

University of Miskolc
Faculty of Technical Earth Sciences
Sámuel Mikoviny Earth Sciences Doctoral School

Head of the Doctoral School
Dr. h. c. mult. Dr. Ferenc Kovács university professor
ordinary member of the Hungarian Academy of Sciences

The Economic Significance of Natural Resources

Thesis of a Ph. D. Treatise

written by:
Péter Vojuczki
certified mining engineer

Topic leader: Dr. József Molnár
university lecturer

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„General well-being depends on two things: first that the intention and the end should be right, second, that we can find the means to the end. In crafts and sciences we need to be aware of both, i.e. the end and the deeds leading to it.” Aristotle”

I. Introduction

Our country remains fit for human living as long as, similarly to our ancestors, we can cultivate the woods, the fields, the mineral deposits, the land, the water and the air and thereby produce the food to live on, the building materials to build shelter, the raw materials (working objects) for material production processes, and we believe that our intellectual and material resources are adequate to build the future, we can develop the skills and tools for cultivating them.

The essence of our economic history is the current development of the exploitation of natural resources, and establishes a relationship between the availability of raw materials with favorable features, as a fundamental condition and the development of the production, transportation and professional system on the one hand, the scientific level of development of the country and the scientific level of the applied raw material production and utilization on the other hand.

In the development system of “natural resources – technology – science” - the Hungarian culture of the cultivation of mineral resources was highly appreciated abroad, it was a progressive area that enriched the country and was of European significance at the beginning of the last century. From the 12th century to the end of the 19th century ore mining and salt mining employed 1-2 per cent of the population and contributed the majority of the revenues of the treasury, while the technological level and training were first class quality by the standards of the day. Owing to coal mining and iron ore production, in the 19th century the development of the steam engine and railroads became possible in Hungary, too. Hungarian industry would have been impossible to develop and Budapest could have hardly been built up without coal production. At the beginning of the 20th century, when the utilization of electricity became the basis of technical and economic development, we were a competitive nation,

what is more, Hungary was a recognized global participant in the production of power generating and utilizing machines. Our own resources gave trust and self-respect, they encouraged more efficient utilization in science and industry, as a combined effect of these factors, the country manifested fast development.

After the World War I., in the ravaged country coal and steel industry started to develop with the highest speed, even though most of the mineral raw material deposits were lost. After granting duty-free status to coal import, some mines were closed as early as in 1926, showing the limits of the competitiveness of Hungary, however, after the Great Depression coal production in Hungary grew and stood the test of the market until the time of the World War II. The import of ore mining products necessary for the operation of industry was at that time offset by agricultural raw materials, such as fats, grain and rye.

For lack of foreign sourcing opportunities, we could mostly rely on our own natural resources after the World War II. as well. Relying on the accomplishments of research in the field of earth sciences, domestic production covered two-third of the energetic, mineral mining and raw construction materials necessary for the reconstruction of the country, we only imported those raw materials that could only be sourced within the country to a limited extent or not at all. It is an undisputable fact that beginning from the 1950s, the political leaders of the country overestimated the value generating capabilities based on our resources, when the increase of production, based on the accelerated technological development in developed countries, was considered to be attainable by extensive and forced economic growth, which resulted in excessive strain on agriculture, metallurgy and mining.

Despite that, up until the end of the 1960s the structure of our economy had been diversified and suitable for opening in every direction, and the country was not indebted. Despite the earlier efforts of industrialization that overestimated our capacities, the accomplished investment projects were designed from technological aspects and did not pose any unforeseeable risks on the economy designed to be self-sustaining. In the exploitation of our own mineral and agricultural resources, the production volume of the economy was close to the present level, even higher in certain cases. The country believed that it would recover from the consequences of the war, it made headway relying on its own resources, even though a

lag existed in technological development and productivity, compared to developed countries.

In the leading countries of the world the use of chemicals and machines in the agriculture was growing rapidly in the 1960s, transportation was transformed and new branches of industry were created. The weight of our branches of exploitation in the economy was changed and market competition intensified, as the products of the new branches (plastic, fertilizers and pesticides) replaced the old products in many instances. The supply of chemical raw materials, the production of fuel and the utilization of the by-products of petro-chemistry in energetics brought about many changes in power engineering as well: variable consumers started using fuel oil and furnace oil as a substitute of coal, oil processing and power engineering combined into one system, countries with low oil production of their own had to rely on imported oil. It became a dominant view of economists that in countries without favorable natural resources the detachment of a country's own base of raw materials, mostly meaning detachment of the country's energy carriers, could support the fast growth of the economy.

The sourcing of energy carriers was a major strain on the economy in Hungary, as well. In the 1960s the value of energy carriers measured at official prices exceeded 10% of the national income, the annual investment needs of the equipment necessary for production, utilization and transformation exceeded 20% of all annual investments in the national economy. In view of the importance of reasonable management of energy carriers, and to maintain our international competitiveness, at the order of the Hungarian Academy of Sciences guidelines were formulated in 1958, then from 1960 under the leadership of the National Planning Office and from 1962 under the leadership of the National Technological Development Committee studies were made on how the energy needs could be covered more economically.

In the studies it was demonstrated what were the energy carriers that could be produced and expanded, given the planned economy and the pricing conditions of the time, at the expense of what other energy carriers. It followed from the calculations that oil products and gas could be more efficiently utilized by small consumers, while energetic brown coal, lignite and stone coal are more suitable for large power generators, the cement industry can utilize high quality

black coal and oil products with similar efficiency, in the blast furnaces the efficiency of natural gas blasting cannot be proven. The authors of that study proposed that the production and sourcing of oil should be intensified at the expense of low quality energy carriers, but they could not prepare a plan that would have shown to what extent it was economical to intensify the domestic production of hydrocarbon and the increase of oil import, *because it was impossible to determine the incremental prime costs associated with the increase of production and import*. Finally, the proposals applying to the given economic situation but burdened with uncertainties in the long-term were still put together to *form a comprehensive conception*, and structural changes began in the 1960s, mainly relying on Soviet oil.

The oil crisis of 1973 soon indicated the dangers of economic development based on imported crude oil, which triggered a quick technological change in Western countries. On the other hand, in our country the structural transformation continued – even though it was belated anyway, and was erroneous in terms of proportions, then from the 1980s our national economy and our own raw material production started to decline, while we contributed COMECON integration investments to the exploration of foreign resources and the build-up of the related infrastructure, in an effort to increase the import of hydrocarbon, furthermore, developed a new transportation, distribution and firing technological system sized for the mass importation of energy carriers. In the beginning, the economic policy makers considered the decline temporary, then later, when it turned out that it was an enduring phenomenon and was in close connection with the oil and hydrocarbon prices which the policy makers could hardly influence, the crisis was explained away by the deterioration of the terms of trade deriving from the unexpected increase of world market oil prices, the openness of the economy, the higher level of consumption than production and the increase of the foreign trade deficit. However, these are consequences and not causes.

The real cause of the deterioration was the erroneous structural change that was costing more and more, being based on a raw material whose prices could hardly be influenced by the country, which was often acknowledged by the economic policy handed over from government to government, but instead of action, sometimes they hoped that the world market conditions would change for the

better, at other times the miracle of the „economic reforms” was meant to bring a better future.

For years we had been fascinated by programmes. Almost every field of the economy had their own programmes (olefin, road vehicles, light structure construction, energetics and others), but the professional programs were developed to enhance a structure that lacked its own raw material basis, were launched subject to economic conditions imposed by the state and often carried out only in part, thus they could not deliver the expected improvements. With the deterioration of the economic situation, owing to a lack of funds, the professional programs were replaced by comprehensive concepts. In such concepts as „Turn and Reform,” „Stabilization”, „The Way Out” and „Concepts for Action”, the production objectives were now assessed from the aspect of the debt-ridden state budget, and by way of generalization, *market tools* were recommended for the consolidation of the economy, especially in the field of mining. It was not clear why the application of market tools was “especially important” only in certain areas of the economy, and what (market) economic criteria were used to make this distinction, which resembled the command economy. In practice, we knew that owing to the short-term removal of tools from energetics, the problems that would show up later could not be dealt with at present.

In the autumn of 1989 the accelerated political changes diverted attention from stabilization, the transformation of the economy continued, relying on the toolset of the market solutions that had already failed earlier. In the same way as after the oil crisis of 1973, we once again failed to adapt to the new conditions, although this time there were no political impediments, and it was obvious that the benefits hoped for in the COMECON system were gone for good, therefore the processing industry that was created through the earlier structural changes and produced an output that was detached from the domestic needs could not produce the exports that could have offset the raw material import of Hungary. In the supply of raw materials for mining, the ratio of domestic production to import, which fell below 50% back in 1984, further deteriorated, *at that point already, our own production was replaced by import, in a situation where there were no products available for export to offset this import*. In addition, when energy consumption decreased owing to the decline of the economy, it was not the raw material import

assuming high domestic economic growth and sized for erroneous forecasts that decreased, rather the domestic mining output that was considered *more expensive*. Over the last 20 years coal mining and power engineering remained the sector of the Hungarian economy that was regulated with the most contradictions, where the application of “market tools” only served to drain the resources. In fact, it was never proven that the domestic coal mines and coal-based power generators were uneconomical in market terms, compared to the energy solutions based on imported hydrocarbon.

The fiscal and monetary approach of economic policy was not modified by the political changes. Despite the completion of privatization in the meantime, the assessment about production did not change, the crisis of the economy continues to deepen and our room for action is getting narrower. This also applies to mining, which was depleted to such an extent, owing to the legacy economic and political approach, that the significance of this branch and profession for the national economy was questioned. Professionals who have doubts about the benefits of this approach and challenge the bright hopes successfully communicated in the media are pushed to the background. The tirade that “we are a country poor in raw materials” is dominating, which has covered up the wrong approach responsible for the recurring indebtedness of the country for decades, and ultimately resulting in lower living standards.

We have ample domestic experiences relying on the raw material management tendencies of the world to enable us to answer the question of whether it will be possible to sustain in the long-term the approach that degrades our resources. In my article published in the 1989 in the economic policy journal titled “Economy” of the Hungarian Economic Society, and in the Mining and Metallurgical Paper in 1991 I also pointed out – as was expected by the social and economic reforms – the consequences of assessing our mineral resources erroneously. I highlighted a few statements from these articles of mine as well, because the energetic problems brought up for investigation in the latest programs (for example, in the Energetic Market Opening Programme) imply that the old approach is still valid. A society is organized to look to the future, however, when new plans and required for development, it should look back, to learn lessons and derive experiences from its past. *My aim is to contribute to strengthening the now damaged belief that it is reasonable to rely on*

our own natural resources and to emphasize that we if we want to create well-being in this century, we will need to use our resources, more economical than imports, to a higher extent than ever before. The international economic conditions of the New World resulting from the new European integration are unsettled, its raw material import intensive economic structure is in need of changes, which requires a review of our approach regarding the utilization of our own resources, since the advent of new technologies that would revolutionize the bases of production is obviously not imminent.

II. Research methodology

In countries of the world with significant industrial sectors industry was developed relying on mining. Since its establishment, our country has had a significant mining sector, which was a basis for the recovery of the national economy, even after the territorial losses in the 20th century. When was it that a major part of deep mining lost its viability and how justified was its termination? Does this profession still have a chance for survival, or it will be terminated for good on account of no economic viability?

When it was possible, I conducted the research relying on long time-lines, and chose the year 1960, quite arbitrarily, as my starting point, since it was the period between 1960 and 1965 when optimization of the energy carrier utilization structure started, justified by the spread of hydrocarbon. Within the constraints of data availability, I was searching for the impact of the changes of the economic structure on the development of the utilization ratios of energy carriers, furthermore, by the comparison of the data in kind of domestic production and import (such as kg, heat) and the terms of trade, I tried to demonstrate the export efficiency of the processing industrial products designed to offset import. In the comparison I made an effort to demonstrate the impact of state monopoly on the assessment of the economic viability of the products.

I reviewed the changes in the geographical distribution of the mining output of the world, the movement of the main market prices of the products at current and fixed prices, the impact of transportation on the prices of raw materials, furthermore, the impact of raw material prices and utilizing technologies on the prices of the products. I compared the trends of the changes to the transformation of the political

environment and the international cooperation, and searched for the impact of international tendencies on the economic regulation of Hungarian mining and energetics, on the major indicators thereof (such as quantitative plans, incremental production costs, domestic and import price forecasts, transportation costs). I compared the forecasted indicators used in decision making to the subsequent actual figures.

III. Results of the research

Based on an overview of the relationship between the economic structure and the natural resources, it is justified to say that the longtime unclear assessment of the significance of mineral resources in the national economy and the benefits of their exploitation is still dominating. Owing to the resultant erroneous and artificially created controversy between exploiting and processing industries, the disproportionate neglect of exploiting industry continues, the major role of our aluminum industry, coal mining and hydrocarbon production in the past and their significance today are underrated. Among the market tools in use, the economists avoid the definition and application of solutions that provide a realistic assessment of the raw material assets, such the real marginal rent.

Back in the 1980s, the political leaders acknowledged that the exploitation of a major part of our domestic mineral resources is more beneficial economically than the import of raw material, still, nobody assumed the task of creating realistic value conditions. It has been and still is a grave mistake in the Hungarian economic mechanism that the prices of mineral resources and energy are not determined based on marginal costs, inclusive of capital burdens, infrastructural expenditures and transportation costs, rather in an officially administered pricing regime – while there is talk about the reality of the market economy – with reference to social considerations, aspects of price stability and other political reasons, resulting in much lower prices. In addition, domestic exploiting industry is burdened by mining fee, which the political leaders “forget” to take into account when their economic efficiency is measured, similarly, they also forget that no mining fee will be paid after exploitation has been terminated.

When domestic raw material production and import are compared, it is not taken into account that operators of long distance trans-

portation infrastructure are interested in increasing consumption, while the users will realize the transportation costs as expenditures that are never returned. This was one of the factors why our processing industry that was based on low transportation charges went bankrupt with the per unit increase of infrastructure costs and the application of market raw material prices.

Per unit transportation costs are especially high in energetics. For example, the costs of the infrastructure of natural gas consumption are so high that consumption making economic use of capacities is a condition of economic viability, because the decrease of transported quantity results in production cost increases that can be measured as far as the points of consumption. It is one of the serious problems of domestic energy management how to distribute the natural gas received in accordance with the transportation capacities, while the per unit consumption of the population and the industrial sector decreases. It is paradoxical that in a market economy (?), with state subsidy, more expensive natural gas crowds out domestic coal from Hungarian power generation and the production of the most economical Hungarian base power generators must be restricted by the further destruction of the structure of the economy, in order to enable the operation of gas turbines and gas engines, getting more and more popular with liberalization.

It is possible to avoid the harmful distortion of the structure of the economy. By saving the enormous transportation costs – often as high as half the value of the purchased raw material - of artificially boosted import, by mining and base material industries that utilize the raw material and geographical capabilities it is possible to develop a processing industrial sector that is dependable, reasonable and matches the domestic market and our economic region well. It is obvious that for such an approach, contrary to the current views, we need to accept that the optimal development of the exploiting and base material manufacturing branches provides a basis for the development and economical operation of the processing industry and does not impede it, furthermore, the notion that it is wrong and risky to base developments on a high volume of import in the long-term, because with the depletion of the existing deposits exporters will have to cultivate deposits with worse geographical characteristics that will be consequently more expensive, and the demands for raw materials will increase with the diversification of the market.

It is a global tendency that the focus of raw material production and consumption shifts to the East and to America, while the technological advantages of member states of the European Union decrease, the economic structure of the Union keeps getting older. The growth of China and India is highly based on their own mining sectors, but the demands they generate in the raw material market is also significant. However, the current economic approach of the world does not support the development of mining necessary for fulfilling the increasing raw material needs of the world, consequently, there is a shortage in raw material supply. Therefore economic growth essentially requires making the new mining investments more favorable, such as a review of society management solutions that would enable the development of a partnership between the government and private capital, the cost efficient operation of mines.

In view of the economic restructuring of the world, we must look for ways of development relying on the domestic market and raw materials. Our experiences prove that we also have appropriate mining and energetic technical solutions available, constituting a knowledge base for the society and designed to offset the disadvantages deriving from the lower quality of raw materials and less favorable residential settlement characteristics, by which the utilization of local raw materials and energy carriers is more favorable or can be made more favorable than import. It has been a case in point for several decades that, since the beginning of surface mining of lignite in Mátra mountains and burning of the lignite in a power generator, our professionals have found such cutting edge solutions to resolve the firing technological and environment protection problems that occur in the operation of the mine and the power station, by which it is possible to operate the surface mining and the power station at a low production cost and competitively. Relying on the accumulated technological and scientific skills, such a competitive way of power generation was realized by the fuel of low caloric value that keeps improving the foreign trade balance of the country and the terms of trade, while it continuously provides a livelihood for the population of the area and orders for domestic energetic machine production industry. Therefore it is both possible and necessary to establish harmony once again between the exploitation of our natural resources and the development of the technological – scientific skills of the country, by adequate economic policy, with the aim to enrich our country.

IV. Theses

1. *In theory*, the selling price of mining products is a strategic factor depending on the raw materials needs that are being modified by the development of technology and the supply determined by the quantity, quality, geographical location and exploitation costs of mineral deposits, however, *in practice* owing to the political conditions, the purchased quantities, the transportation and utilization structure, the offsetting or foreign exchange generating transactions and the lack of a real market mechanism, the prices are different from region to region, there is no uniform world market price.
2. The reason why the country is dependent on unilateral energy import to an extent of almost 80% is not the lack or quality of mineral deposits, or the inability to comply with the technical and reasonable environment protection conditions of exploitation, rather the biased economic regulatory system. By relying on the proven mining and energetic solutions that constitute our knowledge base, our mineral deposits can be utilized well, the disadvantages owing to the relatively less favorable geological conditions are more than offset by the advantages of the favorable geographical location, the opportunity of safe supply available at calculable prices. At the level of the national economy the generation of energy from our own coal or lignite is both less expensive and more secure than from imported energy carriers.
3. It is a harmful generalization impeding the creation of harmony between aims and intentions of the national economy, that mining drains the resources from the development of processing industry or infrastructure, these being more economical than mining. The basis for strategic electricity production, raw material and processing industry should be created by the optimal domestic development of exploiting branches.
4. The capital burdens of the investment costs of energy carrier transportation systems should be taken into account in the calculations, comparing the economic viability of domestic and foreign raw materials. In the products of branches utilizing raw materials the transportation costs are increasing expenditures that cause market disadvantages with the increase of distances and create no added value.

5. The subsidized and undervalued raw materials, the low transportation charges encourage the development of raw material and energy intensive branches, which will, in a market context, inevitably be defeated by industries that can rely on more favorable resources of their own (such as mineral deposits and labor).
6. If we are to create well-being for this century, we need to use our own resources that are more economical than import. Owing to the failure of restructuring based on hydrocarbons and the obvious delay of the advent of new and revolutionary energy generating technologies, it is a shared interest of Hungary and EU member states dependent on raw material import to review our approach regarding the utilization of coal and lignite resources.

V. List of publications made on the topic of the research

1974	Bányászati és Kohászati Lapok. Bányászat. issue 8, 572-573	Same organizational issues of coal mining in COMECON country
1974	Műszaki Könyvkiadó, Budapest. Translation. 17.5 sheets	Operating and work it is in mining (Asztahov A. Sz.)
1976	Economic parameters of the mines of the futures. All-Union Conference. Mining University of Moscow	“Contribution to the assessment of the efficiency of technical solutions applied in Hungarian coal mining”. Theses of the all-union conference of MGI. (Harczenko V. A., Koszulin R. Z., Péter Vojuczki)
1979	Műszaki Könyvkiadó, Budapest. Translation. 21.5 sheets	Analytical definition of mine cultivating techniques. (Burcsakov A.Sz. Harcsenko V.A. Kaforin L.A.)
1990	14th World Congress of Mining	Some tendencies of the development of mining technique among complex geographical conditions . (Gusztáv Faller, István Gál, János Gebhardt, Miklós Tóth, Péter Vojuczki)
1989	Gazdaság. Economic Policy Journal of the Hungarian Economic Society, 65-81.	Decisions on industrial development in light of the experiences

1990	14. World Congress of Mining, Beijing, lecture.	Some tendencies of the development of mining technique among complex geographical conditions . (Gusztáv Faller, István Gál, János Gebhardt, Miklós Tóth, Péter Vojuczki)
1990	Népszava, July 24, 1990. page 5.	Culprits and scapegoats.,. Reflections about Márkushegy
1990	Bányászati és Kohászati Lapok. Bányászat. 11-12. szám, 651-652	From daily papers. Reflections about Márkushegy
1991	Bányászati és Kohászati Lapok. Bányászat. 9-10. szám, 467-469. old.	What is my view? Realistic approach or the wrong route once again?
1998	16. World Congress of Mining. Sofia. Lecure.	A hierarchical model for the consideration of risk factors in the assessment of the efficiency of mining, with special regard to the natural environment. (Gusztáv Faller, Béla Fodor, István Tóth)
2000	Gorniy Journal, issue 10. 67-71.	1000 years of mining in Hungary (Gusztáv Faller, Péter Vojuczki)
2001	Inginerie Mineră, Editura Focus, Petrosani, pp. 165-168	Energy sources for the energy supply of the future (Ferenc Kovács – Péter Vojuczki)
2002	microCAD 2002, University of Miskolc, pages 143-148.	Aspects for the regional assessment of our natural resources
2002	University of Harkov	Aspects for the regional assessment of our natural resources
2004	Bányászat és Geotechnika. Miskolci Egyetem Közleménye. A sorozat. Bányászat. volume 66. pages 35-48	Naturally resources and economic policy