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FACTORS CREATING ECONOMIC VALUE ADDED OF MINING COMPANY

CZYNNIKI KREUJĄCE EKONOMICZNĄ WARTOŚĆ DODANĄ
PRZEDSIĘBIORSTWA GÓRNICZEGO

The company's strategy that focuses on the growth of the company represented by the economic value added (*EVA*) requires the identification of factors affecting the size of the *EVA*. For this purpose, in the paper the formula for *EVA* was transformed in such a way as to reveal the determinants affecting its value. Three levels of disaggregation of *EVA* were assumed. At the first level *EVA* depends on the amount of invested capital (*IC*) and economic spread (*EC*). At the second level economic spread is expressed using the weighted average cost of capital (*WACC*) and the return on invested capital (*ROIC*). The third level takes into account the capital structure (w_i), the cost of capital (k_i), the profit margin (*NOPAT/S*) and invested capital turnover ratio (*S/IC*). Such disaggregation can be continued on the next levels of detail.

Using the method of successive substitutions an analysis of the cause and effect of the mining company, was conducted. In this way, we can indicate which factors and to what extent affected negatively and positively the change of *EVA* in the analysed year compared to the previous year. Such analysis allows decision makers to determine a strategy directed to the increase of the mining company's value.

Keywords: economic value added (*EVA*), determinants of *EVA*, analysis of cause and effect, mining company

Obserwowana od ponad dwudziestu lat globalizacja rynków oraz rosnąca konkurencja sprawia, że zarządzanie wartością przedsiębiorstwa zyskuje na coraz większej popularności, choć sama koncepcja VBM (value-based management) jest dużo starsza, bowiem sięga końca XIX w. Istotny wzrost zainteresowania zarządzania wartością odnotowuje się od momentu opublikowania książki autorstwa A. Rappaporta pt. „*Creating Shareholder Value*” w 1986 r. (tłum. polskie „*Wartość dla akcjonariuszy. Poradnik menedżera i inwestora*” WIG-Press Warszawa 1999). Od tego czasu definiuje się różne mierniki wartości, które pozwalają zarządzającym podejmować strategiczne i operacyjne decyzje zmierzające do wzrostu wartości przedsiębiorstwa. Jednym z bardziej popularnych stał się miernik ekonomicznej wartości dodanej (*EVA*, economic value added) sformułowany przez Stern Stewart & Co, choć wykorzystuje się również takie mierniki, jak stopa zwrotu oparta na przepływach pieniężnych (*CFROI*, cash flow return on investment), czy też zwrot z zainwestowanego kapitału (*ROIC*, return on invested capital). Wielkości

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te mają tę przewagę nad tradycyjnymi miernikami księgowymi, że uwzględniają koszt kapitału nie tylko obcego, ale również własnego jak też ryzyko, jakie podejmują inwestorzy i stopę zwrotu jakiej oczekują oni ze swoich inwestycji.

Strategia przedsiębiorstwa ukierunkowana na wzrost wartości przedsiębiorstwa reprezentowanej przez *EVA* wymaga zidentyfikowania czynników mających wpływ na wielkość *EVA*. W tym celu w artykule formułę na ekonomiczną wartość dodaną przekształcono w taki sposób, by ukazać determinanty wpływające na jej wartość. Przyjęto trzy poziomy dezagregacji wartości *EVA*. Na poziomie pierwszym jest ona zależna od wielkości zainwestowanego kapitału (*IC*) i tzw. spreadu ekonomicznego (*EC*). Na poziomie drugim spread ekonomiczny wyrażany jest za pomocą średnioważonego kosztu kapitału (*WACC*) oraz zwrotu z kapitału zainwestowanego (*ROIC*). Natomiast na poziomie trzecim uwzględnia się strukturę kapitału (w_i), koszt kapitałów (k_i), marżę zysku (*NOPAT/S*) oraz wskaźnik rotacji kapitału zainwestowanego (*S/IC*). Taką dezagregację można kontynuować na następne poziomy szczegółowości.

Następnie przeprowadzono analizę przyczynowo-skutkową na przykładzie wybranej spółki górniczej, wykorzystując do tego metodę kolejnych podstawień. Dzięki temu, można było wskazać, które czynniki i w jakim stopniu oddziaływały negatywnie i pozytywnie na zmianę *EVA* w analizowanym roku w stosunku do roku poprzedniego. Taka analiza pozwala decydom na określenie strategii zmierzającej do wzrostu wartości przedsiębiorstwa górniczego.

Słowa kluczowe: ekonomiczna wartość dodana (*EVA*), czynniki wzrostu *EVA*, analiza przyczynowo-skutkowa, spółka górnicza

1. Introduction

In recent years we have seen more and more pressure on the boards of companies to show a rise in the value of one's own company in the context of increasing shareholder value. This happens for many reasons. Capital markets are becoming increasingly global, and investors are looking for opportunities for increasing profits with every opportunity. Shareholders expect that executives will justify their high wages, especially in cases of poor performance of the company. Traditional financial measures based on the profit do not take into account costs of capital that is necessary for business operations. Also, return measures such as return on assets (*ROA*) or equity (*ROE*) often motivate managers to take short-term, sub-optimal decisions. Moreover, neither profits nor return indicators show a good correlation with the actual market value of companies (Venanzi, 2003, p. 13).

Shareholders are directly interested in the size of generated values, because they translates into a return which they expect in exchange for the capital invested and the risks incurred by them. Managers should systematically keep track on information about the value of the company so they would be able to make financial, organizational, marketing and allocative decisions through which an increase in company value will be obtained.

Over the years, the criteria for assessment of companies have evolved, beginning with the assessment based on the profit margin, through the size of the operating profit and profit growth (the 80s) and return on assets (the 90s). Currently, probably a widely recognized measure (though not the only one) is generated economic value added (*EVA*).

The purpose of this article is to present the factors affecting the value of the mining company generated at different levels of detail and degree of their impact on the change in the value on the example of the selected mining company.

2. Drivers of the company's value

The economic value has different names in literature, although they relate to a similar concept. These different terms are:

- Economic Value Added (*EVA*),
- Residual Value, Residual Income (*RI*),
- Economic Profit (*EP*),
- Shareholder Value Added (*SVA*),
- Cash Value Added (*CVA*).

The concept of economic value added (*EVA*) was introduced by Stern Stewart & Co. in 1991. But in the economic literature, this concept appeared much earlier, in 1890 in the book written by the famous British economist Alfred Marshall "Principles of Economics", in which he stated: „[When a man is engaged in business] ... what remains of his profits after deducting interest on his capital at the current rate (allowing, where necessary, for insurance) is generally called his *earnings of undertaking or management*” (Marshall, 1920).

The key role is played by the cost of capital and the notion of economic profit, defined as the excess of properly adjusted revenues over accordingly adjusted costs of the resources involved. Equally important is to raise the significance of cash flow as a value driver in the form of free cash flows in the valuation of the company or the net cash flows when assessing investment projects (Helfert, 2004, p. 505-506).

More on managing the value of the company and the nature and importance of measuring the economic value of the mining company in (Bluszcz & Kijewska, 2013).

The concept of *EVA* is based on two fundamental theorems (Grant, 2003, p. 4):

- “a company is not truly profitable, unless it earns a return on invested capital that exceeds the opportunity cost of capital and
- that wealth is created when a firm's managers make positive *NPV* investment decisions for the shareholders.”

The economic value added can be viewed from two perspectives. First, based on financial statements it can be defined as the difference between operating profit after tax (*NOPAT*) and the weighted average cost of capital invested, expressed in monetary units. This definition is expressed by formulas:

$$EVA = NOPAT - WACC \cdot IC \quad (1)$$

or

$$EVA = (ROIC - WACC) \cdot IC = ES \cdot IC \quad (2)$$

where:

NOPAT — Net Operating Profit After Taxes,

IC — Invested Capital at the beginning of period,

ROIC — Return on Invested Capital,

WACC — Weighted Average Cost of Capital,

ES — Economic Spread.

The product of the weighted average cost of capital (*WACC*) and invested capital (*IC*) in the formula (1) means a charge of equity expressed in monetary units.

On the other hand, from the financial perspective *EVA* is defined in relation to the market value added of the company (*MVA*), which is equal to the present value of the expected future value of company's *EVA*. Since *MVA* is equal to the market value of the business minus the book value of equity involved, it can be shown that *EVA* is related to the internal value of the company and to its equity and debt.

$$MVA = \sum_{t=1}^n \frac{EVA_t}{(1+WACC)^t} \tag{3}$$

Regarding the subject of this study, further discussion will focus on the first method of defining and development of *EVA* and the analysis of formulas (1) and (2).

To be able to make decisions aimed at increasing *EVA* the factors that are the value drivers must be determined. According to Rappaport (1999, p. 64-65) there are seven value drivers:

1. increase in sales growth,
2. increase in operating profit margin,
3. reduction in tax payments,
4. reduction in fixed capital investment,
5. lower investment in working capital,
6. value growth duration,
7. reduction in cost of capital.

Relations between company goal, which is to create value for owners, and basic value drivers can be illustrated as in Figure 1. These values drivers relate to operational, investment and financial decisions.

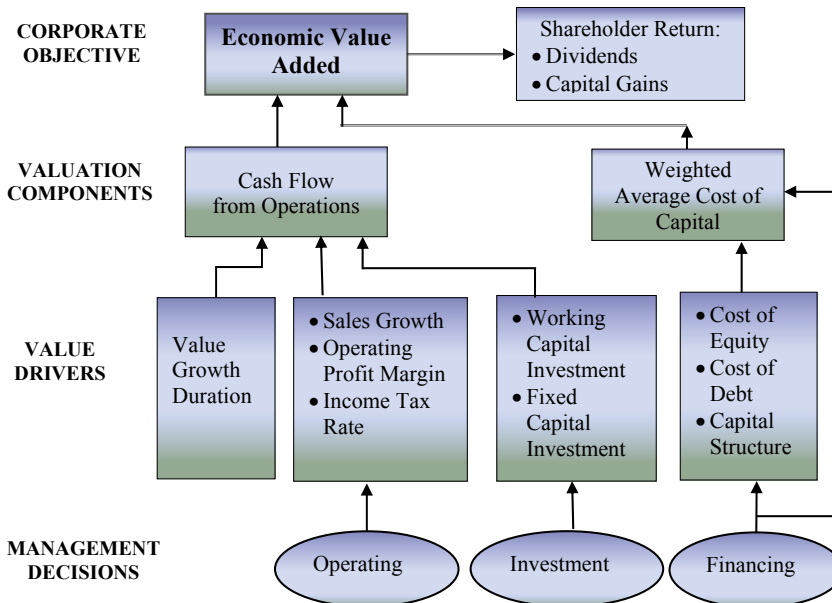


Fig. 1. The shareholder value network. Source: own elabor. based on (Rappaport, 1998, p. 56)

Operational decisions, shaping the product structure, price level, promotional activities, advertising, distribution and customer service levels translate into three main factors affecting the value of the business which are sales growth rate, operating profit margin and the size of the income tax. *Investment decisions* translate into decisions regarding the size of the fixed assets and investments in working capital. *Financial decisions* refer to expressing the optimal structure of equity and debt and the use of appropriate financial instruments. The last value driver is a value growth duration, which is estimated by managing the number of years in which the rate of return exceeds the cost of capital.

The decision tree of maximizing the economic value of the enterprise can be built for visualizing the impact of each factor on the size of the *EVA*, as illustrated in Figure 2.

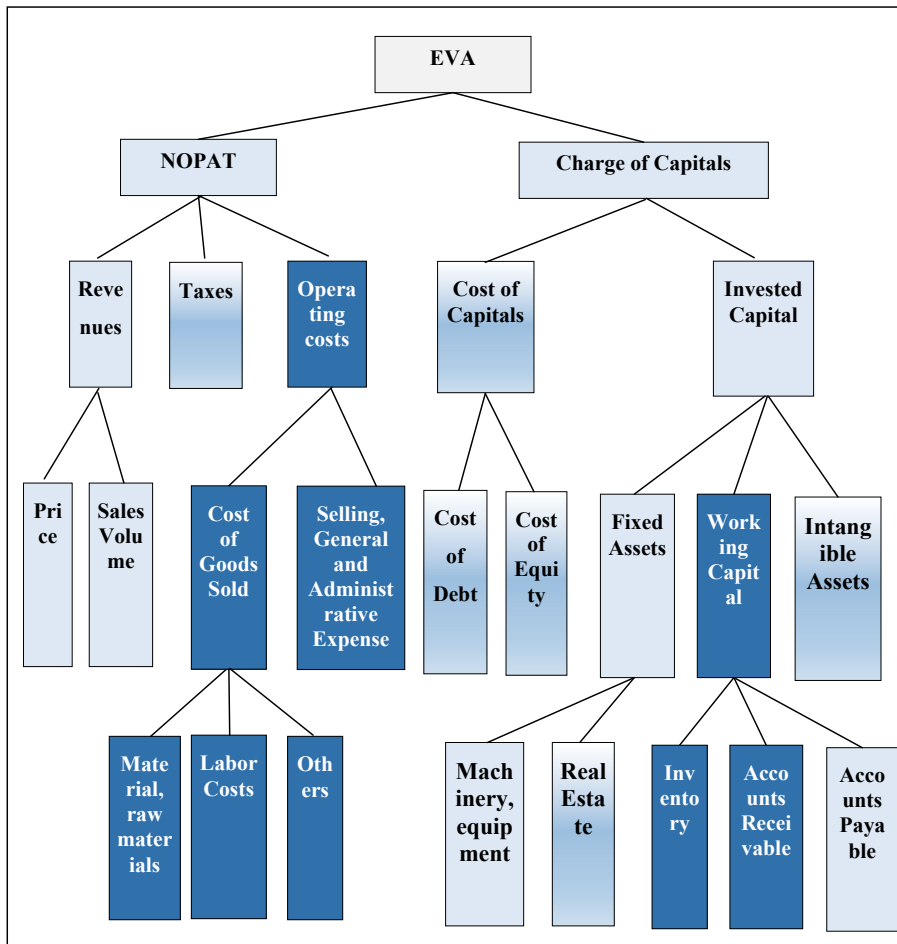


Fig. 2. Decision tree of maximizing the economic value of the company

3. Decomposition of economic value added *EVA*

As mentioned earlier, managers seek a way to maximize *EVA*. Therefore, to determine how this goal can be achieved and what factors affect the economic value, the disaggregation of *EVA* components was made, similar to du Pont pyramids.

Return on invested capital (*ROIC*) can be expressed as the product of two indicators:

$$ROIC = \frac{NOPAT}{IC} = \frac{NOPAT}{S} \cdot \frac{S}{IC} \quad (4)$$

$$ROIC = NOPAT \text{ margin} \times \text{capital invested turnover} \quad (5)$$

Consequently, the *EVA* can be written in the form (6):

$$EVA = ES \cdot IC = (ROIC - WACC) \cdot IC = \left(\frac{NOPAT}{S} \cdot \frac{S}{IC} - WACC \right) \cdot IC = \left(\frac{NOPAT}{S} \cdot \frac{S}{IC} - \sum_i w_i k_i \right) \cdot IC \quad (6)$$

where:

- S — sales (sales revenue),
- w_i — the share of the i^{th} capital,
- k_i — the cost of the i^{th} capital,

other symbols as above.

With so written formula for *EVA* it is seen that there are four main actions that can affect the economic value. Here are the directions of possible actions (Karama, 2009; Scott, 2001):

- a) to improve the operations and efficiency through an increase in *NOPAT* margin (return on *NOPAT*). This can be achieved inter alia reducing production costs, improving processes, producing according to the principle of Just-in-Time. Such techniques as Lean Manufacturing, Six Sigma, Kanban, TQM, etc. would be helpful.
- b) to reduce the amount of capital invested. This means selling assets, reducing management costs, or maintaining the current level of sales while reducing working capital and fixed assets turnover.
- c) to optimize the capital structure; for example, to increase the debt in relation to equity, as far as it will decrease the *WACC* and does not jeopardize the flexibility and security of the company.
- d) to invest capital profitably by allocating it in such a way that the value will be created. Possible activities include the acquisitions that generate value, investing in projects that generate a positive *NPV* or investment in marketing and research and development.

4. Disaggregation *EVA* on impact factors

To examine the real impact of various factors on the achieved value of the *EVA* the analysis was carried out on the example of one of the companies of the mining industry for the years 2008–2012. Figures such as sales revenue (*S*), invested capital (*IC*), net operating profit after

taxes (*NOPAT*) were obtained from published financial statements. To calculate the *WACC* it is necessary to know the cost of equity k_e and cost of debt k_d (interest-bearing):

$$WACC = k_e \cdot \frac{E}{V} + k_d \cdot \frac{D}{V} = k_e \cdot \frac{E}{V} + r_d \cdot (1-T) \times \frac{D}{V} \quad (7)$$

where:

- k_e — cost of equity,
- k_d — cost of debt (interest-bearing),
- E — equity,
- D — interest-bearing debt,
- T — the income tax rate,
- r_d — interest on debt
- V — the value of the company equal $E + D$.

To estimate the cost of equity k_e the capital asset pricing model (*CAPM*) can be used, while assuming that the required by the owner of the rate of return is equal to the rate of return on risk-free assets plus the risk premium associated with a particular company:

$$k_e = R_f + (R_m - R_f) \cdot \beta \quad (8)$$

where:

- k_e — cost of equity,
- R_f — risk-free return,
- R_m — expected market rate of return, the rate of return on investment in the market portfolio of shares,
- β — a measure of market risk (the index shows the risk of the stock of a company in relation to market risk).

Expression $R_m - R_f$ is called the Risk Premium, i.e. the rate of additional income required to compensate the risk incurred.

Due to the fact that in Polish conditions the most common debt instrument is a bank loan, to estimate the cost of debt k_d considering the tax shield the following formula was used:

$$k_d = r_d \cdot (1 - T) \quad (9)$$

where:

- r_d — annual effective interest rate bank loan,
- T — the rate of income tax.

In practice, estimation of the effective interest rate is based on a knowledge of the market conditions for granting the loan in a given period. Analysts usually take WIBOR 3M plus a risk premium, which lenders require.

The problem of estimating the cost of equity and debt in the mining industry is discussed, among others, in positions (Jonek-Kowalska, 2011; Michalak & Turek, 2010). Also, the methodology for estimating the costs and relevant calculations for the audited company are presented in the article (Bluszcz et al., 2013). It should be noted that among experts there is no complete agreement as to the methods used for estimating the cost of equity and debt. These costs are

influenced by both external factors such as general economic conditions or marketability of the company's securities as well as internal factors, which include operating and financial decisions of the company and the amount of financing needed for new investments.

Considering the components presented in the formula (6) on the *EVA*, calculations were made for the audited company, which are shown graphically in Figure 3.

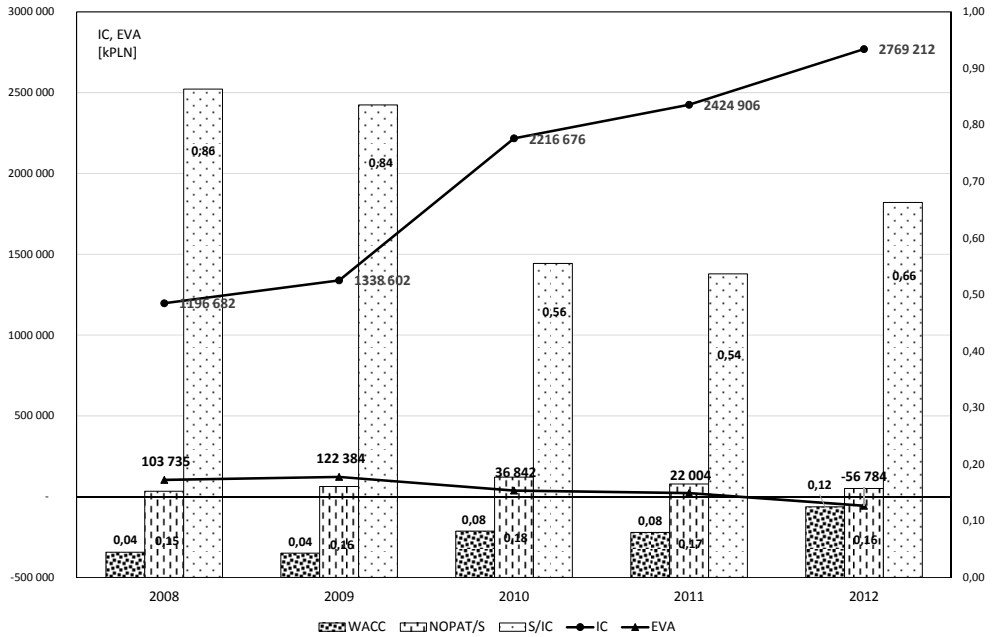


Fig. 3. The values of *EVA* and its components in the years 2008÷2012 audited mining company

Economic value added from year to year decreased to a negative value in 2012. In this time invested capital and the weighted average cost of capital were increasing, *NOPAT* margin was increasing to 2010, and in the next two years was declining, while the rotation of the capital invested behaved vice versa (was decreasing to 2011 and in 2012 increased).

To illustrate the interdependencies the model for calculating *WACC* (Fig. 4) and a model for calculating *EVA* (Fig. 5) was built. Values presented in both models refer to the year 2012.

It is worth noting that in the studied company capital structure differs significantly from the average in the mining industry, a significant advantage in favour of equity. A detailed analysis of the capital structure in the mining industry can be found in (Sierpińska & Bąk, 2012), however, it concerns only the years 2005÷2010.

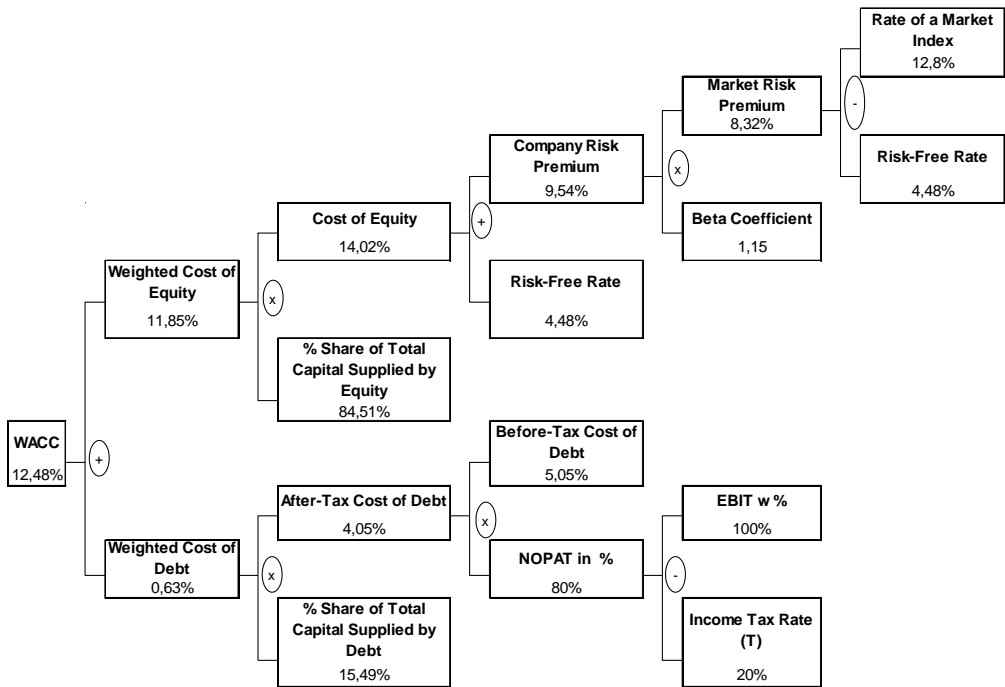


Fig. 4. Diagram of calculation of the weighted average cost of capital (WACC) – numbers for the mining company for the year 2012. Source: own elabor. on the basis (Grotheer, 2001)

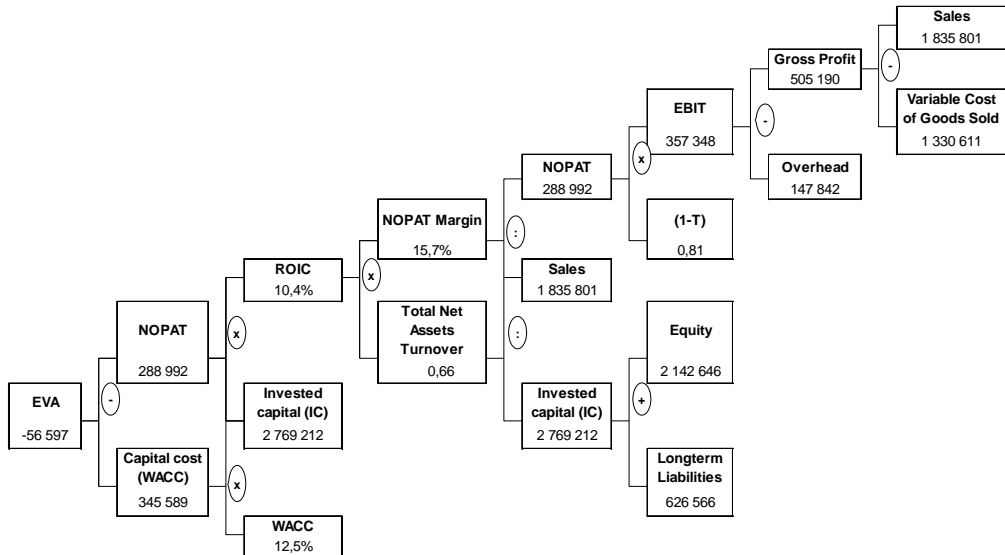


Fig. 5. Diagram of calculation of the EVA – numbers for the mining company for the year 2012. Financial values in kPLN. Source: own elabor. on the basis (Grotheer, 2001)

5. Cause and effect analysis of EVA for mining company

Observing in Figure 3 the changes that have taken place in the value of *EVA* generated by the company and individual factors influencing it, it is difficult to determine which of them had the biggest positive, and negative impact on *EVA*. Hence the need for an analysis of cause and effect.

Causal analysis lies in determining the factors affecting the studied economic indicator, and then to determine the size of the impact of various factors on the other deviations.

Among the deterministic methods of causal analysis methods most frequently mentioned are consecutive substitution, differentiation, residues, partial differences, indicator method, the proportional distribution of deviations, cross-functional substitutions and logarithmic method (Jerzemowska, 2013, p. 29; Bednarski at al., 1996, p. 42-58). These methods are of different labour-intensivity, mathematical correctness and practical usefulness. D. Wędzki (2009, p. 444) after analysing the advantages and disadvantages of particular methods took the view that only two methods: substitution and logarithmic seem to be useful. Hence, taking into account the form of equation (6), for the causal analysis consecutive substitutions (or chain substitutions) method was chosen.

The essence of the consecutive substitutions method is expressed in the following substitution of individual factors determining the value of that factor, which is the subject of comparison, in the position of adopted by reference base. It is important to adhere the principle of keeping this already carried substitutions in all subsequent substitutions, up to the last factor. By proceeding in this manner the impact of individual factors on the total deviation is calculated. The sum of the partial deviations should be equal to the total deviation between the size of the factor, which is the subject of comparisons, and the one adopted for the reference base (Waśniewski & Skoczylas, 2002, p. 42-43). The disadvantage of this method is the influence of the assumed order of substitution on the results. Therefore, it is indicated that the agents were evaluated in a specific order (from the left or from the right side), or in the order implied from the subject of study, or in the order resulting from the sequence of influence.

Form of equation (6) allows to determine the degree of influence of each factor placed on three levels. On the first level are invested capital (*IC*) and the economic spread (*ES*). On the second level is the weighted average cost of capital (*WACC*) and the rate of return on invested capital (*ROIC*), while on the third level is the capital structure (w_i) and the cost of capital (k_s) having an impact on *WACC* and the sales margin (*NOPAT/S*) and the ratio of invested capital turnover (*SIC*), which affect the size of *ROIC*. This is illustrated by Figure 6. Above-mentioned breakdown of the factors on the levels of influence corresponds to the order presented by Burja & Burja, (2009).

At first in order to determine the effects of various factors on the *EVA* the absolute deviation of *EVA* compared to the reference year should be calculated¹.

$$\Delta EVA = EVA_1 - EVA_0 \quad (10)$$

Then the impact of consecutive factors on the change in *EVA* is calculated.

Decomposition of *EVA* on the impact factors in absolute values from the first level requires the calculation of the impact of capital invested *IC* and impact of economic spread *ES* on *EVA*:

$$\Delta EVA(IC) = (ROIC_0 - WACC_0) \times (IC_1 - IC_0) = ES_0 \times \Delta IC \quad (11)$$

¹ In all consecutive formulas index 1 is assigned the size of the analyzed year, while the index 0 refers to the year adopted as a reference.

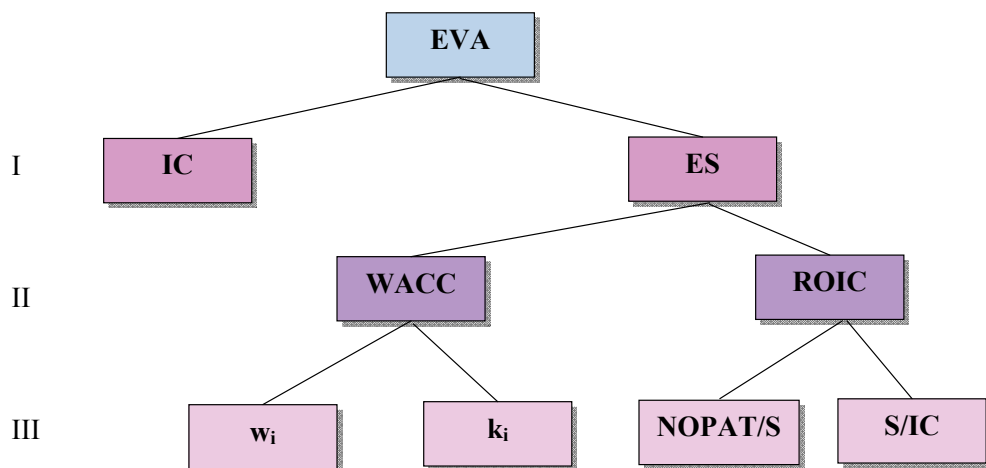


Fig. 6. Three levels of the factors influencing the value of *EVA*

$$\Delta EVA(ES) = [(ROIC_1 - WACC_1) - (ROIC_0 - WACC_0)] \times IC_1 = \Delta ES \times IC_1 \quad (12)$$

The sum of the partial deviations (11) and (12) must be equal to the absolute deviation of *EVA*:

$$\Delta EVA = \Delta EVA(IC) + \Delta EVA(ES) \quad (13)$$

At the second level, the impact of *WACC* and *ROIC* on *EVA* is calculated:

$$\Delta EVA(WACC) = -(WACC_1 - WACC_0) \times IC_1 = -\Delta WACC \times IC_1 \quad (14)$$

$$\Delta EVA(ROIC) = (ROIC_1 - ROIC_0) \times IC_1 = \Delta ROIC \times IC_1 \quad (15)$$

The sum of the partial deviations should be equal to the deviation of the combined ΔEVA :

$$\Delta EVA = \Delta EVA(IC) + \Delta EVA(WACC) + \Delta EVA(ROIC) \quad (16)$$

At the third level, the impact factors of this level are calculated:

$$\Delta EVA(w) = -(\sum w_1 k_0 - \sum w_0 k_0) \times IC_1 \quad (17)$$

$$\Delta EVA(k) = -(\sum w_1 k_1 + \sum w_1 k_0) \times IC_1 \quad (18)$$

$$\Delta EVA\left(\frac{NOPAT}{S}\right) = IC_1 \Delta\left(\frac{NOPAT}{S}\right) \frac{S_0}{IC_0} \quad (19)$$

$$\Delta EVA\left(\frac{S}{IC}\right) = IC_1 \frac{NOPAT_1}{S_1} \Delta\left(\frac{S}{IC}\right) \quad (20)$$

Here is also the principle that the sum of the partial deviations of the lower level should be equal to the deviation from a higher level.

In addition to the absolute values relative values of the above figures can be determined. Thus, the relative deviation of *EVA* can be written as:

$$\Delta rEVA = \frac{EVA_1 - EVA_0}{EVA_0} [\%] \quad (21)$$

Also, decomposition of *EVA* on the impact factors can be expressed in relative terms (Δr):

$$\Delta rEVA(IC) = \frac{\Delta EVA(IC)}{EVA_0} [\%] \quad (22)$$

$$\Delta rEVA(ES) = \frac{\Delta EVA(ES)}{EVA_0} [\%] \quad (23)$$

$$\Delta rEVA(WACC) = \frac{\Delta EVA(WACC)}{EVA_0} [\%] \quad (24)$$

$$\Delta rEVA(ROIC) = \frac{\Delta EVA(ROIC)}{EVA_0} [\%] \quad (25)$$

$$\Delta rEVA(w) = \frac{\Delta EVA(w)}{EVA_0} [\%] \quad (26)$$

$$\Delta rEVA(k) = \frac{\Delta EVA(k)}{EVA_0} [\%] \quad (27)$$

$$\Delta rEVA\left(\frac{NOPAT}{S}\right) = \frac{\Delta EVA(NOPAT / S)}{EVA_0} [\%] \quad (28)$$

$$\Delta rEVA\left(\frac{S}{IC}\right) = \frac{\Delta EVA(S / IC)}{EVA_0} [\%] \quad (29)$$

The sum of the relative partial deviations should be equal to the combined $\Delta rEVA$:

$$\Delta rEVA = \Delta rEVA(IC) + \Delta rEVA(WACC) + \Delta rEVA(ROIC) \quad (30)$$

The calculations were carried out according to the above formulas for year 2012, taking 2011 as the reference year. Selected items for years 2011-2012 as a basis for the calculation of *EVA* and individual factors with three levels of impact are summarized in Table 1.

TABLE 1

Some values for calculating *EVA*

Item	2011	2012	Absolute change	Relative change
Equity [kPLN]	1 969 019	2 142 646	173 627	8.82%
Interest bearing debt [kPLN]	455 887	626 566	170 679	37.44%
Invested capital (<i>IC</i>) [kPLN]	2 424 906	2 769 212	344 306	14.20%
The share of equity (w_e)	0.863	0.845	-0,018	-2.04%
The share of interest bearing debt (w_d)	0.137	0.155	0,018	12.84%
Sales (<i>S</i>) [kPLN]	1 301 349	1 835 801	534 452	41.07%
<i>NOPAT</i> [kPLN]	215 004	288 805	73 801	34.33%
Cost of equity (k_e)	8.68%	14.02%	5.34%	61.55%
Cost of interest bearing debt (k_d)	3.42%	4.05%	0.63%	18.49%
<i>WACC</i>	7.96%	12.48%	4.52%	56.80%
<i>ROIC</i>	8.87%	10.43%	1.56%	17.62%
Spread (<i>ES</i>)	0.91%	-2.05%	-2.96%	-325.97%
<i>NOPAT/S</i>	0.17	0,16	-0.08	-4.78%
<i>S/IC</i>	0.54	0.66	0.126	23.53%
<i>EVA</i> [kPLN]	22 004	-56 784	-78 788	-358,06%

The influence of consecutive factors on the change of *EVA* in absolute and relative terms are summarized in Table 2

TABLE 2

The influence of the three levels factors on *EVA* change in 2012

Level	Influence factors	Absolute values [kPLN]	Relative values [%]
	ΔEVA	-78 788	-358.06%
I	$\Delta EVA(IC)$	3 124.28	14.20%
I	$\Delta EVA(ES)$	-81 911.79	-372.26%
II	$\Delta EVA(WACC)$	-125 184.94	-568.92%
II	$\Delta EVA(ROIC)$	43 273.15	196.66%
III	$\Delta EVA(w)$	2 569.45	11.68%
III	$\Delta EVA(k)$	-127 754.39	-580.60%
III	$\Delta EVA(NOPAT/S)$	-11 737.41	-53.34%
III	$\Delta EVA(S/IC)$	55 010.56	250.00%

As in 2012, there was a sharp decrease in the *EVA* until to a negative value (about 358%), it becomes essential to determine which factors had the greatest impact on this fall.

Analysing the impact of the first level, it can be seen the significant negative impact of the economic spread *ES* (-81 912 kPLN, -372%), and too small positive impact of the increase of capital invested *IC* (3 124 kPLN, 14%) on a change of *EVA*. In turn, on the economic spread the *WACC* had a strong negative impact (-125 185 kPLN, -569%), while *ROIC* had a positive impact (43 273 kPLN, 197%), although too small to overcome the influence of *WACC*.

On the negative impact of *WACC* a very strong negative influence of the cost of capital k_i (−127 754 kPLN, −581%) can be noted which was not able to offset the positive impact of capital structure w_i (2 569 kPLN, 12%). By breaking down the cost of equity and debt the information can be obtained that the greatest negative impact on the decline in *EVA* was caused by an increase in the cost of equity (125 042 kPLN, −568%).

On the positive influence of *ROIC* on *EVA*, a positive impact of turnover of invested capital took place (55 011 kPLN, 250%), reduced by the negative impact of return on operating profit after taxes (11 737 kPLN; −53%). This analysis of the impact could be continued at the next lower levels of detail, assuming that the relevant data would be available, such as the structure of production, costs, unit prices, etc. Decision makers should indicate the degree of detail of the cause and effect analysis.

6. Summary

The *EVA* generated by the company is the result of multiple factors. In this study, the effects of the so-called soft factors such as human capital, management style, organizational structure, leadership, including motivating employees, customer relationship management, etc., were omitted. The study concerned only the tangible, hard, measurable factors. Decomposition of the formula for *EVA* allows to identify factors on the level of the highest aggregation, then decompose them into a specific level of detail. To determine the degree of their influence on the size of the generated *EVA* the cause and effect analysis was chosen, specifically the method of consecutive substitutions (chain substitution). An example of one of the mining companies was used in order to analyse data from 2012 year, and taking 2011 as the reference year. Taking into account the fact that in the year under review a decrease of *EVA* up to the negative value (about −358%) took place, it becomes extremely important to be able to determine the reasons for such decline. On the first level of detail the decline of economic spread (*ES*) had the greatest negative impact on the change in *EVA*.

In turn, on a change of economic spread *ROIC* ratio had a positive impact, whereas negative was caused by the increase in *WACC*. While the capital structure had a positive effect, the impact of cost of equity had strong negative impact.

The analysis indicates that the causes of decline in the value of *EVA* in 2012 are mainly of external nature. Significant influence had an increase in β , which rose from 0.5 in 2011 to a value of almost 1.15 in 2012, which meant an increased risk of an investment in the shares of the audited company. Data from year 2013 year indicate that the value of β for the whole year will be less than 1, which means that assuming the other conditions constant, the company will generate a positive *EVA*.

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