. However, such attractiveness does not arise automatically. For an enterprise to become a fully-fledged tourist attraction, the production environment must be specifically adapted for tourism.

Secondly, the study showed that it is the quality of management that creates the organizational foundation for the development of industrial tourism at a company. When processes are established, work rules are clearly defined, and responsibilities are assigned, it becomes possible to organize visits so that they do not interfere with core production activities. In this case, it is easier to design visitor routes, separate safe zones from restricted areas, create clear navigation, establish a procedure for escorting tour groups, and generally ensure an organized and predictable tour experience. However, if the level of management remains poor and internal processes are not streamlined, even an attractive tourist destination will be poorly prepared for visiting.

Thirdly, industrial safety is a key requirement for industrial tourism at coal mines. Research shows that safety plays a crucial role at such sites, as tours take place in a highly hazardous industrial environment. Route planning must take into account dust levels, the movement of quarry and railway equipment, blasting operations, high noise levels, elevation changes, areas with increased technological risks, and strict access regulations. Therefore, the development of industrial tourism is only possible where the company can organize visitor stays in a fully controlled manner and effectively manage industrial risks.

The theoretical comparison of quality-management and industrial-safety requirements indicates that the tourist attractiveness of a coal enterprise is determined by several interrelated organizational factors. Visitors value not only the facility's grandeur and appeal, but also its organization. A well-designed route, clear informational information, clearly marked designated areas, the availability of personal protective equipment, the preparedness of the staff, and the feeling that the entire tour is under complete control are all essential. Therefore, safety in this case is not only a mandatory

operational requirement but also a crucial part of the overall visit experience. It helps build trust, a sense of calm, and the perception of the facility as a modern and responsible facility.

The study also identified the main factors preventing coal companies from actively engaging in tourism. These include the lack of dedicated display areas, poorly designed visitor routes, weak excursion infrastructure, poor communication between production and information support, and the companies' high sensitivity to reputational risks. For many coal companies, opening up to tourists entails additional workload for employees, potential disruptions in operational discipline, and the risk of negative publicity due to environmental issues. All of this demonstrates that industrial tourism at such sites cannot develop spontaneously; it requires a clearly defined and formalized organizational model.

To better understand the conditions under which coal mines can be included in the industrial tourism system, it is important to compare the key organizational requirements and restrictions that determine the ability to host visitors. This comparison is provided in Table 1.

Table 1 – Author-developed matrix of coal-enterprise readiness for industrial tourism

Enterprise readiness component	Requirement content	Main constraints	Significance for the tourism function
Organizational readiness	Availability of visit regulations, allocation of responsibilities, procedures for group escorting, and route approval	Lack of coordination between departments, absence of formalized procedures, additional workload for staff	Ensures the manageability of visits and reduces the likelihood of organizational disruptions
Safety readiness	Control of production risks, safety briefings, restricted access, provision of personal protective equipment, and continuous supervision	High-risk production environment, movement of machinery, noise, dust, and blasting operations	Makes the controlled presence of visitors at the site possible
Infrastructural readiness	Creation of safe demonstration areas, observation platforms, navigation, sanitary and welfare facilities, and waiting areas	Lack of spaces adapted for receiving tourists, high cost of refurbishment	Improves visitor comfort and helps separate excursion activities from the production process
Informational readiness	Preparation of excursion materials, visual schemes, information boards, and digital and multimedia solutions	Insufficient interpretation of production processes for an external audience	Increases the educational value of the site and makes the tour easier for visitors to understand
Reputational readiness	The enterprise's willingness to be open to the public, engage in transparent communication, and demonstrate its quality and safety practices	Risk of negative perceptions related to environmental, technological, or social issues	Influences public trust and the ability to position the enterprise as an industrial tourism site

Note – compiled by the authors based on the synthesis of scientific and regulatory sources [4; 7; 10; 12–15].

As shown in Table 1, the proposed model includes five components that cover the principal organizational and safety-related conditions for receiving visitors. The matrix differs from a general list of recommendations because each component can be assessed using documented evidence. Such evidence may include approved visitor regulations, risk-assessment records, route maps, staff-training records, instructions, emergency procedures, infrastructure inspection results, and public communication protocols.

The analysis results show that for coal companies, the most suitable option is not free access for visitors to operating production facilities, but rather the organization of partially controlled visit formats. These could include sightseeing tours through safe areas, visits to corporate museums and training centers, observation decks, demonstrations of digital control panels, the use of multimedia and simulation solutions, and the inclusion of industrial heritage sites related to the history of mines, open-pit mines, and workers' settlements. This format makes the tour informative and engaging while minimizing visitors' exposure to the most hazardous production areas.

It is worth noting that a quality management system influences not only a company's internal operations but also its external image. The better a company maintains order, cleanliness, process discipline, clarity of production processes, and safety requirements, the more positive its impression. In this sense, industrial tourism can be seen as a way to demonstrate the high quality of a company's operations. Visitors pay attention not only to the scale of production but also to the overall management culture. This largely determines how the company is perceived by local residents, partners, government agencies, educational institutions, and potential investors.

A discussion of the results shows that incorporating coal mining companies into industrial tourism can have multiple benefits. For the region, this means expanding tourist routes, strengthening its industrial image, developing career guidance programs, and creating new attractive attractions. For the company itself, such initiatives can foster greater openness to society, build trust, increase brand awareness, and demonstrate high levels of safety and quality. However, this is only possible if tourism activities do not interfere with core production or pose risks to industrial safety.

One of the study's key findings was the conclusion that quality, industrial safety, and tourism management at a coal mine need to be managed not separately, but as part of a unified system. This model requires assessing in advance the facility's overall readiness to receive visitors, identifying safe routes, establishing clear tour rules, conducting briefings, training tour guides, providing visitors with protective equipment, and continuously monitoring for potential incidents and deviations. Equally important is establishing feedback with visitors to understand not only how engaging the tour was, but also how safe they felt, how clear the route was, and how they rated the organization of the visit.

The results confirm the modern approach that industrial tourism at hazardous production facilities cannot be viewed solely as a promotional tool or as a means of organizing tours. For coal companies, its development is only possible when the company itself is capable of ensuring order, risk control, technological discipline, and a sustainable management system. Therefore, quality management and industrial safety are not simply mandatory requirements, but the foundation of tourist appeal. They enable the company to be opened to educational visits without compromising its core operations.

Overall, the study's results demonstrate that coal mines have the potential to become important industrial tourism destinations. However, their attractiveness to visitors directly depends on the strength of the company's quality management and industrial safety systems. The better organized the processes, the clearer the internal regulations, the better prepared the infrastructure, and the more

robust the safety measures, the greater the chances of including such a site in regional tourist itineraries. Therefore, the development of industrial tourism at coal mines should be viewed as a gradual and managed process that requires significant organizational preparation, not simply allowing visitors into the operating production facility.

To operationalize the proposed matrix, each of the five components is assigned 0, 1, or 2 points. The total score is converted into the integrated readiness index described in the Materials and Methods section. Because no primary data from a particular coal enterprise were used, the present article does not calculate an actual enterprise score. Table 2 provides an interpretation scale for subsequent case studies and practical assessments.

Table 2 – Interpretation of the integrated industrial-tourism readiness index

Index value	Readiness level	Interpretation and recommended decision
0–49%	Low readiness	A visitor route should not be launched. Critical deficiencies in safety, access control, infrastructure, and organizational procedures must first be eliminated.
50–79%	Conditional readiness	A pilot route may be considered only after the identified deficiencies have been corrected and the required industrial safety approvals have been obtained.
80–100%	High preliminary readiness	The enterprise may proceed to the detailed design and controlled testing of a visitor route, subject to statutory risk assessment and official safety authorization.
<i>Note – developed by the authors. The index is a preliminary conceptual screening tool and does not replace statutory industrial safety assessment or authorization.</i>		

The presented results provide grounds for recommending a phased development of industrial tourism at coal mines. First, it is important to assess the facility's management and safety organization. Then, limited and controlled visitor routes can be created. Afterward, tourism activities can be expanded through museum, educational, and digital formats. This approach helps maintain a balance between production interests, safety requirements, and the facility's openness to external audiences.

Conclusion

The theoretical synthesis conducted in this study indicates that industrial tourism at operating coal enterprises can be developed only when visitor access is formally regulated, internal processes are clearly organized, and industrial safety requirements are consistently implemented. Coal mines can truly be attractive for educational, career-oriented, and industrial tourism, as they offer an opportunity to see how production is organized, the conditions under which it operates, and the importance of the coal industry to the regional economy.

It turns out that interest in a coal mine as a tourist attraction depends not only on its specific production processes or industrial history, but also on how well its internal management is structured. When a mine has clear rules, streamlined processes, access control, trained employees, and pre-planned visitor routes, this creates the necessary conditions for safe tourist visits.

It has become clear that industrial safety at coal facilities is not just a formal requirement, but a fundamental condition without which tourist visits are impossible. The feasibility of conducting tours at an operating facility depends on how well risks are managed, how well hazardous and safe zones are separated, the use of protective equipment, the provision of training, and the availability of

escorts.

The analysis revealed that the most suitable model is one in which industrial tourism becomes part of the enterprise's management system as an additional, yet strictly controlled, area of work. This approach not only helps organize visits but also improves public perception of the enterprise, makes its operations more understandable and transparent, strengthens career guidance efforts, and expands the tourism potential of the industrial region.

The practical value of the study lies in the fact that its results can be used in developing industrial tourism programs for coal enterprises, creating safe excursion routes, preparing visitor admission rules, and improving interactions between the enterprise and the tourism industry.

The study is limited by its theoretical design and the absence of empirical data from a specific coal enterprise. Therefore, the proposed readiness matrix and index should be regarded as a conceptual assessment framework requiring further validation. Future research should apply the model to coal enterprises in Kazakhstan, use documentary and operational evidence to score each component, examine the views of enterprise managers and safety specialists, and test whether the proposed readiness levels correspond to the actual feasibility of controlled visitor routes.

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**ӨНЕРКӘСІПТІК ТУРИЗМ АЯСЫНДАҒЫ КӨМІР ӨНДІРУ
КӘСІПОРЫНДАРЫНДАҒЫ САПА МЕНЕДЖМЕНТІ ЖӘНЕ ӨНЕРКӘСІПТІК
ҚАУІПСІЗДІК**

Аңдатпа. Бұл мақалада көмір шахталарындағы өнеркәсіптік туризмнің дамуына сапа менеджменті мен өнеркәсіптік қауіпсіздіктің қалай әсер ететіні қарастырылады. Бұл тақырып өнеркәсіптік туризмге деген қызығушылықтың артуын ескере отырып өзекті: мұндай орындар тек білім беру турларының орны ғана емес, сонымен қатар мансаптық бағдар беру, оң корпоративтік имиджді қалыптастыру және жұмысшыларды жұмыспен қамтуды насихаттау алаңдарына айналуға. Сонымен қатар, келушілерге жұмыс істеп тұрған өндіріс орындарына кіруге рұқсат беру қауіпсіздік талаптарын қатаң сақтауды талап етеді. Зерттеудің мақсаты - көмір шахталарының туристік тартымдылығының негізгі факторлары ретінде сапа менеджменті мен өнеркәсіптік қауіпсіздіктің маңыздылығын көрсету. Мақалада туристік қызығушылық тек нысанның өнеркәсіптік ерекшеліктерімен ғана емес, сонымен қатар компанияның жетілдірілген ішкі процестерімен, стандартталған процедураларымен, дайындалған инфрақұрылымымен және тиімді тәуекелдерді басқаруымен де анықталатыны айтылған. Зерттеу теориялық болып табылады және негізінен 2010 және 2024 жылдар аралығында жарияланған 15 ғылыми және нормативтік дереккөздің мақсатты талдауына негізделген. Жұмыс істеп тұрған көмір кәсіпорындарына келушілерді қабылдаудың негізгі талаптарын анықтау үшін сапалы мазмұнды талдау, салыстыру, синтездеу және құрылымдық-функционалдық талдау

қолданылды. Негізгі нәтиже - автор әзірлеген дайындық моделі, ол бес компоненттен тұрады: ұйымдастырушылық, қауіпсіздік, инфрақұрылымдық, ақпараттық және беделге дайындық. Бұл компоненттерді бағалау үшін алдын ала бағалау процедурасы және интеграцияланған дайындық индексі ұсынылады. Зерттеу нәтижесінде белгіленген қауіпсіз аймақтар арқылы өтетін бақыланатын бағыттар, ресми кіру процедураларымен, келушілерге арналған брифингтермен, оқытылған персоналмен және үздіксіз бақылаумен қолдау тапқан, жұмыс істеп тұрған көмір кәсіпорындарында өнеркәсіптік туризм үшін ең қолайлы формат болып табылады деген қорытындыға келді.

Кілт сөздер: өнеркәсіптік туризм, көмір кәсіпорындары, сапа менеджменті, өнеркәсіптік қауіпсіздік, туристік тартымдылық, өнеркәсіптік мұра, тәуекелдерді басқару.

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УПРАВЛЕНИЕ КАЧЕСТВОМ И ПРОМЫШЛЕННАЯ БЕЗОПАСНОСТЬ НА УГОЛЬНЫХ ПРЕДПРИЯТИЯХ В КОНТЕКСТЕ ПРОМЫШЛЕННОГО ТУРИЗМА

Аннотация. В статье рассматривается влияние управления качеством и промышленной безопасности на развитие промышленного туризма на угледобывающих предприятиях. Данная тема актуальна в свете растущего интереса к промышленному туризму: такие объекты становятся не только площадками для познавательных экскурсий, но и центрами профориентации, формирования позитивного корпоративного имиджа и популяризации рабочих профессий. В то же время допуск посетителей на действующие производственные объекты требует строгого соблюдения норм безопасности. Цель исследования — показать значимость управления качеством и промышленной безопасности как ключевых факторов туристической привлекательности угольных предприятий. В статье обосновывается, что интерес туристов определяется не только производственной спецификой объекта, но и отлаженностью внутренних процессов компании, стандартизацией процедур, подготовленностью инфраструктуры и эффективным управлением рисками. Исследование носит теоретический характер и базируется на целенаправленном анализе 15 научных и нормативных источников, опубликованных преимущественно в период с 2010 по 2024 год. Для выявления основных требований к допуску посетителей на действующие угольные предприятия применялись методы качественного контент-анализа, сравнения, синтеза и структурно-функционального анализа. Основным результатом работы стала разработанная автором модель готовности, включающая пять компонентов: организационную, инфраструктурную, информационную и репутационную готовность, а также готовность в сфере безопасности. Для оценки этих компонентов предложены процедура предварительной балльной оценки и интегральный индекс готовности. Авторы приходят к выводу, что наиболее подходящим форматом промышленного туризма на действующих угольных предприятиях являются контролируемые маршруты в специально отведенных безопасных зонах, обеспеченные регламентированными процедурами допуска, инструктажами посетителей, подготовленным персоналом и постоянным контролем.

Ключевые слова: промышленный туризм, угольные предприятия, управление качеством, промышленная безопасность, туристская привлекательность, индустриальное наследие, управление рисками.