Particular Aspects of Use Resources of Mineral Useful Substances

Sorin-Iuliu MANGU, Diana-Cornelia CSIMINGA, Mirela ILOIU, Aronel MATEI

University of Petrosani,Str. Universității nr. 20, 332006, Petroșani, jud. Hunedoara, Romania; email: red_rose_ro2000@yahoo.com

http://doi.org/10.29227/IM-2019-02-24

Submission date: *17-09-2019* | Review date: *22-10-2019*

Abstract

The issue generated by the use of mineral resources has far outstripped national boundaries, sometimes becoming the subject of controversy not only among specialists and currents of thought, but even between states. The limited character (fixed plan offer), the uneven distribution in the basement, the different forms of ownership, but especially the increasing dependence of many economies (of the entire human civilization, ultimately) on mineral resources, are only a few of the elements induce specificities in the process of substantiating the decisions that concern their use.

Keywords: mineral resources, growth, rarity, special form of capital

1. Economic growth and mineral resources

Analyzed in close connection with the environmental effects for many specialists, the evolution of the world economy (characterized, over the last three decades, by rapid growth rates, industrial expansion and accelerated widening of the capital goods and consumer goods nomenclature), led to the materialization of the idea of a contradiction between economic growth and mineral resources.

A more detailed analysis of the phenomenon led to the identification of five groups of potential factors generating the contradiction, namely [8]:

- natural factors (uneven distribution of mineral deposits useful in the basement and their variable quality);
- technical factors (development of exploration and exploitation technologies for mineral deposits, minerals preparation and processing of mineral raw materials);
- economic factors (the structures of the mineral raw material markets imposed by the large multinational concerts residing in the developed countries);
- ecological factors (the limited nature of mineral resources and the need for their rational management);
- social-political factors (strategies for the development of mineral resources promoted by the great political and military powers of the world).

In the opinion of many researchers, the conflicting relationship between economic growth and mineral resources is the expression of the general contradiction that the development of civilization has induced between man and the natural environment, expressed in its concrete forms by:

- contraction between the needs of natural resources and the limited possibilities of the natural environment to provide them;
- contraction between the ever-diversified needs of civilization and the technical-economic limits of the use of natural resources;
- the existing conflict between economic development and its effects on the natural environment, in terms of harmfulness, pollution and degradation.

Even though this issue has been the subject of many scientific papers, but elaborated from the positions of different points of view, its increasing importance has led to the emergence of specialized international organizations and bodies, which have devoted extensive studies to it. Between them, a so-called Rome Club (initiated in the 1970s by the famous professor Aurelio Peccei) held a special place, by importance and involvement.

In the first Report to the Club of Rome ("Limits of Growth", elaborated by a group of researchers led by American Professor D. Meadows), based on the analysis of five determinants – population, agricultural production, natural resources, pollution – the idea of halting economic growth was launched by moving to the so-called "zero growth". The proposal, stemming from comparing the rhythm of discovering new resources with increasing demand for mineral raw materials and finding negative impacts of development on the natural environment, has been vehemently criticized, arguing that "any improvement by reducing economic growth requires years and decades" [3] and considering that there is a need for a new way of dealing with the problems, because "there is no question of stopping progress, but of no longer treating the planet as a mine to be exploited, but as a fund managed in the spirit of a good farmer" [2].

The second report (The Work of Mankind, the work of M. Mesarovici and E. Pestel) proposes the transition from "limited growth" to organic growth "because" it is imperative not to look back from the dangers that stand in our face, but to confront them without detour and to assess the possibility of alternative development paths in a positive and optimistic spirit" [8]. The authors of the report started from the idea that the multitude of punctual crises (energy, food, raw materials, the

environment) is the syndrome of a global crisis and considered that the main brake on economic growth is not the physical limits of natural resources but the poor management of them.

"The Restructuring of the International Order" paper (the third report, the synthesis of the efforts of 21 specialists in various fields, working under the coordination of J. Tinbergen) pointed out that there is a need for changes in the capital expenditures needed to exploit mineral resources and proposed to jointly manage them on a global scale. However, the pessimism that transpired from the work was considered unfounded. First, H. Kahn pointed out that "technical innovation is the basic prerequisite for humanity's exit from the impasse" [6], and then, through the Latin American Model, A.O. Hereera concluded that "the mineral wealth of an area or region can not be expressed in absolute, unconditional terms, but only in relation to a certain economic and technological situation existing at the time of assessment" [4].

Finally, the Fourth Report to the Club of Rome ("Let's Get Out of the Age of Waste", coordinated by D. Gabor) has completed the debate on the issue of natural mineral resources, but has great discernment in developing solutions solving the contradiction between economic growth and natural resources. Although the effects of scientific and technological developments have been taken into account, the study did not provide solutions to all the questions asked. For mineral resources (other than energy), however, it introduced the concept of "stocks of mineral materials in use", for example showing that for a number of common metals (iron, copper, lead, zinc), recycling and reuse may constitute major solutions to solving the problem of insufficiency.

Since 1984, the contradiction between the requirements of economic growth and limited natural resources, on the one hand, and the deterioration of environmental factors, on the other hand, are the subject of the work written by the Worldwatch Institute annually and published under the title "Global Problems of Humankind. State of the World".

2. Rarity and potential crisis in the use of mineral resources

In the history of economic thinking, the use of mineral resources is a relatively recent issue, with the first discussions only emerging in the nineteenth century. However, since "most of our thoughts are influenced by the problems of our time" [7], the problem of the use of mineral resources has found different ways of solving the views of the economic schools and thinkers in the field.

One of the pioneers of neoclassicism, W.S. Jevons (who lived in England during the Industrial Revolution) referred for the first time to the relationship between mineral deposits and the development of the economy. The fundamental issue that Jevons pursued was the exploitation of coal deposits, whose incompetence was considered the main obstacle to the industrial development of the British economy. Inspired by the rapid depletion of deposits with easy geomorphic conditions, under a constant increase in coal production, Jevons had a fatalistic view, considering that the gradual depletion of deposits would lead to an increase in operating costs to a level where industrial branches they will not be able to resist.

In the early part of the twentieth century, French economist A.C. Pigou, starting from the scarcity of mineral resources and concerned about sharing the benefits of exploiting it between generations, was making radical recommendations that governments should pursue an active policy of defending exhausting resources by promoting harsh legislation to prevent their unreasonable exploitation.

The Problem of Mineral Resources Failure and the Bad Effects on Future Development of Transparency and the Writings of the End of the 20th Century by A. Huxley. Explained at a time when communism still appeared to be invincible for many, its predictions of diminishing the reserves of useful minerals and the expansion of dictatorial political regimes have not been able to convince the scientific community, much more so since the last decade of the century the past has been marked by tremendous efforts to restore liberties to countries that have lived for decades under dictatorship.

The common point of thinking for all of the above is that there is insufficient, scarce and limited nature of mineral resources, manifested by a possible future crisis in their use. In the last century, extensive studies have been devoted to this issue, with almost all attempts to demonstrate that the rarity of mineral resources has not increased with their growing exploitation.

Barnett and Morse developed one of the most important studies in the field in 1963, highlighting the implications of the scarcity of mineral resources, both on operating costs and on world market prices, initially for a period of 87 years (1870–1957), then expanded for another 13 years. In this study, the estimate of fossil fuel prices and non-combustible mineral resources was made when the United States would have progressed steadily, from the underdevelopment stage to the advanced economy, during which time a huge pressure on mineral resources would have been exerted. The methods used to test rarity were three, the unit cost (in real terms), the price of the mineral resources (in real terms) and the rent obtained through their exploitation, but the results they produced and the interpretations they had inspired were very little different. Thus, the conclusion reached by the two researchers was that all mineral resources became less rare, due to the action of three factors: the discovery of new deposits of useful minerals, the development of exploitation and processing technologies, substitution of mineral resources with high content of useful substances (severely limited quantitatively) by those with poor (but abundant quantitative) content.

Another important study on the relationship between rarity and price evolution is that carried out in 1962 by D. Potter and F.F. Christy, in which the price trend for more mineral resources was analyzed. The study, which referred to the same time as Barnett and Morse, produced almost identical results, concluding that all mineral resources have become less rare.

In 1973, W.D. Nordhaus has published a forward-looking, detailed study on the relationship between the supply of mining products, the costs of operation and processing and the evolution of their market price. The conclusion was the same, namely that all mineral resources have become less rare.

In 1982, Nordhaus and Tobin drew up a new study devoted to the identification of specific functions compatible with the historical value of the proportion of inputs in national income, concluding that mineral resources would not become a severe brake on economic development. Similar conclusions came in the last decade of the last century and J. Hartwick

and N.D. Olewiler, which mainly focused on the rents generated by the exploitation of mineral resources, without neglecting the effects of technological change and substitution possibilities.

Although the results of this research are reassuring about the rarity of mineral resources, there are still many researchers who doubt their validity. Even the United States Bureau of Mines has been involved in the problem and has shown that existing mineral resources stocks and depletion periods should be estimated on the basis of more credible data sources.

As a general conclusion, it can be said that the issue of the rarity of mineral resources has not yet been cut in favor of a certain stream of opinion, and probably will never be. Reserves of useful minerals only become known (quantitatively, qualitatively and in terms of deposit conditions) only when they are fully exploited and their uneven distribution in the earth's crust will probably still produce more and more heated debates, both on how to put it into use and on national property rights, as globalization of the world economy has become a reality of our day.

3. Reserves of useful minerals – a special form of capital

For a nation, the reserves of useful minerals are a special form of capital. Relative to the economic developments they have experienced in the last decades of the last century, certain geographic areas (among which the prominent one is South East Asia), the notion that a nation's economic progress is not necessarily conditioned by the supply of factors natural production (mainly mineral resources), appeared at one time, fully justified. Nevertheless, it is obvious that at the basis of the economic prosperity and military power of the great nations the control of resources and the world market of mineral raw materials has been and continues to be controlled by the United States of America, China and the Russian Federation. The endowment of nations with mineral richness is still a determining factor in their place on the world economic and political scene. The explanation for this is precisely the very special character of these riches, expressed by their potential economic value.

The assessment of the mineral resources potential of a nation (its mineral capital) generates particular problems, the solving of which involves the use of a specific conceptual and methodological edifice. However, the issues of mining property evaluation will return to a future chapter.

A geographic area in the basement of which mineral deposits have been identified but which have not yet been opened can only be attributed to the attribute of a "rich area of mineral resources". At this stage, whether quantified or not, such wealth is unproductive (deposits have the quality of an economic resource and are not yet transformed into production factors). Even when the exploration results fundamentally underpin the transition to the opening works, the area may still be considered unproductive, both in the narrow sense of obtaining the production of useful minerals in an exploitation unit (underground or up to date) and in the sense wide assurance of the raw material base needed in other branches. However, the economic potential of the area has been demonstrated and established with an acceptable margin of error, thus justifying the transition to the higher stages of putting mineral deposits in value. The exploitation of reserves proves their value of utility, as an expression of the intrinsic value conferred by their very existence.

The devastating nature of the mining activities has led to heated debates in the world of those interested in mining and not only (as has been seen in a previous paragraph). This defining characteristic of the mining branch must be appreciated by the term "mineral materials in use, not consumption of their potential". It has to be understood that mining means, in essence, the productive use of mineral capital, with the aim of achieving an extended return, on account of the efficient combination with the other fundamental factors of production. Through mining activities, the unproductive mineral potential of the subsoil is transformed into production assets of an economy.

Although the exploitation of useful mineral reserves may seem at first sight an economic activity of waste (the exploited reserves are consumed forever), economic reality has demonstrated the existence of a constantly changing demarcation line separating exploitable reserves profitable from those exploitable with losses. The existence of this line is the expression of the action of a fundamental axiom of the economy, according to which supply and demand are always self-regulated through price in the context of a free market. In the case of the mineral raw materials market, the action of certain disturbing factors has been highlighted. Among these, probably the most important were the sustained industrial development of some nations and the growth of the world's population, which led to a sharp increase in the demand for mineral raw materials. On the other hand, the discovery of new deposits and the action of technological progress, especially in the exploitation and use of mineral raw materials, have led to a rapid increase in supply. For the different mineral raw materials, market equilibrium, reflected in prices and driven by supply and demand, was different, but overall, mineral raw material prices did not increase. Famous in this respect is the study of three metals (aluminum, copper, iron), two fuels (coal, crude oil) and two non-metals (cement, sulfur) considered typical mineral products [10] in the United States of America. Expanded over a period of 75 years, the study has shown that in relation to their prices, the purchasing power of the US employee has increased slowly but expressed in terms of the hours of work required for the acquisition, the decrease has been spectacular. Hence, the conclusion that mining does not consume economic potential, but only exploits it, putting the mineral assets into the productive use of the human species.

On a national scale, the provision of mineral welfare is a long-term process, decisively conditioned by both the mineral potential of the subsoil and the use of the other factors of production (linked to this aspect from an economic point of view and of the national interest, it is totally condemned what is happening in Romania today with the old iron exported to the benefit of particular interests at prices uncorrelated with previous national efforts to obtain it.

Crucial for ensuring mineral wealth, the expression of putting into use of mineral capital, is the identification and development of uses of mineral raw materials. Thus, complex parageneses, the existence of accompanying minerals, the presence of secondary deposits, are likely to lead to the increase of the underground economic potential.

Literatura – References

1. Angelescu, C. (coordinator) - Economics, 5th edition, Economic Publishing House, Bucharest, 2000.
2. by Jouvenel, B. - Progress in Man, Political Publishing House, Bucharest, 1983.
3. Galbraith, K.J. - Economic Science and Public Interest, Political Publishing House, Bucharest, 1982.
4. Herrera, A.O. - Catastrophe or a New Society ?, Political Publishing House, Bucharest, 1981.
5. Hodor, P .; Dobrițoiu, N .; Simionescu, A. - Fundamental Management Decisions in Mine Design, Universitas Publishing House, Petrosani, 2000.
6. Kahn, H .; Brown, W .; Maste, L. - The Next 200 Years, A Scenario for America and the World, W. Morrow and Company Inc., New York, 1976.
7. Kula, E. - The Economics of Natural Resources, The Environment and Policies, Second Edition, Chapman and Hall, London, 1994.
8. Mesarovici, M .; Pestel, E. - Humanity at Transmission, Political Publishing House, Bucharest, 1985.
9. Neguț, S. (coordinator) - World Economic Geography, Meteor Press Publishing House, Bucharest, 2003.
10. Răducanu, V. - Economics of Natural Resources, All Beck Publishing House, Bucharest, 2000.

Szczególne aspekty wykorzystania zasobów mineralnych substancji użytecznych

Problemy generowane przez wykorzystanie zasobów surowców mineralnych znacznie przekroczyły granice państwowe, niekiedy stając się przedmiotem kontrowersji nie tylko wśród specjalistów ale nawet między państwami. Ograniczony charakter zasobów, nierównomierne rozmieszczenie w środowisku, różne formy własności, a zwłaszcza rosnące uzależnienie wielu gospodarek (ostatecznie całej ludzkiej cywilizacji) od zasobów mineralnych, to tylko niektóre z elementów decydujących o ograniczoności zasobów. Autorzy zaproponowali wprowadzenie uzasadnienia decyzji dotyczących ich wykorzystania surowców.

Słowa kluczowe: zasoby mineralne, wzrost gospodarzy, specjalne formy kapitału