Investment in intangible assets and corporate growth in the industrial companies

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Abstract. This report examines the impact of investment in intangible assets on corporate growth of public industrial companies. An intangible asset growth indicator model has been developed. A new conceptual approach for measuring corporate growth has been implemented, using an integral indicator determined by four single indicators using weighted geometric mean model. Based on built models, a study has been conducted to show that the companies have achieved moderate corporate growth, accompanied by faster growth in intangible assets. Investments in intangible assets are proven to be a stable factor for corporate growth. Bulgarian industrial companies do not sufficiently utilize the intangible assets of leading companies. The investment strategy of Bulgarian companies should be optimized primarily to achieve a spillover effect.

1. Introduction
The economy of tangible assets are constantly growing – an economy symbolically called “weightless world” [1]. Haskel and Westlake emphasize that economy does not rely “solely on investment in tangible assets” [2]. The fundamental changes that take place in modern business with different names among which “digitalization of the economy” affect all aspects of company’s business, including corporate growth.

Under International accounting standards (IAS) 38 intangible asset is an identifiable non-monetary asset without physical substance.

Like any asset, an intangible asset is a resource, controlled by entity as a result of past events that are expected to receive future economic benefits. In industrial companies, the intangible assets are patents, licenses, copyrights, trademarks and more. Their growth is an indication of an increase in company’s competitive potential [3]. In balance sheets of companies, these assets are a separate group called “intangible assets”, to which four articles are distinguished:

1. Property rights.
2. Software products.
3. Development products.
4. Other intangible assets.

It is normal to expect that investments in intangible assets are a powerful factor in the development of industrial companies. To examine the impact of these investments on corporate growth, a sample of
15 publicly traded industrial companies was selected, as the selection is targeted to be sampled the best companies:

- three companies included in the calculation of the basic SOFIX index of the BSE AD – Sofia Sopharma AD, M+C Hydraulic AD and Sirma Group AD;
- two companies from Premium segment of the main market: Monbat AD and Korado Bulgaria AD;
- eight companies in the Standard segment on the main market;
- one company from the alternative market of BSE – Sofia: Saharni zavodi AD;
- a company that goes out of the status of publicity in 2016, but has traditions in investments in intangible assets: Biovet AD.

The period 2007 – 2018 was selected for analysis for the following reasons:

- 2007 is one of the good pre-crisis years;
- 2018 forms the boundaries of a relatively long 12-year period, sufficient for serious changes in the studied parameters of industrial companies.

2. Methodology and methods

The levels and dynamics of intangible assets are defined as follows:

- the balance sheet value is used as a level indicator, by which the asset is recognized in statement of financial position after deduction of accumulated depreciation and impairment losses;
- the growth indicator of intangible assets is used as an indicator of dynamics, which is defined as follows:

\[
G_{ia} = \frac{IA_t}{IA_{t-n}} \times 100 - 100
\]

, where

- \( G_{ia} \) is growth of intangible assets;
- \( IA_t \) – book value of intangible assets in t-th year;
- \( IA_{t-n} \) – the carrying amount of intangible assets during the base year.

In some studies [4, 5], net sales revenue was used as an indicator of enterprise growth and corporate growth was determined by the formula:

\[
G_g = \frac{NSR_t}{NSR_{t-n}} \times 100 - 100
\]

, where

- \( G_g \) – corporate growth;
- \( NSR_t \) – net sales revenue for the t-th year;
- \( NSR_{t-n} \) – net sales revenue for the base year.

There are significant differences in the economic literature regarding firm size indicators. It is believed that the company's growth analysis may be different because there are different ways to measure it. This diversification is sometimes due to the goals of each author, but more often due to lack of data [6]. Some researchers [7, 8] have identified the following basic indicators used in the empirical literature:

- financial or stock exchange value;
- the number of employees;
- sales and revenue;
- production capacity;
To these indicators we can add the following:

- the value of total assets;
- the net value of the property;
- the permanent capital of the company;
- the value of non-current assets (called the “supporting structure” of industrial companies), etc.

Taking the research findings [9] as valid, that some of the presented indicators are interdependent and expendable, we believe that each indicator can paint a different picture of the company’s growth.

For the purposes of this study, we suggest a new approach and new indicators for measuring company size and growth. The available economic literature all studies are based on a single indicator of the size.

- most often the number of employees (up to 2000);
- in periods of financial stability, the stock exchange or financial value;
- after 2000, mostly through the value of total assets;
- after 2010, most often through the turnover (total revenue or net sales revenue).

The problem is that the only indicator, however perfect it may be, has some drawbacks. In addition, researchers are often criticized for choosing the metric that is most appropriate to prove their own thesis. For this reason, we propose a new conceptual model for measuring of the size and growth.

For this reason, we propose a new conceptual model for measuring of the size and growth, respectively, not through one metric a single indicator but through an integral indicator. After a thorough study of the qualities of the single indicators, the possibilities for collecting information, the specificity of the analyzed period and the diverse industry affiliation of the companies, we offer the following models for an integral indicator for the size of an industrial company:

a) Model of unweighted the arithmetic mean average

\[
S_C^i = \frac{NSR + VA + TA + LE}{4}
\]  

where

- \(S_C^i\) is an integral indicator of company size;
- \(NSR\) – net sales revenue;
- \(VA\) – added value;
- \(TA\) – total assets;
- \(LE\) – labor costs (labor as measured by the company’s salary and social security costs).

b) Model of weighted average arithmetic mean

\[
S_C^i = \frac{aNSR + bVA + cTA + dLE}{4}
\]

where \(a\), \(b\), \(c\), \(d\) are the coefficients of significance (relative weights) of the individual indicators involved in the integral indicator model.

c) Model of unweighted average, quadratic value:

\[
S_C^i = \sqrt[4]{\frac{NSR + VA + TA + LE}{4}}
\]

, where the symbols have the same meaning.

d) Model of weighted average, quadratic value:
In the models of integral indicator involving four single indicators. Thus, the size of the company is more comprehensive and objective. Preference of authors of this report for geometric mean over the arithmetic mean or other mean is due to the property of geometric mean better describes the harmony in variation of single indices. Significance coefficients a, b, c, d has the role of ranking single indicators by expert or econometric methods. For the purposes of this study are identified through expert assuming the following meanings: a = 0.25, b = 0.35, c = 0.20, d = 0.20.

Depending on the objectives of the survey and the possibilities for collecting information, the number of single indicators involved in the integrated indicator model may be increased or decreased. Therefore, we propose the following principle model of an integral indicator of company size:

\[ S^i_c = \sqrt[n]{a_1 X_1 \cdot a_2 X_2 \cdots a_n X_n} \]  

(7)

where

\( n \) is the number of unit indicators;
\( a_i \) – coefficient of significance (relative weight) of the i-th unit indicator (i = 1… n);
\( X_i \) – level of the i-th unit indicator (i = 1… n);
\( \Pi \) is a mathematical symbol for a multiplication.

Corporate growth is determined by the following model:

\[ C^j_g = \frac{S^{ij}_{ct} - S^{ij}_{ct-n}}{S^{ij}_{ct-n}} \cdot 100 - 100 \]  

(8)

where

\( C^j_g \) is the corporate growth of the jth industrial company;
\( S^{ij}_{ct} \) – integral indicator of the size of the j-th industrial company in the t-th year;
\( S^{ij}_{ct-n} \) – an integral indicator of the size of the same company in the base year.

3. Results and discussion

Based on a specific study of the actual data of the surveyed industrial companies and the content of the models (1) and (6) were compiled Table 1:

**Table 1. Dynamics of intangible assets and corporate growth of industrial companies (2007 – 2018)**

| Companies              | Intangible assets growth | Corporate growth |
|------------------------|--------------------------|------------------|
|                        | thousand BGN             | %                | (%)              |
| Alcomet AD             | 721                      | 270.51           | 81.54            |
| Sopharma AD            | 4,433                    | 591.07           | 87.66            |
| Monbat AD              | 223                      | 437.25           | 143.14           |
| Neochim AD             | 65                       | 382.35           | 8.99             |
| Yuri Gagarin AD        | 79                       | 146.75           | 88.16            |
| Hydraulic Elements and Systems AD | 175          | 336.54           | 46.11            |
| Zaharni zavodi AD      | 2                        | 9.09             | 37.54            |
The analysis of the results presented in Table 1 shows that all companies achieved corporate growth during the period 2007 – 2018. Corporate growth in three companies is high: Lavena AD, Sirma Group AD and Biovet AD. At the same time, all three companies have increased both in absolute value of intangible assets and high growth modeled on (1). Only Sopharma AD, which has a significant increase in intangible assets, has achieved moderate corporate growth. The other pharmaceutical company Tchaikapharma AD achieved the same growth with a significant decrease in intangible assets. In addition, with four other companies, corporate growth was accompanied by a decrease in these assets. This reduction is very small in absolute terms, but one of the companies (M+C Hydraulic) which are blue chip on the stock exchange, this decrease is significant.

The analysis of the average results for the entire aggregate of 15 companies showed the following:

- the companies achieved moderate corporate growth – 11.96% annual average increase in size;
- this growth is accompanied by a faster growth of intangible assets – 22.30% annually;
- each percent of corporate growth is accompanied by an increase of intangible assets of nearly BGN 54 thousand.

The proposed integral metric used for indicator to measure the size of the company is an average quadratic value. It’s known, that the averages value are those summarizing characteristics, which reflect the typical in phenomenon under study. In this sense, it is unambiguous to conclude that the growth of intangible assets is a stable factor for corporate growth. But within the typical there are deviations that cause serious disturbance. For example, in five companies, corporate growth is accompanied by a decrease in intangible assets, which represents one third (33.13%) of total. If, in three of these companies, this reduction is insignificant in absolute value, for two of the companies, which is considered for successful (M+C Hydraulic AD and Tchaikapharma AD), the decrease is significant. Specific analysis shows that the decrease in intangible assets in the engineering company M+C Hydraulic AD is mainly due to the reduced value of the used software products (-106 thousand BGN) and other intangible assets (-72 thousand BGN), while property rights (industrial and intellectual) are growing significantly.

In the pharmaceutical company Tchaikapharma AD, property rights are also increasing, but the following three articles are substantially reduced:
- software products (-293 thousand BGN);
- R&D products (-128 thousand BGN);
- others (-142 thousand BGN).

Development by international standards is the application of research findings or other knowledge to a plan or design for the production of new or substantially improved materials, devices, products, processes or services prior to commencement of commercial production or use. In our opinion, development is a typical manifestation of the so-called “spillover effect” [2]. With this effect, one company takes advantage of the private investment of another company to create a certain innovation. R&D keywords are “implementation of discovery”. Practice has shown that some intangible assets have an extremely high spillover effect, which means that other companies can relatively easily benefit from intangible investments that they have not made and, through development, to apply foreign discoveries, with or without improvement. The main feature of intangible assets, called “spillover effect”, is of great importance for the development of Bulgarian industrial companies. These
are companies, who do not have the potential for independent research to create innovation. Therefore, the innovation strategy of these companies in the development of intangible assets should be to achieve a spillover effect through the direct application or adaptation of unprotected innovations of developed companies. And this effect can be obtained most quickly through R&D. The analysis shows that only three companies report ownership of R&D products in their balance sheets: Sirma Group AD, Tchaikapharma AD and Biovet AD. Research by international standards is an original and planned study undertaken to gain new scientific or technical knowledge and understanding. The spillover effect can be obtained not only through development, but also through the use of research results from other companies. This process is successfully characterized by Thomas Jefferson through the following symbolism: “He, who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me” [10, 11].

Spillover effect can occur not only in creating new products and services ideas of foreign companies, but also in design, training, marketing, brand and many other intangible assets. In the practice of the Bulgarian industrial companies there are no separate articles on the intangible assets of the research activity, and they are usually reported in the complex article “other intangible assets”. The analysis shows that this article has reported assets in the balance sheets of 12 companies in the sample surveyed. Significant intangible assets of scientific value are created by the company Biovet AD, which has its own research institute. The biggest products in absolute value are the products of the software company Sirma Group AD. The two pharmaceutical companies (Sopharma AD and Tchaikapharma AD) also have significant intangible assets from research. In other companies, these assets are completely or almost missing.

4. Conclusion

The following important conclusions can be drawn from this study:

1. Investments in intangible assets of industrial companies are part of the fundamental changes that occur in modern business, characterized by the name “economy of intangible assets”. In the balance sheets of Bulgarian companies these assets are reported in a separate group with four items, and there are serious problems with their proper accounting. In addition, an entire category of intangible assets called “economic competences” such as training, marketing research and branding, restructuring, etc. is not considered as an investment.

2. For an indicator of the level of intangible assets, it is appropriate to use the balance value, by which the asset is recognized in the statement of financial position after deduction of accumulated depreciation and impairment losses. For an indicator of the dynamics of these assets, a model has been drawn up that represents the ratio of the book value during the surveyed year.

3. A new conceptual approach to measuring the size of a company and, respectively, its growth through an integrated indicator has been applied to study corporate growth. Four specific and one principle model of integral indicator are formed, formed by the individual levels of four single indicators. The authors recommend the use of the model of weighted average geometric value because it better characterizes the harmony in the variation of individual indicators and enables the ranking (weighting) of the individual indicators depending on the situation, research objectives, development prospects or other considerations.

4. Based on the constructed models of indicators for the growth of intangible assets and corporate growth, a survey was conducted in 15 public industrial companies, which are considered to be the most successful and best listed on BSE AD – Sofia. The analyzed period is 2007 – 2018 – before and after the crisis. The analysis of the average results for the whole aggregate shows that the companies have achieved moderate corporate growth, which is accompanied by a faster growth of the intangible assets, with each percentage of corporate growth corresponding to an increase of the intangible assets by BGN 54 thousand.

5. The study of common characteristics convincingly shows that investing in intangible assets is a stable factor for corporate growth. But within the typical deviations occur – in 5 companies
corporate growth is accompanied by a decrease in intangible assets, which represents one third (33.33%) of the aggregate. The specific analysis shows that in three of the companies this decrease is insignificant, but in the other two companies the decrease is mainly due to the protected intangible assets – property rights and software.

6. The analysis clearly shows that industrial companies surveyed do not use enough unprotected intangible assets of leading companies called economic “spillover effect”. This basic characteristic of intangible assets is a great importance for the development of Bulgarian industrial companies that do not have the human and financial potential for their own research and innovation. The investment strategy of these companies in intangible assets should be optimized primarily to achieve a spillover effect by directly applying or adapting unprotected innovations of developed companies to the purchase of protected assets.

7. Spillover effect can be obtained most quickly through R&D. The analysis shows that only three companies account for R&D in their balance sheets. Spillover effect can also occur through research on ideas from foreign companies. This activity is reflected in the comprehensive article “other intangible assets”. The analysis shows that this article contains intangible assets in the balance sheets of 12 companies in the sample. Significant intangible R&D assets are owned by the most successful companies: Sirma Group AD, Biovet AD and two pharmaceutical companies: Sopharma AD and Tchaikapharma AD.

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