GOLD MINING IN APUSENI MOUNTAINS BETWEEN SECOND PART OF XIX CENTURY -FIRST PART OF XX CENTURY

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Abstract. *The goal of the paper is to present the gold exploration in the Apuseni region which benefited from the modernization process imposed by the Habsburg and the Dualist authorities. The new laws and new technologies, the infrastructure lead to increased efficacy, bigger investments, all of which made the area to be known as the California of Europe. The result obtained in this paper is the presentation of the modernization process, being a useful basis for further research. The data compiled in this paper was found in older publications and it is meant to synthetize various aspects of modernization of the exploration in the Apuseni Mountains.*

Keywords*: Modernization, Exploration, Exploitation, Gold mining, Gold production, Transilvania,*

INTRODUCTION

Modernization is a process which occurs during the life of nations, by implications on individual and collective life. The modernization characteristic make the difference between a modern society and a traditional society. Modernization is formed by a set of characteristics, some of the most important are: demographic growth, industrialization, urbanization, innovation, trade and productivity. Other characteristic is referring to inter human new relationships, whit a new set of values and norm which conduct to efficiency, development and individualism (1).

The factors which have motivated the investors to invest into an area are referring to human resources (chip labor) and natural resources (rich surface and underground resources), along with the infrastructure from that area. Other factors are the economic policy and legal economic climate, same as industry lows (2).

After the serfdom was canceled in 1854, there were no other social and economic measures to affect the life of people from Austro-Hungarian Monarchy, as monetary reform from 1892. This reform will renew the technology, therefore the result will be the mining exploitation from the gold mining area of Apuseni Mountains. The Romanians from Transylvania from areas as Brad, Abrud, Rosia Montana were under the influence of this important monetary reform from 1892 (3).

The modernization process was facilitated by communication ways. The first road which was built in Apuseni it has the origin from Roman times, the road was making the connection between Alba Iulia and Abrud, due to mining interest. The second road which was built along the Aries River, which connect the Turda with Cimpeni and Abrud it has the origin on second part of XIX century. The third road connect the Apuseni Mountains with Crisul Alb area and the country road between Abrud and Brad (4)

Other aspect of infrastructure is the railway system, Aries River Valley has beneficiated of a narrow railway, which was known to the time as Mocanita and which was operating between Abrud-Turda, due to the interest of Austro-Hungary. In March 1891 the Trade Minister of Budapest has granted the concession for railway construction between Turda and Abrud to the company Iulius Auspitz and in December 1891 it's given to the H. Boncza and Maur Orbuk group, but all will be suspended due to the lack of the funds. Budapest

government will give in 1897 the construction of the narrow railway (76 cm) to reduce the investment cost and to facilitate easy access to the mountains and valley.

At January 24th 1911 hungarian government give the concession for 90 years to the financial group lead by eng. Maximillian Schiffer and the Griunwald brothers for the construction of the railway with two clauses: once the railway is built and the granted 90 years expired the railway will go to the Hungarian Railway Administration. In 1911 the shareholders group start the construction and at June 20th 1912 is placed in operation and exploited by the Hungarian Railway Administration (5).

MATERIAL AND METHODS

This research is ongoing, as many documents can be still found about this topic. The materials used were archive and library material. This topic was discussed mainly in Hungarian publications, this being the novelty and the limitation in the same time.

RESULTS AND DISCUSSIONS

Apuseni Mountains with its rich gold and silver deposit were important for Hungarian and Habsburgic authorities, which had important companies. (6)

Apuseni Mountains region, or more precise the Abrud area was grouped on following structure:

-Baita mining group: in Cornet and Sfredelul Mountains, where existed an important roman colony. Exploitation took over in majority in Ana mine.

-Baia de Cris mining group: Ruda village (4km from Brad and 9 km from Baia de Cris). (7)

-Fericel-Magura-Dealu Ungurului mining group: from Geoagiu de Jos, on the right part of the Mures river, opposite of Orastie and to Zlatna.

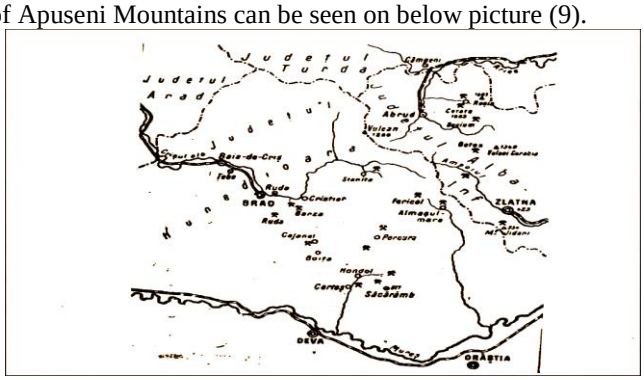
-Almasu Mare mining group: close to Fericel-Magura-Dealu Ungurului mining group, along Dosul Negru Mountain (Stanija and Dupa-Piatra villages).

-Corabia-Vulcoiu-Botes mining group: which starts from Ampoi Valley source, divided of Bucium village and Abrud city, by Dealu Mare. On Vulcoiu Mountain, the top of its peak named Corabia (1351m) there is the gold mine, St. Petru and Pavel.

-Rosia Montana mining group: in Letea, Igreu, Scamnita, Carnicul Mare and Carnicel mountains.

-Baia de Aries mining group (8).

The gold mines area of Apuseni Mountains can be seen on below picture (9).



The gold production from Transylvania under Hungarian administration was published in 1841 statistic, from which can be concluded that Transylvanian production

between 1825-1830 was in gold of 15, 633 gire (1 gira =1/4 of 1kg) in amount of 5, 7563.304 forint; Silver 23,150 gire in amount of 535.32. (10)

Production from Apuseni Mountains between 1872-1877: 5.642 kg 917g Au and 10172kg 886g Ag; (11) The quantity was extracted from 382 mines, with the labour of 6.613 workers. (12)

Ecaterina Mine from Orlea Mountains had 126 parts and between 1852-1871 from this mine were extracted 368kg of Au. Old explorations and important by the end of XVIII century was in Letea Mountain (Laurentiu mine), in Cirnic which split Rosia Montana of Corna (With the mines Verchesul de Sus si Jos, Ladislau de Sus, Coltu, Sf. Treime, Batrana, Lungesti, Ungure etc), then in Cirnicelului Mountain. The stamp mill from Rosia Montana were done by Hungarian state between 1851-1852; Between 1852-1871 the stamp mill were milling 113,279,500 kg of ore, producing 224kg Au and 138kg Ag, in amount of 619.241 florint. (13)

Around 1870 in the Apuseni Mountains was produced a quantity higher than in France and Germany together, meaning 43% of entirely Europe gold production. During the time, in the area were active and present private exploration companies: Petru Paul from Bucium (Producing 15.16kg Au in 1867), Barbara Society (3.40kg of Au and 5.7kg of Ag) and Francisca mining society (6.87kg of Au, 7.79kg of Ag in 1867), both from Baia de Aries. Gold production in 1852 from Baia de Aries was 1.30kg of Au and 6.68kg of Ag, at 1864 the production was 49.98kg of Au and 19.60 of Ag (14)

In the West of Zlatna is located Sacaramb, were at 1784 were discovered the Au vein, therefore from 1784 to 1876 the total gold production and silver production was 40.423kg in value of 24.956.806 florint (15)

Once the modern stamp mill equipment was installed, the Californian system, which has used electricity as motoric force, the gold and silver production concluded: Zlatna mining area at 1908: 118kg of Au and 1958 Ag (state company) and 2021kg of Au and 432kg of Ag (private company) and in 1915: 118kg of Au and 215 Ag (state company) and 1193kg of Au and 634kg of Ag (private company) (16)

The top gold production of Hungary was obtained at 1913: 2.924kg of Au/9.586.071 Au crowns, Apuseni Mountains contribution was 2.004kg. (17)

Apuseni Mountains at 1919 identify gold mines at Rosia Montana and Sacaramb. At Rosia Montana were explorations in Tarina and Lety in Nord part and at Cetate and Catrinta in the South. A characterization of the Rosia Montana deposit is formed by cylindrical corps (20-50m diameter), formed by multiple metallic vein, which take the aspect of eruptive and sedimentary rock. (21). Are extracted the following: rock gold in foils, grain, crystal, pyrite with gold inclusions. It is mentioned that it's rare to find rock gold, this is dispersed around veins. It's a mountainous area, the exploitation is made mainly through galleries, in 1782 the main gallery Orlaer Erbstollen is opened, it is active until 1919, and has a length of 2800 m. Connected galleries are the Tarina to the north, the Tarina shaft, Cetate, Afini, Catrinta gallery to the south with Miskolcz shaft.(18)

The Tarina shaft was built to serve the elevator aided descent of the personnel to the mine and the main shaft for elevating the material to 60 m. The Tarina shaft had an electric extraction machine of 16 HP, the main shaft of 60HP. The Tarina Gallery was dug in 1905 until 1919, so the personnel elevator lifted annually 16000 t of material (80% of the quantity). Between1917-1918, Rosia sent 20000t to the mill from Gura Rosiei. (19)

One important feature is the electric locomotive, which pulls a 14-wagon train, each with 700-800kg material, pulls out material from 1600 m underground to the crusher. The 3 crushers are powered by a 20HP electric engine. The necessary power for all machines is provided by the machine plant, consisting of 2 gas engines of 260 HP. The gas is produced in a

coal generator. The generator needs for 135 HP a quantity of 14-15 tons of coal. The mills are powered by a water turbine of 60 HP, run by the Rosia river in summer and in case of draught there is an electric engine. The electric plant produces current for the elevators of the Rosia mines, the material's transport by electric rail, for the crushing and stamp mills. This facility also provides electricity for the town of Abrud. In 1915-1916, 49kg gold was extracted, in 1916-1917 the gold production was 23,6 kg from amalgam, 11,3kg of native gold. (20)

The Ruda explorations were in 1760 almost deserted, in 1791 the families count Toldalagy and baron Zeyk founded the mining associations Ruda 12 Apostles and Zdraholt St. John Evangelist. Around 1840 two new galleries were started. The 1848 revolution ends the exploitations until 1884, when the 12 Apostles association with the Barza and Ruda mines were bought by the german company Harcort'sche Bergwerke, which bought in 1889 also the Zdraholt association and the Tebea coal mine. (25) In 1889 they buy the Musari association, with Musari and Dealu Fetii Mines. The Brad complex will have a 16 square km area. The air necessary for the exploitations was provided by 6 powerful fans, run by steam and electric engines. The water was evacuated with 10 machines, of a total 470 HP. The underground transport was provided by horse-pulled wagonets on a 48,6 km, electric elevators, and an electric railway on 3,8 km stretch.

Two funicular railways were built, from the Victoria gallery from Barza to the central crusher from Gura Barza (1,26km) and from Tebea to the railway station from Brad (4,15km). The Brad railway station was connected to the central crusher and the electric plant from Gura Barza with a narrow railway (0,74m), 6,4km long. Gura Barza provided the processing and extraction being one of three gold ore processing centres in the Kingdom of Hungary. The Gura Barza unit started its activity in 1898. (21)

The raw gold production of the Ruda 12 Apostles society was between 1884-1911: 27918 kg 520 g, valued 64 millions of austro-hungarian crowns. Between 1911-1912, the production goes up to 2002 kg 350g, from which 936 kg 324g native gold, 1040kg 607g from stamping 175085t ore. From this on, the production drops, in 1918-1919, there are only 670kg 934 g. (22)

The extraction costs were low: at the Gura Barza and Ruda one kg was obtained with 14,4K, at musari 11K, and at Valea Morii and Arsului with 23 K. One kg was sold at 2300K. In 1911, the workers were Roanians and the office representatives and supervisors were foreigners. (23)

The Austrian regime founded around 1747 a plant for melting ores at Zlatna. In 1848, this is destroyed but is rebuilt in 1850 and organized for extraction of precious metals and copper. (24)

From 1880, carbon sulphur was tested. The Zlatna plant had a metallurgy and a chemical section. (25)

In the following table is listed the Zlatna plant production results (26)

Years	Kg of Au	Kg of Ag	Kg of brass	Kg of Pb	T of H2SO4	T of FeSO4	T of CuSO4	T of S	T of NaHSO3
1900	196,7	785,3	-	-	1.371	700	-	123	1.25
1905	130,7	1.090,4	11.961	2.054	1.41	1.18	-	135	2.518
1906	99,1	892,9	4,007	-	1.456	1.304	-	138	2.756
1907	106	1.442,1	19.705	9.794	1.223	1.212	-	117	2.95
1908	105,8	654,6	-	-	1.444	1.372	-	144	1.966
1909	91	568,3	-	-	1.307	1.385	-	131	3.273
1910	-	-	-	-	1.333	1.313	-	127	3.245
1911	72	609,0	-	-	937	821	-	51	3.488

1912	111,2	1.258.1	24.518	17.864	1.311	1.366	-	83	2.692
1913	80,9	790,2	6.982	5.94	555	626	-	41	3.148
1914	59,7	299,8	-	-	238	422	-	14	1.672
1915	69,6	544,9	-	-	1.518	1.911	-	124	1.196
1916	55,1	576,4	13286	17.14	443	-	835	-	-
1917	61,2	665,0	-	-	786	384	460	22	132
1918	68,7	332,2	-	-	1.331	1.14	554	91	107

In below table is listed the Zlatna plant financial situation (27)

Years	Surplus crowns	Crown deficiency
1898	60.318	-
1899	103.472	-
1900	156.599	-
1901	54.443	-
1904	107.015	-
1905	92.979	-
1906	66.006	-
1907	101.638	-
1908	65.124	-
1909	56.79	-
1910	43.175	-
1911	24.156	-
1912	20.443	-
1913	-	4.206
1914	11.789	-
1915	44.143	-
1916	185.417	-
1917	166.189	-

The city of Zlatna was connected to the main railway from the Mures Valley, with a narrow railway of 35 km, along the Ampoi Valley. (26)

CONCLUSIONS

The Apuseni region benefited from the modernization process imposed by the Habsburg and the Dualist authorities. The new laws and new technologies, the infrastructure lead to increased efficacy, bigger investments, all of which made the area to be known as the California of Europe.

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