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HISTORY AND TOURIST VALORIZATION OF THE RUSCHIȚA MARBLE QUARRY (CARAȘ-SEVERIN COUNTY, ROMANIA)

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ABSTRACT. – History and Tourist Valorization of the Ruschița Marble Quarry (Caraș-Severin County, Romania). With an area of over 40 ha, the marble quarry located north of Ruschița village, Rusca Montană commune, Caraș-Severin County is the largest exploitation perimeter of this kind on the territory of Romania and one of the largest in Europe. Many works were written about the Ruschița marble quarry across time, especially regarding geology, but very little was talked about its tourism potential. If generally, the vast majority of the extractive areas are not at all attractive from the tourist point of view, having rather a repulsive appearance, the marble quarry from Ruschița proves the contrary, both by the greatness and sizes of exploitation and by the surrounding area, constituted of a very diversified mountain relief and an abundant forest vegetation. That is why, we consider useful an attraction and integration in the tourist circuit of this spectacular anthropogenic monument, unique in Romania, comparable to the Carrara (Italy) marble quarries. This paper makes a pleading in this respect.

Keywords: *Ruschița, marble quarry, history, tourist valorization*

1. INTRODUCTION

Rusca Montană commune is well-known and recognized at zonal, regional and national level due to the subsoil resources which are found on its territory: iron, lead-zinc ores, copper, silver, coals and last but not least, marble, this being the subject of the present study.

If over time the exploitations of metalliferous and energy resources (bituminous coals) were permanently closed, marble remained the only lithosphere resource which is extracted even now. The main activity of the inhabitants of Rusca Montană commune is the exploitation and processing of this type of rock. More specifically, at communal level function 38 (data valid for the year 2013) companies which have the object of activity *Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate* (NACE Code 0811) or *Cutting, shaping and finishing of stone* (NACE Code 2370).

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Without any doubt, the most famous area on the territory of Rusca Montană commune is the marble quarry from Ruschița, which has become a national and international brand over the years and in our opinion, should be capitalized from tourist point of view as well. Thus, due to the marble quarry, Ruschița, although it is only a belonging village, has become even more reputed at national and world level than the commune seat Rusca Montană. This explains also why, especially in Romania, the word *marble* is very often associated with Ruschița locality and vice versa (Ruschița with marble).

It should also be noted that on the official coat of arms of Rusca Montană commune, approved by Government Decision no. 66 of January 19, 2006 (published in Official Gazette no. 87 of January 31, 2006), a marble block is drawn in the middle as a symbol for the basic economic activity and the main source of income of the population.

Regarding the name of the quarry and implicitly the name of the locality north of which it is located, we draw the attention from the very start that the correct name is *Ruschița* (with *s*) and not *Ruşchița* (with *ş*), as it wrongly appears in very many specialized works (including maps) and not only. *Ruschița* is practically the diminutive form of the toponym *Rusca*. In Hungarian the Ruschița marble is known under the name of *ruszkicai márvány* and in German, *Ruskitza Marmor*.

In conclusion, the purpose of this study is not only to make a general/historical presentation of the quarry from Ruschița and of the marble exploited here, information which was partially written in other works, but first of all, to bring or to come with viable solutions for the introduction of this anthropogenic monument in the national tourist circuit and why not, even the international tourist circuit. Because in 2013 there were 130 years from the official opening of the first marble quarry (Old Quarry), this work can be considered partially as one with anniversary character.

2. MATERIALS AND METHODS

The main research methods used in the elaboration of this scientific paper are: historical method, statistical method and analytical method. It should be mentioned that apart from the bibliographic research, for writing this study was also used the field research which is indispensable in geography.

The historical method was obviously used in the chapter dedicated to the history of the marble exploitations from the territory of Rusca Montană commune, chapter which comprises various information (generally, time intervals) concerning the evolution of the quarry over the years. We also used more images, both from archive and some more recent in which are surprised the development stages of the marble quarry and other aspects regarding it.

As for the second method, the statistical one, we used it in the exposure of numerical data, mainly regarding various characteristics of the Ruschița marble.

In some situations these two research methods (historical and statistical method) were jointly used, for example in case of the presentation of evolution of the marble quantity exploited in certain periods of time.

Finally, the analytical method was used to prepare the tourism SWOT analysis of the Ruschița marble quarry.

3. OVERVIEW OF THE RUSCHIȚA MARBLE QUARRY

To better understand why it is so important to introduce the Ruschița marble quarry in the tourist circuit, it is necessary to give an overview of this objective. Thus, in the following subchapters will be offered various geographical, geological and especially historical information concerning the marble quarry.

3.1. Localization

The marble quarry analysed in this work is located in south-western Romania, more exactly in the north-eastern extremity of Caraș-Severin County, on the territory of Rusca Montană commune, at a distance of 12 km from the homonymous commune seat and 2 km north of the belonging village Ruschița. The geomorphological unit where is located is the Poiana Ruscă Massif (in its central part) and the historical province is Banat. It should be also mentioned that from the geological point of view, Poiana Ruscă Mountains and implicitly the marble quarry from Ruschița, belong to the Southern Carpathians; on the other hand, under geographical (geomorphological) aspect, Poiana Ruscă Mountains are considered a subdivision of the Western Carpathians.

As for the tourist area where is located, according to the classification of tourist areas from Mountainous Banat presented by Popovici (2013), the Ruschița marble quarry, just like the whole territory of Rusca Montană commune, is integrated in the *Scorilo* tourist area. According to Surd (2008), Rusca Montană commune (including the Ruschița marble quarry) belongs to the *Poiana Ruscă* tourist area.

According to the forestry organization of the territory, the quarry is located in the Production Unit (U.P.) IV, *Stânga (Left) Ruschița*.

The geographical coordinates which define the localization of the Ruschița marble quarry are:

- 45°38'54" northern latitude;
- 22°24'20" eastern longitude and
- 600-850 m altitude.

The nearest city to the Ruschița marble quarry is Oțelu Roșu (27.2 km) and the distance to the county capital Reșița is 91.2 km. The road distances between the marble quarry and the main urban centres of Romania are: Bucharest – 478 km; Cluj-Napoca – 242 km; Timișoara – 142 km; Iași – 562 km; Constanța – 699 km; Craiova – 274 km; Brașov – 338 km; Galați – 607 km (https://www.google.ro/maps/).

Initially the marble quarry was located in the vicinity of the confluence between Pârâul cu Raci Mari (En. *Large Crayfish Creek*; on the right bank of the stream) and Padeș River (name given to Rusca River upstream), in the southern tip of the interfluve between these two streams. Seen from above, the quarry had the shape of a triangle or a delta.

Later, the quarrying perimeter gradually extended, developing east of Pârâul cu Raci Mari (on its left bank), more exactly on the interfluve between this stream and Pârâul Morii (En. *Mill Creek*), in the area Dealu lui Ionel (En. *Ionel Hill*).

Nowadays the marble extraction complex from Ruschița consists of 3 quarries: Old Quarry (45°38'45.2" N, 22°24'07.8" E) dubbed *Gropan* or *Steinbruch* (now closed), Dealu lui Ionel Quarry (45°38'46.3" N, 22°24'22.8" E; also referred in other works as

Pârâul cu Raci Quarry) and Dealu Maria Quarry (45°38'54.3" N, 22°24'38.3" E; the newest), to which adds a dense network of exploitation roads, more abandoned mine waste dumps and an area where are crushed a part of the tailings and the marble blocks with defects (usually cracked). The total surface area of this complex is according to Marmosim S.A., 43 ha (46 ha after http://www.digi24.ro/), being the largest and most important exploitation perimeter of ornamental rock (implicitly marble) on the territory of Romania.

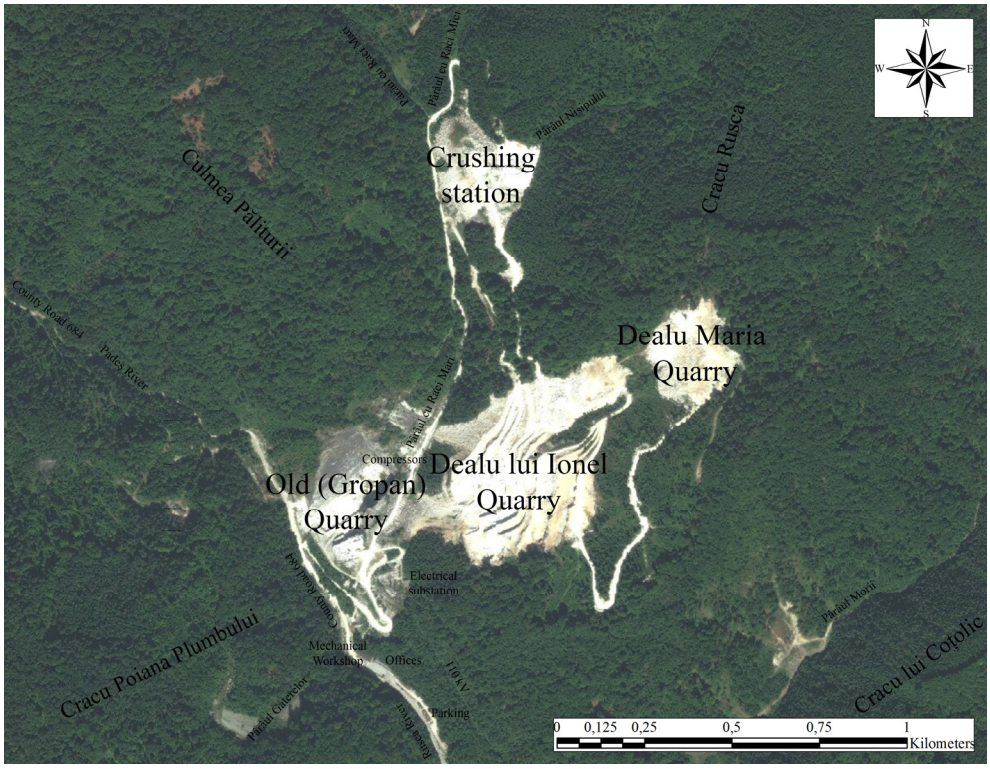

Fig. 1. Satellite image of the Ruschița marble quarry and its surroundings (processing after https://www.bing.com/maps/)

3.2. Geology

According to geologist Kräutner (1984), the Ruschița marble was formed by the metamorphosis of reefs and Devonian perireef limestones, these being developed on a submarine relief composed of basic volcanic rocks.

After Sencu and Băcănaru (1976), this deposit presents itself under the form of marble lenses which are intercalated in layers of chlorite schists and amphibolites.

Under tectonic aspect, the marble deposit develops in an area with a complex system of tectonic dislocations.

From the stratigraphic point of view, the marble reserves from Ruschița belong to Ghelari Series (Crystalline), from the Supragetic Domain (Upper-middle Devonian), being located in the Hercinic epimetamorphic unit (Gherasi *et al.*, 1968, quoted by Benea, 2008). Hence, the Ruschița marble is an epimetamorphic rock, which means that it was formed against the background of a regional (dynamo-thermal) metamorphism, in this case being epimetamorphism. Thus, the rock extracted at Ruschița is an epizonal crystalline limestone or an *epimarble* (formed in epizone, at depths of about 4-6 km inside the Earth's crust and temperatures of 200-400 °C, under the influence of a weak lithostatic pressure and a strong stress).

Following surveys and geological studies carried out, was revealed the existence of three marble levels of different colours, as follows:

- level of grey marbles (with a thickness of 40-70 m);
- level of white marbles (with thicknesses between 80 and 400 m);
- level of pink marbles (50-90 m thick) (Benea, 2008).

Depending on their chemical or mineralogical composition, these marbles are present under various colour intensities, to which are added often stripes of different hues. Thus, grey marble presents white stripes, and white marble, grey, green, violet-blue or pink stripes, the last one (white marble) being in some cases homogeneous from the coloristic point of view, similar to the colour of milk. Because it is ideal for the execution of sculptural works, white marble is often called *statuary marble*. As for pink marble, it is found in pale and dark pink, usually having stripes which vary from light grey to dark grey to black. Apart from the above, there are also reserves of white-yellowish and orange marble.

The structure of Ruschița marble is granoblastic and the texture is compact, sugar-like. The hardness is about 3-4 degrees on Mohs scale, pink marble being somewhat harder than the white one.

Also, according to Marmosim S.A., the only marble type which has the property to be translucent, is the Ruschița marble.

Due to its higher quality, the marble exploited at Ruschița competes with the famous marbles from Carrara (Italy) or Paros (Greece), some experts considering it even harder and more resistant in time than the other two (Carrara and Paros).

As for the chemical composition of the three types of Ruschița marble, it is shown in the table below.

Table 1.

Chemical composition of Ruschița marbles (after Mărunțiu *et al.*, 2011)

No.	Marble type/ colour	Chemical composition (%)	
		CaO	SiO_2
1	grey	54.70	0.50
2	white	55.23	0.25
3	pink	53.65	0.82

Other marble characteristics are the physical-mechanical ones, such as: density, porosity, water absorption, resistance to compression etc. This information is also displayed in tabular form.

Table 2.

Physical-mechanical characteristics of Ruschița marble (average values) (after Florea and Fodor, 2000)

No.	Physical-mechanical characteristics	Values
1	Density (kg/dm^3)	2.72
2	Apparent density (kg/dm^3)	2.70
3	Compactness (%)	99.50
4	Total porosity (%)	0.50
5	Water absorption at normal pressure and temperature (%)	0.12
6	Water absorption by boiling (%)	0.15
7	Fracture strength to compression in dry state (daN/cm^2)	900
8	Fracture strength to compression in saturated state with water at normal pressure and temperature (daN/cm^2)	850
9	Fracture strength to compression after 25 cycles of freezing-thawing (daN/cm^2)	800
10	Softening factor after saturation with water at normal pressure and temperature (%)	5
11	Softening factor after 25 cycles of freezing-thawing (%)	11
12	Wearing resistance by friction (Böhme) to 440 revolutions (g/cm^2)	0.58
13	Strength under mechanical shock (daN/cm^2)	27

The Standard Numbers used for Ruschița marble were between 1984 and 2004, STAS 3415-84 and 2004 to 2012, SR EN 1467:2004. Since September 2012 the Ruschița marble is identified with the Standard Number SR EN 1467:2012 (*Natural stone. Raw blocks. Specifications*).

3.3. History

Regarding the exact opening date or period of the first quarrying perimeter of Ruschița marble, the bibliographical sources contradict themselves.

Thus, archaeologist Boroneanț (2000) considers that the marble deposit from Ruschița was exploited since ancient times (Roman Age), but also in Middle Ages. According to Opruț (2008), the first exploitations go back to 1852, being started by a person named *Ladiszlay*. Most likely, Ladiszlay lived in Rusca Montană or Ruschița, knowing that at the level of these two localities, there were many inhabitants with this surname. Other authors think that the marble exploitation began in 1864 (Jancsó and Szekernyés, 2004). However, in most works it is mentioned that the first quarry was officially opened in 1883, this being the most credible version/information. There are also some sources which claim that the exploitations started after 1883, more exactly in 1884 (Wollmann, 1996, quoted by Luca, 2006) or 1886 (Turnock, 2000; Muşu-Coman *et al.*, 2006).

Although the systematic exploitation began only in 1883, Ruschița marble was discovered long before this year.

The first person who draws the attention to the high quality of Ruschița marble is considered, according to the most bibliographical sources, the Hungarian sculptor István Ferenczy (1792-1856). The person who informed Ferenczy about the existence of the marble reserves from Ruschița was Zacharias Hofmann (one of the former owners of the metallurgical complex from Rusca Montană commune); in 1828, the two met in Luncani locality (now located in Timiş County). After he began to sculpt in Ruschița marble, István Ferenczy compared it due to its higher quality, with the famous Italian Carrara marble. It must also be added that the carver István Ferenczy used white marble from Ruschița in quite a lot of his works, among other things for the decoration of the basilica from the Hungarian city Esztergom (Jancsó and Szekernyés, 2004).

Returning to the exploitation of 1883, it was opened/started by the construction engineer Johann Bibel (written sometimes *Biebel*) senior (1817-1900), who became the first owner and manager of the Ruschița marble quarry. He also dubbed the quarry, *a magyar Carrara* (En. *Hungarian Carrara*). So, we can say that starting from 1883 began an organized exploitation of the marble reserves, being used modern extraction technologies and equipment for that period of time (19th century).

In order to be able to exploit the crystalline limestone from Ruschița, Johann Bibel senior received as concession the land where the deposit is located, from the Hungarian State, to which it belonged at that time. After the death of Bibel senior, the business was taken over by his son, architect Johann Bibel junior (1858-1937), who developed increasingly more the extraction perimeter through the purchase and introduction of state-of-the-art machinery. From 1922 until 1947 (25 years), for the company owned by Bibel junior was extended the right of marble exploitation (Puiu Mărgineanu, 2005). At that time the quarry had a total area of 15.5385 ha.

The marble was processed both in the workshops located in the vicinity of the quarry and in a workshop owned by Bibel in Caransebeș.

Even if Bibel junior died in 1937, the company owned by him continued to function under the name of *I. Bibel S.A.R.* until 1948, when it passed to the state ownership, according to Law no. 119 of June 11, 1948.

After the death of Johann Bibel junior, the administration of the company *I. Bibel S.A.R.* is taken over by Alexandru Ienchi, who in 1943 takes the necessary steps for the inauguration of a new marble exploitation platform, north-west of the Old Quarry (Puiu Mărgineanu, 2005). This was not materialized however.

Later, based on Decision no. 5746 of April 28, 1947 (published in Official Gazette no. 111 of May 17, 1947) issued by Ministry of Industry and Commerce, Valeriu Anghel is appointed administrator of the company *I. Bibel S.A.R.*.

In 1960, with the foundation of the marble processing factory from Simeria (which later became S.C. Marmosim S.A.), the marble deposit began to be exploited by this company, which at that time belonged to the Romanian State. In 1997 (as other sources 1998), S.C. Marmosim S.A. Simeria was privatized, being taken over by the company from Bucharest Titan Mar S.A. So, now the Ruschița marble quarry is owned by the group Titan Mar-Marmosim, which is the holder of the exploitation licence.

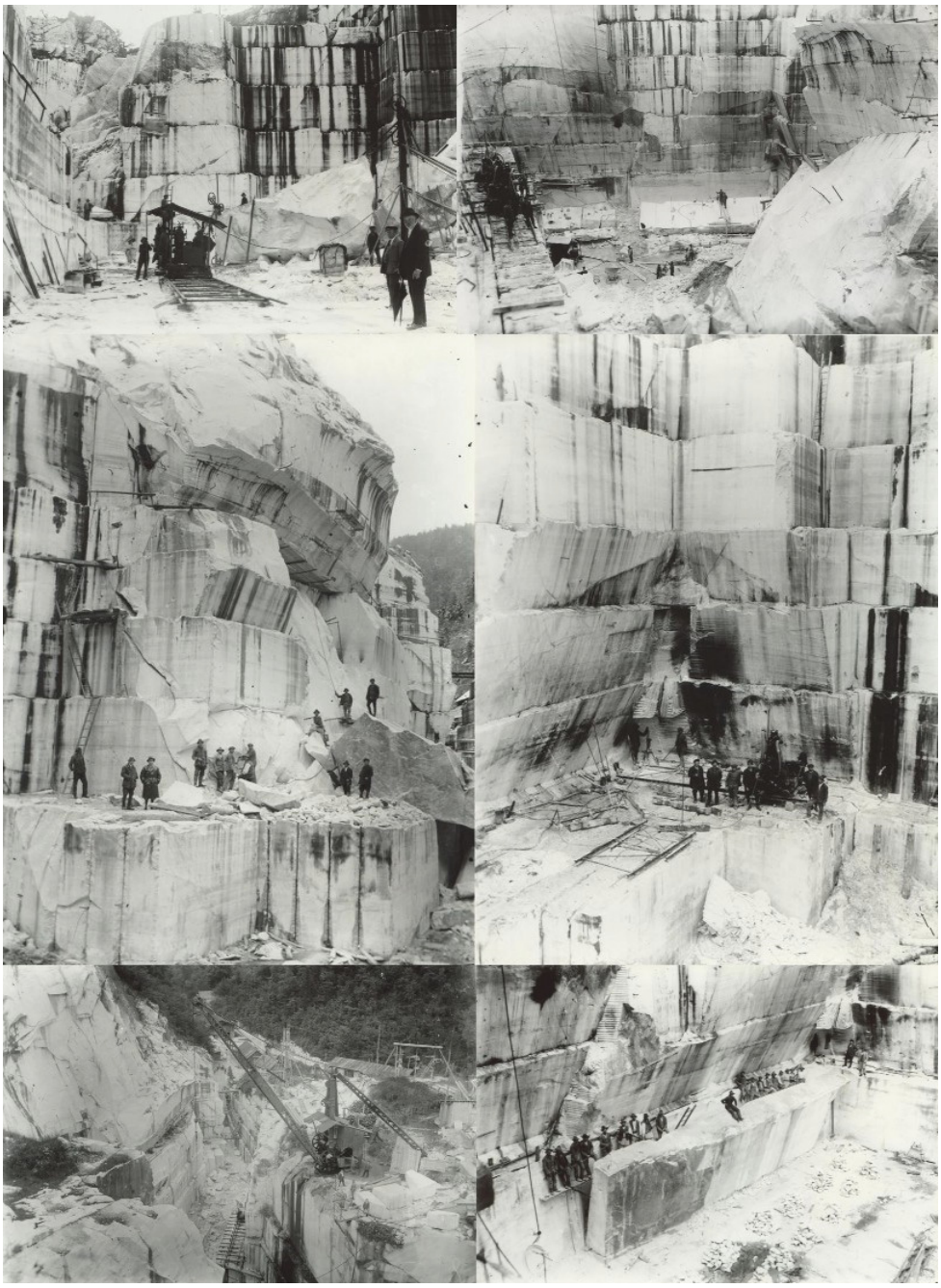

Fig. 2. Archive images of the Old (*Gropan*) Quarry

3.3.1. The marble quarries

From the opening until 1960, the marble was extracted on vertical (in steps), which generated a quarry (Old Quarry) with a depth of 130 m, for this reason being dubbed *Gropan* (En. *Pit*). The shape of the Old Quarry (also named by some locals *Steinbruch*) was quite similar to a cone trunk with the small base down or to a *capsized bell*, as many authors mention in their works.

Fig. 3. The Old (*Gropan*) Quarry nowadays

In 1960 began the exploitation on horizontal. The *Gropan Quarry* is located between the streams cu Raci Mari (on its right bank) and Padeș (on the left bank). In 2005 it is started for the first time for the quarry from Ruschița (in Old Quarry), the underground marble extraction, which was later abandoned. For this type of exploitation method two galleries were dug at the base of the Old Quarry. Now marble is no longer extracted from the Old Quarry, this being currently closed. 2016 or 2017 is expected the reopening of exploitation in this quarry (Ciolpan, 2014). The marble extracted here was mainly white, with different hues and stripes.

In 2000 (Valentin, 2006) or 2001 (Tibar, 2006) it is inaugurated the New Quarry from Dealu lui Ionel (Ionel Hill), which appears in some works under the name of *Cariera Pârâul cu Raci* (En. *Crayfish Creek Quarry*). According to other sources (Benea, 2008), the marble extraction in this quarry started since 1990. After the opening of

the new mining platforms, the material resulted from the deposit uncovering was thrown in the Old Quarry, being plugged a large part of the deep pit created over the years. The marble extracted here is pink (with various hues) and the exploitation is done in terraces of about 10 m wide.

In 2010 the steps were taken for the inauguration of a new extraction perimeter: Dealu Maria (Maria Hill) Quarry. According to environmental studies performed, the marble from this quarry will be exploited until 2023. Following the Government Decision no. 45 of January 25, 2012 (published in Official Gazette no. 85 of February 2, 2012) to the beneficiary S.C. Omya Calcita S.R.L., it was assigned an area of 17.0756 ha coming from the national forestry fund, for the opening of the marble exploitation in Dealu Maria (Maria Hill) Quarry.

Both Dealu lui Ionel and Dealu Maria quarries are located east of Pârâul cu Raci Mari, more exactly between this one and Pârâul Morii.

Fig. 4. Dealu lui Ionel (Ionel Hill) Quarry

Regarding the number of employees of the marble quarry, at the end of the 19th century, it was about 200-300 (by other sources 350). At the level of 2001 the staff of the Ruschița marble quarry was composed of 178 employees, of which 4 in management, 14 in the execution sector and 160 in the operational sector (Arion, N/A; Eremia, N/A).

As diverse fact, in the past, some of the inhabitants of Rusca Montană commune who worked in marble exploitation and processing were of Italian ethnicity, being a well-known fact that the Italians were the best quarry men or stone carvers. A few surnames of former Italian quarry workers and stone carvers from the villages Rusca Montană and Ruschița are: Cichini, Deleomini, Gussetti, Martini, Montresor, Segatto etc.

3.3.2. Marble exploitation and processing technologies

Regarding the marble exploitation technologies, various methods were used over time.

Initially the explosive was used, afterwards it was passed to the wire cutting method after Belgian system, this being introduced either in 1888 (Hillinger, 1977), or in 1906 (Opruț, 2008). At a certain moment it was also applied the American technology of compressed air drilling and stone grooving (Hillinger, 1977). According to Radu (2007), for the extraction of large marble quantities, during the period 1960-1965 were used explosive materials (dynamite and astrolite), which led to the whole cracking of the rock massif where the quarry is located.

Nowadays for the marble extraction, the company Marmosim S.A. which manages the quarry, uses state-of-the-art methods and equipment, such as: kerving (chain saw) machines, diamond wire saw machines, drills, excavators etc. Most of the machinery which is used for cutting the marble blocks is of Italian production, the following brands: Dazzini Macchine, Fantini, Korfmann and Pellegrini Meccanica. After they are cut, the dislocation/detaching of the marble blocks from the massif is done with Japanese Komatsu and South Korean Hyundai excavators.

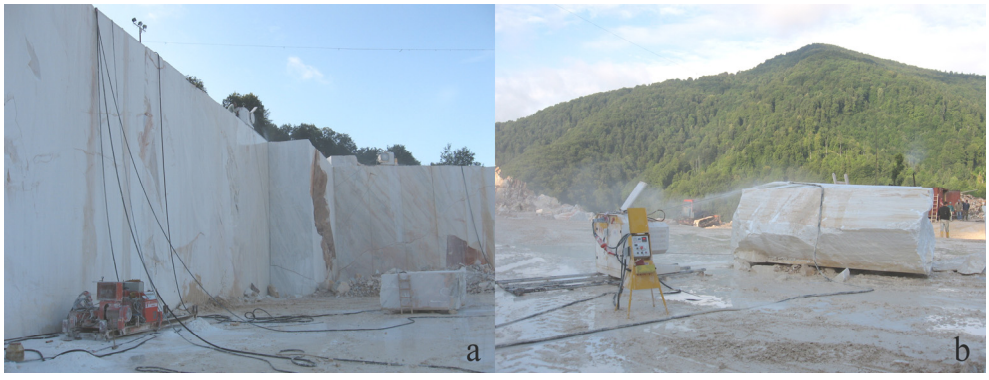

Fig. 5. Marble exploitation equipment in Dealu lui Ionel (Ionel Hill) Quarry
(a. kerving machine and b. diamond wire saw machine)

In order not to disperse in the air the powder resulted during the extraction process, it is used a large quantity of water. Apart from that, water also has the property of cooling the cutting machines, protecting them from overheating.

In the marble processing are used the following tools and machinery: frame saws (sawmills), circular saws, crushers, lathes, milling and engraving machines, drill presses, grinding and polishing machines etc. and can be obtained/manufactured a wide variety of products, such as: art monuments, funeral monuments (tombstones), commemorative plaques, veneers, floor tiles, treads and risers, balusters, handrails, sills, columns, mosaic, dust, fireplaces, artesian fountains, tables, reading lamps, vases, ashtrays, holders for writing instruments, knick-knacks and many other. More recently, for the cutting of marble slabs and tiles, the company Titan Mar uses modern water jet cutting machines (with water and quartz sand), which function at a pressure of 3500 bar (https://www.youtube.com/watch?v=AXV_CZ-Pdgo). This processing method allows the cutting of marble slabs in any possible way or form.

Fig. 6. Marble processing equipment (a. circular sawmill; b. blade sawmill; c. circular saw; d. grinding and polishing machine)

Concerning the tailings resulted from the extraction process, it was stored in the past in several mine dumps: Pârâul cu Raci (En. *Crayfish Creek*; 18 ha), Cariera Veche (En. *Old Quarry*; 2 ha), Compresoare (En. *Compressors*; 0.7 ha), Dealu lui Ionel (En. *Ionel Hill*; 1.5 ha) and Dealu Maria (En. *Maria Hill*; 0.9 ha), all of them totalizing 23.1 ha. Now the activity of these dumps is suspended.

In view of recycling the tailings (including the marble blocks with defects), in the second half of the 2000s, a crushing station of large capacity was arranged in the close vicinity (north) of the quarry. After the crushing of the tailings, the resulting material is transported by truck to the factory of micronized calcium carbonate powders (mineral pigments), which is located in Voislova village. This factory was inaugurated in July 31, 2007 and is owned by the company Omya Calcita S.R.L. from Bucharest (member of the Swiss company Omya AG). The marble powder with a granulation of 1-130 microns produced here is intended for various industrial branches, such as: industry of varnishes and paints, industry of cellulose and paper, industry of glass and ceramics, industry of construction materials, plastics industry or pharmaceutical and cosmetic industry (***, 2007).

Fig. 7. Dump in the Ruschiţa marble quarry

3.3.3. Marble production

Regarding the annual marble production, it is around 15,000 m^3 blocks/year, often exceeding this quantity. Hence, it results that every month are extracted on average about 1250 m^3 marble blocks. At the same time, it is estimated that the remaining marble reserves totalize about 1.8 million m^3, which means that in approximately 120 years, they will be exhausted. Apart from cubic meters, the exploited marble is also

evaluated in tons. In the next few years (until 2019) is expected to be extracted about 43,000-45,000 tons of marble blocks and 300,000 tons of marble for crushing (Ciolpan, 2014).

Going back to the past, between 1883 and 1947 a volume of about 70,000 m^3 of marble was exploited and the annual average production varied between 1000 and 1300 m^3 (Hillinger, 1977). According to Jancsó and Szekernyés (2004), at the end of the 19th century, the monthly production capacity was about 700 tons, which means 8400 tons in a year.

3.3.4. Marble transportation

Different means of transport were used for the marble transportation since 1883 until now.

In the beginning the marble blocks were transported to the marble warehouse or to the railway station from Voislova by carts specially built for this activity, one of them being the so-called *Caru' Mare* (En. *Big Cart*), which, because of the very heavy load, was pulled by 24 (12 pairs of) horses. Companions were Romanian peasants from Voislova village. According to Kutscherak (2001), for the pulling of the *Big Cart* oxen were also used. Even if there is a relatively short distance between the Ruschița marble quarry and Voislova marble warehouse/train station (about 19 km), because of the high tonnage and very low speed, this route was travelled in 10 hours. Although there is no precise information, according to Opruț (2008), the marble transport with the *Big Cart* was carried out between 1920 and 1947.

Fig. 8. Marble transportation by cart (*The Big Cart*)

After the renouncement to the marble transport by cart, was used the narrow gauge train (760 mm), known in Romanian under the name of *mocăniță* or *trenu' mic* (En. *small train*). Most likely, the marble blocks were transported by train until 1976, when the narrow gauge railway from Ruschița to Voislova was closed and later dismantled. From the quarry to the place where they were loaded on the means of transport, the marble blocks were descended on an inclined plane (funicular).

Fig. 9. Marble transportation by narrow gauge train (source: http://foto.arcor-online.net/palb/alben/42/537242/3338653631383064.jpg)

Later, marble began to be transported to the warehouse and factory from Voislova or to the factory from Simeria by trucks, which are still used today (the brands Volvo and Mercedes-Benz). The loading in trucks is done by cranes, front loaders (the brands Caterpillar, Komatsu and Hyundai) and excavators. For the marble transport to be carried out in optimal conditions, in 2006 the County Road 684 was rehabilitated between Voislova and the place where the offices of the company Marmosim S.A. are located.

Fig. 10. Marble transportation by truck

3.3.5. Ruschița marble in Romania and in the world

Even if Ruschița marble is of high quality, in the beginning it was not known and sought on the external market. However, in 1912, after 29 years from the official opening of the first quarrying platform, the Ruschița marble got to be exported in 12

European countries (Jancsó and Szekernyés, 2004). Later, the marble exports have increased significantly. Nowadays, the products made of Ruschiţa marble can be found on almost all continents.

In Romania, the most famous buildings where Ruschiţa marble was used, are: The Parliament Palace (former *Republic House* or *People's House*), Cotroceni Palace, The House of the Free Press (former *Casa Scânteii*), The Palace Hall, Royal Palace, Palace of Justice, Palace of Telephones, the building of the National Opera, National Theatre, the building of the National Bank of Romania, the office of the Romanian Football Federation, the State Circus, Bulevard Hotel, Capşa House, JW Marriott Grand Hotel, Crowne Plaza Hotel, Vernescu House (Palace), all located in Bucharest, the new terminal of the Henri Coandă (Otopeni) International Airport, Ioan N. Roman County Library from Constanţa, The Holy Trinity New Orthodox Cathedral from Arad, Culture House from Reşiţa, various hotels from the Black Sea and Prahova Valley resorts etc.

Also, Ruschiţa marble was used in the execution of various monuments (including tombstones) and sculptural works.

Outside the Romanian borders, the products manufactured of Ruschiţa marble were exported/used in:

- **EUROPE: Austria:** building of the Austrian Parliament from Vienna, Palace of Banks from Vienna, villa of Empress Elisabeth of Austria; **Germany:** BBC office from Mannheim, Friedenspalast Erfurt; **Hungary:** building of the Hungarian Parliament from Budapest, Gresham Palace from Budapest, Esztergom Basilica; **Italy:** The Milan Cathedral (it was restored in the early 1970s with Ruschiţa marble); **Monaco:** villa from Monte Carlo of Formula 1 pilot Michael Schumacher;
- **ASIA: Brunei:** Sultan's Palace; **Hong Kong:** Kowloon Railway Station; **Japan:** Marunouchi Center from Marunouchi, office of TV corporation Asahi from Roppongi; **Singapore:** Ardmore Park;
- **NORTH AMERICA: United States of America:** White House from Washington, D.C. (it is assumed that the eagle located on the ceiling of the Oval Office was sculpted in Ruschiţa marble), House of Gianni Versace, Villa Rebeca, both in Miami etc.

Other countries where Ruschiţa marble was exported over the years are: Belgium, Bulgaria, former Czechoslovakia, Denmark, France, Netherlands, Switzerland, United Kingdom, China, North Korea, Qatar, Saudi Arabia, Taiwan, United Arab Emirates, Canada, Argentina, Egypt etc.

4. TOURIST VALORIZATION OF THE RUSCHIŢA MARBLE QUARRY

Even if, generally, the mining perimeters have a repulsive appearance, making them unattractive from tourist point of view, the Ruschiţa marble quarry proves the contrary, on one hand due to the spectacularity of the rock walls, extended surface and modern exploitation methods, but also due to the surrounding landscapes (various relief forms, mountain streams, forests etc.), on the other hand. That is why, we consider it is very important to introduce this authentic anthropogenic monument (element of the mining cultural landscape) in the national and international tourist circuit and we come with a series of proposals in this respect.

4.1. Tourism SWOT analysis of the marble quarry

Strengths:

- Spectacularity (impressive marble walls, extended area of the quarrying perimeter, belvedere/lookout points, modern and novel exploitation technologies
- etc.);
- Limitrophe natural framework with great ecological and landscape value (Habitats Directive Sites of Natura 2000 network: ROSCI0219 - Rusca Montană and ROSCI0355 - Podișul Lipovei-Poiana Ruscă);
- Possibility of practising a wide range of types and forms of tourism;
- Tradition of over a century in the marble exploitation;
- Chromatic diversity and high quality of the exploited marble;
- Location of the marble quarry in the vicinity of the County Road (D.J.) 684 (0.65 km) and of the Ruschița village (2.2 km);
- Location of the quarry at a distance of 17.9 km to the National Road (D.N.) 68 and 18.7 km to the Voislova train station (since January 1, 2013 closed for passenger traffic);
- Location of the marble quarry at a distance of 138 km to the Timișoara Traian Vuia International Airport and 44.4 km to the Caransebeș Airport (currently closed for passenger traffic);
- Existence at the level of Rusca Montană commune of about 40 companies which have the object of activity the marble processing;
- Large number of specialized staff in exploitation and processing of marble;
- Diversified offer and high number of buyers for marble products;
- Export of raw and finished marble (marble products);
- Dense network of exploitation roads within the quarrying perimeter;
- Fences and slope stabilization works along the main roads within the marble quarry;
- Mobile phone signal inside the quarry.

Weaknesses:

- Interdiction or limitation (restriction) of visitors access (including tourists) within the quarrying perimeter;
- Poor or insufficient promotion of this objective on the domestic and foreign tourist market;
- Lack of a museum dedicated to the Ruschița marble or to the marble quarry;
- Absence of a ticket booth and a souvenir shop in the vicinity of the quarry;
- Lack of an official Facebook page dedicated exclusively to the marble quarry and/or a non-governmental organization for the tourist promotion of this attraction;
- Lack of a tourist management plan or a tourist development/planning project of the marble quarry;
- Reduced number of tourism promotion materials regarding the marble quarry (postcards, leaflets, brochures, trinkets, mugs etc.);
- Absence of road signs towards the marble quarry;

- Absence of tourist arrangements inside the quarry (marked tourist routes, various signs and markings, information and warning boards etc.);
- Lack of cooperation or partnerships between the company which administers the marble quarry and the travel agencies;
- Lack of an integrated tourism development strategy of Rusca Montană commune;
- Absence at communal (local) level (implicitly in the vicinity of the marble quarry) of tourist reception structures with accommodation functions and tourist reception structures with public nutrition functions, in accordance with the norms of the Romanian National Authority for Tourism;
- Absence of a tourist information centre in Rusca Montană commune;
- Lack of qualified staff in the field of tourism;
- Absence of a vocational school with the profile of exploitation and processing of marble;
- Lack of a direct modern road connection between the localities Rusca Montană and Ruschița (implicitly the marble quarry) and the administrative-territorial units from the neighboring counties, Hunedoara and Timiș (Lunca Cernii de Jos and Tomești communes); including the absence of a connection with the A1 motorway (Deva-Lugoj sector);
- Lack of a railway connection between the localities Voislova and Ruschița because of decommissioning in 1976 of the narrow gauge railway between these two villages;
- Decommissioning and dismantling of the inclined plane (cliff railway) intended for the lowering of marble blocks from the quarry;
- Particulate matter emissions resulted from the marble exploitation and transportation process;
- Noise pollution caused by machinery used for the marble exploitation;
- Unavailable statistical data regarding the number of tourist arrivals at Ruschița marble quarry.

Opportunities:

- Revaluation of the natural and anthropogenic tourist potential of the marble quarry (the transformation of the marble quarry into a national and international tourist brand);
- Accessing of European Funds (2013-2015) for the renewal of machinery for exploitation and transportation of marble;
- Increase of marble production with about 30-35 % in the next few years (until 2019-2020);
- Reopening of the marble exploitation in the Old Quarry in the next years (about 2016-2017);
- Rehabilitation of existing roads and arranging of new roads inside the extraction perimeter;
- Steps regarding the modernization of County Road 687 D on the territory of Rusca Montană commune up to the border with Hunedoara County (Lunca Cernii de Jos commune) and County Road 684 between the offices of the marble quarry and Luncanii de Jos village from Timiș County;

- Realization of reports and documentaries about the Rusca Montană commune and the Ruschița marble quarry and posting them on the internet or broadcasting them on the national television channels;
- Launch by S.C. Marmosim S.A. of an official website (http://ruschita.com/) dedicated to the Ruschița marble;
- Promotion of Ruschița marble at various fairs or shows of profile from Romania and outside its boundaries;
- Concerns regarding the arrangement of accommodation units in Rusca Montană commune;
- Supported steps of the local authorities for the attraction of as many tourists as possible from Romania and abroad to the Rusca Montană commune;
- Continuous development of marble processing companies;
- The introduction of the marble quarry in the tourist circuit will implicitly lead to the medium and long-term socio-economic development of the Rusca Montană commune.

Threats:

- Great competition with other tourist areas and attractions from Romania and all over the world;
- Accelerated exhaustion of the marble resources;
- Declining of the marble quality with the advancing of the extraction process;
- Degradation of the landscapes under the influence of exogenous agents or factors (weather phenomena, water, uncontrolled growth of vegetation etc.) in the abandoned extraction perimeters (for example the Old Quarry);
- Practising of disorganized tourism (mass tourism for instance);
- Risk of injury (landslides, collapses, rock-falls etc.).

4.2. Types and forms of tourism practicable in the marble quarry

In our opinion, in the Ruschița marble quarry it can be practiced several types and forms of tourism, among which we enumerate: scientific and research tourism, cultural historical tourism, industrial tourism, recreational and entertainment tourism, sports and adventure tourism, polyvalent tourism etc.

Inside the perimeter of the marble extraction, **scientific and research tourism** could be practiced by specialists in fields, such as: geology **(geological tourism)**, geography, mining industry, industry of construction materials, architecture, plastic arts (stone carving) etc. The access of persons who study or work in one of the enumerated fields, should be free of charge, only based on a study or job identity card.

Event tourism could be developed by the regular organization of scientific events (conferences, symposiums, congresses, seminars, workshops) having as subject the Ruschița marble and its exploitation and processing technologies. In addition, **cultural** and **event tourism** might also develop by organizing inedited or unconventional cultural events (festivals) on the former mining platform of the Old Quarry, such as: book launches, music concerts, dance performances, visual arts exhibitions (e.g. exhibitions

of sculptural works made of Ruschița marble) and contests, theatrical plays, photography and film screenings (about the marble quarry for instance) etc. It is also recommended, to establish a celebration or a commemorative day dedicated to the marble quarry (e.g. *Doors Open Day at Ruschița Marble Quarry* or *Anniversary Day of The Ruschița Marble Quarry*), after the model of *The Tourism Monument's Day* from Rusca Montană, which is celebrated every year, on a given date.

In relation to **cultural historical tourism (heritage tourism)** and **industrial tourism**, these two forms of tourism are addressed to persons interested in the history of the quarry, but also in the marble exploitation technologies. This category of tourists could also be interested in the marble processing process, not only its extraction. In this respect, it would be very useful to organize visits to the profile companies which carry out their activity on the territory of Rusca Montană commune. Once arrived at a marble processing company, some tourists may be interested in buying or ordering marble products made here and, thus, would develop the **business** or **shopping tourism** as well. In other words, it could be created a tourist route called *The Marble Road*, thus, allowing tourists to follow the entire technological process, from the marble exploitation (in raw state) until its transformation into finished products.

Fig. 11. Marble processing plants in Rusca Montană village

An important role in the development of economy and implicitly tourism **(educational tourism)** of the Rusca Montană commune would play the establishment at local level of a vocational or an arts and trades school which has as basic profile the exploitation and processing of marble. In this way could be attracted a large number of students, both from the neighboring and more remote localities, who are interested in studying the technologies of marble exploitation and processing.

For those interested in going outdoors **(recreational and entertainment/ leisure tourism)** and want to visit a novel objective from all points of view, one of the attractions could be the Ruschița marble quarry. For this category of tourists it would be advisable to arrange during the summer in the vicinity of the quarry, a summer terrace, where they can serve a variety of drinks: coffee, tea, juice, alcoholic beverages etc. A good alternative would also be the arrangement of a picnic area nearby the marble quarry.

Sports and adventure tourism (including **extreme tourism**) is intended for those persons who are passionate about equitation, bicycling or motorcycling, rock climbing, zip-lining etc. Thus, in certain closed or abandoned perimeters, such as the Old Quarry or some former dumps, the practicing of climbing should be allowed. At the same time, between Dealu lui Ionel Quarry and the Old Quarry could be practiced zip-lining. On certain (bumpy) roads within the quarrying platform it could be practiced equestrian tourism, cyclotourism, enduro-tourism and off-road. In this regard, it would be useful to arrange in the vicinity of the quarry, a place where tourists can rent bicycles, mopeds or all-terrain vehicles (ATVs), specifically designed for moving inside the extraction perimeter. Another important aspect in the development of adventure tourism and not only would be the reconstruction of the former inclined plane (Fig. 12) which was used in the past for lowering the marble blocks to the old loading place. Moreover, it would be useful to construct a funicular or an elevator, such as those from the cities Deva and Brașov, to transport the tourists upwards in the quarry.

Fig. 12. The former inclined plane used for the lowering of marble blocks

Polyvalent or **complex tourism** could be practised by combining several forms of tourism previously presented.

For those persons who for some reason can not visit *live* the Ruschiţa marble quarry, it would be necessary to launch a virtual tour platform of this tourist attraction, after the model of the Google Street View application. In this way, the marble quarry might be *visited* in detail in front of the computer. Thus, could be developed the **virtual tourism** as well.

Finally, it is very important that the visiting of this tourist attraction to be done in a rational, organized way and disorganized or mass tourism must be fought as much as possible because it leads most of the times to the degradation of the geographical landscape or of the environment (throwing garbage in unarranged spaces, destruction of tourist markings, accidents etc.).

4.3. Measures and proposals for the tourist development of the marble quarry

Nowadays the access of strangers within the marble exploitation perimeter is restricted, the quarry being closed to the majority of visitors. For the resolution of this problem, we propose and consider necessary the instatement of an entrance fee accessible to any tourist (regardless of the country of origin) and the hiring of qualified staff, preferably geologists, geographers or mining engineers, to train and guide the tourists inside the extraction platform. For the tourists who want to take pictures and/or to film within the quarry, these activities should be allowed either free of charge or after the payment of an additional fee. Thus, these fees can be a new source of income for the company which exploits the marble deposit or why not, for the Rusca Montană and Ruschiţa localities. In exchange, as it was already mentioned, the access of students (including MA and PhD students), researchers and teaching staff from institutions with geographical, geological or mining profile who want to visit or to investigate the quarrying perimeter, should be free of charge, based on a special identity card issued by the unit to which they belong.

In the space intended for the purchase of tickets for the access into the quarry, a stand could be arranged, to put up for sale small souvenirs made of Ruschiţa marble, such as: ashtrays, vases, reading lamps, pencil and pen holders, knick-knacks, statues, various engraved plates, small tables etc.

Apart from the marble objects, it could also sell postcards, leaflets, brochures, books, maps, CDs or DVDs with documentary films, all with and about the Ruschiţa quarry.

For the potential tourists to be better informed about this attraction, we consider imperatively necessary the launch of an official virtual tour platform and a Facebook page, dedicated exclusively to the Ruschiţa marble quarry, where it should be promoted from the tourist point of view. It would be ideal even the editing of magazines or books in which are presented different aspects regarding the marble quarry. At the same time, it should be elaborated a tourism development strategy with strict reference to the marble quarry. In order to promote this objective as tourist destination, it is also very important to be concluded partnership agreements between the company that manages the marble quarry and the travel agencies or the Mayoralty and the Local Council of Rusca Montană Commune.

For the prevention of accidents, tourists could wear personal protective equipment (PPE) made of overalls, jumpers, rubber boots, safety glasses, helmet etc., all these being provided by the company which manages the quarry. In the areas that have a high degree of danger, such as some deep excavations, it should be mounted both fences and protection rails and warning signs.

It would be also useful to be mounted explanatory signs (including a detailed map of the quarry), on which the information is written in several international languages.

A special importance has the mounting on the main public roads (National Road 68 and County Road 684) of multilingual road signs which indicate the route to the Ruschița marble quarry. Thus, these signs would be very useful for the tourists who do not know the route to this tourist attraction and do not have maps or modern navigation equipment, such as GPS.

Always, in order to attract more tourists, it is very important that the infrastructure to the objectives which are to be visited should be in an excellent condition. Otherwise, the tourists will prefer other destinations. Therefore, we consider obligatory the modernization of the County Road 684 on the sector between Luncanii de Jos village (Tomești commune, Timiș County) and the place where are located the offices of the marble quarry (total distance of 22.1 km), but also the County Road 687 D (*Trans-Rusca*) between the limit with Hunedoara County and its intersection with the County Road 684 (close to the area Gura Ciotorogului), located on the territory of Rusca Montană commune (total distance of 6.3 km). Thus, the road between the municipality of Hunedoara and its neighbouring localities, but also the road from the eastern side of Timiș County (Făget city and its surroundings) towards the Rusca Montană commune and implicitly to the Ruschița marble quarry, will be considerably shortened and it would generate a greater flow of tourists, among other things. With the modernization of the County Road 684 between the counties Caraș-Severin and Timiș, the villages Rusca Montană and Ruschița will be connected to the National Road 68 A (European Road 673) and to the A1 motorway (Deva-Lugoj section). Thus, the foreign tourists who come from Central and Western Europe countries to Rusca Montană and Ruschița, on the A1 highway (from Nădlac direction), could leave it at Margina interchange/exit and continue their journey on National Road 68 A and County Road 684. In another train of thoughts, if the County Road 687 D would be asphalted between the intersection with County Road 684 and the border with Hunedoara County, respectively the Lunca Cernii de Jos commune, the route of trucks which transport marble blocks to Simeria, will be shortened with about 11 to 12 km and the traffic will be also considerably reduced in Rusca Montană locality.

Within the marble extraction platform, it could be arranged and marked more routes (roads or footpaths) intended exclusively for visitors; including the rehabilitation or modernization of the driveways to the quarry.

Certainly, if the narrow gauge railway (760 mm) would not have been disused in 1976 between the villages Voislova and Ruschița, the tourists flow would have been even higher.

In relation to the tourist infrastructure of today, at the level of the Rusca Montană commune, there is no accommodation unit which complies with the decisions of the Ministry of Regional Development and Public Administration. Thus, this administrative-

territorial unit obtained 0.00 points concerning the accommodation options/units. However, the tourists who arrive in Rusca Montană commune, can accommodate at *Kolping House*, which is located in the homonymous locality (Rusca Montană). Although, it is not a unit with accommodation function in the true meaning of the word, having another object of activity, the *Kolping House* has today the following facilities: more bedrooms with 3 to 5 beds, bathrooms, a kitchen, a dining hall and a conference or seminar room with a capacity of 50 seats. The tourists who visit the Rusca Montană commune can also accommodate at the *Pleşu Negrii* (*Gura Negrii*) hunting chalet (22 km away from the marble quarry), which is located in the Şoimu (also named *Pleşu* or *Lozna*) Valley, at the confluence of the streams Şoimu and Negrii (the place called *Între Râuri*). This chalet is managed by the Rusca Montană Forest District.

Hence, in order to supplement the accommodation places, a good variant would be the complete rehabilitation of the abandoned or partially decommissioned blocks of flats or former industrial buildings located in Ruschiţa village and their transformation into accommodation units such as hotels, hostels or guest/boarding houses. According to the Prefect's Institution of Caraş-Severin County (http://www.prefcs.ro/), the buildings from Ruschiţa which are available to be offered to local and foreign investors are: Block no. 62 (1800 m^2), Block Cichini (3000 m^2), the building of the former Mechanical Workshop (500 m^2) and other spaces covering an area of 2000 m^2, all of them being owned by the Local Council of Rusca Montană Commune. Therefore, if all these buildings would be bought and rehabilitated by a few investors, it could be created accommodation units with a total area of over a half hectare.

It is also very important to set up a local tourist information centre in the commune seat village Rusca Montană. At the same time, it would be necessary to establish an association or a non-governmental organization which aims at promoting the tourism potential of the Ruschiţa marble quarry.

Returning to the marble quarry, in its immediate vicinity or in Ruschiţa village, it should be arranged a museum dedicated to this tourist attraction, after the model of the Gold Museum from Brad (Hunedoara County). In a future *marble museum*, the following could be exposed: photographs and various archive documents of the quarry, maps and detailed plans of the quarry (including orthophotomaps), models and dioramas, tools and machines used in the exploitation and manufacturing process, samples and various marble objects etc. For certain exhibits of large sizes, for example certain machinery which would be impossible to introduce inside of the building or would take a lot of space, it could be created an open-air museum section. With the foundation of a museum dedicated to the Ruschiţa marble, the Old (*Gropan*) Quarry could be declared historical monument with industrial (mining) character. In addition, a good option would be the conversion of the marble quarrying complex into an *ecomuseum* (Iancu and Stoica, 2010).

Finally, it would be also very helpful arranging a library, where tourists and researchers can consult various documents and publications relating to the marble quarry.

5. CONCLUSIONS

From those presented in the previous chapters we conclude that the Ruschiţa marble quarry meets almost all the conditions and criteria for its tourist valorization.

Even if at a certain moment the marble reserves will be exhausted and the extraction perimeters will be permanently closed, it is very important not to be abandoned, but to try to integrate them into the tourist circuit.

Due to their spectacularity, we feel that some quarrying platforms (even still active), should be also valorized on tourist level. So, it is important not only to capitalize the subsoil (marble) resources, but also the tourist ones (the tourism potential of the quarry). It should be also noted that, if all lithosphere resources will run out at a certain point in time (marble in this case), the tourist resource will never be exhausted, especially if it is exploited in a rational way and respecting the basic principles of sustainable development.

At the same time, with the capitalization of the tourism potential of the Ruschiţa marble quarry, would develop/revitalize under socio-economic aspect inclusively the entire territory of Rusca Montană commune (Rusca Montană and Ruschiţa localities).

REFERENCES

1. Arion, P. C. (N/A), *Auditul de management al S.C. MARMOSIM S.A.*, Academia de Studii Economice, Facultatea de Management Economic, Bucureşti.
2. Benea, M. (2008), *Marmura de la Ruşchiţa (judeţul Caraş-Severin)*, Repere geologice în Apuseni şi sud-vestul Carpaţilor Meridionali, Edit. Presa Universitară Clujeană, Cluj-Napoca.
3. Boroneanţ, V. (2000), *Arheologia peşterilor şi minelor din România*, Edit. cIMeC, Bucureşti.
4. Ciolpan, M. (2014), *Coloşii metalici din inima munţilor*, Maşini şi Utilaje pentru Construcţii, Anul IX, 05 (99), Bucureşti.
5. Eremia, Ruxandra (N/A), *Reproiectarea sistemului de management al S.C. MARMOSIM S.A.*, Academia de Studii Economice, Facultatea de Management Economic, Bucureşti.
6. Florea, A., Fodor, D. (2000), *Dimensional Stone Industry from Romania in the New Millenium*, Mining Challenges of the 21st Century, S. B. Nangia/A.P.H. Publishing Corporation, New Delhi.
7. Hillinger, N. (1977), *Marmura de Ruşchiţa*, Ocrotirea Mediului Înconjurător, Natura, Terra, Anul IX (XXIX), 1, Bucureşti.
8. Iancu (Merciu), Florentina-Cristina, Stoica, Ilinca-Valentina (2010), *Tourist Capitalization of Industrial Heritage Elements: A Strategic Direction of Sustainable Development. Case Study: The Petroşani Depression*, GeoJournal of Tourism and Geosites, Year III, vol. 5, 1, Oradea.
9. Jancsó, Á., Szekernyés, J. (2004), *Maderspach*, Edit. ArtPress, Timişoara.
10. Kräutner, H. G. (1984), *Poiana Ruscă*, Edit. Sport-Turism, Bucureşti.
11. Kutscherak, R. (2001), *Der Marmorsteinbruch in Ruskitza*, Banater Berglanddeutsche, 17. Jahrgang, 101, München-Wien.
12. Luca, S. A. (2006), *Descoperiri arheologice din Banatul românesc – Repertoriu*, Edit. Altip, Sibiu.
13. Mărunţiu, M., Bindea, G., Colţoi, O. (2011), *Template for Baseline Study Reports (BSR-R) of SARMa Model Sites (Recycling). Case Study of: 2. Deva-Ruşchiţa*, SARMa, Ljubljana.
14. Muşu-Coman, M., Ispas, H., Petrescu, M. I., Jianu, E. (2006), *Improved Retention of Surface Treated Diamonds in Sintered Tools for Processing Ornamental Stones*, University Politehnica of Bucharest Scientific Bulletin, Series B, vol. 68, 4, Bucureşti.

15. Opruț, P. (2008), *Voislova*, Edit. Marineasa, Timişoara.
16. Popovici, Gh. (2013), *Banatul Montan. Ghid turistic*, Edit. Tim, Reşiţa.
17. Puiu Mărgineanu, D. (2005), *Giuvaerul dintre munți*, Edit. Dalami, Caransebeș.
18. Radu, A. (2007), *Cioplitul pietrei. Tehnicitate, măiestrie, artă*, Edit. Ars Docendi, Bucureşti.
19. Sencu, V., Băcănaru, I. (1976), *Județul Caraș-Severin*, Edit. Academiei Republicii Socialiste România, Bucureşti.
20. Surd, V. (coord.) (2008), *Monografia turistică a Carpaților românești*, Edit. Presa Universitară Clujeană, Cluj-Napoca.
21. Tibar, O. (2006), *Aventura marmurei – Piatra neseacă*, Revista Flacăra, nr. 1-2, Bucureşti.
22. Turnock, D. (2000), *Growth Potential in Romania's West Region*, Geographica Pannonica, vol. 4, Novi Sad.
23. Valentin, D. (2006), *Exploatare de marmură în subteran*, România Liberă, 4 ianuarie, Bucureşti.
24. *** (2007), *OMYA – investiție de 15 milioane euro, în Caraș-Severin*, Prisma, Anul XII, 28, Reşiţa.
25. *** *Monitorul Oficial, Partea a I-a, Anul CXV – Nr. 111, Legi, Decrete, Jurnale ale Consiliului de Miniștri, Deciziuni Ministeriale, Comunicate, Anunțuri Judiciare (de Interes General),* Sâmbătă, 17 mai, 1947.
26. *** *Monitorul Oficial al României, Partea I, Anul 174 (XVIII) – Nr. 87, Legi, Decrete, Hotărâri și Alte Acte,* Marți, 31 ianuarie, 2006.
27. *** *Monitorul Oficial al României, Partea I, Anul 180 (XXIV) – Nr. 85, Legi, Decrete, Hotărâri și Alte Acte,* Joi, 2 februarie, 2012.
28. http://foto.arcor-online.net/palb/alben/42/537242/3338653631383064.jpg.
29. http://www.bing.com/maps/.
30. http://www.prefcs.ro/pdf/tabel_rom.pdf.
31. https://www.google.ro/maps/.
32. https://www.youtube.com/watch?v=AXV_CZ-Pdgo.
33. http://www.digi24.ro/Stiri/Digi24/Special/Raport+de+tara/Caras-Severin/RAPORT+DE+TARA++Domul+din+Milano+a+fost+reconstruit+cu+marmura+de+Ruschita.