ABSTRACT
of the dissertation

"ASSESSMENT OF INVESTMENT ATTRACTIVENESS OF ORE DISTRICTS IN EAST KAZAKHSTAN WITH PROSPECTS FOR REPLENISHING THE MINERAL RESOURCE BASE OF NON-FERROUS AND PRECIOUS METALS"
Submitted for the degree of Doctor of Philosophy (PhD) in specialty 8D07201 – "Geology and Exploration of Mineral Deposits"

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Relevance of the research. Modern geoeconomic challenges, the growing demand for non-ferrous and precious metals, and the need for sustainable development of the mineral resource base of the Republic of Kazakhstan determine the relevance of assessing the investment attractiveness of ore districts. East Kazakhstan, being one of the country's leading mining regions, has significant potential for replenishing reserves of copper, lead, zinc, gold, and silver, which requires comprehensive scientific evaluation.

Research objective. Development of a methodology for qualitative and quantitative assessment of the investment attractiveness of subsoil use objects based on geological, economic, and socio-environmental factors using the example of deposits in East Kazakhstan.

Research tasks:

1. Study of the global market for non-ferrous and precious metals, including an analysis of market conditions and raw materials policy.

2. Analysis of Kazakhstan's mineral resource base using a SWOT approach.

3. Systematization and assessment of geological and mining data on ore districts of East Kazakhstan.

4. Development of a methodology for assessing investment attractiveness incorporating geological, economic, and social criteria.

5. Application of the developed methodology to specific objects and formulation of recommendations for development.

Research methodology. The research is based on the collection, systematization, and analysis of data on globally significant rare metal deposits; field expeditions and sample collection; analytical research including sample preparation and mineralogical studies of ores and host rocks; petrographic analysis of host rocks (optical microscopy); chemical analysis of ore composition using ICP-MS and isotope analysis.

The author conducted a critical assessment of the state of Kazakhstan's mineral resource base for key strategic resources (non-ferrous and precious metals).

Monographic, literary, and reference materials were systematized and analyzed. Data from industrial reports, including the GDP-200 results and other research works, were used.

Scientific novelty of the work:

1. A SWOT analysis of Kazakhstan's mineral resource base for strategic raw materials was conducted, identifying strengths and weaknesses, as well as threats and risks to development.

2. A methodology for investment attractiveness assessment was developed, providing detailed information on promising geological investment targets.

3. The methodology was applied to assess the level of exploration and investment potential of specific subsoil use sites.

Practical significance of the research:

Based on the study, a SWOT analysis of the reproduction and development of Kazakhstan's mineral resource base was developed, enabling objective assessment both at the national and regional levels. This analysis can serve as a basis for decision-making by executive bodies such as the Akimat of East Kazakhstan region, where permanent commissions on this topic are active.

The results of the investment attractiveness assessment allow potential investors to understand the readiness level of geological objects for development.

The scientific results were implemented in the production activities of " KAZ EXPLO SERVICE " LLP (Appendix A) and are also used in the educational process at D. Serikbayev East Kazakhstan Technical University for lectures and practical classes in the bachelor's program "Geology and Exploration of Mineral Deposits" within the discipline "Geology of Mineral Deposits."

Main points defended in the dissertation:

1. The SWOT analysis of Kazakhstan's mineral resource base revealed risks of increased economic dependence on raw material markets and supplies of high value-added products. The analysis describes strengths and weaknesses of the sector and proposes ways to mitigate identified risks.

2. The proposed methodology for investment attractiveness assessment incorporates three sets of quantitative and qualitative indicators: **geological factors** determining the exploration status and favorable conditions for localizing promising subsoil use targets; economic factors reflecting investment risks; social factors related to the regional labor market and availability of qualified personnel.

3. The application of the methodology to specific subsoil use objects resulted in quantified and qualified assessments of the exploration status and investment risks of promising sites, with recommendations on the scope of studies needed to prepare the objects for development.

Factual basis and author's personal contribution.

The dissertation is based on materials obtained by the author during doctoral studies, fieldwork, sample preparation, analytical research in the laboratories of the Veritas Center for Advanced Development at D. Serikbayev EKSTU, and the study of typical collections of host rocks and ores of polymetallic and gold deposits. The research was carried out as part of the following state-funded projects: 1. BR10264558 (2021–2023): "Scientific assessment of the investment attractiveness of Kazakhstan's structures promising for the discovery of mineral deposits"; 2. BR24992854 (2024–2026): "Development and implementation of competitive, scientifically grounded technologies to ensure sustainable development of the mining and metallurgical industry in East Kazakhstan."

Research validation.

The author conducted the majority of theoretical and applied research, including analysis of geological and geodynamic data, development of the investment attractiveness assessment methodology, systematization and interpretation of factual materials, and formulation of practical recommendations for the development of ore districts in East Kazakhstan.

Publications and implementation: The dissertation resulted in 8 scientific publications, including:

2 articles in peer-reviewed international journals indexed in Scopus;

4 articles in journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Education and Science of Kazakhstan;

2 abstracts in international scientific conference proceedings.

The main results were presented at:

International Conference "Geoinformatics: Theoretical and Applied Aspects" (Kyiv, Ukraine, 2021);

XI International Scientific and Practical Conference "Forecasting, Exploration and Evaluation of Mineral Deposits" (Moscow, Russia, 2023, FGBU "TSNIGRI");

Republican Conference "Modern Problems of Geology and Subsoil Use" (Ust-Kamenogorsk, 2022);

International Forum of Young Scientists and Postgraduates "Science and Education in the 21st Century" (Almaty, 2023).

Practical implementation:

The developed methodology was tested and applied at «KAZ EXPLO SERVICE» LLP and is also used in the teaching process at D. Serikbayev EKSTU in geology and subsoil use disciplines.

The research results received positive feedback at both international and national levels and were approved by industry experts through expert evaluations of the implemented methodologies.