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STRATEGIC WAYS OF MINING INDUSTRY DEVELOPMENT

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ABSTRACT

This paper reviews the strategic ways of developing the mining industry, as well as reveals the shortcomings of the legal framework hindering the development of the sector, and discusses the accounting complexity.

The article substantiates that the mining industry has a significant share in the national economy of the Republic of Armenia, and the goal of the development of the sector is to contribute to the sustainable development of the country by highlighting the existing problems, as well as increase the ranking and competitiveness of the RA mining companies in the international market.

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Introduction.

Mining industry could highly benefit by the improvement of the relevant legal framework or at least by the improvement of the national policy for the mining industry, while still only the Concept of the Development of the Mining Industry has been adopted.

We believe that for the development of the national mining policy the actual methodology should be reviewed and changed, which means to exclude the potential of conflict of interest by balancing the opposing sides. For example, one of such controversial issues is the problem of exploitation or non-exploitation of Amulsar, around which many conflicting opinions have been formed with different justifications and calculations. In any case, the target of the national mining policy and strategy should be the assessment of the economic and environmental damages, the reduction of the potential risks and the ensurance of the sustainable development of the sector.

Another direction of the development of the mining industry is the classification of mines as pre-Soviet and post-Soviet years, as well as those opened after independence of RA. It would allow to understand the challenges related to the operation of mines, the basis of their legalization, the extent of social and environmental damages, the risks to human health, otherwise the sector will simply not develop. For example, the pledge for development in the world's leading mining countries is listing of mining companies on stock exchanges, which not only solves the problem of ensuring investment flows, but also provides an opportunity to hold mining companies accountable in the international court system in case of environmental, economic, social and human health damage.

As shown in Table 1, companies from leading mining countries are listed on the stock exchanges in different countries.

Table 1. List of leading mining companies listed on the stock exchange by country¹, 2021.

Company	Stock Exchange	Stock Exchange by Country
Anglo American	Botswana Stock Exchange (BSE)	Botswana
Anglo American	London Stock Exchange (LSE)	UK
Anglo American	Namibia Stock Exchange (NSX)	Namibia
Anglo American	Swiss Exchange (SIX)	Switzerland
AngloGold Ashanti	Australian Stock Exchange (ASX)	Australia
AngloGold Ashanti	Johannesburg Stock Exchange (JSE)	South Africa
AngloGold Ashanti	New York Stock Exchange (NYSE)	USA
Antofagasta	London Stock Exchange (LSE))	UK
ArcelorMittal	Amsterdam Stock Exchange (Euronext Amsterdam) (ENX)	Netherlands
ArcelorMittal	Luxembourg Stock Exchange (LuxX)	Luxembourg
ArcelorMittal	Madrid Stock Exchange (Bolsa de Madrid) (BME)	Spain
ArcelorMittal	New York Stock Exchange (NYSE)	USA
ArcelorMittal	Paris Stock Exchange (Euronext Paris) (ENX)	France
Banpu	Stock Exchange of Thailand (SET)	Thailand
Barrick Gold Corp	New York Stock Exchange (NYSE)	USA
Barrick Gold Corp	Toronto Stock Exchange (TSX)	Canada
BHP	Australian Stock Exchange (ASX)	Australia
BHP	Johannesburg Stock Exchange (JSE)	South Africa
BHP	London Stock Exchange (LSE)	UK
BHP	New York Stock Exchange (NYSE)	USA
BHP	New York Stock Exchange Consolidated (NYSE)	USA
Buenaventura	Lima Stock Exchange, Bolsa de Valores de Lima (BVL))	Peru
Buenaventura	New York Stock Exchange (NYSE)	USA
Bumi Resources	Indonesia Stock Exchange (IDX)	Indonesia
China Shenhua	Shanghai Stock Exchange (SSE)	China
China Shenhua	Hong Kong Stock Exchange (HKEx)	Hong Kong
Coal India	Bombay Stock Exchange (BSE)	India
Coal India	National Stock Exchange of India (NSE)	India
Evraz	London Stock Exchange (LSE)	UK
Exxaro Resources	Johannesburg Stock Exchange (JSE)	South Africa
First Quantum Minerals	Lusaka Stock Exchange (LUSE)	Zambia
First Quantum Minerals	Toronto Stock Exchange (TSX)	Canada
Fortescue	Australian Stock Exchange (ASX)	Australia
Freeport-McMoRan	New York Stock Exchange (NYSE)	USA
Glencore	Johannesburg Stock Exchange (JSE)	South Africa
Glencore	London Stock Exchange (LSE)	UK
Gold Fields	Johannesburg Stock Exchange (JSE)	South Africa
Gold Fields	New York Stock Exchange (NYSE)	USA
Gold Fields	Swiss Exchange (SIX)	Switzerland
Grupo México	Lima Stock Exchange, Bolsa de Valores de Lima (BVL)	Peru
Industrias Peñoles	Mexican Stock Exchange (MexBol) (BMV)	Mexico

¹ Armenian Securities Exchange, https://amx.am/am/issuers_list

MMG	Australian Stock Exchange (ASX)	Australia
MMG	Hong Kong Stock Exchange (HKEx)	Hong Kong
Newcrest Mining	Australian Stock Exchange (ASX)	Australia
Newcrest Mining	Papua New Guinea National Stock Exchange (PNGX)	Papua New Guinea
Newmont	New York Stock Exchange (NYSE)	USA
Newmont	Toronto Stock Exchange (TSX)	Canada
NMDC	National Stock Exchange of India (NSE)	India
Peabody Energy	New York Stock Exchange (NYSE)	USA
Polymetal	Astana International Exchange (AIX)	Kazakhstan
Polymetal	London Stock Exchange (LSE)	UK

Returning to the Armenian reality, only 3 mining companies are listed on the Armenian Stock Exchange: "Pure Iron Factory" OJSC, "Zangezur Copper-Molybdenum Combine" CJSC, "Aske Group" OJSC, the low listing index clearly indicates existence of shadow part in the sector, informal employment, and the facts of deliberate tax evasion.

One of the leading mining companies in Kajaran is "Zangezur Copper-Molybdenum Combine" CJSC, which has been operating for about 60 years. The company mines and processes molybdenum and copper ore, the processing of which produces two separate copper and molybdenum concentrates. Molybdenum-derived oxide and ferro-molybdenum are mainly used in steel casting as strengthening, heat-stabilizing and anti-corrosion components¹. Copper is one of the most used and common metals in the world today, widely used in industrial production. It should be noted that the company implements many social programs.

"Clean Iron Factory" OJSC (hereafter CIF) is a leading enterprise processing molybdenum concentrate in the Republic of Armenia. It was the first to start producing ferromolybdenum, and so far it is the only one that also produces metallic molybdenum².

The continuous development of the construction sector in RA requires meeting the demand for imported steel bars, especially with domestic production. For this purpose, "ASCE GROUP" OJSC, based on "HayAvto" P.U. "Avtodzul" factory in Charentsavan, started the production of steel billets for the further production of bars in 2007. Along with the mitigation of the global economic crisis, in 2011 the company signed contracts with Siemens VAI to upgrade the company with new alloys and rolling equipment for the production of steel bars³.

It turns out, that only heavy metal extracting companies out of RA mining companies were listed on the Armenian Stock Exchange.

According to the data in the Table 2, molybdenum provides a huge share of raw metal extraction in RA, the volume of which increased by 106.36% in 2020 compared to 2016, and by 66.86% compared to 2019.

Compared to molybdenum, copper volumes decreased by 12.4% in 2020 compared to 2016.

A significant increase was recorded in the extraction of precious metals, in particular, in 2020, gold extraction increased by 42.47% compared to 2016, but due to the COVID-19 pandemic, in 2020 volumes decreased by 8.72% in 2020 compared to 2019.

For another precious metal - silver, a growth trend was recorded in the same period and in 2020 the increase was 38.25% compared to 2016, and 8.77% compared to 2019.

¹ Zangezur Copper Molybdenum Combine, <http://www.zcmc.am/arm/our-metals/>

² Plant of Pure Iron (Cronimet) <http://pureironplant.am/am/>

³ ASCE Group, <http://www.asce.am/>

Table.2 Extraction of mineral metals and industrial minerals in RA in 2016-2020.¹

Mineral metals	Unit	2016	2017	2018	2019	2020	Change 2016/2020	Change 2019/2020
Iron and ferrous metals (heavy metals)								
Molybdenum	t	5771	5038	5422	7137	11909	106.36	66.86
Base metals (non-ferrous metals)								
Bismuth	t	1	1	0	0	0	-100.00	.
Copper	t	95080	95793	68928	91214	83291	-12.40	-8.69
Rhenium	kg	280	260	280	310	260	-7.14	-16.13
Selene	t	1	1	0	0	0	-100.00	.
Zinc	t	4960	6070	6946	7162	8684	75.08	21.25
Precious metals								
Gold	kg	3732	4670	4967	5825	5317	42.47	-8.72
Silver	kg	14100	17200	16700	17922	19493	38.25	8.77
Industrial minerals								
Bentonite	t	13956	24712	0	0	0	-100.00	.
Diatomite	t	25486	23465	0	0	0	-100.00	.
Plaster	t	14831	14336	20387	22907	28508	92.22	24.45
Perlite	t	44820	14036	51222	80676	104410	132.95	29.42
Salt	t	68435	137236	155393	56685	24401	-64.34	-56.95
Sulphur	t	8500	8100	10500	10500	11500	35.29	9.52
Total	t	281859	328810	318820	276305	272727	-3.24	-1.29

Referring to the challenges of the strategic development of the mining industry, we should note that choice of strategy implies, first of all, defining the goal and problem, developing a road map, as well as monitoring and analysis. As a result of the development of different scenarios, the strategy makes it possible to evaluate the effectiveness of their application, to perform a comparative analysis and to perform an evaluation and selection of the best strategy alternative, where special tools are used, including quantitative and qualitative forecasting methods, design of development scenarios, portfolio analysis, etc.

Table 3. The system of internal and external factors affecting the strategy of the mining sector²

External factors	Internal factors
Political	Availability of mineral resources
Economical	Competitive advantages
Social	Training of workers
Legal	Social guarantees of employees and addressing health problems
Output results	Mining industry development or mine closure as a result of the interaction of external and internal factors
	Evaluation and selection of strategic alternatives
	Implementation of the strategy according to the current development challenges of the sector

¹ https://www.world-mining-data.info/?World_Mining_Data_Data_Section, Data Section Chapters of WMD 2022 with production figures 2016 - 2020: sheet 6.6

² Developed by the author

In the structure of the strategy, it is also necessary to classify the factors influencing the sector as internal and external (Table 3).

One of the primary directions for forming a stable economy is the identification of the priority directions of the economy and the use of policy instruments, taking into account the influence of the sector in improving the socio-economic situation, solving the urgent problems that the country faces, and ensuring the stability of the political situation.

We have substantiated and calculated the impact of mining in the sustainable development of the economy, both positively and negatively. In order to reduce the latter, it is necessary to assess the amount of economic, social and environmental damage caused by them, in particular:

1. environment and social consequences,
2. carbonation,
3. activity license,
4. geopolitical development,
5. capital,
6. uncertain demand,
7. digitization and innovations,
8. workforce,
9. new business models,
10. productivity and costs.

Table 4. A Guide to the Algorithm of Mining Development

Criterion	Sphere of influence
Implementation of the function	Environmental
Timetable	Short term, medium term, long term
Social benefits	Profitable, optimal and efficient
Environmental impact	Potentially low risks
Effect size	Temporary, permanent

To estimate the size of the listed factors, it is necessary to develop an algorithm to solve the problem. At the same time, during the development of the algorithm, first of all, the parameters and then the scope of the possible impact are specified (Table 4).

In order to assess the socio-economic impact of the mining industry and outline the direction of the real development of the sector, we have identified the following factors (Table 5):

Table 5. Classification of factors affecting the mining sector and description of the extent of their impact

Factors Affecting the Sector	Extent of Impact + or -
<i>Socio-economic factors</i>	
Revenues	+
Employment ũ	+
Standard of living	+ or -
Poverty	+
Export	+
Training and acquisition of knowledge	+ or -
Rational use of water resources	-
Social development	+
Earth factors: soil and laws	-
Asset Impact	+
<i>Political factors</i>	
Securit	-
Adolescent Employment and Exploitation	-
Corruption and bribery	-
Human rights	-

To sum up, for the development of the mining sector, first of all, it is necessary to classify the factors affecting the latter, to define the amount of risk, and secondly, to develop an algorithm for choosing the best option.

Conclusions.

As a result of the analyzes carried out in the article, the following conclusions were summarized, in particular:

- One of the directions of the development of the mining industry is to implement changes in the actual field, or at least the development of the national policy of the mining industry, while still only the concept of the development of the mining industry has been adopted.
- In order to develop a national mining policy, first of all, it is necessary to review the current methodology, secondly, to exclude the potential conflict of interests in favor of balancing the opposing parties.
- To classify types of mines according to communities and marzes in the pre-Soviet and Soviet years, as well as after independence of RA, to identify the bases of the legalization of mining operations, the extent of social and environmental damage, and risks to human health.
- To increase the number of listings of mining companies in Armenia in the Armenian Stock Exchange in order to activate investment flows and increase the international ranking.

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