

## DEVELOPMENT OF METHOD FOR CALCULATION OF THE COST OF GOODWILL OF AN ENTERPRISE AS AN ECONOMIC ENTITY ON THE BASIS OF REVENUE STATISTICAL FORECAST MODEL

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**Keywords:** goodwill, business reputation, intangible assets, net assets, capitalization, excess-profit, supercost, revenue, regression model, discounting rate.

The article deals with the problem of a company business reputation (goodwill) cost estimation, the analysis of classic attitudes to the estimation and new methods for calculation of goodwill cost on the basis of statistical forecast of an enterprise revenue (by the example of iron-and-steel metallurgy companies of the Russian Federation).

In present-day conditions of a rapidly developing world economy M&A (Mergers & Acquisitions) transactions are becoming more widely-spread, taking place in most sectors of national economy. Gradually, the popularity of such kind of undertakings has been growing in Russia as well. For example, in 2006 344 M&A transactions with the participation of Russian companies were registered. Total sum of all transactions reached about 42.28 billion dollars. In com-

parison to 2005 the number of transactions increased by 26%, and their sum - by 30.1%. In 2007 the growth of M&A segment continued. At the 2007 year-end the number of transactions exceeded the results of 2006 by 28%, and the total sum of transactions overcame the level of the preceding year by more than 2.8 times.

Before the beginning of the world economic crisis Russian metallurgy was one of the most attractive sectors for M&A transactions. In 2006

Table 1

**Data of M&A transactions with the participation of Russian companies from 2004 to 2007, million dollars\***

Sectors	Results by the end of 2004		Results by the end of 2005		Results by the end of 2006		Results by the end of 2007	
	Number of transactions	Sum	Number of transactions	Sum	Number of transactions	Sum	Number of transactions	Sum
Mining operations	11	933	8	2 538	10	1675	25	9849
Mechanical engineering	19	538	25	1 222	20	511	32	2725
<b>Metallurgy</b>	<b>16</b>	<b>1 052</b>	<b>16</b>	<b>1 555</b>	<b>20</b>	<b>15866</b>	<b>22</b>	<b>6169</b>
Oil and gas	23	14081	22	17438	26	8381	45	45683
Food	23	821	37	1 452	36	1254	50	4425
Telecommunications	22	1 763	19	735	27	2009	30	7468
Mass Media	7	154	9	322	23	1293	18	2049
Insurance	4	42	6	145	5	127	10	2642
Building	9	144	14	1 537	14	568	24	2003
Trade	13	358	27	630	39	2698	41	4688
Transport	22	653	4	225	14	928	19	1660
Services	6	143	10	580	26	1580	40	2494
Finances	21	1 023	22	1 367	32	2531	43	4491
Chemical	10	410	15	1 107	9	284	20	4347
Electric power	1	70	2	173	3	473	23	18300
<b>TOTAL</b>	<b>238</b>	<b>22863</b>	<b>273</b>	<b>32482</b>	<b>344</b>	<b>42277</b>	<b>442</b>	<b>118993</b>

\* Sources of reference: Analytical group of the journal "Mergers and Acquisitions"; Data of the web-portal <http://www.ma-journal.ru/statma/>.

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the total sum of 20 transactions with the participation of Russian metallurgic assets exceeded 15.8 billion dollars, which became the most significant indicator among all sectors. In 2007 metallurgy held one of the leading positions among the industrial sectors, securing the fourth place in the volume of M&A transaction (for more detailed information see Table 1).

In 2006 Russian M&A market potential was estimated at 100 billion dollars, but the volume of actually effected transactions didn't go beyond the psychological mark of 50 billion dollars (according to [1]). However by the end of the fall of 2007 the barrier of 100 billion dollars had been cleared by the Russian market and at the end of the year the sum of transactions came up to more than 118.99 billion US dollars.

It is obvious that with the results of 2008 Russian M&A market potential will be considerably lower due to unstable economic situation.

Notwithstanding the deceleration of economic growth, the question of reliable estimate of purchased assets cost remains one of the most crucial issues. Therewith, number one difficulty in the process of estimation is the identification of volumes, the so-called intangible (non-inventory) assets of an enterprise, among which one of the most important and significant in the context of economy is business reputation (goodwill).

The problem of cost estimation of business reputation aroused in the world of economic activity long ago, at the stage of emergence of operations with economic assets. Once the transaction entity was represented by an entire enterprise, there emerged the necessity for cost estimation of economic entity business reputation. Thus, it became obvious that the set of intangible characteristics of an enterprise (such as conscientiousness, honesty in the opinion of partners and buyers, trust of consumers, qualified personnel, knowledge and talent of top-managers) can add the considerable cost that, accordingly, positively affects the total cost of a company.

The complex of these parameters is commonly referred to as *goodwill* (or, as mentioned above, business reputation) and is estimated when affecting the transaction.

The practice of estimation of the intangible assets for the long period of formation of economic relations in Europe and United States has undergone numerous changes. As a result,

at the present stage of development of this field of knowledge, native and international economics have few methods of calculation and estimation of goodwill, most of which can be rather restrictedly applicable due to a number of peculiarities [4].

Currently, the most obvious way of goodwill estimation is considered to be the method of calculation of goodwill cost as a difference between the market value of the company (its capitalization calculated on the basis of common stock value circulating on the trading floor), and the market net value of the company's assets.

This method is assumed as official and is regulated by Russian Accounting Statute "Record of Intangible Assets" AS (PBU) 14/2007 [7], representing, in fact, the basic way of estimation of goodwill value (supercost of the enterprise) when effecting purchase and sale transactions or mergers.

Among the basic drawbacks of this method the following ones can be pointed out:

- ◆ Estimation of market value of a company, as an integral property complex, can turn out to be quite a challenge for non-public companies, which do not have their shares listed, as the calculation of capitalization in such a case is rather complicated. Therefore, application of this method in practice requires estimation of the whole business and, subsequently, additional expenses;

- ◆ The method is indirect, as it allows carrying out calculation of goodwill cost only after estimation of actual cost of a company. That is, the method cannot be possibly applied before affecting the purchase or sale transaction or merger.

More available and convenient for use is a method of goodwill estimation by means of excess-profit discounting. A scientific basis for application of such a method is a theory that positive business reputation enables the company to receive additional profit or *excess-profit*. More detailed information on the classic method of excess-profits is represented in the work by B. Colasse [3].

The author presupposes that goodwill as a cost of intangible assets of a business is a discounted cost of a number of profits, which were obtained from these assets. That is, goodwill can be calculated by the formula:

$$GW = \frac{NP - t \cdot A}{a}, \quad (1)$$

Table 2

Properties of regression model (2)

Index	Value
Volume of original sample	215
Correlation coefficient	0.9827
Determination coefficient	0.9657
t-criteria for variables included in the model	x1 - 3.578
	x2 - 10.239
	x3 - 3.315
	x4 - 10.972
	x5 - 7.388
	x6 - 3.936

where  $GW$  - sum of goodwill;  $NP$  - average annual sum of net profit of an enterprise;  $A$  - average annual value of assets of an enterprise;  $t$  - average industry profitability rate of assets;  $\alpha$  - discounting rate.

Like other methods of goodwill calculation, this method is imperfect. One of its basic drawbacks is a lack of uniqueness for calculation of excess-profit, as the use of average industry profitability rate allows obtaining a rather roughly estimated result of excess-profit of a certain enterprise.

However, it should be pointed out that the improvement of the method of excess-profit calculation for conditions of a certain sector can considerably increase the efficiency of application of the above-described method.

An attempt to modify the classic method of excess-profits was made in the work [4]. As

a basic idea for excess-profit estimation the author of the article took the method of enterprise profit forecasting using the profile of company assets (taking into account specificity of Russian iron-and-steel metallurgy sector).

As the statistical analysis showed, the index *revenue volume of an enterprise* has a stable connection with the profile of assets of a certain enterprise. That is, from statistical point of view, the result of revenue forecast on the basis of enterprise balance profile will be most reliable.

Data processing of the accounting reports of 33 Russian iron-and-steel metallurgy enterprises for an 8-year period (from 1999 to 2006) made it possible to develop a regression model showing the dependence of enterprise revenue volume on the volume and profile of its assets. As a result of a calculation the following regression model was obtained:

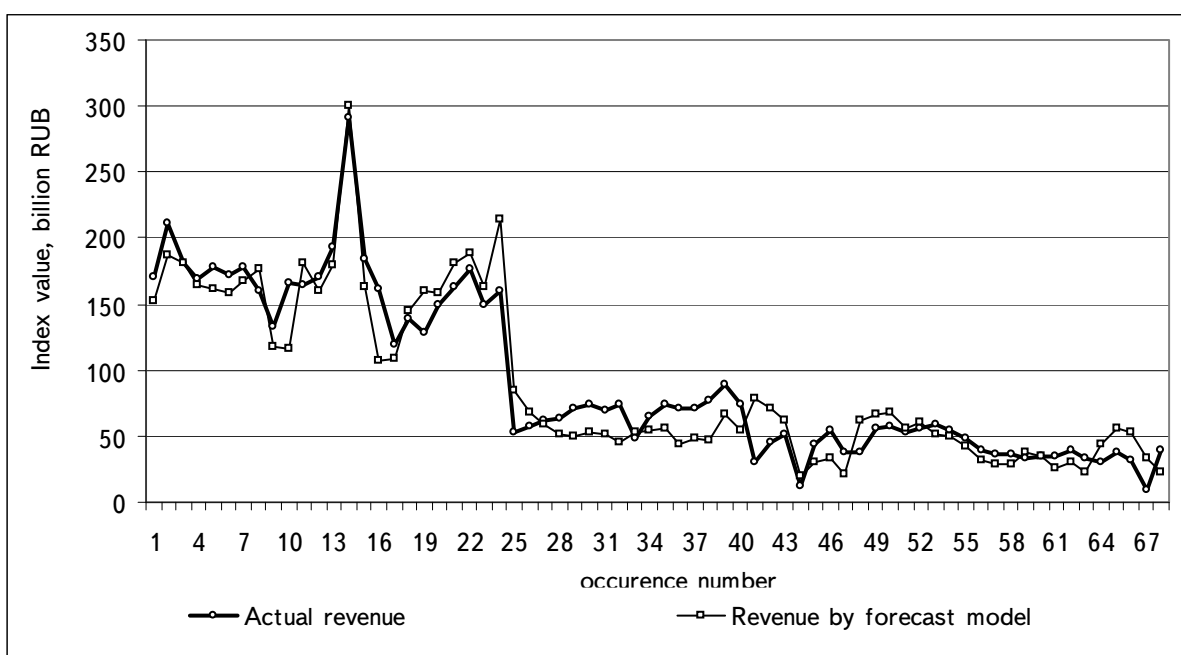


Fig. 1. Comparison of actual revenue values and values of the revenue calculated with the regression model (2) for Russian largest iron-and-steel metallurgy combines

$$Y = 0,542 \cdot x_1 + 1,01 \cdot x_2 + 0,869 \cdot x_3 + 3,577 \cdot x_4 + 5,34 \cdot x_5 + 0,474 \cdot x_6, \quad (2)$$

where  $Y$  - enterprise revenue volume at the year-end;  $x_1$  - sum in the line *Money* in Blank No.1 of accounting report at the year-end;  $x_2$  - sum in the line *Short-term financial investments* in Blank No.1 of accounting report at the year-end;  $x_3$  - sum in the line *Accounts receivables* in Blank No.1 of accounting report at the year-end;  $x_4$  - sum in the line *Stocks* in Blank No.1 of accounting report at the year-end;  $x_5$  - sum in the line *Other current assets* in Blank No.1 of accounting report at the year-end;  $x_6$  - sum in the line *Basic assets* in Blank No.1 of accounting report at the year-end.

Properties of this regression model are represented in Table 2.

As it is shown in Diagram 1, the index of revenue, calculated with the use of the regression model, reduplicates the changes of actual value of the revenue taken from the Blank No.2 of accounting reports of metallurgic combines.

In fact, the value obtained from calculation by means of the developed model reflects average value of the revenue, which, if all other conditions are equal, can be gained by a metallurgic enterprise possessing the determined profile and volume of circulating and non-circulating assets.

Economic nature of proportion (2) should be specified. Let us divide its left and right part by the sum of assets. Then its left part will contain turnover of assets (per year), and the right part instead of variables  $X_i$  - shall represent a share of a corresponding type of asset in the total balance. Therefore, economic nature of proportion (2) and high degree of its statistical reliability are defined by a strict dependence of the assets sum turnover and their profile.

Further on, let us deal with the enterprise excess-profit gained by a company from additional intangible assets (i.e. from its business reputation or goodwill).

$$\begin{aligned} \text{Excess-profit} &= P^{act} - P^{expect} = \\ &= (Rev^{act} - PC^{act}) - (Rev^{expect} - PC^{expect}) = \\ &= (Rev^{act} - Rev^{expect}) - (PC^{act} - PC^{expect}), \end{aligned} \quad (3)$$

where  $P^{act}$  - is value of actual profit gained by an enterprise;  $P^{expect}$  - is value of expected profit, which an enterprise can gain under the conditions of the given sector using all its tangible assets;  $Rev^{act}$  - is value of actual revenue gained by an enterprise;  $Rev^{expect}$  - is value of expected revenue, which an enterprise can gain under the conditions of the given sector using all its tangible assets;  $PC^{act}$  - is value of actual production cost produced

by an enterprise;  $PC^{expect}$  - is value of expected production cost of an enterprise, obtained on the basis of average weighted level of costs per ruble of revenue in the technological group taking into account the scale of a certain enterprise.

*Note:* Calculation of  $PC^{expect}$  is carried out as follows: actual revenue of an enterprise is multiplied by average weighted level of costs per ruble of revenue:

$$PC^{expect} = Rev^{act} \cdot C^{av}, \quad (4)$$

Which results in:

$$PC^{expect} = Rev^{act} \cdot \frac{\sum_{i=1}^n PC_i^{act}}{\sum_{i=1}^n Rev_i^{act}}, \quad (5)$$

where  $Rev^{act}$  - is value of actual revenue gained by an enterprise;  $PC^{expect}$  - is value of average weighted production cost;  $C^{av}$  - average weighted costs per ruble of revenue for the given technological group. It is calculated as a ratio of total production cost produced by an enterprise of the group to the total revenue of all enterprises included into the group under consideration, that is:

$$C^{av} = \frac{\sum_{i=1}^n PC_i^{act}}{\sum_{i=1}^n Rev_i^{act}}.$$

The excess-profit value, used as numerator in formula (1), can be received on the basis of application of model (2) reflecting advantage of the company over the competitors, resulting from higher qualification of its personnel in the field of management of assets turnover, lower production and realization expenses, as well as from use of modern equipment and technologies.

It is obvious, that possessing a set sum of assets, the enterprise being under conditionally equal competitive conditions with other participants of the metallurgic market, can receive the revenue value calculated by model (2). Then the excess of this value by actual revenue will be the so-called excess-profit, which could be gained from the intangible advantages of the company over its competitors.

The second key moment when applying the modified method of excess- profits is the ques-

Table 3

**Results of calculation of average annual asset profitability rate inside a group of enterprises consisting of nine metallurgic combines**

Year	Average return on assets
1999	9.10%
2000	14.60%
2001	4.69%
2002	8.92%
2003	18.40%
2004	31.75%
2005	18.36%
2006	19.41%
2007	21.73%

tion of estimation of discounting rate used for capitalization of excess-profit value into supercost. It would be most logical to use a certain average value of the assets profitability in the sector for this purpose, as considering goodwill an asset, we mean that it is capable to return profit equally efficiently. However, a high degree of Russian metallurgic sector heterogeneity reduces the efficiency of calculation of an average industry profitability rate. More intelligent approach to the matter under consideration is calculation of the average profitability rate of certain groups of enterprises, where the companies are comparable in turnover volumes, types of production, number of personnel and other parameters.

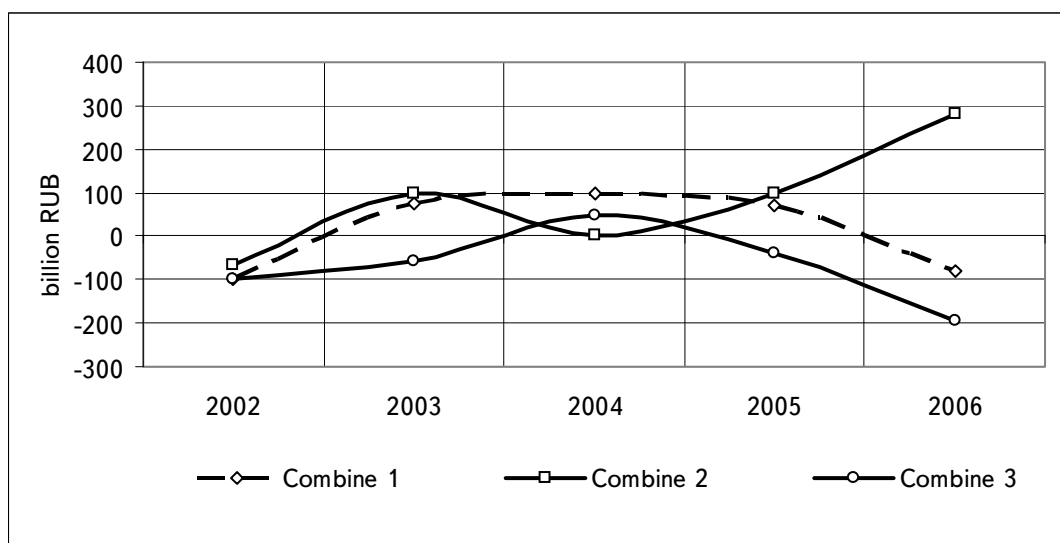
For example, calculation of average annual asset profitability rate was carried out inside the group of enterprises consisting of nine metallurgic combines of Russian iron-and-steel met-

allurgy of complete cycle. The results of this calculation are given in Table 3.

In case of carrying out the procedure of excess-profit capitalization using average annual profitability of this group of Russian metallurgic combines as a discounting rate, supercost volumes of a certain enterprise (or its business reputation cost) and their changes can be obtained.

An obvious advantage of this method is the fact that it is adapted to Russian iron-and-steel metallurgy, which means that the applied model of revenue forecast takes into account the specificity of work of enterprises in this field and allows more adequate forecast of a probable change of company's activity financial results due to the change of asset profile and sum.

When analyzing supercost of a metallurgic company, we can compare the efficiency of its activity with the results of work of its competitors. Model calculations of goodwill value of



**Fig. 2. Changes in supercost of largest iron-and-steel metallurgic enterprises of Russian Federation**

the Russian largest metallurgic combines for the considered 8-year period have shown that 2002-2003 was the optimum period for the supercost growth (see Diagram 2).

From the data of Diagram 2 we can see a relatively low business reputation of Combine 3. Such a conclusion can be explained as follows: possessing a sufficient amount of assets of favorable profile, the enterprise received much less revenue than it would receive in a normal business environment.

Certainly, in order to achieve the maximum accuracy of the result it is necessary to carry out the detailed analysis of changes in financial flows and to study all financial and economic indicators in details. However, in case of regular supercost monitoring, calculation with the use of the offered algorithm could become an effective way of goodwill cost estimation.

Among the basic advantages of the developed method we can highlight the following:

- ◆ Simplicity of excess-profit calculation on the basis of revenue forecast model;
- ◆ Simple technique of discounting rate calculation, in accordance with which excess-profit capitalization is carried out;
- ◆ Direct focus on Russian iron-and-steel metallurgy sector.

Among the drawbacks is the necessity of periodical (annual) model updating, as well as low level of recognition of non-standard factors reaching beyond ordinary activity (investments, gross borrowings, turn in the market, etc.).

In fact, excess-profit capitalization method of cost estimation of intangible assets is a traditional way of goodwill calculation. However, many discussions are held on estimation of the excess-profit itself. It is worth mentioning that application of an average industry profitability rate for this purpose allows gaining quite a rough idea of index values to be determined.

The goodwill calculation method offered by the authors was developed especially for the conditions of Russian metallurgic sector. From

statistical point of view it takes into account the specificity of Russian metallurgic complex and peculiarities of changes in financial result depending on the operations with assets and efficient management of enterprise expenses. In the authors' opinion, application of this method under the present-day conditions of iron-and-steel metallurgy of Russian Federation allows obtaining rather accurate excess-profit values, that is, to determine to what extent actual financial result exceeds "normal" value for the given enterprise under the current conditions of business environment.

Capitalizing the value of excess-profit to the profitability rate, average for a certain group, in which the given enterprise is included, an economist obtains the cost value of assets, which permitted to gain an extraordinary profit.

This value, in its turn, is the cost estimation of company business reputation (or goodwill) playing an important role in the process of estimation of the entire enterprise both when effecting M&A transactions and when it is necessary to calculate the cost of the given intangible asset.

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