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COST BENEFIT ANALYSIS IN KOSMAÇ LIMESTONE DEPOSIT REPUBLIC OF KOSOVO

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ABSTRACT

In this paper a functional model in the deposits of carbonate rocks is presented. One such model is applied to mineral deposit limestone “Kosmaç" which uses the company Doni Fert. So for a fair assessment of investment in technology to acquire a cubic meter of useful minerals, should question the analysis of costs and benefits (B/C) for these mineral resources in Kosovo.

Keywords: limestone, cost benefit, deposit, reserves, doni fert, Kosovo,

INTRODUCTION

Kosovo is rich in deposits of carbonate rocks (Figure-1), which include limestone, dolomite and marbles. Total deposits of carbonate rocks in Kosovo are 402 (Table-1) behave geological reserves 25, 135.7 (Mill.m^3). These resources, together with geological deposits of silicate rocks represent a good basis for economic development of Kosovo (Barth, *et al*., 2006). Therefore for these geological resources necessary planning and evaluation for exploitation of these mineral resources useful. Therefore, for evaluation of capital investment in this segment of economy should be taken into the current level of scientific achievement and technological possibilities of production, applying method called Cost Benefit Analyses (B/C). Cost benefit analysis during the implementation of projects using limestone provides a more appropriate basis for assessing the perspective of deposit exploitation through implicit forecast costs and potential effects arising during conduct of mining activities.

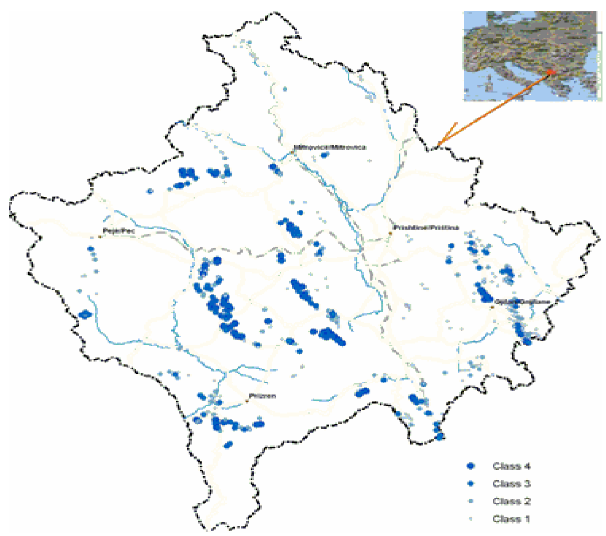

Figure-1. Spatial distribution of mine ability of carbonate hard rocks.1:1, 000, 000 (Beak, 2006 modified).

Table-1. Geological reserves of carbonates hard rocks and silicate hard rocks.

Commodity group	**Deposit** (Total)	**Geological reserves** (mill m^3)	**Area** (km^2)
Silicate hard rocks	460	15,233.1	262.0
Carbonate hard rocks	402	9,902.6	196.6
Sum	862	25,135.7	486.6

ASSESSING THE COST OF OPENING AND USE OF THE LIMESTONE DEPOSIT

Given the analysis of economic evaluation of the process of surface exploitation of mineral deposits useful addition to technological and technical indicators to analyze the level of investment and production costs as the main evaluation factors extraction and processing costs and selling price 1 [m^3] of limestone rock. In determining the cost of extraction and processing of 1 [m^3] limestone usually have to take into account all the necessary actions that enable exploitation and processing and therefore also in this context the building structure of the sale price that 1 [m^3] should be based on the costs that are made during production (exploitation). Income from carbonate rocks fractions benefit can be filed on the basis of the relation

(1) who expresses the amount of product between annual production and selling price per unit product:

$$R = S\,(Qy\ Ps) \qquad [€] \qquad (1)$$

Where R = revenue from the sale of production
Qy = annual production
Ps = product selling price per unit

Selling price of a unit of limestone fractions (Ps) said the amount of the cost of expenses (Cp) and profit planning (P).

$$Ps = Cp + P \qquad (2)$$

Where Cp = cost price
P = planned profit

The cost of gaining 1 [m^3] factions carbonate rocks is determined by the amount of expenses directly (Dc) and indirect (Ic).

$$Ps = Dc + Ic \qquad (3)$$

Where Dc = direct costs (these are the costs of labour, materials and equipment costs)
Ic = indirect costs

Operating costs (Oc): submit expenses for engaging the workforce in the manufacturing process (Mp)

$$Oc = Mp \qquad [€/m^3] \qquad (4)$$

Material costs (Mc): represent the costs necessary for the implementation of certain operations technological process: drilling-blasting, loading, separation, etc. To carry out these operations in the process of using beneficial minerals needed: fuel, explosive etc. (Mc_{fe})

$$Mc = \Sigma\,(Mc_{fe}) \qquad [€/m^3] \qquad (5)$$

In the realization of every technological process during the development of mining activity in the utilization of useful minerals, different materials are needed, such as: fuels, explosives, oils etc. Therefore, it is of course that in this case to determine the amount necessary to other materials used consumables normative act production work.

Operating costs of equipment (O_{ce}): represent the commitment costs of the equipment necessary for carrying out the process (O_{ce}):

$$O_{ce} = \Sigma\,O_{ccp} \qquad [€/m^3] \qquad (6)$$

Indirect costs (Ic) - represent expenses that are not made directly from the working process, in other words these expenses belong to nature: deposit geological research, drafting technical documentation technology, infrastructure construction, various compensations properties that will be included in mining activity and royalties (Hyseni, *et al*., 2012). Drafting of technical documentation: it includes these expenses shown in Table-2.

Compensation

Any company that uses any useful mineral reserves is regulated by legal acts to compensate the damage caused to the environment and the community in the form:

Royalties

The holder of the license for the use of mineral raw material is obliged to pay 2% of the value of revenues from the sale of limestone products.

The water

The holder of the license is obliged to pay 0.5% of the value of revenues from the sale of limestone products.

Forests

The holder of the license is obliged to pay 1% of the value of revenues from the sale of limestone products when using field was previously forested.

Environment

The holder of the license is obliged to pay 1.5% for emission of gas and dust from the value of revenue from the sale of limestone products.

Depreciation of equipment

Mining Equipment has investor have value 552 000 € where the depreciation is annual estimates of 12% (Table-3).

Table-2. Drafting of technical documentation.

Item	Eexpense
Exploration	10 000 €
Elaboration of geological reserves	5 000 €
EIA (Environmental Impact Assessment)	5 000 €
Project design of exploitation limestone	5 000 €
Total	25 000 €

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Table-3. Equipment which are necessary for the realization of the utilization.

No.	**Type of equiment**	**Measuring units**	**Time** (h)	**Quantity**	**Value** (€)	**Total** (€)
1	Drilling machines	50 kW	9000	1	Subcontractor	
2	Hydraulic excavat. with hammer	180 kW	9000-14000	1	250000	250000
3	Auto truck	348 kW	12000	4	30000	120000
4	Charger	180 kW	13000	1	50000	50000
5	Mobile separation	200 kW	14000	1	100000	100000
6	Transformer	250 kVA	-	1	20000	20000
7	Container	6X2 m	-	4	5000	5000
8	Plateau for row material	5X8 m	-	1	2000	2000
9	Fences	1800 m	-		5000	5000
						552000

Table-4. Cost of loading the fragmentation and transport 1 [m^3] limestone.

No.	**Item**	**Time capacity** (m^3/h)	**Cost of 1 hour** (€/h)	**Specific costs** (€/m^3)
1	Uploading	120	44.40	0.37
2	Crumbling	100	135.83	1.36
3	Transport	41	37.75	0.92

According to the data (Table-4) a summary of the cost of 1 [h] job mining equipment is presented, which are engaged for loading, transport and crumbling, and drilling costs-blast 1.43 €/m^3 (Bytyçi. A, 2010). While detailed estimates of expenditure for earning 1 [m^3] limestone fractions is given in the following Table-5.

Table-5. The costs of production of 1 [m^3] carbonate rock with separation.

Type of costs	**Unit measuring**		**Unit**	**Unit**	**Anual costs**	**Total**
			(€/m^3)	(%)	(€/year)	(€/ 32 year)
Personal income	**Salaries**		**0.62**	**0.08**	**31000**	**992000**
Anual production 50, 000 m^3/y						
Tailing	€/m^3	Random 10% Qy	1.63	0.21	8150	2608000
Drilling-blasting	€/m^3	50000 m^3/vit	1.43	0.18	71500	2288000
Secondary crumbling	€/m^3	Assumption 6% for Qy	1.46	0.18	4380	140160
Uploading	€/m^3	50000 m^3/y	0.37	0.05	18500	592000
Crumbling and separation	€/m^3	And other activities	1.36	0.17	68000	2176000
Transportation	€/m^3	50000 m^3/y	0.92	0.12	46000	1472000
Countable value of spending			7.17	0.91	216530	
			7.79	0.99	247530	9276160
Annuities						
Royalties	2% carrying value of expenditure		0.02	0.002	4950	158400
Forestry	1% annual income value		0.01	0.001	2475	79200
Waters	0.5% annual income value		0.005	0.006	2037	65184
Environmet	1.5% annual income value		0.015	0.0012	1240	39680
			0.05	0.01	10702	342464
			7.85	1.00	258232	9618624

Determining the cost of using 1 [m^3] carbonate rocks based on annual costs by the use of 50, 000 [m^3], so in this case the cost is around 7.85 €/ m^3. Economic evaluation is pick up the cost of producing 1 [m^3] of fractions 0/90 mm, for which the annual costs are calculated according to the formula (1) and expression (2) which can be formed selling price fractions produced by the company, "Doni Fert" if we arrange in advance the rate of margin (profit) that usually ranges between (20-30)% of the value of spending where our case is taken 26%, then the dot have P = 2.1 [€/m^3].

Ps = 7.85 + 2.1
Ps = 9.95 [€/m^3]

Given this calculated sales price fractions 0/90 mm, and annual production of 50, 000 m^3, revenues are:

P = 50000 x 9.95
P = 497500 [€/y]

After determining the revenue from the sale of products carbonate rocks should be compared with the costs that are created in order to have an overview about which usually gross profit represents profit excluding VAT (value added tax). So the company, "Doni Fert" its production plan has these factions the carbonate rocks (Table-6).

Annual degree production costs (by Table-3) are € 247, 530, in addition to the cost of production also have to add the cost of marketing, sales, financial management and control and other administrative costs, such costs typically range (5-6.5)% where the case will be € 14, 851€.

Therefore, gross profit could be:

Pg = P - (Ps +P*0.05) (7)
Pg = 472615 €

While net profit is determined after deduction of 16% VAT

$P_n = P_b - 0.16\ P_b$ (8)
P_n = 396700 €

Table-6. Sale price 1 [m^3] limestone rock.

No.	Item	Unit	€/m^3
1	Crushed rock fractions 0/90 mm	m^3	10.0
2	Rock without separation	m^3	5.50
3	Buffer (0-60) mm class II	m^3	6.35

COST BENEFIT ANALYSIS OF OPENING AND EXPLOITATION DEPOSIT

Methods used for the evaluation of Cost-benefit analysis of almost all projects in mining activity and other works are: Method return deadline invested assets Pay-Beck (PB), net present value (NPV) and the internal rate of return (IRR). Today such assessments there are software packages such as the Xeras, Runge mining co, Enginea etc. To have a fair and objective estimations on the use of limestone deposit, Kosmaç "Doni Fert" Company where above is laid out in detail the analysis of benefit costs 1 [m^3] of the rocks so. Therefore, direct investment, according to data from the deposit are districts I_d^1 = 32, 000 €.

Opening deposit is associated with a phase advance called administration-bureaucratic, which must be performed a variety of procedures ranging from research license, wide legal property procedures drafting of technical documentation. All of these have a cost that our case in question have not been affected, so the investments made for this phase amounted I_d^2 = 25, 000 €.

Total investment in this field can be determined by:

$It = (I_d^1 + I_d^2)$ (9)
It = 57000 €

So the decision on such investments in this deposit will be based on the calculation of the Net Present Value (NPV), which could be based on the service of this project as well as production costs. Benefits from investment in the future in this deposit will be compared with the cost of the project generated:

$$NPV = \left[\frac{P_n}{(1+r)^n} - It \right] \quad (10)$$

NPV = 26165 €

Where

Pn = Income

It = Total investment
R = the interest rate (discount rate) by
(FTSE Euro top 300) proposes 5%
n = Exploitation time deposit (n = 1, 2, 32) years

As NPV value > 0, the project may qualify as both profitable and acceptable. From the above analysis, we believe that the same important role plays the interest rate," r" in the profitability of the investment project.

Internal rate of return (Pohl, 2011) for the project of opening and using limestone rock deposit "Kosmaç" can be assigned according to the expression:

$$IRR = \left[\frac{P_n}{(1+j)^n} \right] - It = 0 \quad (11)$$

Or in the form of explicit:

$$\left[\frac{P_n}{(1+j)^n}\right] = It \qquad (12)$$

Where n = time use of deposit (n = 1 year)
J = Marginal efficiency of investment

IRR calculation period one year deals n = 1, then the expression (12).

$$j=\frac{P_n - I_t}{It} \qquad (13)$$

j = 5.96

Efficiency limit value is higher than the interest rate (discount rate) (j> r).

The B/C ratio of a cash flow is the ratio of the present worth of benefits to the present worth of costs. This is defined as:

$$B/\ C = 1.54 \qquad (14)$$

If the B/C ratio is greater than one, then the investment is acceptable. If the ratio is less than one, the investment is not acceptable (Baritu and Omitaum, 2007). Calculation of B/C is 1.54 exploitation project of limestone deposits 'Kosmaç "Doni Fert Company, may qualify as profitable because revenues are greater than the value of the expenditure.

CONCLUSIONS

This form of exploitation project evaluation through the limestone surface Cost benefit analysis is an argument to justify the capital investment in this branch of the economy. The bases for this assessment are superficial exploitation costs, while respecting the environment. In this case is necessary to use norms that arise from the current legal acts in compliance with the directives of the European Community (EU) and the current broad experiences of many companies involved in this activity in relation to costs that are needed to perform the whole technological process in the production of 1 [m^3] fractions of carbonate rocks. Economic assessments according to the calculated data show that the deposit has perspective and the positive business.

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