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Value of Construction Company and its Dependence on Significant Variables

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Abstract. The paper deals with the value of the construction company assessment respecting usable approaches and determinable variables. The reasons of the value of the construction company assessment are different, but the most important reasons are the sale or the purchase of the company, the liquidation of the company, the fusion of the company with another subject or the others. According the reason of the value assessment it is possible to determine theoretically different approaches for valuation, mainly it concerns about the yield method of valuation and the proprietary method of valuation. Both approaches are dependant of detailed input variables, which quality will influence the final assessment of the company's value. The main objective of the paper is to suggest, according to the analysis, possible ways of input variables, mainly in the form of expected cash-flows or the profit, determination. The paper is focused mainly on methods of time series analysis, regression analysis and mathematical simulation utilization. As the output, the results of the analysis on the case study will be demonstrated.

1. Introduction

To determine the value of a company it is possible using various approaches. However input variables are important. As one of possible input variables the profit of the company can be considered. This variable depends on two basic factors, the sales and costs. With use of values of these factors from the previous period the expected development of the company can be predicted. The prediction is very important for next orientation of the company. That is the reason, why this paper deals with the determination of the company's value as a predicted economic result. To be able this prediction to carry out, it is necessary to predict first two basic variables – sales and costs. In the prediction the mathematical methods, usually considered as the easiest and the fastest approaches, are usually used. If the prediction should be taken as optimal, the feedback, the checking of predicted variables, must be assured. Then the prediction can be used also in the future. In the case of found differences it is possible to define corrections, to approximate predicted values to the real state. The prediction of the company's value is from the procedural point of view quite complicated from the aspect of the number of particular steps. However it is very important for next orientation of the company and it has also the predictive value from the aspect of the market value of the company establishment. From this reason the papers deals with the assessment of the value of the construction company respecting particular variables. All conclusions are supported with the case study, which is based on information filled in the accounting statements of the selected construction company working not only in the Czech Republic, but also abroad.



2. Present state references

The main purpose of the company's valuation is the assessment of its value and it considers the company to be the product, which is intended for exchange. [1]

The issue of company's financial sustainability ensuring in modern business conditions is very important for enterprises of any size [2].

The result of the company's valuation is the estimation of the value within the specific required category. The category of the value must be in the harmony with the purpose, for which the valuation is carried out, because the category of the value determines the explanatory power, the interpretation and the usability of the result of this valuation. [3]

According to the Krabec (2002) [3] it is possible to distinguish two basic categories of the value, the market value and the non-market value (e.g. value in use, value in exchange, investment value, liquidation value etc.). According to the Mařík (2011) it is possible the market value to characterize as an estimation of the value achievable on the market at "normal conditions". [4]

Respecting the results of Nývltová and Marinič (2010) [5] the valuation of the company with using of three methods, the revenue method, the market method and method based on the valuation of the company's property, can be used. The property valuation comes out from the accounting evidence and the resulting value is calculated as an addition of values of particular items of actives decreased with the value of the external resources. Market methods use the comparative analysis, when based on the selected indicators it is possible to compare comparable companies. In the frame of this method it is possible to use benchmarking [6]. Similar approach of the company's valuation is mentioned in the paper of Connors and Mooney (2013) [7].

Construction company valuation using net asset value method is described in the paper [8] and the valuation of intangible assets is discussed in the papers [9] and [10].

The comparison of particular used methods for the company's valuation is dealt in the paper [11].

The revenue methods are based on the principle of the assessment of the present value of expected future revenues (incomes) generated with specific actives of the company. As revenues the discounted cash flow, the dividend revenue, the capitalised profit or economic value added can be taken into account. The key issue is the determination of the discount rate, which can be created with the real interest rate, average costs of capital or required profitability of shares [5].

In the case of the use of the capitalised profit it is necessary to define the relation between revenues and costs. For these purposes it is possible to use the method of the percentage rate on sales. The method of the percentage rate on sales comes out from the supposition, that the main accelerator of the dynamic development of the company is the increase of sales, and all other parameters are derived from their relation to sales [5].

For the possibility to use the capitalised profit in the revenue method it is necessary to assess expected development of sales. To assess the development of sales it is possible to use some mathematical methods, e. g. the time series analysis or the regression analysis. The time series (also called the chronological series) is considered as the series of values of the certain index sorted from the aspect of the natural time consequence. It is necessary that the factual contents of the index and its space determination were the same in the whole monitored time section [12].

Statistic methods (regression) come out from the definition of the statistical dependences and with the help of regression functions elaborated according the previous development. These dependences are corrected (decreasing of costs, inflation, etc.) and are projected into future objectives and tasks [3].

Using the simple linear regression method In the analysis of results is solved in [13].

3. Methodology

The paper is focused on the prediction of the construction company's value. This value is in dependence on used method derived from the potential profit of the company. The potential profit depends on the amount of sales and costs. For the assessment of the potential profit the sales as an input value in the case study will be used. Costs will be derived using percentage rate on sales method. The key for the company's value assessment is the prediction of the input value in the form of sales.

For the prediction of the input value the particular mathematical methods, esp. the time series method and the regression analysis, are used. Using these mathematical methods and available data –

input variables for these methods, it is possible to determine expected future development of the researched value.

For the purpose of the assessment of the predicted values the mathematical methods will be used. Within solved mathematical methods following trends will be applied:

a) Linear

Monitored indicators, which develop in time with regular constant tempo, are predicted using linear trend. It concerns about linear increase or decrease. The equation of this trend is as follows:

$$y = b_1 \cdot x + b_0$$

Where:

y sales of the company
 x particular yeas
 b₀, b₁ coefficients of regression

b) Power law

At the estimation of parameters the general equation of the exponential trend is transferred into general equation of the linear trend. The transformation is done with the logarithm of the equation. The model of the power law trend has following equation:

$$y = \alpha \cdot x^\beta$$

Where:

x particular yeas
 $\alpha = e^b$, where b is coefficient of regression
 $\beta = m$, where m is coefficient of regression

c) Exponential

Exponential trend represents the process of the searching of the exponential function equation, which would describe a default set of values.

$$y = b_0 \cdot m^{x_1}$$

Where:

x particular yeas
 b₀ coefficient of regression
 m coefficient of regression

These trends will be applied within the predicted values of sales determination. There the index of determination, which serves as a primary key for the suitability of the model confirmation, will be calculated. This factor informs, how many per cents of the variation of the explained variable is explained with the model and how many retained not explained. The bigger value, the more reliable the used model is.

The source of data for the use of time series analysis method is the profit and loss account and as groundwork the data from years 2011 – 2015 are used.

The regression analysis method also comes out from information from years 2011 – 2015. Moreover it is necessary to determine next variables, which are related to the financial development of the company. These variables can be the development of the Gross Domestic Product (GDP) of the Czech Republic or the development of the relevant branch of the national economy – Index of Construction Output.

After achieving of predicted sales it is possible to evaluate found indexes of determination. The most reliable model of the sales prediction is the model, which value of the index of determination is the biggest. The bigger index of determination, the lower part of evaluated variable retains unexplained.

4. Results and discussion

The procedure defined in the methodological part of this paper is verified on the case study based on the analysis of the construction company STRABAG a.s. For the purposes of the case study as input variables the data from accounting statements from 2011 to 2015 were used.

4.1 Case study

The output of the case study is the calculation of the company's value using capitalised profit method. To assess the capitalised profit it is necessary the carryout following steps:

- based on sales from monitored period (see Tab. 1) to choose suitable method for the prediction of sales for consequent period 2016 – 2018 (see Tab. 2),
- using selected mathematical method to carry out the prediction of sales for period 2016 – 2018 (see Tab. 3),
- based on costs analysis from 2011 to 2015 to assess percentage representation of costs in relation to sales (the method of the percentage rate on sales) (see Tab. 4),
- using the method of the percentage rate on sales in the relation to sales to assess the amount of predicted costs (see Tab. 5),
- assessment of the predicted economic result as a difference between sales and costs (see Tab. 6).

In the Tab. 1 the amount of sales in 1000 CZK in monitored period 2011 – 2015 is displayed. This information is taken from the account statement – the profit loss account.

Table 1. Sale of goods and services of the STRABAG, a.s.

Year	Sales [1000 CZK]
2011	15 070 970
2012	12 769 293
2013	12 536 939
2014	11 225 252
2015	11 688 146

Based on values from Tab. 1 and using mathematical methods, which are described in the chapter three indexes of determination were assessed. Following these indexes it is possible to highlight the mathematical method, which is for the next prediction of sales to most suitable and where the lowest number variables retains unexplained.

Table 2. Values of the index of determination according to used mathematical method.

Method	Trend	Index of determination
Methods of time series analysis	linear	0,780867412
	power law	0,908029006
	exponential	0,792268287
Regression analysis (HDP)	linear	0,765347269
	power law	0,79277251
	exponential	0,772022983

Method	Trend	Index of determination
Regression analysis (Construction Output Index)	linear	0,304710538
	power law	0,329205454
	exponential	0,338104295

Based on the determination and the comparison of particular achieved indexes it is possible to assess that the most suitable model for the prediction of the development of sale of the company STRABAG, a.s. the time series method with the power law trend (see Tab. 2). Using the time series method with the power law trend the predicted sales for the period 2016 – 2018 were assessed (see tab. 3).

Table 3. Prediction of sales based on chosen mathematical method.

Realty	Time series method			
	Sales	Linear	Power law	Exponential
Year				
2011	15 070 970	-	-	-
2012	12 769 293	-	-	-
2013	12 536 939	-	-	-
2014	11 225 252	-	-	-
2015	11 688 146	-	-	-
Index of determination	-	0,7809	0,9080	0,7923
2016	-	10 165 213	10 929 215	10 400 631
2017	-	9 334 244	10 646 956	9 758 510
2018	-	8 503 276	10 408 350	9 156 032

For the predicted profit it was necessary to assess the predicted costs using the method of the percentage rate on sales. For the utilization of percentage rate on sales approach the accounting statement the profit loss account, where the particular costs were monitored, was used (see tab. 4).

Table 4. Assessment of the percentage representation of particular costs in the relation to sales.

Year	Costs [CZK]	Sales [CZK]	Sales/Costs	Material, energy and services	Personal costs	Taxes and fees
2011	14 836 983	15 070 970	0,9845	0,9026	0,0742	0,0014
2012	13 006 252	12 769 293	1,0186	0,8751	0,0915	0,0008
2013	12 983 195	12 536 939	1,0356	0,8870	0,0906	0,0014
2014	11 190 811	11 225 252	0,9969	0,8747	0,1006	0,0018
2015	11 204 990	11 688 146	0,9587	0,8610	0,1069	0,0017
Average value			0,9988	0,8801	0,0928	0,0014

Year	Costs [CZK]	Sales [CZK]	Sales/Costs	Depreciation	Other operation costs	Interest costs	Other financial costs
2011	14 836 983	15 070 970	0,9845	0,0116	0,0021	0,0022	0,0059
2012	13 006 252	12 769 293	1,0186	0,0116	0,0091	0,0019	0,0099
2013	12 983 195	12 536 939	1,0356	0,0107	0,0054	0,0012	0,0037
2014	11 190 811	11 225 252	0,9969	0,0128	0,0039	0,0011	0,0052
2015	11 204 990	11 688 146	0,9587	0,0146	0,0078	0,0011	0,0068
Average value			0,9988	0,0123	0,0057	0,0015	0,0063

With usage of values from the Tab. 4 the volumes of particular costs in CZK were calculated. These volumes it was necessary to determine for next prediction of the economic development of the selected construction company.

Table 5. The assessment of planned costs using the percentage rate on sales approach.

Year	Planned Sales [CZK]	Planned Costs [CZK]	Material, energy and services [CZK]	Personal costs [CZK]	Taxes and fees [CZK]
2016	10 929 215	10 916 583	9 607 708	1 012 665	15 481
2017	10 646 956	10 634 650	9 359 578	986 512	15 081
2018	10 408 350	10 396 320	9 149 824	964 404	14 743

Year	Planned Sales [CZK]	Planned Costs [CZK]	Depreciation [CZK]	Other operation costs [CZK]	Interest costs [CZK]	Other financial costs [CZK]
2016	10 929 215	10 916 583	133 806	61 773	16 401	68 749
2017	10 646 956	10 634 650	130 350	60 177	15 978	66 974
2018	10 408 350	10 396 320	127 429	58 829	15 620	65 473

Based on the consequent process at the prediction of the economic development of selected construction company the economic result for the following period 2016 – 2018 was determined (see Tab. 6).

Table 6. The assessment of the predicted economic result.

Year	Planned Sales [CZK]	Planned Costs [CZK]	Economic result [CZK]
2016	10 929 215	10 916 583	133 806
2017	10 646 956	10 634 650	130 350
2018	10 408 350	10 396 320	127 429

4.2 Discussion

It is possible to distinguish many approaches for the prediction of selected variable, which interprets the economic development of the construction company. In the case study the predictions were based mainly on mathematical approaches, esp. on the time series analysis and the regression analysis. In the case of the regression analysis dependences on two variables, the Gross Domestic Product and the Construction Output Index were used. Mentioned mathematical methods belong to the most used approaches thanks to their fast and easy usage and interpretation. The optimal mathematical method used in the case study was selected based on the determination index analysis. According to the determination index the method with the biggest value of this index from the reason of the lowest number of unknown variables was selected. As a predicted variable, which should express the economic development of the construction company, the economic result was selected. For the possibility to predict this variable it was necessary to determine expected development of sales. This development was assessed using mentioned mathematical methods. After that, to be able to determine the predicted economic result, it was also necessary to assess expected volumes of particular costs. To determine these volumes the percentage rate on sales approach, where the information from the accounting statements of the monitored period were used, was carried out. Based on the assessment of the percentage amounts the values of predicted costs could be calculated. With the help of consequent steps of the process of the prediction of the selected variable the expected development of the predicted economic result was done. Because in the monitored period it was possible to see the decrease of the economic development, this trend was also predicted into consequent period.

5. Conclusion

The paper deals with the value of the construction company assessment respecting usable approaches and determinable variables. As a basic variable for the company's value assessment the economic result, which should represent the economy of the company, was chosen. The economic result can be calculated with the only one way as a difference between sales and costs. However it is very important, how these variables are predicted. It is possible to recognize many approaches for this prediction. The most used are mathematical methods. From this reason two mathematical methods were used in the case study. With the help of these methods the predicted amounts of sales were assessed. For the costs determination the simple method of the percentage rate on sales was used. According to this method the values of costs from previous periods were used. After that it was possible to calculate the predicted value of the economic result. Because in the previous periods the company was in the crisis, the development of the economic result has been in the regression. That is the reason, why the predicted values (the prediction is based on the historical development of relevant variable) are not optimal. To evaluate adequacy of used methods and approaches intended for the prediction it was suitable to verify their usage, when the differences between planned and real values should be analysed. Then it is possible to confirm that the selected methods are usable for the prediction of the development of the construction company.

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