



# A NEW APPROACH METHOD OF COMPANY VALUATION

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## Abstract

*The authors present in this paper the results of a research initiated in the field of company valuation, that is a current activity in Romania, generated by the privatization process and by other processes specific to market economy.*

*The results of this research allowed us to develop this field at the level that exceeds the achievements, both in Romania and in Europe.*

*We refer to the possibility to apply the subtle sets to the valuation of goodwill elements that enhance a company's value. The evaluation of such elements is currently made by means of an accounting approach, which does not respond to the requirements of informing the future buyers.*

**Key words:** fuzzy theory, subtle sets theory, goodwill, badwill

**JEL Classification:** C65

## 1. Introduction

In the free market economy, the ownership under the form of capital is subject to certain specific processes such as: privatization, sale, merger, winding up, etc., which create a market of companies. The performance of any of these processes requires complex actions taken by initiators. For example, sale and acquisition of companies do not entail a mere ownership transfer. Such a process is very complex and includes the activities through which teams of specialists draft, at the concerned parties' request, valuation studies, in order to establish the price and tender documentation, carry out negotiations and only in the end, when the negotiation results are accepted by both parties, the necessary acts for the ownership transfer are drafted. The calculation of the market value is the most complex one among all the activities.

The determination of an asset value is based also, in the case of companies, on objective and subjective criteria. The objective criteria are to be found in all valuation

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methods; without such criteria, a company's value cannot be accurately established. The methods based on such criteria relate the tangible elements, such as fixed assets, securities, receivables, debts, etc., which provide a company's utility, for which the buyer is interested in, and papers, generally expressed through profit and dividends, that the buyer will obtain in the period of their utility.

The subjective criteria, without which the integral value of a company cannot be established, relate to non-tangible assets, which are not included in the value of assets, for which no life span can be established and which, therefore, cannot be deductible<sup>1</sup>. Such criteria are the management quality and the professional training of the entire personnel, goodwill, product quality, brand etc. elements which for the goodwill, as well as the subjective criteria enhancing or reducing the will to sell or acquire.

Unlike the tangible elements, the valuation of goodwill components determines the complexity of the process of establishing a company's value and generates, in most cases, the difference between the size of the proposed value and the actual price obtained upon sale<sup>2</sup>. Certainly, there are also other elements which make the price difference from the calculated value: the experience and talent of the team negotiating sales, the quality of the documents drafted for tender, etc.

## **2. The Current Method for Establishing the Companies' Market Value**

Since the non-tangible elements bring an additional profit as compared to other companies of the same category, which, however, do not benefit of the mentioned elements, and which, as it was previously specified, carry the name of goodwill (GW), the company value ( $V_0$ ) is determined by adding GW to a value determined on the basis of a net asset method, e.g. the corrected net assets (CNA), according to equation:

$$V_0 = CNA + GW \quad (1)$$

If the determination of the CNA values is made relatively simple, the GW calculation, corresponding to its role in informing the buyer with regard to the company's economic and management status is very complex. In this context, we consider that GW determination method does not comply with the buyer's or seller's need of information. In this way, expert accountants determine the size of the GW as the difference between the acquisition price – or the contribution value for GW – and the updated value of assets. The resulting difference will be included into the assets value forming the object of the sale–purchase contract or will be recorded in the goodwill account, without and knowledge of the factors determining it or of the percentage of the participation of each of them.

<sup>1</sup> Ioniță, I., Bănac, C., Stoica, M. (2004), *Evaluarea organizațiilor*, Editura Economică, București.

<sup>2</sup> Stoica, M., Renaty-Daciana Cantău (2002), *Previunea economică a firmei*, Editura Matrix Rom, București.

The same remark also occurs in the GW calculation methods, proposed in the specialized literature<sup>3</sup>, which we consider as unlikely in the valuation practice. In order to demonstrate this statement, we will analyze three of these methods, which are most often used in valuation studies.

### **The Anglo–Saxon Method**

According to this method, the GW is determined on the basis of the following equation:

$$GW = s(\overline{Ph} - a' CNA) \quad (2)$$

and the company value ( $V_{GW}$ ) results from the equation:

$$V_{GW} = CNA + GW \quad (3)$$

Analyzing equation (2), it results that GW is determined as the difference between the yearly forecasted profit ( $Ph$ ) and the CNA value, updated by a rate ( $a'$ ), which does not include the risk coefficient, a difference enhanced by the global discounting factor ( $s$ ), where:

$$s = \frac{(1+a)^n - 1}{a(1+a)^n} \quad (4)$$

where:  $a$  is the updating rate including also a risk coefficient and  $n$  is the number of years of the calculation period, considered as being of 3–5 years. If the difference is higher than 0, the company is considered to have goodwill.

### **Practitioners' Method**

In the case of this method, the following equation is used to determine GW:

$$GW = \frac{1(\overline{Ph} - CNA)}{2a'} \quad (5)$$

In this equation, the GW value represents half of the difference between the yearly average profit updated by a rate  $a'$  and the CNA value established through the net asset value.

### **The Method Based on CNA Capitalization**

In this case, the goodwill is determined as the difference between the yearly average profit and the product of interest rate ( $rd$ ) and CNA, multiplied by the years number of the time period taken into account, as according to equation:

$$GW = n(\overline{Ph} - rd \cdot CNA) \quad (6)$$

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<sup>3</sup> Andreica, M. Stoica, M. (2008), *Muștile subtile și aplicațiile lor*, Editura Cibernetica MC, București.

According to the method, we consider that, when the yearly average profit exceeds the capitalization of CNA value, at the daily interest for the  $n$  years of the calculation period, the organization has GW.

The manner of GW calculation and interpretation in the valuation studies is, in our opinion, not satisfactory, as it does succeed to underline the elements generating it and the contribution of each of elements to obtaining an extra profit. As it was already mentioned, such information is essential to buyer, who always bears in mind to get a clear image as regards the future profitability of the company.

### 3. The New Method proposed for Goodwill Calculation

The GW corresponding to buyer's, respectively to seller's need of information can be determined by means of econometric models based on fuzzy and subtle sets. In order to clarify the role of fuzzy sets in determining a higher accuracy degree of the goodwill value, the elements required to obtain the goodwill value within a company should be analyzed one by one. In this paper, we shall present one of these elements.

#### Employees' Loyalty to Company

In order to express the extent to which an  $i$ -ranked worker is loyal to the company that employs him/her, we introduce a membership degree denoted by  $\mu F(i)$ , indicating the membership of worker  $i$  as against property  $F$  of being loyal to company. According to Zadeh convention,  $\mu F$  belongs to the closed interval  $[0,1]$ . This means that a scale was defined, where the highest membership degree as against the property of being loyal to company is 1, while the lowest is 0. The membership degree can be estimated according to worker's conduct, and to the term of his/her employment contract. Within the fuzzy sets theory, we usually choose a certain criterion, easy to measure, that will be valued. Such a criterion may be the number of overtime hours ( $h_s$ ) supplied by worker, since his/her employment time up to the analysis time.

However, the loyalty criterion can also be expressed by employment seniority, work quality, workplace discipline, etc. All these criteria should be analyzed with the aid of subtle sets, while only one of these criteria could be analyzed with the aid of fuzzy sets. Reminding the criterion of the overtime hours' number, a very simple calculation method of the  $\mu F(i)$  membership degree, based on this criterion, could be:

$$\mu_{F(i)} = \frac{h_s^i}{h_s^{\max}} \quad (7)$$

where:  $h_s^i$  is the number of overtime hours supplied by worker  $i$ , since his/her employment up to present;

$h_s^{\max}$  is the maximum number of overtime hours supplied by a worker employed by company.

The fuzzy set AF of a company's loyal employees is under the form:

$$AF = \left\{ \begin{array}{cccc} 1, & 2, \dots, & i, \dots, & n \\ \mu_{F(1)} & \mu_{F(2)} & \mu_{F(i)} & \mu_{F(n)} \end{array} \right\}$$

where:  $\mu_{F(1)} \geq \dots \geq \mu_{F(n)}$ ,

$1, 2, \dots, i, \dots, n$  - employees' codes (brand).

The fuzzy sets introduce two elements of subjectivism:

- Selection of the criterion according to which the analyzed characteristic is evaluated (in the given example, the criterion selected for evaluating the loyalty characteristic is the number of supplied overtime hours). The criterion according to which the analyzed characteristic is evaluated can be changed, according to the objectives pursued by experts.
- Selection of the membership function. Selection is usually made by experts.

In order to create a unitary fuzzy sets theory, the subtle sets have appeared in the last decade of 20<sup>th</sup> century, sets defined by the Romanian mathematician from Chisinau Petre Osmătescu and his collaborators, who have further developed the concept of subtle set. A subtle set can be defined in the simplest way as a set of fuzzy sets which defines the same characteristic, but using different criteria<sup>4</sup>.

In this way, in the case of the example regarding the employees' loyalty to company, we consider that other criteria, by means of which we can define this characteristic, can also be taken into consideration, namely:

- 1 length of service within the company (v);
- 2 percent pay rise offered by another company, which may determine the employee to leave his/her current company, requesting transfer to a new company (sp);
- 3 workplace discipline (d) manifested during his/her length of service (v);
- 4 cooperation degree with work colleagues, managers and subordinates (gc).

By analyzing the four criteria, we find that the first two are fuzzy sets, while the last two are subtle sets. Therefore, in order to keep the given definition, we shall decompose criterion 3 and 4 into sub-criteria and, in this way, we shall obtain the fuzzy subset. For example, criterion 3 "workplace discipline" could be appreciated according to:

- a) number of absences without reason ( $N_a^i$ );
- b) number of leave absences ( $N_i$ );
- c) number of rejections, penalties for the delayed delivery of certain works, imputations and other damages caused to company ( $N_p$ ).

For N employees, we can set the maximum number of absences without reasons

( $N_a^{\max}$ ), the maximum number of leave absences ( $N_i^{\max}$ ) and maximum damages ( $N_p^{\max}$ ).

<sup>4</sup> See Stoica, M., *Renaty-Daciana Cantău (2002), Previunea economică a firmei, Editura Matrix Rom, București.*

For criterion 4, the “cooperation degree”, it is necessary to make an investigation among work colleagues, managers and subordinates – if applicable. The  $j$ -ranked work colleagues will respond to questions such as: how many years they have been cooperating with the employee ( $t_{ij}$ ); whether the employee carried out his/her tasks ( $P_{sj}^{is}$ ); whether the employee assists his/her colleagues in difficulty ( $D_{ij}$ ), whether they had any litigation with the employee ( $L_{ij}$ ); whether they would like to continue their cooperation with the employee ( $C_{ij}$ ).

The answers that fall under the grades corresponding to the question (e.g. poor, fair, excellent or small, average, large, etc.) get a number of points (+, -).

Admitting that  $n$  workers are investigated, thus we obtain for each worker the following:

$$NPC_i = \frac{1}{vi} \sum_{j=1}^n (Ps_{ji} + D_{ij} + N_{ij} + C_{ij})t_{ij} \quad (8)$$

Similarly, the number of points granted to employee  $i$  by his/her managers ( $NPS_i$ ) is calculated, and, if applicable, the number of points granted by subordinates ( $NPSB_i$ ). Then, the total number of points  $NPT_i$  granted to employee will be calculated as follows:

$$NPT_i = k_1 \cdot NPC_i + k_2 \cdot NPS_i + k_3 \cdot NPSB_i \quad (9)$$

where:  $i = (1, 2, \dots, n)$ , where:  $k_1, k_2, k_3$  are the importance coefficients attached to colleagues, managers and subordinates ( $k_2 > k_1 > k_3$ ). For the set of employees, a maximum  $NPT_{max}$  can be established.

On the basis of such determinations, the membership degrees for each fuzzy set and subset can be calculated. Thus, for the length of service, we can obtain:

$$\mu_{\gamma_1}(i) = \frac{vi}{v_{max}} \quad (10)$$

where:  $v_{max}$  - the longest length of service among all company employees.

For the percent pay rise  $S_p^i$  that causes the employee's decisions to request the transfer, the following will be obtained:

$$\mu_2(i) = \frac{S_p^i}{S_p^{max}} \quad (11)$$

where:  $S_p^{max}$  - the percentage that causes that even the most loyal employee to get a transfer.

Further on, the membership degree for employees will be determined according to the proved workplace discipline (based on sub-criteria a,b,c). The compensation law is admitted to be multiplicative, i.e.:

$$\mu_3(i) = \frac{N'_a}{N_s^{\max}} \cdot \frac{N'_i}{N_i^{\max}} \cdot \frac{P'_b}{P_b^{\max}} \quad (12)$$

For the degree of cooperation with other persons from company, three sub-criteria were taken into consideration (colleagues, managers and, eventually, subordinates). In their turn, such criteria were decomposed more analytically into five elements. A rating system was introduced, which was weighted by the cooperation length, and a rating was obtained, firstly, per classes of employees. By adding up the class ratings, a total  $NPCT_i$  and a maximum total rating  $NPCT_{\max}$  were obtained. Consequently, the calculation of the employee's cooperation degree becomes possible, as follows:

$$\mu_4(i) = \frac{NPCT_i}{NPCT_{\max}} \quad (13)$$

The last problem to be solved is the composition of the five membership degrees:  $\mu_F(i)$ , calculated for the criterion of overtime hours, that was supplemented by the membership degrees for the four new criteria (length of service in the company, pay rise that could cause an employee's transfer, work discipline and cooperation degree),  $\mu_1(i), \mu_2(i), \mu_3(i), \mu_4(i)$ , respectively. This problem can be accurately solved after a long time, by creating an information system where numerous processes to be listed below, would take place.

Firstly, the independence of criteria taken into consideration must be verified (in the exemplified case – the number of overtime hours, length of service, pay rise that could cause the employee's transfer, work discipline and cooperation degree with other employees of the company). In order to be able to prove this independence, 25 correlation coefficients  $\gamma_{ij}$  among the five criteria should be calculated. In the first stage, since the necessary statistical data do not exist the hypothesis according to which  $\gamma_{ij} = 0$ ,  $i \neq j$ , where  $ij \in \{1, 2, 3, 4, 5\}$  and that for any parameter  $i$ , the sequence is not self-correlated with any gap<sup>5</sup>. In fact, a composition law of a multiplicative type can be taken into consideration, namely the Cobb-Douglass:

$$\mu_c(i) = \prod_{i=1}^5 x_i^{\alpha_i} \quad (14)$$

where:  $\alpha_i$  - exponents to be statistically determined. Until the precise determination of these exponents,  $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 1$ .

<sup>5</sup> Andreica, M. Stoica, M. (2008), *Muștile subtile și aplicațiile lor*, Editura Cibernetica MC, București.

In the second stage, the first estimates of the correlation coefficients are made. If  $\gamma_{ij}$  is not equal to 0 significantly, then, variable  $x_j$  will be replaced by  $x_j^1 x_j^{\gamma_{ij}, \alpha_i}$ , since, at initial time,  $\gamma_{ij}^0 = 1$  (any  $i$  that is not equal to  $j$ , may be), it results that  $\gamma_{ij}^i$  is not equal to 0,  $\alpha_j^{(1)} = (1 - \gamma_{ij}^i) \alpha_j$ .

Also, by calculating the weight of the correlation coefficient in the total amount of these coefficients, the criterion relevance is estimated.  $Max \mu_G(i) = \mu_G^{\max}, i \in \{1, 2, \dots, n\}$  and  $min \mu_G^{\min}$  will be calculated. The interval  $[\mu_G^{\min}, \mu_G^{\max}]$  will be divided into a number of parts, e.g. five parts (approximately equal or approximately in a geometric progression). When a pay rise for loyalty is granted, then, it is recommended to apply a system stimulating the employees, in such a way as its size to depend upon the global membership degree  $\mu_G(i)$  related to person  $i$ .

Based on such rises, the loyalty "prices" can be calculated, reporting the rise to the membership degree  $\mu_G(i)$ , but attaching a trust degree  $g(i)$ , calculated according to the above recommendations.

The value of the CNA obtained by using the net assets method, having the same name, will be increased by the result obtained in this way.

## 4. Conclusions

The method we propose responds to the requirements of perfecting the companies' valuation projects, offering the possibility to determine a market value, with a much more rigorous substantiation than the current methodology can perform. Also, it better responds to the requirements to inform the parties' interest in participating in tenders for the privatization of companies or for sale of certain assets.

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