ENTERPRISE VALUE ASSESSMENT IN RELATION TO METALLURGICAL INDUSTRY SPECIFICS

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Abstract

Continuous development of the market environment is associated not only with change in business conditions, under which every enterprise operates, but also the change in requirements for the assessment of the enterprise parameters and significance of the parameters assessed. This paper presents a model of a metallurgical enterprise value assessment based on the DCF method (Discounted cash flow), using the principles of structural analysis for objective evaluation of impacts of factors affecting the change of the cost potential in the immediate environment of the enterprise.

Keywords: Enterprise value, structural analysis, metallurgical industry

INTRODUCTION

In the present globalized entrepreneurial environment, industrial enterprises need a management tool that is able to apply all of the expected changes in the enterprise plans and help render successful decisions. Evaluation criteria of enterprise success thus may include the "enterprise value" that can be considered a synthetic indicator, the value of which reflects the condition, health and perspective of a company in a complex manner. There are a number of methods for assessing the enterprise value and each method naturally gives a different result. If we focus on the frequently applied DCF method, there are a number of factors in this case which depend on subjective opinions and experience of an expert assessing the enterprise value. Using the "enterprise value" indicator as the only guidance for making management decisions then becomes highly questionable. This is the reason why the existing model of enterprise value calculation using the DCF method is supported by the application of exact objective methods (structural analyses) and the assessed area has been expanded with the cost aspects of the environment of the enterprise being assessed (major suppliers), which finally made the entire calculation of the enterprise value assessment more accurate and objective.

The paper presents a model for assessing the value of a metallurgical company on the basis of the DCF method, using the structural analysis principles for objective evaluation of impact of facts influencing the change of the cost potential in the immediate environment of the company.

1.   THE METHODOLOGICAL BASES

The metallurgical enterprise value assessment model was created on the basis of the DCF method using the structural analysis principles for objective evaluation of impact of factors influencing the change of cost potential in the immediate environment of the enterprise.

The need to appraise an enterprise in the Czech Republic mainly emerged in connection with the transformation of the economy and privatization of then state-owned enterprises, as it was necessary to know not only the accounting value of the enterprise assets, but also the market value that became important for investors, owners (mostly shareholders) and creditors (e.g. banks). An outcome of the enterprise appraisal is the allocation of a certain enterprise value that arises from material justifiability, conditions and circumstances documenting the appraised value as an independent value [1]. Enterprise appraisal in the Czech Republic is governed by the Act on Business Corporations No.90/2012 Coll [2], another statutory regulation is Act No.

151/1997 Coll. on property appraisal and on amendment of certain acts, as amended [3]. The enterprise value can be assessed by various appraisal methods, whereas the method selection mainly depends on the purpose of appraisal, while it is also necessary to consider the characteristics of the company to be appraised. The enterprise value determined is largely affected not only by the method selection, but also by the quality of input information and data used for the enterprise appraisal.

In terms of the appraisal theory, the DCF (Discounted Cash Flow) method is considered the basic appraisal method, while it is the most frequently applied method in current practice [4]. This appraisal method is based on assessing the creation of free cash by the appraised enterprise for the selected period of time.

Metallurgical enterprises feature complex and structured production in the industry, and therefore we need a tool that will enable the capture and monitoring of such complex relations. A tool that enables production, prices, wages, costs, etc. to be calculated in individual enterprise departments, as well as in the enterprise as a whole. In some cases, it is useful to include the broader environment of the enterprise in these calculations. As a result of fixed technological relations, semi-finished products are transferred between these departments (both external and internal) [5]. The structural models appear to be a proper tool with all of the attributes for capturing such relations required [6].

Every industry or enterprise has its specifics which the model must accept. In the verified case from the metallurgical industry, this included transfers of raw iron between an external and internal department and calculation of prices of such transfers. The model enables determining and calculating such price using the surcharge margin in the amount of a mutually agreed percentage of continuous costs of the supplier in the raw iron production. As demonstrated by a number of expert assessments (Mc Kinsey 2003, HZ Praha 2003, 2004, 2005, VŠB Ostrava 2006, 2008, Znalex Praha 2007, 2008), the price of liquid iron cannot be derived from the market price of solid iron, as the character thereof makes them completely different products. Therefore, it is appropriate to take the supplier's costs and corresponding profit margin. These facts result in the conclusion that, in some cases, inclusion of the cost potential of major suppliers from the economic environment of a company is advisable and useful for the company value analysis in the Value Based Management system. [7]

2.　EXPERIMENTAL PART

The metallurgical enterprise value assessment model was created on the basis of the DCF method, using the structural analysis principles for objective evaluation of impacts of factors influencing the change of cost potential in the immediate environment of the enterprise.

The proposed model for assessing the value of an enterprise in the industrial segment contains the following sub-parts:

- Structural model
- Structural model dynamization
- DCF calculation and enterprise value assessment

The proposed model is verified on the basis of two metallurgical enterprises (A and B). The enterprise value is calculated for enterprise "A", which is a metallurgical enterprise without basic industry. Supplies of required liquid conversion raw iron are purchased from company "B", which is a metallurgical company with a closed cycle, i.e. including a coking plant, sintering and blast furnaces, situated at a distance enabling the safe transport of liquid iron in mobile mixers along a railtrack.

2.1. Structural model

The structural model has been design in line with the procedures defined in specialized literature [5]. In the case being verified, these were transfers of raw iron between an external and internal department and costing

of prices of such transfers. The model enables determining and calculating such price using the surcharge margin in the amount of a mutually agreed percentage of the through costs of the supplier in raw iron production. The fact that this model monitors changes in the enterprise value, including consequences of change in the supplier's parameters, makes it unique. An example of determining the through costing of costs of products in enterprise A is provided in **Table 1**, showing also the processing and fixed costs per unit.

Table 1 Through costing of enterprise A

CZK per ton	Coke	Sinter	Raw Fe	Steel	Cut slabs	Sheets	Profiles	Cuttings
Coal	2918	150	1132	850	866	938	971	1402
Fe ores, pellets	0	1178	1956	1469	1497	1622	1678	2423
Non-metallic additives	0	48	56	206	210	228	235	340
Coke	0	0	448	336	342	371	384	554
Oil	0	0	76	57	58	63	65	94
Scrap, waste	0	32	67	1073	1093	1184	1225	1770
Ferroalloys	0	0	0	414	422	457	473	683
Slabs	0	0	0	0	0	415	0	621
Margin	0	0	604	453	462	501	518	748
Processing costs	167	209	520	918	963	2523	2971	4653
Fixed costs	672	230	778	1707	1798	3643	4555	8312
Through costing - total	3 756	1847	5636	7483	7711	11946	13075	21599

The final structural model of the initial period provides information about the economic results of the individual products, as well as of the entire enterprise A, as stated in **Table 2**.

Table 2 Information about the economic results of the individual products and of the entire enterprise A

	Coke	Sinter	Raw Fe	Steel	Cut slabs	Sheets	Profiles	Cuttings
Total costs (CZK)	4 857 129 030	6 241 756 464	18 789 980 029	5 986 234 726	956 195 684	7 286 873 743	1 438 215 094	388 789 661
Outgoing revenue (CZK)	148 757	2 908 521	15 404 086 495	157139	5 405 590	6 938 985 200	1 397 000 000	397 800 000
Incoming revenue (CZK)	4 856 980 273	6 241 465 613	3 385 893 534	5 986 077 587	950 790 094	321 243 621	0	0
Balance (CZK)	0	0	0	0	0	-26 644 923	-41 215 094	9 010 339
Balance - enterprise A (CZK)					**- 58 849 677**			

2.2. Structural model dynamization

Structural model dynamization was performed for the next 10 periods of time (i.e. economic periods of time). It is required for determining the operating result in the individual periods and subsequent valuation of enterprise A. The structure of these partial structural models of the individual periods is identical to the structure of the initial structural model for the period (t). The modelled inputs for the respective period of time are thus

established in these structural models. Therefore, the value evaluation as of the current moment requires the structural models to be designed and subsequently mainly their transformation into the financial plan. It is a difficult task that requires broad knowledge and experience also for setting a realistic prognosis of development of the planned input data.

2.3. DCF calculation and enterprise value assessment

An example of calculation of discounting FCF and calculation of the present value of enterprise A is provided in **Table 3**.

Table 3 Calculation of the present value of enterprise A

Periods	(t+1)	(t+2)	(t+3)	(t+4)
FCF (CZK)	343 812 547	-113 230 523	-63 914 029	250 681 649
WACC (%)	9	10	11	12
Discount	0.92	0.83	0.74	0.63
Present value of enterprise A (CZK)	316 307 543	-93 981 334	-47 296 381	157 929 439

The created model enables not only the assessment of the enterprise value, but also the conducting of the sensitivity analyses, i.e. evaluating sensitivity of the "enterprise value" to changes in input parameters. The sensitivity analysis explores theoretical changes in input data in the individual parts of the structural model, impact of change in costs of equity and costs of debts on the company value. Any and all changes in the parameters in the sensitivity analysis are made and compared to changes in the company value calculated by DCF method.

In the sensitivity analysis, it is also possible to analyse sensitivity of the enterprise value to change in the supplier's surcharge margin, as shown in **Table 4**. **Table 4** shows what happens to the enterprise value when the subject margin changes, which can be important particularly in the case of a monopoly supplier.

Table 4 Sensitivity the enterprise value to change in the supplier's surcharge margin

Margin (%)	100	110	120	130	140	150
The value of enterprise A (CZK)	5 090 836 726	4 793 156 692	4 495 476 657	4 197 796 623	3 900 116 589	3 602 436 554

3. RESULTS AND THEIR DISCUSSION

The proposed model enables one to assess the enterprise value on the basis of the DCF method, using the structural analysis principles. It also includes impacts of the immediate environment, see **Figure 1**.

The application of metallurgical industry specifics in the proposed model created a tool that is suitable, for instance, for monitoring the production costs of the transferred product and determining the margin for the supplier as a share in such costs. Both enterprise A and B can then cooperate in a better way and calculate fair prices of transfers of monopoly product in a manner that earns profit for both of them.

During the model verification, we worked with an aggregated set of calculations structured to the basic detail of input components and dividing the processing costs to fixed and variable ones. With the particular specification, it is obviously possible to utilize the corporate database for a detailed breakdown of the items chosen. The model does not exclude designing a calculation for more selected suppliers and using an interface with differently set supplier margins.

Through value

determine through growth in phase II	1%
FCF in the last year (CZK)	1 319 026 271
WACC	0.14
Through value	10 146 355 931

Present value of enterprise

	1,00	2,00	3,00	4,00	5,00	6,00
period	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)
FCF (CZK)	343 812 547	-113 230 523	-63 914 029	250 681 649	390 524 021	669 100 893
WACC	9%	10%	11%	12%	17%	17%
discount	0.92	0.83	0.74	0.63	0.46	0.38
Present value (CZK)	316 307 543	-93 981 334	-47 296 381	157 929 439	179 641 050	254 258 339

period	(t+7)	(t+8)	(t+9)	(t+10)	Through value
FCF (CZK)	929 523 536	990 469 499	1 308 311 327	1 319 026 271	10 146 355 931
WACC	13%	14%	15%	14%	14%
discount	0.41	0.35	0.29	0.28	0.28
Present value (CZK)	381 104 650	346 664 285	379 410 285	369 327 356	2 840 979 661

interest -bearing debts	0
Net present value (CZK)	5 084 344 931

Figure 1 Net present value of enterprise A

Having verified the specific data, the value of enterprise A was determined and the sensitivity analysis determined the parameters (on the part of both the supplier and enterprise being appraised) more or less affecting the company value. Such created tool enables one to assess the enterprise value upon change of any parameters, whether they occur theoretically or factually. Therefore, the model is suitable for comparing trend alternatives when the criterion is the enterprise value, whether for investment, operational, personnel, financial technological and other considerations.

4.   CONCLUSION

The metallurgical enterprise value assessment model was created on the basis of the DCF method, applying the structural analysis principles for objective evaluation of impact of factors influencing the change of cost potential in the immediate environment of the enterprise.

Due to regional significance, this idea was applied to the metallurgical industry that has its specifics which such a management tool should respect and apply. The metallurgical industry specifics which are relevant to the model thus must become the basic assumptions of such a model. In the subject model, these are:

- complex and structured production with a complex technological procedure and transfers between individual productions
- monopoly of the supplier in supplying the basic production material (raw Fe)

Such reality of monopoly supplies of raw iron is almost unprecedented in metallurgy; however, it has initiated the basic idea and profiled the required model into the final form. Finally, a tool was created that is suitable for enterprises facing monopoly on the part of their supplier (or do not face monopoly on the part of the supplier, but have different interests in observing the supplier part). The fact that the model monitors changes in the enterprise value, including change in the supplier's parameters, makes it unique.

The considered model will enable a wide range of industrial enterprises to apply their specifics in the model and thus effectively manage their companies and individual departments based on the criterion of the enterprise value.

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