



FROM RESOURCE EXTRACTION TO INDUSTRIAL VALUE CREATION IN UZBEKISTAN'S MINING SECTOR

Kurbanova Mehriniso Nematjanovna, PhD

kurbanovanisoxon@gmail.com

Tashkent state transport university

Associate Professor of the Department of Transport Economics

Abstract: This thesis examines the transition of Uzbekistan's mining sector from resource extraction to industrial value creation. The study argues that mining competitiveness should no longer be measured only by extraction volume or export of raw materials, but by the capacity to create higher added value through deep processing, localization, resource efficiency, technological modernization and industrial cooperation. Using the case logic of a large mining and metallurgical enterprise, the thesis shows that energy saving, green technologies and local production linkages can transform mining from a raw-material sector into a strategic industrial platform. The findings suggest that Uzbekistan's mining policy should prioritize value-added production, resource productivity and technological independence.

Keywords: mining sector, value creation, resource extraction, Uzbekistan, added value, localization, industrial policy, technological modernization.

Introduction

Mining has traditionally been viewed as a sector of resource extraction. In many resource-rich economies, its main role has been to extract minerals, process them at a limited level and export them as raw or semi-processed commodities. This model can generate significant revenue, but it also creates structural vulnerabilities. A country that depends mainly on raw material exports becomes exposed to global price fluctuations, technological dependence, limited domestic industrial linkages and low value capture. Therefore, the central challenge for modern mining economies is not only how much mineral resource is extracted, but how much industrial value is created from that resource¹.

¹ In this thesis, industrial value creation means the transformation of mineral resources into higher added value through deep processing, localization, technological modernization and resource efficiency.



Uzbekistan's mining sector plays a strategic role in national industrial development. Gold, copper, uranium, coal and other mineral resources form an important part of the country's economic base. However, the future competitiveness of the sector depends on its ability to move beyond extraction. Mining enterprises must become centers of deep processing, energy efficiency, localization, innovation, digital monitoring and green industrial transformation. In this context, the transition from "resource extraction" to "industrial value creation" becomes a key direction of economic modernization.

A large mining and metallurgical enterprise provides a clear example of this transition. The available analytical data show that added value increased from 38.5 trillion UZS in 2020 to 63.5 trillion UZS in 2025, meaning that real economic value grew by almost 65 percent. This growth was linked not only to production expansion, but also to resource-saving technologies, energy efficiency and a higher share of deep processing. This indicates that mining enterprises can create greater economic value when they transform resource flows into industrial productivity.

The purpose of this thesis is to analyze the shift from resource extraction to industrial value creation in Uzbekistan's mining sector. The thesis focuses on four main mechanisms: deep processing, localization, resource productivity and green technological modernization. It argues that value creation should become the main strategic criterion for mining development.

Conceptual Background

Resource extraction and industrial value creation represent two different development models. The extraction model is based on the physical volume of minerals produced. Its main indicators are ore output, metal production, export volume and revenue. The value creation model, by contrast, focuses on the economic value generated per unit of resource. Its indicators include added value, resource productivity, technological depth, localization, energy efficiency and industrial cooperation [1].

In the traditional extraction model, the country may produce a large amount of minerals but capture only part of the economic value. In the value creation model, the same resource base can generate more income because minerals are processed more deeply, local industries supply equipment and components, energy is used more efficiently and waste is converted into secondary resources.

This logic is consistent with the concept of resource productivity. Resource productivity means that each unit of raw material, energy, water or capital should

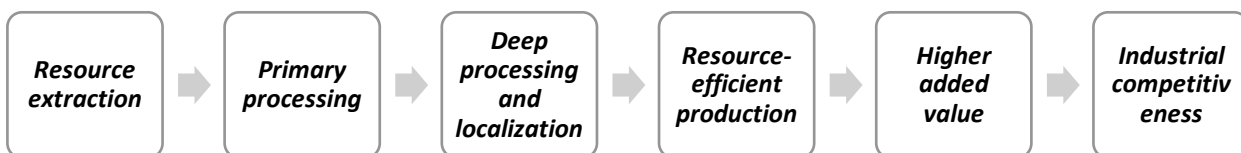
produce more economic value². In mining, this is especially important because resources are finite and extraction creates environmental pressure. The more value a mining enterprise creates from each unit of resource, the more sustainable and competitive it becomes.

The transformation can be presented as follows:

Figure 1. Transition from extraction logic to value creation logic

The relationship can be summarized as follows:

Figure 1. From ESG transparency to green finance readiness



This figure shows that value creation is not achieved by extraction alone. It requires a chain of industrial upgrades. Each stage increases the economic content of mining activity.

Key Mechanisms of Industrial Value Creation

The first mechanism is **deep processing**. Mining enterprises create more value when they move from simple extraction to advanced processing. Deep processing increases the economic value of mineral resources because it allows the enterprise to produce higher-quality outputs, reduce raw material losses and capture a larger share of the value chain. In gold and metallurgical production, this may include advanced beneficiation, hydrometallurgical processing, refining, recovery of useful components and technological optimization.

Deep processing also changes the meaning of productivity. A company may extract the same amount of ore but generate more added value if it improves recovery, reduces losses and processes materials more efficiently. This is important because future competitiveness will increasingly depend on technological depth rather than extraction volume alone.

The second mechanism is **localization**. Localization means that spare parts, equipment components, technical services and industrial inputs are increasingly produced domestically. In mining, localization has several economic effects. It reduces import dependence, saves foreign currency, shortens supply chains, improves

² Resource productivity is interpreted as the ability to generate more economic value from each unit of energy, water, raw material, equipment capacity and capital used in mining operations.



maintenance speed and strengthens domestic industrial cooperation³. It also supports the development of machine-building, engineering and service industries around large mining enterprises.

For Uzbekistan, localization is not only an enterprise-level efficiency tool. It is also an industrial policy instrument. When mining enterprises purchase more components and services from domestic suppliers, they create multiplier effects across the economy. This turns mining from an isolated extraction sector into a driver of industrial ecosystems.

The third mechanism is **resource productivity**. Energy, water, raw materials and equipment capacity are not passive inputs. They are strategic productivity factors. If energy consumption is high, production cost increases. If water use is inefficient, ecological and operational risks rise. If equipment downtime is frequent, value creation slows down. Therefore, resource productivity is central to industrial value creation.

The available data indicate that energy saving has become a strategic resource for financial stability in a large mining enterprise. Energy efficiency is no longer only a cost reduction factor; it becomes one of the strongest mechanisms for improving production profitability.

The fourth mechanism is **green technological modernization**. Green modernization includes energy-saving technologies, digital monitoring, water recycling, emissions control, waste reduction and circular resource management. These technologies increase value creation because they reduce losses and future environmental liabilities. They also strengthen ESG credibility and investment attractiveness.

The fifth mechanism is **industrial cooperation**. Mining enterprises can create value not only within their own production chain but also through cooperation with related industries. Machine-building plants, energy companies, digital technology providers, research institutions and transport organizations become part of the mining value creation system. This creates a broader industrial platform.

Analytical Interpretation

The transition from extraction to value creation can be analyzed through the structure of added value. Added value reflects the real economic contribution of an enterprise beyond the cost of purchased inputs. In mining, added value increases when

³ Localization in mining includes domestic production of spare parts, components, technical services and engineering solutions used in extraction, processing and maintenance.



the enterprise processes resources more deeply, reduces production costs, uses energy more efficiently and strengthens local industrial linkages.

The growth of added value from 38.5 trillion UZS in 2020 to 63.5 trillion UZS in 2025 demonstrates that the mining enterprise moved toward a more intensive economic model. The increase of almost 65 percent suggests that modernization, resource efficiency and deeper processing began to produce measurable economic effects .

Table 1. Added value dynamics and economic interpretation

Year	Added value, trillion UZS	Interpretation
2020	38.5	Baseline level of industrial value creation
2025	63.5	Stronger added value due to modernization and resource productivity
Change	Almost 65% increase	Shift toward intensive value creation model

This table shows that value creation is not only a theoretical idea. It can be measured through added value dynamics. The main policy question is how to sustain and expand this trend.

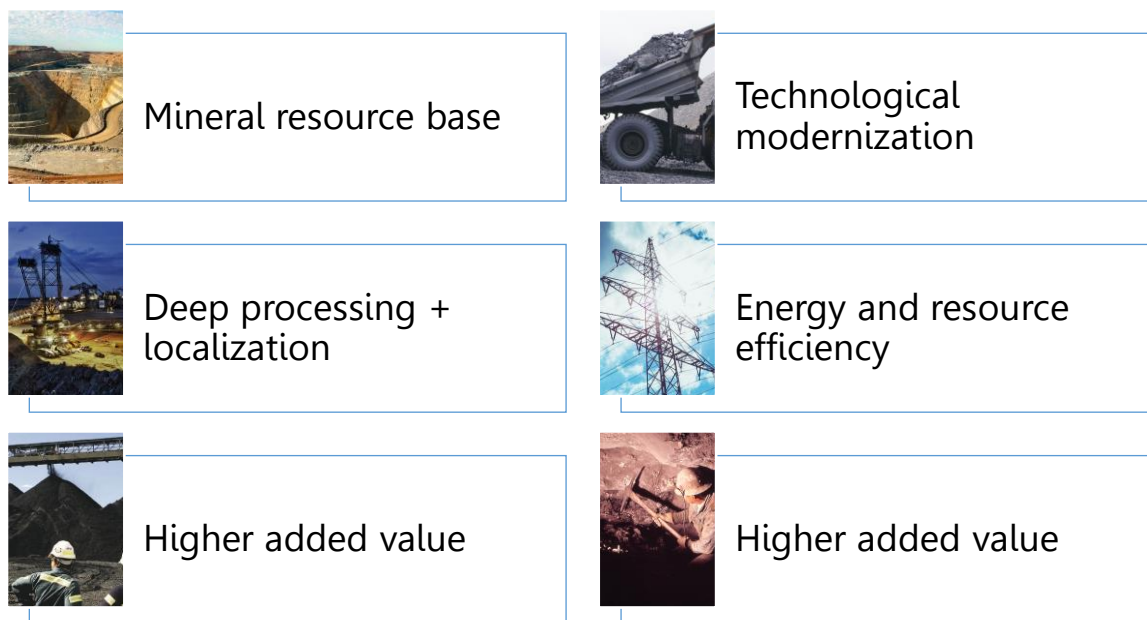
A useful way to describe the transformation is to compare the old and new models.

Table 2. Resource extraction model and industrial value creation model

Dimension	Resource extraction model	Industrial value creation model
Main focus	Physical extraction volume	Added value and resource productivity
Technology	Extraction and primary processing	Deep processing and modernization
Supply chain	Import-dependent equipment and inputs	Localization and industrial cooperation
Resource use	High energy and water intensity	Energy-saving and circular resource use
Competitiveness	Based on mineral reserves	Based on efficiency, quality and ESG credibility
Economic effect	Revenue from raw materials	Broader industrial multiplier effect

The comparison shows that industrial value creation requires a different management philosophy. The goal is not simply to extract more resources, but to transform mineral resources into higher economic, technological and industrial value.

Figure 2. Industrial value creation mechanism in mining



This mechanism shows that value creation is formed through interaction between technology, localization and resource efficiency. If one element is weak, the whole chain becomes less effective.

Discussion

The shift from resource extraction to industrial value creation is strategically important for Uzbekistan. The country has significant mineral resources, but natural resource wealth alone does not guarantee long-term industrial development. The real economic advantage appears when resources are transformed into higher added value, industrial competencies and technological independence.

This issue is particularly relevant in the context of global market changes. International buyers and investors increasingly prefer products with lower carbon footprints, transparent ESG performance and stable supply chains. Therefore, mining enterprises that rely only on extraction may face growing competitive pressure. Enterprises that combine resource efficiency, green technologies and value-added processing will be better positioned in global markets.

Industrial value creation also reduces vulnerability to commodity price fluctuations. If an enterprise exports only raw or low-processed materials, its revenue



depends heavily on global prices. If it produces higher value-added outputs and develops local industrial cooperation, it can capture more value domestically and reduce exposure to external shocks.

Localization is especially important in this process. When equipment, spare parts and technical services are imported, part of the value created by mining leaves the national economy. When these components are produced locally, the value remains inside the country and supports domestic industrial development. This creates a multiplier effect: mining demand stimulates machine-building, engineering, digital services and professional training.

Green technologies also strengthen industrial value creation. Energy saving reduces cost, digital monitoring improves process control, circular resource management reduces waste, and water recycling protects operational continuity. These effects create both economic and ecological benefits. The mining enterprise becomes not only a producer of minerals but also a platform for technological and sustainable industrial development.

Practical Implications

The first implication is that mining development should be evaluated by **added value**, not only by production volume. Output growth is important, but it does not automatically mean industrial upgrading. Added value better reflects the real economic effect of mining.

The second implication is the need to strengthen **deep processing capacity**. Mining enterprises should prioritize technologies that increase recovery, reduce losses and create higher-value products. This will help the country capture more value from its mineral resources.

The third implication is the importance of **localization and industrial cooperation**. Domestic suppliers should be integrated into mining modernization programs. This can reduce import dependence and stimulate related industries.

The fourth implication is the need to increase **resource productivity**. Energy and water efficiency should be treated as industrial competitiveness factors. Resource saving is not only an environmental measure; it is a way to reduce cost and increase value creation⁴.

⁴ Resource saving becomes economically important when it reduces production cost, lowers operational risk and increases value added per unit of input.



The fifth implication is that **green modernization** should be linked with export competitiveness. Global markets increasingly value low-carbon and ESG-compliant production. Mining enterprises should therefore treat green technologies as tools for protecting and expanding market access⁵.

Conclusion

The transition from resource extraction to industrial value creation is one of the most important strategic directions for Uzbekistan's mining sector. Mining enterprises should no longer be evaluated only by the amount of minerals extracted or exported. Their real contribution should be measured by added value, resource productivity, technological depth, localization and industrial cooperation.

The analysis shows that a large mining and metallurgical enterprise can move toward an intensive value creation model when it combines deep processing, energy efficiency, green technologies and local industrial linkages. The increase of added value from 38.5 trillion UZS to 63.5 trillion UZS during 2020–2025 demonstrates the economic potential of this transformation.

The main conclusion is that Uzbekistan's mining sector should become not only a source of mineral resources, but also a platform for industrial modernization. This requires a shift in policy and enterprise strategy: from extracting more to creating more value; from raw material dependence to technological depth; from import dependence to localization; from energy-intensive production to resource-efficient growth. Such a transition can strengthen national competitiveness, reduce vulnerability to global price fluctuations and support sustainable industrial development.

References

1. OECD. (2021). Mining and green growth in the EECCA region. OECD Publishing.
2. World Bank. (2019). Climate-smart mining minerals for climate action. World Bank Group.
3. Porter, M. E. (1990). The competitive advantage of nations. Free Press.
4. Tilton, J. E. (2003). On borrowed time assessing the threat of mineral depletion. Resources for the Future.

⁵ Low-carbon and ESG-compliant production is becoming increasingly relevant for mining exports because global buyers and investors are paying more attention to sustainability standards.



5. International Energy Agency. (2021). The role of critical minerals in clean energy transitions. IEA.
6. International Council on Mining and Metals. (2022). Mining principles performance expectations. ICMM.
7. Global Reporting Initiative. (2024). GRI 14 mining sector standard. Global Sustainability Standards Board.
8. Stahel, W. R. (2019). The circular economy a user's guide. Routledge.
9. Tidd, J., & Bessant, J. (2020). Managing innovation integrating technological, market and organizational change (7th ed.). Wiley.
10. O'zbekiston Respublikasi Prezidentining 2019-yil 4-oktabrdagi PQ-4477-son qarori. (2019). 2019–2030-yillarda O'zbekiston Respublikasining “yashil” iqtisodiyotga o'tish strategiyasini tasdiqlash to'g'risida.
11. O'zbekiston Respublikasi Prezidentining 2023-yil 11-sentabrdagi PF-158-son Farmoni. (2023). “O'zbekiston — 2030” strategiyasi to'g'risida.
12. “Navoiy kon-metallurgiya kombinati” AJ. (2024). Korxonada faoliyati, qo'shilgan qiymat va sanoat kooperatsiyasi bo'yicha analitik ma'lumotlar. NKMK AJ.