


“The role of internally generated goodwill in choosing areas and objects of investment”

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THE ROLE OF INTERNALLY GENERATED GOODWILL IN CHOOSING AREAS AND OBJECTS OF INVESTMENT

Abstract

The purpose of the study is to develop and test in practice the method of analyzing the relationship between the formation of internally generated goodwill and investment attractiveness of an enterprise based on econometric modeling in order to improve the investment management process. Attracting additional investments, both for Slovakia and Ukraine, requires the identification of promising objects of investment. Assessment of enterprise's potential cannot be accurately performed on the base of financial statements, which reflect only the state of assets. It is necessary to take into account the prospects for development of this business unit in the future, that largely depends on effective functioning of management system. The success of business processes depends on how rationally managers use the resources of the enterprise and form the structure of assets adequate to the demands of the market. The article considers the problem of estimating the value of enterprises in order to attract investments based on internally generated goodwill, and determines the peculiarities of the formation and types of goodwill of a commercial enterprise. As the main research method, canonical correlation modelling was used to analyze data of Ukrainian machine-building enterprises for the period 2017–2020. As a result, the factors responsible for the formation of internally generated goodwill were identified and classified according to their economic nature. Correlation dependencies between groups of initial and resulting coefficients were calculated and the areas of enterprise management that have the greatest impact on the formation of its market value were identified.

Keywords

intangible assets, market value, reputation of an enterprise, goodwill, canonical modelling, directions of investment

JEL Classification

C51, G11, G31, M21, M49

INTRODUCTION

Ensuring the investment attractiveness of an enterprise requires improving the determination of its value characteristics by identifying the formed assets and establishing the impact of their formation on the valuation and operation of business. One of the innovative types of enterprise assets that ensures the formation of enterprise value and reflects the generated additional economic benefits from the business is internally generated goodwill, which ensures the formation of additional value of the enterprise and its competitive advantages, improves the financial status of the company and, as a result, its investment attractiveness.

However, goodwill in the process of business management can be considered not only as a factor of investment attractiveness, but also as a result of a company's established reputation: the higher the quality of business positioning, the higher the volume of investments, which will eventually form additional sources of economic potential and goodwill formation, in turn.

Models for assessing the investment attractiveness of industrial enterprises based on financial reporting ratios are often supplemented with indicators characterizing other aspects of activity, and therefore complex econometric calculations are increasingly used to find relationships between various business process management systems and complex groups of performance results, followed by forecasting for future periods (when, in fact, the investor plans to start receiving profit from the spent funds). Depending on the objectives of the study, various models and methods are selected. Certain approaches have already been developed and tested in the practice of Ukrainian enterprises, taking into account the peculiarities of the Ukrainian approach to disclosing information that is not a trade secret.

The purpose of the article is to develop and test in practice a method for analyzing the relationship between the formation of internally generated goodwill and investment attractiveness of an enterprise based on econometric modelling to improve the investment management process.

1. THEORETICAL BASIS

The development of scientific and technical progress determines the need for constant updating of business processes at an enterprise to increase its sustainability as a business unit. Innovative activity requires additional capital investments; that is why determining the size and directions of investment is important for the enterprise. In addition, existing and potential investors should be confident in the efficiency of the invested capital. Therefore, the selection of investment objects and evaluation of an enterprise's innovative capabilities is a guarantee of the effectiveness of capital investments. It is agreed by Alves et al. (2017) and Beck et al. (2017).

Despite the huge number of international and regional rating methods (numerous "indices" comparing national economies), which are designed to assess the investment attractiveness of countries, cities, industries, etc. (Dovhan, 2015; Gliznutsa, 2016; Gutkevych, 2019; Kharlamova, 2014), real business examples sometimes become paradoxical. It is logical to assume that stable and prosperous countries should be of interest to investors in the first place, since there are practically no risks in their economies, and a high degree of predictability facilitates strategic planning for several years ahead. In fact, the economies of developing and post-crisis countries are sometimes of greater interest (Jantoń-Drozdowska, 2016; Bogatyrev et al., 2019). In business practice, there is even a "recovery after destruction" approach, when infrastructure is reconstructed or re-created in territories affected by natural disasters, military conflicts or a long recession. An example can be the countries

of Eastern Europe, which over a fairly short period were able to go from command and control to a market economy. From abroad, not only the market was financed, but also various institutions, including state ones, which were supposed to prove the functioning of the new conditions and ensure the stability of the transition period.

The analysis of investment amounts and indicators of innovativeness of economies among Eastern Europe countries (Figure 1) shows that the level of innovation development in countries is almost the same, but the amount of investment received differs significantly. This means that the countries have the potential to receive investments and manage them effectively, but the development of additional instruments for assessing investment attractiveness is necessary.

The comparative analysis of GDP per capita and Doing Business scores by the European countries shows slight disparities between the level of a national economy's attractiveness ratio for investment and the general level of a country's development (GDP measured in real USD) (Figure 2). For the selected 43 national economies in Europe, Figure 2 demonstrates no correlation between a country's income level and its attractiveness for foreign investment (2020 data). There is also inequality in the selected economies' distribution: The Doing Business ranking has close to normal distribution, while GDP per capita is skewed to the left as 19 countries out of 43 (44%) have less than \$20,000 income per capita, and the next 10 (23%) earn from 20 to 30 thousand dollars per capita. On the contrary, the investment attractiveness score lays between 72 and 82 points for 36 nation-

Source: Compiled by the authors based on the Global Innovation Index 2021 indicators and the Invest Europe 2021 study.

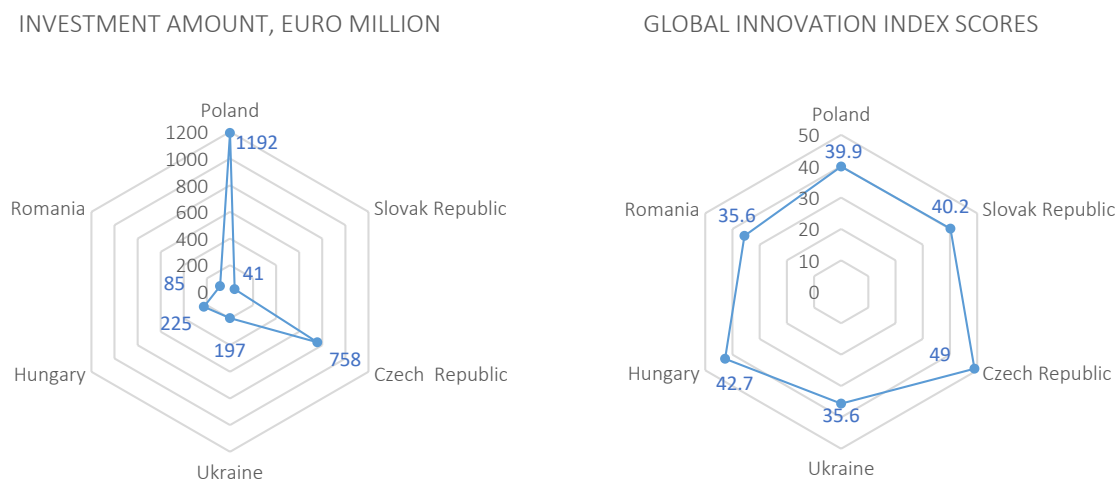


Figure 1. Distribution of investment values and Global Innovation Index scores in Eastern Europe

al economies (84%). Secondary rankings within the group made by the number of observations, 1 to 43, represent a set of national economies with the high level of similarity between income and investment attractiveness: they are Croatia, Czech Republic, Finland, and Slovak Republic with 0 difference, and Albania, Germany, Norway, and Slovenia with 1 point of difference. Within this set, Norway leads both in the Doing Business score (the 4th place out of 43) and GDP per capita (5th out of 43). Albania, being on the 40th place by investment attractiveness, has at the same time one of the lowest income level – 39th compared to other European countries. From the opposite side of the axis is Liechtenstein: its GDP per capita is the highest within the selected national economies, but it has the most unattractive business environment for foreign investors. In 2020, the countries of Eastern Europe did not perform different patterns: some of them coincided by both rankings, and the others diverge the same as the countries of other parts of Europe. In Ukraine, the difference made 6 points – 37th by investment attractiveness and 43rd (the last) by GDP per capita in real USD.

So, it is needed to reveal main parameters for assessing the investment potential, which can compare the prospects of enterprises under other relatively equal conditions. The economies of Ukraine and Slovakia face the need to assess investment attractiveness in order to attract additional investments. Analyzing the data in Figure 3, the fastest growing in Slovakia is the electricity industry,

which means its potential attractiveness for investors. The mining industry is gradually reducing the pace of development; it also requires a detailed analysis and management of the formation of investment attractiveness to ensure development of the industry.

The obtained financial result is now one of the main indicators of activity efficiency. The results of their analysis in Figure 3 for Slovak Republic indicate that the sectors with an average high financial result from their activities include positions 11 and 15, fig.3. However, it should be noted that these industries are the riskiest areas. Those are subject to the influence of stochastic, poorly predictable environmental factors. Usually, investors focus on industries that have a medium-high financial result, but stable growth. Such industries are included to positions 6-8, fig.3. At the same time, an investor who has chosen the capital investment industry faces the problem of an accurate and reliable assessment of assets as investment objects. An important role belongs to the evaluation of rationality of structure of the enterprise's resources, which provide it further development and a stable position in the market.

Research (Alves, 2017; Beck, 2017) highlights such essential enterprise capabilities that should be assessed as development, operations, management, and transaction capabilities. In the series of publications, Ukrainian scientists (Malyarets, 2020; Us, 2018) prove that the efficiency of a modern compa-

Source: Compiled by the authors based on World Bank indicators and the Doing Business 2020 report.

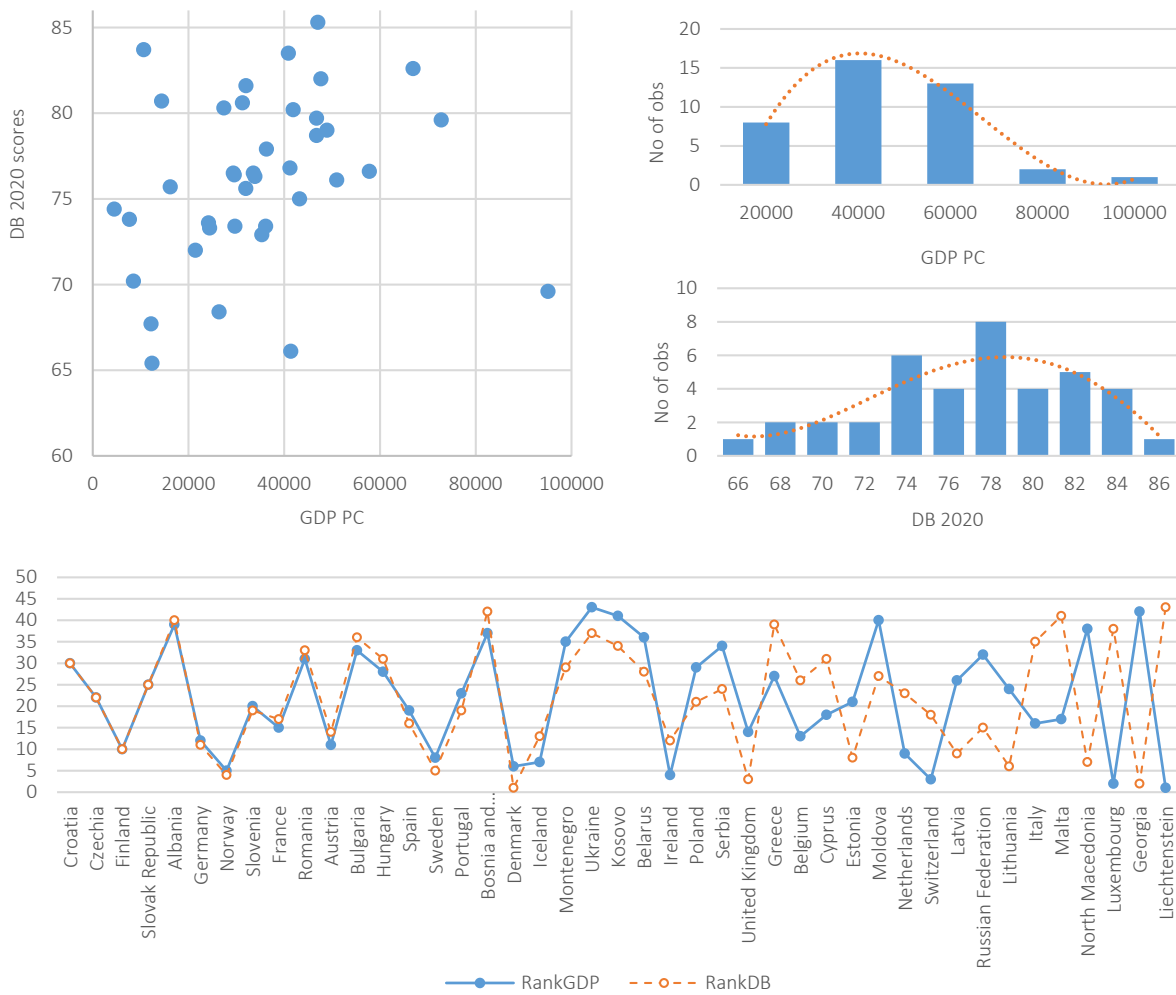


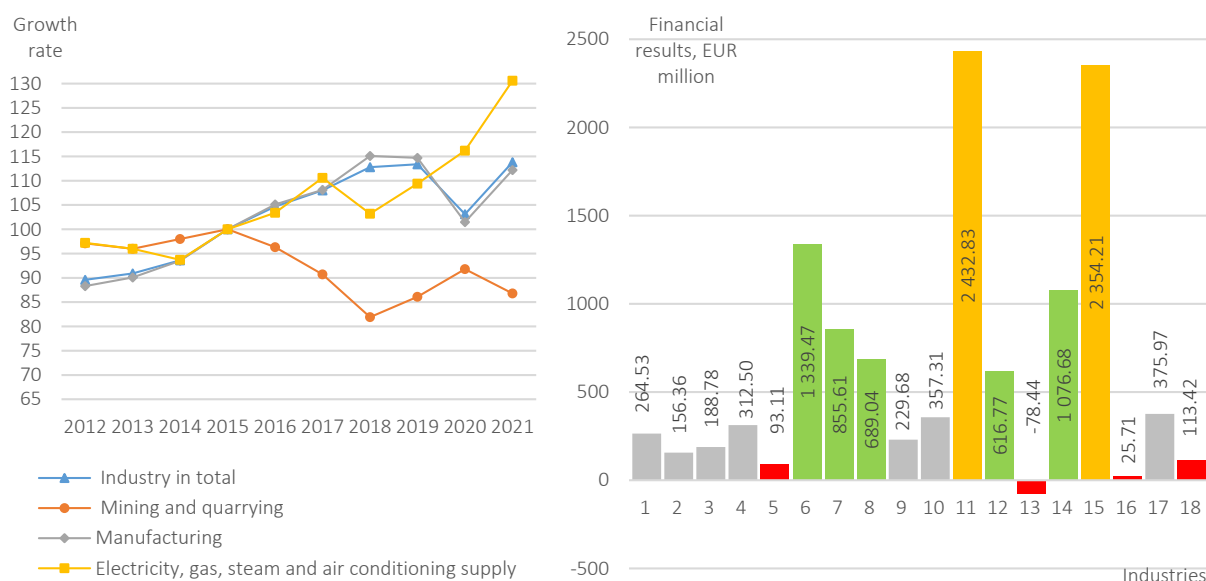
Figure 2. Distribution of GDP per capita values and Doing Business scores

ny should be estimated through the synergy of the main components of a production process, which simultaneously are its scopes of activity control and resource administration. They are marketing, finance, personnel and production. Optimization of their indicators will lead to the profit's growth; their performance must be analyzed in close mutual associations, as multidimensionality and multi-objectivity of enterprise development will support the strategic implementation and planning of the company's goals in the long run. Us (2018) suggests using the system of interrelated balanced indicators, composed from the list of financial and non-financial indicators. The FPMSII model is developed made from the five directions of activity of an industrial enterprise – financial, production, marketing, staff, innovative and investment activities. Just as the balanced scorecard works, steps are being developed to improve the

business processes of the enterprise. Malyarets et al. (2019) expand the Balanced Scorecard (BSC) concept by using different mathematical methods for constructing integrated indices, namely, the Hurrington method. Altogether with some other ones, it aims to set relevant intervals for the final indicator enabling the qualitative description for making further managerial decisions.

Modern business in the general global market seems to consist of multiple bifurcation points, which, in their turn, are interrelated. Neither suppliers nor consumers are confident in their tomorrow preferences, nevertheless everyone agrees that the image and reputation of a company are at least of the same importance as its measurable resources and productive forces. Loyalty and confidence cannot be evaluated through financial reports, so analysts and investors have to find options pru-

Source: Compiled by the authors based on data of Statistical Office of the Slovak Republic.



INDUSTRIES		
1	Agriculture, forestry and fishing	7
2	Mining and quarrying	8
3	Manufacture of food products, beverages and tobacco	9
4	Manufacture of coke and refined petroleum products	10
5	Manufacture of chemicals and chem. products	11
6	Manufacture of basic metals, fabricated metal products	12
7	Manufacture of motor vehicles, trailers and semi-trailers	13
8	Electricity, gas, steam and air conditioning supply	14
9	Water supply; sewerage, waste management and remediation activities	15
10	Construction	16
11	Wholesale and retail trade, repair of motor vehicles and motorcycles	17
12	Transportation and storage	18
13	Accommodation, food and beverage service activities	
14	Information and communication	
15	Real estate, professional, scientific, technical, administrative and supporting activities	
16	Education	
17	Human health and social work activities	
18	Arts, entertainment and recreation and other service activities	

Figure 3. Industrial production dynamics and financial results of companies in Slovak Republic in 2021

dent and flexible at the same time. Thus, there is a need to assess intangible factors, including intangible assets, mainly in the form of intellectual capital, and goodwill.

The formation of intellectual capital and intangible assets is important for assessing the innovation potential. It will contribute to the formation of goodwill (Labunska, 2019; Serpeninova et al., 2022; Ievdokymov et al., 2020; Shubita, 2022; Singh et al., 2019). Todorova et al. (2019) explain the peculiarities of intellectual capital formation and the tasks of quality management in the educational sector on the state level. Dudova (2014), Siller and Cibak (2016) highlight the importance of reputed social protection systems and avoiding corruption in the reputation and stability of public administration.

Indicators for assessing the investment potential are complex in calculations, but they are also based on an assessment of financial and economic results, combined with expert evaluations in a particular area of management. For example, goodwill can be taken to assess the level of efficiency in the use of intangible assets. It is important that data for such an analysis can be obtained from open sources, especially if it is necessary to substantiate an investment decision on choosing one or more companies for investment/buying a business from many similar cases. If the decision to invest is made at the state level, when funds are directed from the state (regional) budget, a universal calculation method is needed to eliminate lobbying for the interests of individual business groups and corruption. When developing this methodology, the authors aimed precisely at its universality and

applicability for different industries, although the primary data and financial reporting information belonged to large machine-building enterprises.

Sudyn (2015) suggests that goodwill is a very broad concept that includes almost all types of intangible assets that help a business to maintain its competitiveness. However, these types can have a precise quantitative measurement, for example, the number and value of patents, know-how, trademarks, etc., whereas other elements are not simple to quantify. It is difficult to assess staff qualifications solely based on their education and training diplomas, and even more difficult to evaluate the synergy effect of teamwork and the use of the expertise of the most qualified employees.

Hellman (2022) suggests using R&D portfolios to separate the asset component from the expected value of investment efficiency. He proves that even the fail of current innovations may not lead to the decrease of a company's value, as it has potential for growth when using the synergy of all its researches (both successful and failed). The main idea is to form a balanced portfolio of R&D for innovation; enterprises that succeed will have the highest market value. Hellman and Hjelström (2022) describe in detail the advantages and discrepancies of goodwill evaluation within the IFRS standards. Hajnišová et al. (2012, 2013) discuss the legal aspects of assessing the assets of an enterprise in the process of selling and tax optimization. Slezáková (2020) observes legal issues of financial market regulations.

Gierusz et al. (2022) analyze the results of companies in themining and energy sector and prove that goodwill is the main indicator of a company's survivability during the long-term crises. The authors distinguish the following core components of goodwill: market share, management qualifications and a unique business model. Investigations are based on the self-developed index of disclosure quality, which depicts the ability of an enterprise to provide certain reliable data and reports for the potential investors and consumers not to drop their loyalty during the crisis.

Grosu (2022) highlights the necessity to demarcate purchased and internally generated (primary) goodwill, which is sometimes difficult due to the established terms in different European languages.

Portuguese, French, Italian and Swedish accountancy traditions have different phrases for these two types, while in English, German, Dutch and Spanish languages the same term is used for both types. The researcher also compares the ways how various scientific schools distinguish goodwill from other groups of intangible assets.

Experts shy away from an unambiguous interpretation of financial statements, since it is here that the dry language of formal indicators does not reveal the "personal" characteristics of the company. Birca (2022) explores the usage of both legal and accountancy norms of goodwill estimation, describing the situations when particular groups of intangible assets are recorded differently, by fair or tradable price. The ultimate attention is drawn to the evaluation of positive and negative goodwill and income forecasting, resulting from the ability to manipulate the market prices for a company's products. These should be clearly seen in the insurance market, as the reputation of the company is here the most important factor to make a purchase decision. Hudakova and Adamko (2016) estimated the formation of technical reserves in the insurance industry through several years in correspondence with the general trends in investment activities.

One of the problems that appraisers must overcome is the ambiguous attitude towards the valuation of intangible assets and the lack of uniform accounting standards. Qualitative indicators are assessed using expert methods, and since experts often have different opinions on the same issue and different specialists feel comfortable to use their own methods, expert assessments are not always considered reliable and worthy of attention, even when formalized approaches such as scaling are introduced. Goodwill is disclosed under two standards – IAS 3 for the one acquired in a business combination and IAS 38 for internally generated goodwill, but it is still not recognized as an asset being an identifiable resource. To be evaluated, intangible assets must be separable, or origin from contractual or other legal rights. Otherwise, they cannot be sold, licensed or transferred. Warnock (2022) gives an example that the ratio of recognized intangible assets to total assets represents less than 2% on average, although the actual value of non-material assets used is significantly higher. Thus, the scope of models of IGG assessment and analysis is quite wide, but nevertheless

there are common tasks and methods for different companies and industries.

Statistical and mathematical models can be used for the purpose of multi-objective optimization; therefore, there is no reason to improve one side of the business operation sphere while neglecting all the others. If a company's management decides to increase profitability ratios or consumer loyalty, it will need to work on all components mentioned above. Improving post-sales servicing demands both personnel training (i.e., intellectual capital formation) and funding an additional marketing campaign, while both measures require extra funding, which will temporarily jeopardize costs efficiency, as the money are spent in the current period, whereas the positive effect of customers' commitment to a brand may show up after half a year. A company's board must choose between the numerous scenarios of enhancing one group of indicators and deteriorating the others, considering inner and outer business environment, foreign markets, mission of an enterprise, state vision of the industry and even the opinion of half-related to business itself communities in social networks. Optimization modeling should be the basis for further simulations, as the main problem of traditional optimization models is the pre-disposed behavior of economic agents, while urgent decision-making must have at least several scenarios to be implemented immediately.

The management system should provide a comprehensive study of the interrelation between the process of internally generated goodwill (IGG) formation and investment attractiveness by assessing the similarity of their factors in order to manage the value of an enterprise and its positioning among investors. This approach assumes that valuation indicators important for investors are formed under the influence of the same factors as IGG.

The methodology of canonical analysis was chosen as a tool for solving this problem. This choice was made due to the functional capabilities of the canonical correlation as an instrument for modeling the directions and closeness of relationships between groups of factors influencing IGG and investment attractiveness (systems of factor and resultant attributes). The result of the modelling is the identification of key factors for ensuring the growth of business attractiveness for investment.

Canonical-correlation analysis was chosen as the most relevant way to collate the interlinked influences of IGG formation factors, as this method allows extracting information from mutual covariance matrices. Suppose there are two vectors of random variables, $X = (X_1, \dots, X_n)$ and $Y = (Y_1, \dots, Y_m)$. If there are close associations between these variables, the canonical correlation analysis will find such linear combinations of X_i and Y_j that have the maximum correlation with each other. A typical use of canonical correlation in statistics is to assess two sets of variables and identify the commonalities between them. The method investigates the relationship between two sets of variables, and in this sense, it advances the capabilities of other statistical models (for example, we can find a relationship between four factors from one set of data and five parameters from another).

The evaluation procedure of the impact of an enterprise's IGG formation on its investment attractiveness is based on canonical modelling and includes three main stages.

Stage 1. *Formation of a system for evaluating indicators of factor and resultant attributes*

To assess the investment attractiveness, the main indicators of financial status in the view of investors were selected. These indicators reflect the efficiency of business operations, the effect of additional economic benefits from goodwill generation and the possibility of further business development.

Estimated indicators of the IGG formation are grouped according to the main factors of its occurrence, namely:

1. The availability of intangible assets of intellectual nature, which reveal the formation and prospects for the development of information and intellectual resources and intellectual potential.
2. The level of costs of innovation activity, which show a company's innovation susceptibility as a prerequisite for the development of intellectual potential.
3. The availability of intangible assets of a non-intellectual nature, which characterize

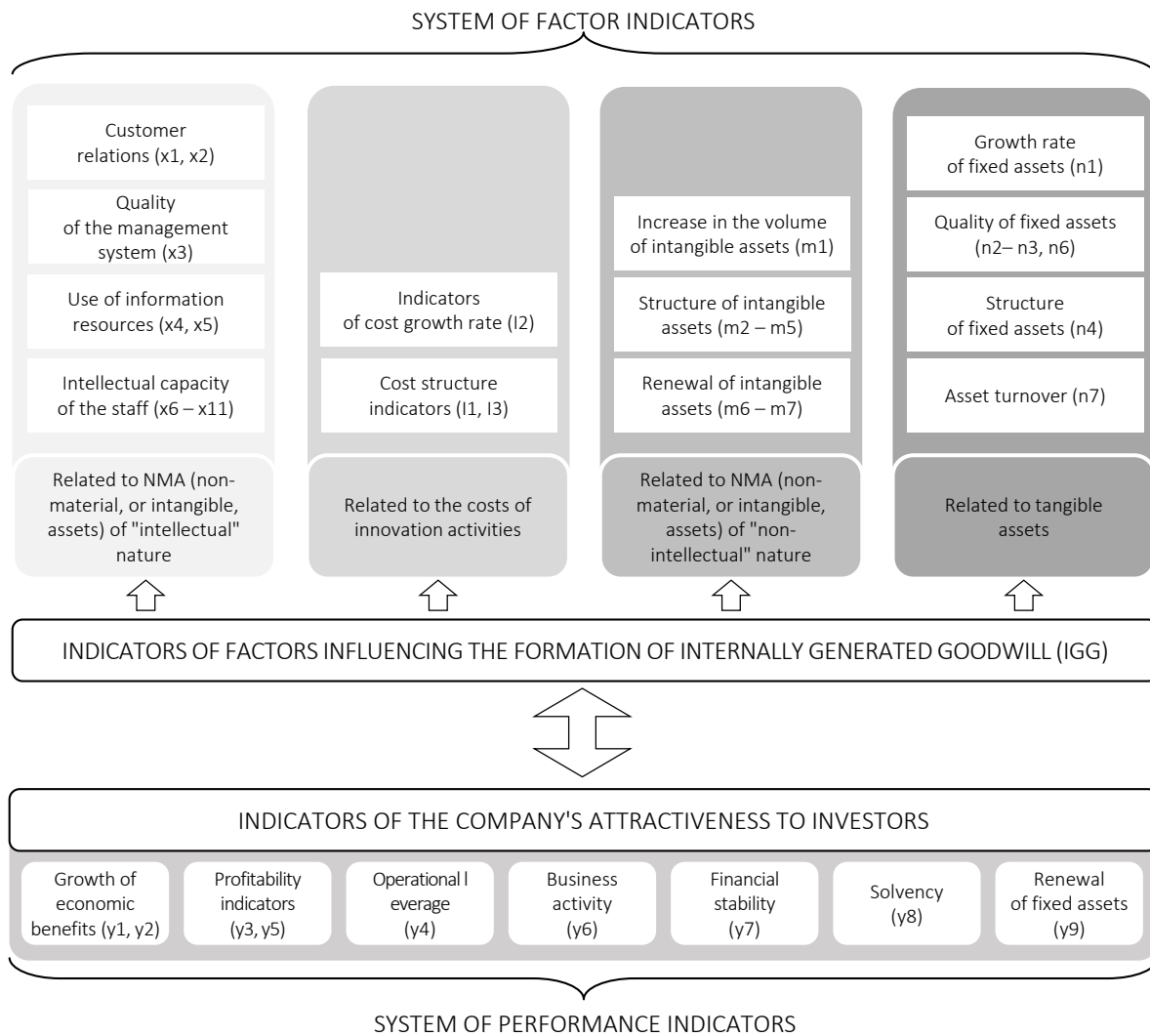


Figure 4. The system of indicators for the canonical analysis model to measure the impact of IGG on the investment attractiveness of an enterprise

the development potential of identified intangible assets (not obtained as a result of an intellectual process).

4. The use of a company’s tangible assets, which assess their ability to improve the company’s performance.

The structuring of indicators for canonical modelling of the relationship between goodwill formation and investment attractiveness of an enterprise is presented in Figure 4.

Table 1 presents detailed information on the description, substantiation and relevant intervals of indicators of the IGG and investment attractiveness formation factors.

Stage 2: Estimating the values of the system of calculated and qualitative indicators – the input data of the canonical modelling process using quantitative and expert methods

To achieve a high level of quality of future models and reliability of their results, the input data for the modelling procedure should be comparable. Therefore, modelling should include certain sectors of the economy, i.e., enterprises of the same industry with similar conditions and characteristics of their activities are to be analyzed. The purpose of the proposed modelling approach is to identify the key factors of goodwill formation (intangible assets of intellectual and non-intellectual nature, costs of innovation activity, tangible assets) and investment attractiveness of an enterprise to provide addition-

Table 1. Indicators for assessing the impact of factors of internally generated goodwill formation on the investment attractiveness of an enterprise

Indicator	Substantiation for including the indicator into the model	Scale
Indicators for assessing the attractiveness of an enterprise for investment (a set of performance indicators)		
Profit growth rate (y_2)	The increase in profit provides opportunities to direct resources to the development and growth of the company's value	$[0; \infty]$, in %
Return on assets (y_3)	The level of the enterprise efficiency reflects the profitability of the investments made	$[0; \infty]$, in %
Operating leverage (y_4)	Depicts the efficiency of the management system and the qualifications of managerial personnel compared with change in the cost structure and business conditions. The efficiency of the management system is one of the factors in making investment decisions	$[0; \infty]$
Return on investment (y_5)	Indicates the level of profitability of investments made	$[0; \infty]$, in %
Asset turnover ratio (y_6)	Higher use of own assets by the company indicates better organization of business processes and contributes to the growth of efficiency	$[0; \infty]$
Equity to debt ratio (y_7)	The growth of the indicator is the result of increased profits and accumulation of goodwill, which also reflects the efficiency of the company's management and influences decision-making on investments	$[0; \infty]$
Coverage ratio (y_8)	A higher level of the indicator indicates the accumulation of economic benefits as a result of business operations, financial stability of the company, which is an important factor in investor decision-making	$[0; \infty]$
Fixed assets renewal ratio (y_9)	Renewal of production assets contributes to improving the quality of products and production efficiency, and reflects the availability of opportunities for enterprise development and effective asset management	$[0; 1]$
Factors of IGG formation due to intangible assets of information and intellectual nature		
Availability and quality of customer base (x_1)	The indicator affects the growth of the company's revenue and profit, i.e. the generation of additional benefits for the company	$[0; 1]$
Availability and quality of own trademarks and brands (x_2)	Affects customer capital and creates additional income and value for the enterprise	$[0; 1]$
Quality of management (x_3)	Better organization of the administrative system and ensuring a high level of management qualification will contribute to a higher quality of management decisions	$[0; 1]$
Information diffusion time (x_4)	A lower level of diffusivity indicates a higher rate of loss of information as a productive resource and the ability to generate economic benefits; the quality of the information resource directly affects the development opportunities and efficiency of the enterprise	months
Level of alternative profit (x_5)	Describes the efficiency of investing in the enterprise's information resources; reflects both the quality of the formed information resource and its usefulness for investors	0-100%
Staff stability ratio (x_6)	Characterizes the experience of employees, which affects performance. Higher work experience helps to optimize work and achieve better performance results, which will help to attract additional investments	$[0; 1]$
Staff development ratio (x_7)	Describes a company's activities to improve its intellectual potential, resulting in the improved business process and additional opportunities for increasing efficiency	$[0; 1]$
Intellectual level of employees (x_8)	Indicates the level of an enterprise's intellectual potential and opportunities for innovation; reflects the possibility of additional economic benefits and advantages for investors	$[0; 1]$
Share of expenditures on advanced training (x_9)	Reflects the activity of an enterprise's intellectual potential formation; reflects the possibility of additional economic benefits and advantages for investors	$[0; 1]$
Ratio of rationalization activity (x_{10})	Characterizes the level of innovation and intellectual activity, potential opportunities to improve performance	$[0; \infty]$, in money units
Labor intensity of production (x_{11})	Production efficiency should be achieved by optimizing the production process, which involves reducing labor costs through the intellectual and innovative component of resources. Therefore, a decrease in the value of this indicator reflects an increase in efficiency and additional economic benefits	$[0; \infty]$, in money units
Factors of IGG formation due to the expense of innovation activity		
Share of expenditures on innovations (z_1)	Reflects the activity of innovation at the enterprise, which has a positive impact on the formation of information and intellectual resources and the generation of additional economic benefits. The higher the value of the indicator, the more innovative the enterprise is	$[0; 1]$
Growth rates of expenditures on innovations (z_2)	Evaluates the innovation activity at an enterprise. The higher the rate of development of innovation activity, the higher the volume and quality of the formed information and intellectual resource	$[0; \infty]$, in %
Growth rates of expenditures on organisational, process and marketing innovations (z_3)	A higher value of the indicator shows an increase in the activity of forming an information and intellectual resource, which contributes to obtaining economic benefits	$[0; 1]$

Table 1 (cont.). Indicators for assessing the impact of factors of internally generated goodwill formation on the investment attractiveness of an enterprise

Indicator	Substantiation for including the indicator into the model	Scale
Factors of IGG formation due to intangible assets of a non-intellectual nature		
Growth rate of intangible assets (m_1)	Higher growth dynamics indicates the intensive development of intangible assets, which generally contributes to the formation of goodwill and growth of the enterprise value	$[0; \infty]$, in %
Share of intangible assets (m_2)	Transformation of the asset structure and increase in the share of their intangible component indicates the effectiveness of management decisions, support for innovative development and formation of the potential for creating goodwill	$[0; 1]$
Share of rights to use resources and licenses (m_3)	Expands a company's business opportunities, helps to take certain competitive positions in the market, which contributes to additional advantages and gains for the business	$[0; 1]$
Share of patents (m_4)	Expands a company's business opportunities, which contributes to additional advantages and benefits for the business	$[0; 1]$
Share of software (m_5)	Software is an element of the organizational structure of a company's management, and therefore the growth of its value and share in the asset structure helps to support management decisions, improve operational efficiency and provide additional benefits	$[0; 1]$
Intangible assets renewal rate (m_6)	Renewal of intangible assets helps to improve their quality and create additional opportunities and benefits for business activities and the formation of goodwill	$[0; 1]$
Share of capital investments in intangible assets (m_7)	Investment in intangible assets contributes to the formation of non-material resources, which are the basis for increasing competitiveness and obtaining additional benefits	$[0; 1]$
Factors of IGG formation due to tangible assets		
Growth rate of fixed assets (n_1)	Expansion of fixed assets increases opportunities for growth of a company's operations and manufacturing of additional products	$[0; \infty]$, in %
Average age of equipment (n_2)	The lower the age of the equipment, the higher its quality characteristics, which contributes to the efficiency growth and goodwill formation	$[0; \infty]$, in years
Fixed assets eligibility ratio (n_3)	The higher the value of the indicator, the higher the efficiency of fixed assets use, which is reflected in the growth of production efficiency and better quality of products	$[0; 1]$
Depreciation rate of fixed assets (n_4)	A higher value of the indicator describes a decrease in the efficiency of fixed assets use, which will further decrease a product quality, positioning of the enterprise and profit	$[0; 1]$
Share of production fixed assets (n_5)	An indicator of the quality of the fixed assets structure; a higher value of the indicator provides additional opportunities to increase the volume of output and product range, which will result in additional benefits	$[0; 1]$

al opportunities for further development. Therefore, the object of analysis should represent the most profitable industries for investors, i.e. those that generate the highest volumes of added value. The ability of enterprises to innovate forms the framework for increasing production efficiency, which in turn is the basis for a faster return on investment.

Based on the presumptions for the modelling preparatory stage mentioned above, the authors studied enterprises of the machine-building industry of Ukraine. This industry was chosen due to its leading role in the Ukrainian economy and high level of innovation. Machine building is the most high-tech industry in Ukraine, generating high added value, which ensures higher levels of performance and investment attractiveness. Therefore, identifying the factors that will help manage the development of this industry is essential for the overall state of the economy and its recovery after the war. To conduct a canonical modelling of the relationship between the formation of internally generated goodwill and investment attractiveness, the data on the four-year activities of 11 Ukrainian machine-building enter-

prises were selected. These companies were selected to ensure a high level of comparability of indicators. In addition to operating in the same industry, the selected enterprises have the same organizational and legal forms of business (joint stock companies), similar scales of activity and number of employees. In addition, enterprises from different regions of Ukraine were estimated, which will make it possible to draw conclusions about the entire machine-building industry of Ukraine. Values and other data about the companies were taken from the annual financial statements, corporate reports and other published information on their official websites.

Stage 3. *Development of canonical models of the influence of factors of internally generated goodwill formation on the investment attractiveness of an enterprise. Analysis of the obtained results of canonical modelling and their description*

To reveal the relationship between factors of internally generated goodwill formation and investment attractiveness, the canonical models were

developed as correlation between canonical variables U and V . The general form of models is:

$$Y \leftrightarrow X = \begin{cases} U = a_1y_1 + a_2y_2 + \dots + a_qy_q \\ V = b_1x_1 + b_2x_2 + \dots + b_qx_q \end{cases}, \quad (1)$$

where a_i and b_j are coefficients of the linear distribution of canonical variables according to the corresponding indicators of the two systems; U is represented by indicators of an enterprise's attractiveness; it is common to all models; canonical variable V in each of the models is represented by groups of indicators of factors of internally generated goodwill: V_1 – factors of intellectual intangible assets (X); V_2 – factors of the costs of innovative activities that produce an informational and intellectual resource (I); V_3 – factors of non-intellectual intangible assets (M); V_4 – factors of material assets (N).

2. RESULTS AND DISCUSSION

As a result of canonical modeling, four paired models of the dependence of the system of evaluative indicators of enterprise performance (U) on each of the groups of factors of internal goodwill formation (V) were obtained.

1. Relationship between the indicators of investment attractiveness (Y) and the factors of formation of internally generated goodwill due to intellectual intangible assets (X) is represented by the following model:

$$Y \leftrightarrow X = \begin{cases} U_1 = -0.08x_1 - 0.8611x_2 + \\ +0.3523x_3 + 0.1287x_4 + 0.0x_5 + \\ +0.0089x_6 - 0.1541x_7 - 0.5985x_8 - \\ -0.2641x_9 + 0.2587x_{10} - 0.1839x_{11} \\ V_1 = -0.0748y_1 - 0.4453y_2 + \\ +3.411y_3 + 0.291y_4 - 3.508y_5 + \\ +0.429y_6 - 0.687y_7 + +0.086y_8 - \\ -0.1855y_9 \end{cases} \cdot (2)$$

2. Relationship between the indicators of investment attractiveness (Y) and the factors of formation of internally generated goodwill due innovation costs (I) is represented by the following model:

$$Y \leftrightarrow I = \begin{cases} U_1 = -0.0139y_1 - 0.266y_2 + \\ +3.3174y_3 + 0.258y_4 - 2.652y_5 - \\ -0.4569y_6 - 0.0318y_7 + \\ +0.242y_8 - 0.006y_9 \\ V_1 = 0.982i_1 + 0.1813i_2 - 0.112i_3 \end{cases} \cdot (3)$$

3. Relationship between investment attractiveness (Y) and the factors of the formation of internally generated goodwill due to non-intellectual intangible assets (M) is as follows:

$$Y \leftrightarrow M = \begin{cases} U_1 = -0.4609y_1 + 0.0122y_2 - \\ -0.737y_3 + 0.34y_4 + 1.19y_5 + \\ +0.508y_6 + 1.168y_7 - 1.1y_8 - \\ -0.521y_9 \\ V_1 = 0.457m_1 + 0.392m_2 + \\ +0.583m_3 - 0.411m_4 - 0.065m_5 - \\ -0.798m_6 - 0.195m_7 \end{cases} \cdot (4)$$

4. Relationship between investment attractiveness (Y) and the factors of the formation of internally generated goodwill due to tangible assets (N) is explained by the model:

$$Y \leftrightarrow N = \begin{cases} U_1 = -0.157y_1 + 0.051y_2 - \\ -0.361y_3 + 0.023y_4 + 0.398y_5 - \\ -0.903y_6 - 0.251y_7 + \\ +0.212y_8 + 0.072y_9 \\ V_1 = -0.045n_1 + 0.023n_2 + \\ +0.039n_3 + 0.381n_4 - \\ -0.792n_5 - 0.266n_6 \end{cases} \cdot (5)$$

The process of decision-making predisposes checking the quality of the results obtained to determine whether they can be used in the management process. In addition, a correct and detailed interpretation of the obtained models is necessary to identify key factors as an object of management influence.

The main indicators that should be analyzed after obtaining the canonical models are correlation coefficients, which measure the association between two sets of models. As a result of calculations us-

ing special software, high values of the canonical correlation coefficients of the factors' systems within each of the models were found:

- 5) the association between investment attractiveness and the formation of goodwill by intangible assets of an intellectual nature is 0.882;
- 6) the correlation ratio of investment attractiveness and goodwill formation by innovation costs is 0.7446;
- 7) the correlation ratio of investment attractiveness and goodwill formation by intangible non-intellectual assets is 0.7157;
- 8) the correlation ratio of investment attractiveness and goodwill formation by tangible assets is 0.974.

Thus, tangible assets and intellectual property rights are the most significant for machine-building enterprises in the process of forming their investment attractiveness and providing additional economic benefits. The obtained indicators of the high importance of tangible assets reflect the peculiarities of the researched enterprises and the significant dependence of economic results on the quality of material support of the production process.

Obtained results suggest that the investment attractiveness and goodwill formation are highly sensitive to the availability and use of all components of intangible assets. Similar results also were obtained by Vuković et al. (2022), Xu et al. (2021), Arianpoor (2021), and Seo (2020), who proved that intangible assets now play the main role in improving a company's performance and competitiveness and increasing its value.

Analysis of the influence of intangible assets on the formation of goodwill and investment attractiveness reveal that the most significant are intangible assets of an intellectual nature. This also was proposed by Dimitru (2022), Dogan and Kevser (2020) who emphasize that knowledge is now the most important element of intangible assets, leading to the increase in so-called intangible investments. The series of uncertainty risks should be taken into account, one

of them is that knowledge and skills are hardly controllable by the enterprise as they cannot be dissociated from human or material resources. Nevertheless, training and research costs have lasting effects and thus should obtain the status of invested costs, with the risk of non-recovery. The distinctive feature of intangible assets is their ability to form future economic benefits, which is difficult to calculate in the current financial period.

The established values of the canonical correlation indicators allow identifying the most significant factors influencing the value and positioning of an enterprise, which will further become the main objects of managerial influence to achieve strategic development goals.

Based on the analysis of the strength of the relationship between the indicators in each model, the most influential indicators were identified, on the basis of which complex latent factors were formed. Table 2 presents the results of the analysis.

The identification of complex latent factors that provide a mechanism for the interaction between factor systems is based on the analysis of the set of coefficient values in the equations that define a pair of new canonical variables.

The proposed approach is designed to improve the management of the investment attractiveness of an enterprise by directing resources to the formation of objects that are the main drivers of work efficiency and the enterprise value. It is usually believed that when considering investing in a particular industry or buying a business, profit is the only major decision criterion. Depending on the type of business, the relationship with the beneficiaries and the strategic objectives, either businesses with maximum sales in the short term or those that are not very profitable now but have high growth potential are prioritized. So, it is necessary to evaluate not only the financial reporting indicators, which are a static component of an enterprise's value. Also, the dynamic component of the cost, which reflects the effectiveness of the overall company's management system, should become as a subject of evaluation. According to the authors, goodwill is a reflec-

Table 2. The most influential indicators in the factor systems of the studied enterprises

Association between the systems	Selected indicators that form the main relationship	Complex latent factors
Indicators for assessing the investment attractiveness of an enterprise ↔ factors of influence by intellectual property rights	Return on investment (y_5), return on assets (y_3), equity/assets ratio (y_7), profit growth rate (y_2), asset turnover ratio (y_6).	Efficiency of managing the financial result of the enterprise Development of intellectual capital
Indicators for assessing the investment attractiveness of an enterprise ↔ factors of influence due to the cost of innovation	Availability and quality of own trademarks and brands (x_2), intellectual level of employees (x_8), quality of management (x_5).	Efficiency of production processes. Innovation activity
Indicators for assessing the investment attractiveness of an enterprise ↔ factors of influence due to identified intangible assets	Return on assets (y_3), return on investment (y_5), asset turnover ratio (y_6).	Equity capital provision of the enterprise and efficiency of its use Formation of the structure of the company's NMA; provision of the company with NMA and efficiency of their use
Indicators for assessing the investment attractiveness of an enterprise ↔ factors of influence due to tangible assets	Share of expenditures on innovation (z_1).	Efficiency of the production process organization Formation of the structure of tangible assets and their suitability for use

tion of the efficiency of using a company's assets. Therefore, first of all, it is necessary to evaluate it, and secondly, to determine the main ways of its formation for further management of this process.

To ensure the formation of investment attractiveness, managerial influence should be directed to the most influential groups of influence factors. To determine the specific objects of management influence, the key elements have been identified within the allocated groups of indicators.

The complexity of goodwill valuation also lies in the fact that this category of assets was formed ambiguously and approaches to its valuation were constantly changing. "Goodwill" in accounting terminology is the excess between the purchase price and the fair market value of the business, also called "a good reputation of a company". It directly affects the perceived value of the business. Well-known companies have almost tangible assets such as branding and customer loyalty, and therefore can sell their business for more than it is worth according to the financial statements, as these assets can increase its value in the eyes of investors. Goodwill generating assets do not have a physical form, so the goodwill is usually considered an intangible asset. But it is necessary to set apart goodwill and intangible assets and analyze them separately. This study considers that IGG reflects the efficiency of using a company's resource potential from tangible and intangible assets, while at the same time being part of the latest one.

The existence of the influence of goodwill on a company's value and financial performance indicates the need to find more effective internal sources and instruments of financing activities for enterprises. The Intangible Assets Financial Statement Impact Comparison Report by Ponemon Institute LLC proves that the intangible component of the market value of S&P 500 companies is 84%.

The high values of the canonical correlation between goodwill formation by all groups of intangible assets and the indicators of the impact on investment attractiveness confirm the importance of non-material assets in the process of ensuring the enterprise development. The prevailing close association between the group of intellectual non-material assets and the company's attractiveness proves the growing role of the information and intellectual resource for the formation of the enterprise value. These results confirm the significant role of intangible assets in ensuring the growth of business value. But the results of the study show that not only intangible assets can be a source for goodwill formation. Tangible assets are also a significant factor in goodwill, especially for industrial enterprises, like analyzed machine-building industry.

To manage the value and investment attractiveness of an enterprise, it is necessary to direct managerial influence on the most significant groups of IGG factors (for machine-building enterprises – on intangible assets of an intellectual nature and tangible assets). Within each group,

latent factors should be selected as an indicator of the general direction of management actions. Such latent factors can be chosen by management based on the most significant indicators within each model.

The proposed analysis should be tested at enterprises of other industries. The importance of IGG factors, the choice of latent factors will vary depending on the specifics of the enterprise's activity. For the post-war economy of Ukraine, the issues of strategic restructuring of heavy industry and power generation will become relevant, without excluding the further development of non-material production, especially the information technology industry, and the service sector. It is believed that the value of intangible assets is important precisely for the investment assessment of the latter, while for the machine-building complex, the quality of equipment and the streamlining of technological processes come

first. It is assumed that this assumption is not entirely correct in today's environment, when manufacturing companies must constantly research, improve and develop new technological processes. To remain competitive in domestic and foreign markets, it is necessary to constantly monitor the emergence of industry-specific innovations and anticipate future trends. Enterprises that do not do this, but only seek to maximize the profit from the current established technology, are destined to become outsiders in the future. Therefore, internally generated goodwill can be the indicator of the effectiveness of innovation management within the enterprise and the quality of its management system.

The value of goodwill can change due to circumstances; it can both increase in value and depreciate, so revaluation should be carried out annually, as well as during the initial acquisition of an enterprise

CONCLUSION

The purpose of the study was achieved by developing an approach to improving investment management, which reveals the relationship between internally generated goodwill of an enterprise, as a reflection of the efficiency of asset use, and its investment attractiveness. For enterprises and investors, information is needed not only about the availability of assets and the results of past periods, but also about the effectiveness of management decisions that is the dynamic component. The article proves that goodwill is an indicator of the effectiveness of the management system and its decisions regarding the use of the company's assets. Therefore, to make investment decisions, it is necessary to evaluate the indicators of financial reporting and IGG as a dynamic component of the enterprise's value, as well as their relationship. The applied method of canonical modelling makes it possible to determine the overall relationship between the factors of goodwill and investment attractiveness and to highlight key indicators within each of the systems.

The main result of the work is the proposed approach as a tool for choosing the objects of investment, as it takes into account the actual indicators of a company's activity, which are reflected in the financial statements, and the dynamic component of the company's value, which reflects the efficiency of the use of assets and invested capital of the owner (investor).

The results obtained in the work are of interest to management in order to improve market value and investment attractiveness of an enterprise based on revealing factors responsible for the formation of internally generated goodwill. Management of such factors will contribute to the growth of business value and additional reputation of an enterprise.

It was assumed that the significance of the factors of IGG formation and investment attractiveness of an enterprise depends on its industry and specifics of its activities, and therefore a similar analysis can be carried out for enterprises in other sectors of the national economy. First and foremost, the object of analysis should be industries that generate high added value and receive significant amounts of investment. Analyzing Ukraine's economy, the prospects for further similar research are related to the

construction industry and power plants, which is also one of the key sectors of the economy for post-war revival. For Slovakia, such industries can be automotive industry, electronics, mechanical and chemical engineering. The proposed approach can be applied by investors in any country and field of activity, and the obtained results will be used as a indicator for the most profitable directions of investment.

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