
INTELLECTUAL CAPITAL AND MARKET CAPITALIZATION OF PUBLIC COMPANIES

Ventsislav Dikov¹

¹ D. A. Tsenov Academy of Economics – Svishtov, Bulgaria

E-mail: ¹v.dikov@uni-svishtov.bg

Abstract: Value creation is the main goal of economic agents operating in capital markets. The subject of research are the intangible fixed assets reflecting the intellectual capital of companies. The object of the article are some current issues regarding the assessment of the influence of intellectual capital on the stock market capitalization of public companies listed on BSE - Sofia. The research hypothesis to be tested is formulated as follows: The dynamics of accounting profit can be explained by changes in intellectual capital records, as evidenced by scientific research having its evolutionary development in theory and practice. The aim is to critically review the literature on intellectual capital, value creation and company performance, identifying positive examples from BSE-Sofia of the impact of changes in intellectual capital on the market capitalization of public companies.

Keywords: intellectual capital, BSE-Sofia, market capitalization, intangible assets.

This article shall be **cited** as follows: **Dikov, V.** (2023). Intellectual Capital and Market Capitalization of Public Companies. *Economic Archive*, (4), pp. 46-65.

URL: nsarhiv.uni-svishtov.bg

DOI: <https://doi.org/10.58861/tae.ea-nsa.2023.4.04.en>

JEL: G32; J24.

* * *

Introduction

With the development of digital technologies in the modern dynamic economic environment, the structure of the company's assets is shifting more and more noticeably in the direction from tangible to intangible assets. The rapid development of Internet technologies and the digital market environment provide opportunities for companies to promote and sell

their products (including intellectual property products that are reported as intangible assets) to their potential users. The risks for misuse of such assets (especially copyrighted products) by third parties have brought to the fore certain problems associated with their valuation and financial reporting.

Value creation is perceived as an essential objective for economic agents operating in the capital markets, especially when viewed against the background of the recent financial, liquidity and economic crises that have significantly affected the financial performance of firms. Managers of publicly traded companies are under enormous pressure to improve their profitability and create added value. In turn, investors seek to achieve maximum return on the equity capital invested in these companies. In today's financial markets, the key to any company's success depends on its ability to maximize value for its equity owners (IMA, 1997).

Considering the above, the **subject** of the research presented in this article are the intangible non-current (fixed) assets of companies that represent their intellectual capital (IC). The **object** of research are some current issues regarding the assessment of the influence of intellectual capital on the stock market capitalization of public companies listed on BSE - Sofia.

The **research hypothesis** to be tested in this article is formulated as follows: *The dynamics of accounting profit (a company's net income) can be explained by changes in intellectual capital records, as evidenced by scientific research having its evolutionary development in theory and practice.*

The **aim** of the article is to critically review the literature on intellectual capital, value creation and company performance and to identify positive examples from BSE-Sofia on the impact of changes in intellectual capital on the market capitalization of public companies.

Terminologically, for the purposes of this research the concept of intellectual capital is defined as the general concept a company's intangible assets which are either self-constructed through research and development or acquired in the form of patents, brands, and related intellectual property rights.

With regard to the hypothesis stated above, the article has the following structure: The first paragraph discusses the evolution of economic concepts of capital. Paragraph two presents an analysis on the discursive aspects in scholarly definitions of the term "intellectual capital". Paragraph three discusses the paradigm of intellectual capital with a focus on its constituent elements. The fourth paragraph addresses certain theoretical models for evaluation of intellectual capital in terms of non-monetary and monetary models for its measurement. The fifth paragraph presents an approbation of the theoretical models with empirical data of the effect of intellectual capital on the stock market capitalization of leading companies included in the SOFIX and BGBX40 indexes.

1. Capital as an evolutionary category in economic science

The world has undergone various phases and transformations of economy models, which are well-known from the works of various classical economists. Originally, in an agricultural economy, the main drive behind a country's economy was land, which was described in detail by Adam Smith (1776) but industry (industrial production) and service sectors did not exist at that time. In 1817, David Ricardo emphasized that capital and labour were the main sources of economic growth. Karl Marx (1867) based his work on industrial capitalism, where natural resources such as labour, iron ore and coal were the main factors in an industrial economy, recognizing that industry was the most important sector of developed economies. In 1890, Alfred Marshall proved that knowledge is an essential factor for the development of industrial production (Marr, Schiuma, & and Neely, 2004a).

During the Industrial Revolution, Schumpeter (1939) was one of the economists who introduced an economic theory based on the entrepreneurship and innovation of the capitalist system (Attar, 2015), (Croitoru, 2017) and who believed that growth depended mainly on key factors such as technology, knowledge, human capital, and, in particular, innovation.

In the post-capitalist and post-industrial society, Drucker (1992) foresaw the emergence of a new economy and recognized that knowledge and information had transformed into valuable resources for the modern economy, while traditional factors of production such as capital, land, labour, plant and equipment have become secondary factors (Bontis N. , 1998), (Pulic, 2004a), (Cabrita & Bontis, 2008), (Tomé, 2011). There is a shift from an industrial economy of cost-based industrial production to knowledge-based and value-based production of goods and services.

Thus, in the first years of the 21st century, a transition was observed from the period of the industrial revolution and a developed industrial economy to a knowledge-based economy, which is defined as “*production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence. The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources*” (Powell & Snellman, 2004).

In today's business world, knowledge is seen as a major factor in creating and developing sustainable competitive advantage, and traditional sources of competitive advantage are becoming less effective as technology advances, as globalization and deregulation of economies change competitive and market structures. As a result, companies are forced to produce rare,

substitutable, or inimitable products and services relative to their competitors in order to maintain their competitive advantage.

Attempts to identify and classify the factors that contribute to a company's performance and their ability to generate capital have been made by a number of scientific researchers in various fields, such as industrial economics, strategic management, international business, sociology, economic policy, marketing, accounting and finance (Capon, 1990). An example of such attempts is Capon's meta-analysis of over 300 studies, which proves that the determinants of financial performance include elements of the environment, corporate strategy, and the specific characteristics of each company. (Capon, 1990). The classic paradigm of corporate finance states that the goal of any company is to generate maximum wealth for its shareholders. Its value can be estimated by analysing its financial statements. To measure shareholder wealth, financial analysts must predict a company's future financial performance by assessing its profitability, growth rate, and corporate strategy. (Varaiya, 1987); (Fairfield, 1994).

In theory, creating shareholder value means that the company's market value must exceed the book value of the equity that was originally invested in it by its shareholders (Liow, 2010). During the Industrial Revolution, the value created by and the profitability of companies were largely estimated based on measures of the volume of industrial output and the yield of agricultural produce and their contribution to economic growth.

With the development of technology and the transition to a knowledge-based economy, these more or less natural indicators have been supplemented by accounting measures and in the field of finance appeared a number of research publications that aim to determine whether accounting factors contribute to the profitability of companies in Australia's industry (McDonald, 1999), the services sector in Europe (Goddard, 2005) and in Portugal (Nunes, 2009); (Serrasqueiro, 2009), the processing industry in Japan (Nakano, 2011), etc.

Using a panel data regression approach, Goddard et al. (Goddard, 2005) examine whether traditional accounting factors such as leverage, liquidity, asset turnover, market share, size, etc. are determinants of profitability that contribute to the growth of firms and add value for their shareholders.

The ever-increasing interest in value creation has led to a growing pressure from shareholders for companies to pay dividends, as well as an increased desire of the managers of these companies to receive performance bonuses and rewards. (Baum, 2004); (Gharsellaoui, 2011). Further questions regarding the value added arise in the context of mergers and acquisitions (Rappaport, 1981); evaluation of corporate units (Arzac, 1986); corporate management (OECD, 2012); intellectual capital (Edvinsson, 1996), etc.

In today's era of globalization, value creation depends more on intangible rather than physical assets (Cabrita & Vaz, 2006) although in the financial statements of companies the latter are traditionally perceived as more important (Marr, 2008). In the new information and knowledge economy, investor wealth, organizational growth and success are increasingly driven by intellectual capital (Marr, 2008); (Zhang & al., 2018). In 1969, the term "intellectual capital" was first introduced by the economist John Galbraith, who described it as a combination of intangible assets that are put in use to create wealth.

This definition was further developed over the last two decades by Edvinsson and Sullivan (Edvinsson, 1996), Bontis (Bontis, 1998), (Bontis, Chua Chong Keow, & Richardson, Intellectual capital and business performance in Malaysian industries, 2000), Carson (Carson, 2004), Khan (Khan, 2011); Martín-de-Castro (Martín-de-Castro, 2011); Asadi (Asadi, 2013). According to Brooking (cited in (Marr, Schiuma, & Neely, 2004a), intellectual capital is a combination of assets related to markets, intellectual property, infrastructure and human resources.

Moreover, the rapid development of digital technologies, the Internet, service and innovation industries has led to the emergence of a new knowledge economy, giving rise to the concept of "intellectual capital", where value creation is linked to competitive advantage as an intangible asset (Bontis N. , 1998). However, there is currently no unanimously accepted definition of this concept (Asadi, 2013).

There are a number of studies that examine the relationship between intellectual capital variables, company performance and market value, and the purpose of these studies is to determine whether human capital, relational capital, process capital, and innovation capital enhance value creation, especially in China's high-tech industry (Zhang & al., 2018), the US electronic industry (Wang, 2008), Taiwan's semiconductor companies (Chang, 2011), Indonesia's pharmaceutical industry (Basuki, 2012), etc.

Further empirical studies highlight that the effect of the interaction between human capital and the other components of intellectual capital affect corporate performance and value creation. More importantly, some of these studies seek to explain the relationship between accounting and market values in the knowledge economy (Wang W. Y., 2005), (Cabrita & Bontis, 2008), (F-Jardón & Martos, 2009), (Kamukama, Ahiauzu, & Ntayi, Competitive advantage: mediator of intellectual capital and performance, 2011), (Ferraro & Veltri, 2011), (St-Pierre & Audet, 2011), (Scafarto, Ricci, & Scafarto, 2008).

Despite the growing popularity of intellectual capital in the knowledge economy and in the process of globalization, its empirical value and measures are yet to be recognized as value creation factors. The present study attempts

to address this gap in the literature by developing a framework for analysing the relationships between intellectual capital components on the one hand and corporate performance (including stock price behaviour) on the other.

Many publications do not explicitly prove the relationship between intellectual capital, capital structure and company performance. For example, Mouritsen and Roslender (Mouritsen & Roslender, 2009) call for additional research to investigate further the integration of intellectual capital and financial value. Moreover, Beattie and Thomson (Beattie & Thomson, 2010) point out that since the recent financial crisis, longitudinal studies have been undertaken to determine the extent to which intellectual capital and value creation affect market capitalization, i.e. the ratio of the market to book value of a company.

2. Evolution of scholarly definitions of intellectual capital

According to N. Bontis (Bontis N. , 2001), the term “intellectual capital” was introduced by John Galbraith in 1969. In 1997, Edvinsson and Malone published their book “Intellectual Capital: The Proven Way to Establish Your Company's Real Value by Measuring its Hidden Brainpower”, in which they define the term “intellectual capital” as “the possession of the knowledge, applied experience, organizational technology, customer relationships, and professional skills that give a company competitive edge in the market.” Lynn (Lynn, 1998) define IC as the combination of ideas and innovation capacity, both being factors that determine the future of the organization.

In his 1998 publication, Bontis (Bontis N. , Intellectual capital: an exploratory study that develops measures and models, 1998) defines IC as “the pursuit of effective use of knowledge as opposed to information”. T. Stewart’s definition is “the intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth” (Stewart, 1998). N. Brennan and B. Connell proposed the definition “the knowledge-based equity of a company”, which is rather ambiguous as equity is a balance sheet item that is quite easy to identify and measure quantitatively (Brennan & Connell, 2000). Harrison and Sullivan narrowed this definition by defining intellectual capital as “knowledge that can be converted into profit” (Harrison & Sullivan, 2000).

Other authors consider intellectual capital more generally as the difference between a company's market value and its book value, which difference is the knowledge-based resources contributing to the company's sustainable competitive advantage generated by its intellectual capital. Roos and Roos define it as “the ‘invisible’ assets such as employee knowledge, customer and

supplier relationships, brand loyalty, market position and knowledge of the market" (Roos, Roos, Dragonetti,, & Edvinsson, 1997).

Bontis (Bontis, Dragonetti, Jacobsen, & Roos, 1999) compiles the definitions of IC from (Bontis N. , Intellectual capital: an exploratory study that develops measures and models, 1998) and (Roos, Roos, Dragonetti,, & Edvinsson, 1997) into the definition the IC is the collection of interrelated intangible resources and their flows that create value from the operations of the company and are controlled by the company. Since the value generating processes and production resources are specific for each company, it follows that IC is context specific. These definitions, however, do not define the basic categories for identifying, classifying and measuring the IC components.

3. Intellectual capital elements

Bontis' (Bontis N. , 1998) definition of IC only partially overlaps with the definition of Lynn (Lynn, 1998) and defines the main components of IC as human, structural, and customer capital. In this respect, his classification covers and corresponds most closely to many of the existing classifications of IC components.

Human capital (HC) includes the individual tacit knowledge, skills, experience and attitudes of the members of the organization, which cannot be measured but which they need to perform their functions. Considering the fact that HC is related to individuals in the organization, it cannot be quantified and considered as a property of the company. However, hiring staff with the necessary knowledge and skills, as well as upgrading staff qualifications can be measured in terms of costs incurred by the company.

Structural capital (SC) includes mechanisms and structures that support the work of employees both at individual level (i.e. to achieve individual results from the individual employee's work) and at group level (i.e. to increase the efficiency of the organization as a whole). These are organizational procedures that transform individual human assets into group assets. In the Skandia scheme, structural capital is further subdivided into two components:

First. *Process capital*, which includes systems, tools, techniques and processes that belong to the company. In order to achieve an efficient process, companies must maintain a flexible operational process as it is considered a key factor for evaluation from the point of view of investors Ferraro (Ferraro & Veltri, 2011). Cheng et al. (Cheng, 2008) emphasize that process capital represents certain business activities oriented towards investment in research

and development, economy and productivity of administrative processes and lead times.

Second. *Innovation capital*, which includes a company's ability to market, create and design innovative products and services through its R&D activities.

Customer capital (CC), in turn, is the knowledge of marketing channels and relationships with customers and suppliers. According to Bontis (Bontis N. , *Intellectual capital: an exploratory study that develops measures and models*, 1998), knowledge of marketing channels and customer relationships plays a primary role, but should be complemented by relationships with suppliers and competitors, which also fall into this category.

CC is not included in the model proposed by Lynn (Lynn, 1998). in which the last component of IC is intellectual property (IP), which is the most tangible and the most widely accepted element of IC by management and shareholders since the methods for its measurement are provided for by the accounting standards. Lynn (Lynn, 1998) defines IP as property rights that can be sold. A. Brooking (Brooking, 1996) defines IP as "legal mechanisms for protection of corporate assets and infrastructure assets". Bontis, on the other hand, explicitly excludes IP from the scope of the IC definition. Actually, in the literature on this topic the relationship between IC and IP or, alternatively, the role that IP plays in determining IC, remains "problematic". At one end of the spectrum are scholars who do not include IP in the definition of IC. They do this based on the argument that intellectual property includes many more "tangible" assets, such as patents, copyrights, trademarks, etc. As such, they adhere to the definition of IC as part of a company's intangible assets. Supporters of this "school" are Bontis (Bontis & al, *The Knowledge Toolbox: A Review of the Tools Available to Measure and Manage Intangible Resources*, 1999), (Bontis N. , *Assessing knowledge assets: a review of the models used to measure intellectual capital*, 2001), Roos (Roos, Bainbridge, & Jacobsen, 2001) and Nerdrum & Erikson (Nerdrum & Erikson, 2001).

On the other hand, a number of more "integrative" scholars who focus on performance measurement, performance management, and performance reporting argue that it is ineffective to exclude IP metrics and IP performance from the discussion of how a company must manage its IP assets. Supporters of this point of view are Brennan and Connell (Brennan & Connell, 2000), Quinn (Quinn, Bright, & Strum, 1996), Smith and Hanson (2002), and Lev (2001). From a managerial perspective, an "academic" or even a "semantic" discussion does not contribute to the debate about how a company can improve its performance. Therefore, if IP and IP management affect a company's profitability, it should be considered in the context of IC.

In this study, IP is considered a separate element in models originally developed by scholars that clearly distinguish IP from IC with the aim to examine the effect of introducing IP as a link between IC components and the overall performance (profitability) of firms. Thus, the study aims to improve our understanding of the importance of IP and its management in relation to company performance.

4. A critical review of intellectual capital evaluation models

IC is both difficult and expensive to measure due to the costs of collecting, processing and disseminating information (Revsine, Collins, & Johnson, 1999). There are many models for estimating IC, including methods based on market capitalization (e.g. Tobin's Q), return on assets (e.g. economic value added or EVA), direct methods (e.g. technology broker method), and scorecard methods (e.g. Intangible Asset Monitor), but few of these methods provide an opportunity to empirically link the value of IC to company performance. This question was discussed by N. Bontis in a paper published in 2001 (Bontis N. , 2001).

4.1. Non-monetary models for measuring intellectual capital

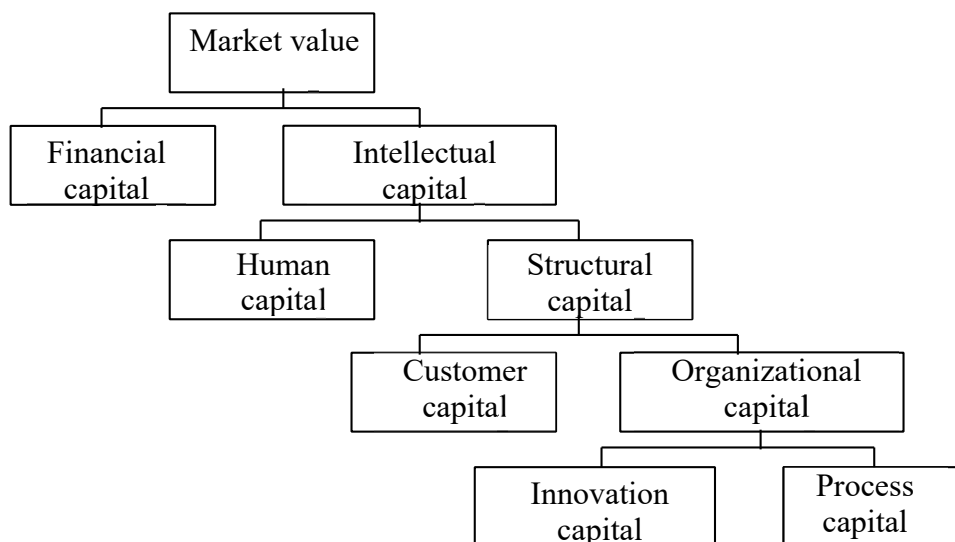
Until the beginning of the 1980s, this field was dominated by neo-classical concepts which considered competition between firms in an environment where resources were distributed evenly among individual sectors, firms had easy and free access to them, and the firm's internal resources played a minor role (Roos, Roos, Dragonetti., & Edvinsson, 1997). In the 1980s, these concepts were opposed by the so-called resource-based approach, in which managers no longer rely on competitive advantages based on different product-market combinations and are increasingly convinced that in order to create and sustain competitive advantage they must rely on a combination of different organizational (and possibly unique) resources. They realize the need to optimize the use of the available material resources and intangible assets that are unique for each company in order to gain a strategic advantage. Thus, provided that material resources (raw materials, materials, standard equipment) are generally available, they are compelled to turn to their companies' internal knowledge-based resources (technology, customer and supplier databases, loyalty programs, etc.) and staff skills.

Managers also realize that, in addition to these information-based resources, there is another intangible resource which is the internal organization of the firm itself. As a result, there is a transformation from vertical

organizational structures to global matrix structures and significant investments are made in structural capital to enable companies to optimize their resources, consolidate certain business processes to supply large customers worldwide and to exchange knowledge and best practices.

As a result of these changes, in 1995 the general term "intangible assets" was replaced by the concept of "intellectual capital" in Skandia's first annual report entitled "Developing intellectual capital at Skandia" (Edvinsson L. , 1997). Skandia's example was followed by other companies that realized the importance of developing leadership and human capital as prerequisites for increasing the potential of organizational culture and as factors for achieving a sustainable competitive advantage.

Skandia introduced the measurement of knowledge assets by means of an internal intellectual capital report. It was the first company to consider intellectual capital instruments and to include in 1991 an additional disclosure of intellectual capital in the annual reports presented to its investors. Skandia's Vice President and Director Leif Edvinsson took the initiative to develop a new model for accounting for intellectual capital called "Navigator", whose structure includes human, process and customer capital. This new accounting taxonomy attempts to analyse the market value of a company based not only on financial-accounting indicators, but also on non-financial (hidden) factors such as human and structural capital (Edvinsson L. , 1997), (Bontis N. , 2001).



Source: Skandia, 1995.

Figure 1. *Skandia Value Scheme*

In 1997, Edvinsson developed further the Navigator model into a valuation model called the Skandia Value Scheme (see Fig. 1). In this model, market value is determined by both financial and accounting measures (financial capital) and elements of intellectual capital. A significant drawback of this model is that it cannot achieve measurement precision because some components of intellectual capital cannot be easily measured and disclosed in the annual financial statements.

4.2. Monetary models for measuring intellectual capital and value added coefficients

There are a number of concepts for measuring intellectual capital based on market capitalization (e.g. Tobin's Q) and return on assets (e.g. economic value added (EVA) or market value added (MVA)), but according to Pulic (Pulic, 2004a) EVA measurement focuses mainly on capital employed.

In 1998, Ante Pulic introduced a methodology for quantitative measurement of intellectual capital by means of a Coefficient of Added Value of Intellectual Capital (VAICTM). (VAICTM)). He agrees with other experts in the field that traditional financial metrics are insufficient to accurately measure the value of firms in the modern economy, in which material resources matter less and less to business processes. (Pulic, 2004a). Knowledge, skills, decisions and company values are important factors to consider when determining the value of companies. As intangible resources become key drivers of value creation to achieve competitive advantage, the vital question arises of how to account for the intangible asset as a key element of value creation.

In essence, Pulic (Pulic, 2004a) proposed a new index for assessing business success in the process of value creation with the contribution of all participants: management, employees, shareholders, investors and business partners.

The VAICTM coefficient is calculated based on empirical data published in the annual financial statements of the companies and using the components of intellectual capital as independent variables to measure and analyse the contribution of intellectual capital to the book value of the company.

Value added shows the degree to which a company is successful and creates value, including wages and interest, dividends, taxes and investment for future development (Pulic, 2004a). Furthermore, in the VAIC model concept, intellectual capital includes human capital (Zahariev A. , 2012) and structural capital, with all personnel costs assumed as human capital, i.e. wage costs are seen as an investment rather than production costs (Pulic, 2004a).

The next step is to determine the human capital efficiency coefficient (i.e. the added value of human capital). The second component of intellectual capital – structural capital – is calculated as the difference between a company's added value and its human capital.

Structural capital (the difference between VA and HC) is a dependent variable, which means that for higher values of HC in value added (VA) created, the value of SC will be lower. The value of SC can be zero or even negative when the value of VA is less than the amount invested in HC. The total efficiency of intellectual capital increases when both HC and SC increase accordingly.

Moreover, Pulić (Pulic 2004a) takes into account the role of financial and physical capital for the effective creation of added value. Therefore, the VAIC model measures the efficiency of intellectual capital and determines the overall efficiency of the company. According to Pulić (Pulic, 2004a), the knowledge economy has evolved to the perception of value creation at both national and organizational levels. Added value replaces financial capital; VAIC and ICE are the new indicators of a company's success, now considered even more important than traditional metrics like return on equity (ROE) and return on investment (ROI). In addition, VAIC and ICE can indicate whether value is being added to or subtracted from the company.

In 1995, James A. Ohlson developed a model for measuring the market value of companies in relation to three accounting concepts: earnings, book value and dividends (Ohlson, 1995). Six years later, he (Ohlson, Earnings, Book Values, and Dividends in Equity Valuation An Empirical Perspective, 2001) Ohlson (2001) revised this model and transformed it into Residual Income Valuation (RIV) model.

The model is based on several assumptions, viz.: (i) accounting is not biased; (ii) it assumes risk neutrality, i.e. present value of expected dividend depends on risk-free rate as a factor of discount; (iii) companies always have clean surplus; (iv) stockholders are indifferent regarding tax rates; (v) real options are not taken into consideration; (vi) there is no asymmetry of information; and (vii) the „v“ variable and abnormal earnings are derived in an autoregressive process (Ohlson, Earnings, Book Values and Dividends in Equity Valuation, 1995); (Hand, 2001); (Ferraro & Veltri, 2011). A disadvantage of the model is that in the absence of market information (e.g. price per share) the valuation is made only on the basis of accounting information (Özer, 2016). The model establishes the difference between book value and market value as a residual variable "v", which is considered an element of the missing intangible asset, the so-called "intellectual capital" (Swartz, Swartz, & Firer, 2006), (Veltri & Silvestri, 2011), through which the

real value of a company is determined, including its human resources, knowledge, processes, skills and innovation capabilities (Wang J.-C. , 2008).

5. Intellectual capital and the balance positions of public companies listed on BSE – Sofia

The study of the companies traded on BSE - Sofia requires consideration of the public nature of their reports and the possibilities to use certain indicators (Simeonov, 2016) for assessing their market performance in relation to market trends, changes in fundamental factors, investments (Prodanov, Investitsii i investitsionni resheniya: mothodika-prilozhni aspekti, 2020) in intellectual capital or capital budget solutions (Prodanov, 2012).

According to the statistics published by BSE-Sofia, for a period of one year, the SOFIX index increased by 25.47%, reaching its highest level of 759.25 points, while the recorded lowest level was 595.64 points. The market capitalization of the public companies included in the SOFIX stock index for the period 12 Dec. 2022 – 11 Dec. 2023 reached BGN 4.7 billion as of the last date of the researched period. The leading company included in the index in terms of market capitalization is Sopharma AD, the volume of intangible assets and Goodwill of which in its statement of financial position reached BGN 48,883 million as of 09/30/2023 or 3.4% of its total assets. Compared to 31 Dec. 2022, this is a decrease of the intellectual capital positions of the company by BGN 2.8 million and a decrease in its relative share by 0.72%.

The main profitability coefficients (Zahariev A. , 2022) ov Sopharma AD are as follows: ROA=0.07 and ROE=0.09. These values reflect the active dividend policy of the issuer (Zahariev & al., 2015). The asset turnover ratio of 0.39 and the total liquidity ratio of 1.42 (Zahariev, Angelov, Ganchev, & Kostov, 2022), indicate that the company is sustainable and has sufficient solvency to cover its operating costs.

Over the last year, the market capitalization of the 40 companies included in the broader index of BSE-Sofia broad index (Zaharieva, Tarakchiyan, & Zahariev, 2022) is more conservative compared to that of the SOFIX companies, showing a positive trend of about +12.59%, which is still two time lower compared to SOFIX. The highest value of the BGBX index for the period was 159.17 points, and the lowest, respectively, 127.76 points. Of the companies included in the index with the largest positive change in market capitalization Shelly Group AD (+115.77%) is followed by Sopharma AD (+71.10%), TB PIB AD (+52.94%), etc. Leader in terms of financial performance ratios is Shelly Group AD with ROA=0.14 and ROE=0.16, respectively. Its asset turnover is at the level of 0.24 and the total liquidity ratio

is at the very high level of 7.28, which corresponds to a very low level of debt ratio of 0.08 (Zahariev A. , Debt Management, 2012). Shelly Group AD reports a corresponding increase in its balance sheet positions of asset as well as its balance sheet positions of intangible long-term (non-current) assets and goodwill. The data from the reports disclosed with BSE-Sofia indicate that for a period of four quarterly reports (from 01 Oct. 2022 to 30 Sept. 2023) the company increased its assets by 27%, which corresponds to an increase of its intellectual capital positions (Intangible assets and Goodwill) of the impressive 130%. The overall increase in the share of intellectual capital for the same period is from 4.9% to 8.9%, which clearly demonstrates the positive impact of the increase in intellectual capital on the stock market capitalization of the public company and the ahead pace compared to Sopharma AD.

Conclusion

The research presented in this article leads to the following main findings and conclusions:

First. The mainstream research publications define intellectual capital as the collection of interrelated intangible resources and their flows that create value from the operations of the company and are controlled by the company. Since the value generating processes and production resources are specific for each company, IC is context specific.

Second. The main elements of intellectual capital are human, structural and customer capital. In the present study, intellectual property is a separate element in models originally developed by scholars who clearly distinguish this property from intellectual capital. They examine the effect of including intellectual property as a linking element between the components of intellectual capital and the overall performance (profitability) of firms.

Third. The assessment of the dynamics of the stock prices of BSE-Sofia for the period 12 Dec. 2022 – 11 Dec. 2023 is positive, with the SOFIX index reporting over 25% growth, and the broad BGBX40 index reporting a positive change of 12.6%. The leading company in terms of growth in market capitalization from the broad index BGBX40, Shelly Group AD, reports a corresponding increase in its balance sheet assets, as well as in the balance sheet positions for intangible long-term (non-current) assets and goodwill with an outpacing growth rate for intellectual capital.

References

- Arzac, E. R. (1986). Do your business units create shareholder value? *Harvard Business Review*, 121-126.
- Asadi, L. (2013). *The Effect of Intellectual Capital on Market Value and Financial Performance of Companies Listed at Tehran Stock Exchange*. Извлечено от Science Road Publishing Corporation: <http://www.sciroad.com/TASE/TASE1371/TASE-13008.pdf>
- Attar, M. (2015). Entrepreneurship, Knowledge, and the Industrial Revolution. *Economics*, 1-54.
- Basuki, a. K. (2012). Intellectual Capital, Financial Profitability and Productivity: An Exploratory Study of the Indonesian Pharmaceutical Industry. *Asian Journal of Business and Accounting*, стр. 41-68. Извлечено от [http://ajba.um.edu.my/filebank/published_article/4154/AJBA%20\(2\)%20Basuki](http://ajba.um.edu.my/filebank/published_article/4154/AJBA%20(2)%20Basuki)
- Baum, C. L. (2004). EVA, MVA and CEO Compensation: Further Evidence. *American Business Review*, 82-87.
- Beattie, V., & Thomson, S. J. (2010). *Intellectual Capital Reporting: Academic Utopia or Corporate Reality in a Brave New World?* Great Britain: The Institute of Chartered Accountants of Scotland. [online], icas.org.uk/res/thomson_beattie_report_may_2010.pdf.
- Bontis, N. (1998). Intellectual capital: an exploratory study that develops measures and models. *Management Decision*, 63-76.
- Bontis, N. (2001). Assessing knowledge assets: a review of the models used to measure intellectual capital. *International Journal of Management Reviews*, 41-60.
- Bontis, N., & al, e. (1999). The Knowledge Toolbox: A Review of the Tools Available to Measure and Manage Intangible Resources. *European Management Journal*, 391-403.
- Bontis, N., Chua Chong Keow, N., & Richardson, S. (2000). Intellectual capital and business performance in Malaysian industries. *Journal of Intellectual Capital*, 85-100.
- Bontis, N., Dragonetti, N. C., Jacobsen, K., & Roos, G. (1999). The knowledge toolbox:: A review of the tools available to measure and manage intangible resources. *European Management Journal*, 391-402.
- Brennan, N., & Connell, B. (2000). Intellectual capital: current issues and policy implications. *Journal of Intellectual Capital*, 206-240.
- Brooking, A. (1996). *Intellectual capital*. London: International Thomson Business Press.

- Cabrita, M. D., & Bontis, N. (2008). Intellectual capital and business performance in the Portuguese banking industry. *International Journal of Technology Management*, crp. 212-237.
- Cabrita, M., & Vaz, J. (2006). Intellectual Capital and Value Creation: Evidence from the Portuguese Banking Industry. *The Electronic Journal of Knowledge Management*; www.ejkm.com.
- Capon, N. F. (1990). Determinants of financial performance: a meta-analysis. *Management Science*, 1990 – JSTOR. [online], <http://xa.yimg.com/kq/groups/26137950/273092269/name/2632657.pdf>
- Carson, E. e. (2004). Intellectual capital: Mapping employee and work group attributes. *Journal of Intellectual Capital*, 3-12.
- Chang, W. S. (2011). Intellectual Capital and Value Creation-Is Innovation Capital a Missing Link? *International Journal of Business & Management*, crp. 3-12.
- Cheng, M.-Y. e. (2008). Censoring model for evaluating intellectual capital value drivers. *Journal of Intellectual Capital*, 639-654.
- Croitoru, A. (2017). Schumpeter, Joseph Alois, 1939, Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process. *Journal of Comparative Research in Anthropology and Sociology*, 67-80.
- Edvinsson, L. (1997). Developing intellectual capital at Skandia. *Long Range*, 366-373.
- Edvinsson, L. a. (1996). Developing a model for managing intellectual capital. *European Management Journal*, 356-364.
- Fairfield, P. M. (1994). P/E, P/B and the Present Value of Future Dividends. *Financial Analysts Journal*(50).
- Ferraro, O., & Veltri, S. (2011). The value relevance of Intellectual Capital on firm's market value: an empirical survey on the Italian listed firms. *International Journal of Knowledge-Based Development*, crp. 66-84.
- Ferraro, O., & Veltri, S. (2011). The value relevance of Intellectual Capital on firm's market value: an empirical survey on the Italian listed firms. *International Journal of Knowledge-Based Development*, 66-84.
- F-Jardón, C. M., & Martos, M. S. (2009). Intellectual capital and performance in wood industries of Argentina. *Journal of Intellectual Capital*, crp. 600-616.
- Gharsellaoui, M. (2011). Measuring the Value of Creativity: Theories and Empirical Validation of Tests: The Case of Tunisian Companies Listed in Stock Exchange. *Interdisciplinary Journal of Contemporary Research in Business*, 929-937.
- Goddard, J. T. (2005). Determinants of profitability in European manufacturing and services: evidence from a dynamic panel model. *Applied Financial Economics*, 1269-1282.

- Hand, J. R. (2001). Discussion of "Earnings, Book Values, and Dividends in Equity Valuation: An Empirical Perspective". *Contemporary Accounting Research*, 121-130.
- Harrison, S., & Sullivan, P. (2000). Profiting from Intellectual Capital. Learning from Leading Companies. *Journal of Intellectual Capital*, 36-44.
- IMA, I. (1997). Measuring and Managing Shareholder Value Creation. [online], <http://www.imanet.org/PDFs/Public/Research/SMA/Measuring%20and%20Managing%20Shareholder.pdf>. *Institute of Management Accountants*.
- Kamukama, N., Ahiauzu, A., & Ntayi, J. M. (2011). Competitive advantage: mediator of intellectual capital and performance. *Journal of Intellectual Capital*, ctp. 52-164.
- Khan, S. (2011). The Interactive Effects of Intellectual Capital Components on the Relevance of the Balance Sheet as an Indicator of Corporate Value. *Journal of American Academy of Business, Cambridge*, 130-136.
- Liow, K. H. (2010). Firm value, growth, profitability and capital structure of listed real estate companies: an international perspective. *Journal of Property Research*(27), 119-146.
- Lynn, B. E. (1998). Performance evaluation in the new economy: bringing the measurement and evaluation of intellectual capital into the management planning and control system. *Journal of Technology Management*, 162-176.
- Marr, B. (2008). Impacting Future Value: How To Manage your Intellectual Capital. . *Journal of Accountancy [online]*, <http://media.journalofaccountancy.com/JOA/Issues/2008/09/MAG%20IntCapital-Eng.pdf>.
- Marr, B., Schiuma, G., & Neely, A. (2004a). The dynamics of value creation: mapping your intellectual performance drivers. *Journal of Intellectual Capital*, ctp. 312-325.
- Martín-de-Castro, G. e. (2011). Towards 'an intellectual capital-based view of the firm': origins and nature. *Journal of Business Ethics*, 649-662.
- McDonald, J. T. (1999). The determinants of firm profitability in Australian manufacturing. *Economic Record*, 115-126.
- Mouritsen, J., & Roslender, R. (2009). Editorial: critical intellectual capital. *Critical perspectives on accounting*, ctp. 801-803.
- Nakano, A. a. (2011). Dynamics of Growth and Profitability: The Case of Japanese Manufacturing Firms. *Global Economic Review*, 67-81.
- Nerdrum, L., & Erikson, T. (2001). Intellectual capital: a human capital perspective. *Journal of Intellectual Capital*, 127-135.

- Nunes, P. J. (2009). Profitability in Portuguese service industries: a panel data approach. *Service Industries Journal*, 693-707.
- OECD. (2012). *Intangible Assets, Resource Allocation and Growth: A Framework for Analysis*. Извлечено от <http://www.oecdilibrary.org/docserver/download/5k92s63w14wb.pdf?expires=1394580694&id=id&acname=guest&checksum=98B0DE65C7B6F9CED833A432CD8F0431>
- Ohlson, J. A. (1995). Earnings, Book Values and Dividends in Equity Valuation. *Contemporary Accounting Research*, 661-687.
- Ohlson, J. A. (2001). Earnings, Book Values, and Dividends in Equity Valuation An Empirical Perspective. *Contemporary Accounting Research*, 107-120.
- Özer, G. a. (2016). The Role of Human Capital in Firm Valuation: An Application on BIST. *Procedia - Social and Behavioral Sciences*, (стр. 168-177).
- Powell, W. W., & Snellman, K. (2004). The Knowledge Economy. *Annual Review of Sociology*, 199-220.
- Prodanov, S. (2012). *Capital Budgeting*. V. Tarnovo: ABAGAR.
- Prodanov, S. (2020). Investitsii i investitsionni resheniya: mothodika-prilozhni aspekti. *Stopanski svyat*, 142.
- Pulic, A. (2004a). Intellectual capital – does it create or destroy value? *Measuring Business Excellence*, 62-68.
- Quinn, R., Bright, D., & Strum, R. (1996). *Becoming a Master Manager: A Competing Values Approach*. Wiley.
- Rappaport, A. (1981). Selecting strategies that create shareholder value. *Harvard Business Review*, 139-149.
- Revsine, L., Collins, D. W., & Johnson, W. B. (1999). *Financial reporting and analysis*. New Jersey: Prentice Hall.
- Roos, G., Bainbridge, A., & Jacobsen, K. (2001). Intellectual capital analysis as a strategic tool. *Strategy & Leadership*, 21-26.
- Roos, J., Roos, G., D. N., & Edvinsson, L. (1997). Intellectual Capital: Navigating in the New Business Landscape. *Long Range Planning*, 413-426.
- Scafarto, V., Ricci, F., & Scafarto, F. (2008). Intellectual capital and firm performance in the global agribusiness industry: The moderating role of human capital. *Measuring Business Excellence*, стр. 3-9.
- Serrasqueiro, Z. (2009). Growth and Profitability in Portuguese Companies: A Dynamic Panel Data Approach. *Economic Interferences*, 565-573.
- Simeonov, S. (2016). *Izmeriteli na borsovata aktivnost – izsledvane na indikatorite i analiz na pazarniya trend* (Том 131). (" свят", Ред.) Svishtov: Tsenov PH. Извлечено от <https://ssvjat.uni-svishtov.bg/issue.asp?issue=232>

- Stewart, T. A. (1998). *Intellectual Capital: The new wealth of organization*. Random House.
- St-Pierre, J., & Audet, J. (2011). Intangible assets and performance: Analysis on manufacturing SMEs. *Journal of Intellectual Capital*, стр. 202-223.
- Swartz, G. E., Swartz, N.-P., & Firer, S. (2006). An empirical examination of the value relevance of intellectual capital using the Ohlson (1995) valuation model. *Meditari Accountancy Research*, 67-81.
- Tomé, E. (2011). Human resource development in the knowledge based and services driven economy: An introduction. *Journal of European Industrial Training*, 524-539.
- Varaiya, N. K. (1987). The Relationship between Growth, Profitability, and Firm Value. *Strategic Management Journal*, 8, 487-497.
- Veltri, S., & Silvestri, A. (2011). Direct and indirect effects of human capital on firm value: evidence from Italian companies. *Journal of Human Resource Costing & Accounting*, 232-254.
- Wang, J.-C. (2008). Investigating market value and intellectual capital for S&P 500. *Journal of Intellectual Capital*, стр. 546-563.
- Wang, W. Y. (2005). Intellectual capital and performance in causal models- evidence from the information technology industry in Taiwan. *Journal of Intellectual Capital*, стр. 222-236.
- Zahariev, A. (2012). *Debt Management*. V. Tarnovo: ABAGAR. doi:10.13140/RG.2.1.4872.3607
- Zahariev, A. (2012). *Financial Management of Human Resources*. V. Tarnovo: ABAGAR. doi:10.13140/RG.2.1.3561.6402
- Zahariev, A. (2022). *Financial Analysis*. Svishtov: AI "Tsenov". Извлечено от <https://www.researchgate.net/publication/365793801>
- Zahariev, A., Zveryakov, M., Prodanov, S., Zaharieva, G., Angelov, P., Zarkova, S., & Petrova, M. (2020a). Debt management evaluation through support vector machines: on the example of Italy and Greece. *Entrepreneurship and sustainability issues*(7(3)), 2382-2393. doi:10.9770/jesi.2020.7.3(61)
- Zahariev, A., & al., e. (2015). *Upravljenje na kapitalite (teoriya i praktika)*. V. Tarnovo: FABER.
- Zahariev, A., Angelov, A., Ganchev, A., & Kostov, D. (2022). *Finansov Analiz*. Svishtov: Tsenov PH.
- Zaharieva, G., Tarakchiyan, O., & Zahariev, A. (2022). Market capitalization factors of the Bulgarian pharmaceutical sector in pandemic environment. *Business Management*, XXXII(4), 35-51. Retrieved from <https://bm.uni-svishtov.bg/title.asp?title=2784>
- Zhang, M., & al., e. (2018). How does intellectual capital affect product innovation performance? Evidence from China and India. *International Journal of Operations & Production Management*, 895-914.

Zahariev, A.; Angelov, A.; Ganchev, G.; Bratanov, P.; Iliev, N.; Todorov, J.;
Petkov, K. (2016). *Finansov analiz*. V. Tarnovo: FABER.

Ventsislav Dikov is a Senior Lecturer at the department of Foreign Language Teaching of D. A. Tsenov Academy of Economics and a doctoral student at the department of Finance and Credit conducting a PhD research on the topic of “Intangible non-current assets in the balance sheet positions of Bulgarian public companies. **Scientific interests:** intellectual capital, financial valuation, business communications, English language teaching.

ORCID ID: 0000-0002-7110-104X.

ISSN 0323-9004

Economic Archive

Svishtov, Year LXXVI, Issue 4 - 2023

On Social Reality, Theory and Economics Education

**Discriminative Ability in Estimating Probability
of Default with Certain Machine Learning Algorithms**

**Possibilities for Overcoming Issues in the Phase
of Old-Age Pension Payments from an Universal
Pension Fund**

**Intellectual Capital and Market Capitalization
of Public Companies**

**Finance and Economic Accounting – Faculties,
Scientific Research and a 70-Year Tradition**

D. A. TSENOV ACADEMY OF ECONOMICS
SVISHTOV



Народно-стопански архив

година LXXVI, книга 4 - 2023

Year LXXVI, Issue 4 - 2023

Economic Archive

EDITORIAL BOARD:

Prof. Andrey Zahariev, PhD – Editor-in-chief
Prof. Yordan Vasilev, PhD – Deputy Editor
Prof. Stoyan Prodanov, PhD
Prof. Todor Krastevich, PhD
Assoc. Prof. Iskra Panteleeva, PhD
Assoc. Prof. Plamen Yordanov, PhD
Assoc. Prof. Svetoslav Iliychovski, PhD
Assoc. Prof. Plamen Petkov, PhD
Assoc. Prof. Anatoliy Asenov, PhD

INTERNATIONAL BOARD:

Prof. Mihail A. Eskindarov, DSc (Econ) – Financial University under the Government of the Russian Federation, Moscow (Russia).
Prof. Grigore Belostechnik, DSc (Econ) – Moldovan Academy of Economic Studies, Chisinau (Moldova).
Prof. Mihail Zveryakov, DSc (Econ) – Odessa State Economic University, Odessa (Ukraine).
Prof. Andrey Krisovatiy, DSc (Econ) – Ternopil National Economic University, Ternopil (Ukraine).
Prof. Yon Kukuy, DSc (Econ) – Valahia University, Targovishte (Romania).
Prof. Ken O'Neil, PhD – University of Ulster (Great Britain)
Prof. Richard Thorpe, PhD – Leeds University (Great Britain)
Prof. Olena Nepochatenko, DSc (Econ) – Uman National University of Horticulture, Uman (Ukraine)
Prof. Dmytro Lukianenko, DSc (Econ) – Kyiv National Economic University named after Vadym Hetman, Kyiv (Ukraine)
Assoc. Prof. Maria Cristina Stefan, PhD – Valahia University of Targoviste (Romania)
Assoc. Prof. Anisoara Duica, PhD – Valahia University of Targoviste (Romania)
Assoc. Prof. Vladinir Klimuk, PhD – Baranovichi State University, Branovic (Belarus)

Support Team

Rositsa Prodanova, PhD – Technical Secretary
Anka Taneva – Bulgarian Copy Editor
Ventsislav Dikov – Senior Lecturer in English – Translation from/into English
Margarita Mihaylova, PhD – Senior Lecturer in English – Translation from/into English

Editorial address:

2, Emanuil Chakarov street, Svishtov 5250
Prof. Andrey Zahariev, PhD – Editor-in-Chief
☎ (+359) 889 882 298
Rositsa Prodanova, PhD – technical secretary
☎ (+359) 631 66 309, e-mail: nsarhiv@uni-svishtov.bg
Blagovesta Borisova – computer graphic design
☎ (+359) 882 552 516, e-mail: b.borisova@uni-svishtov.bg

In 2023, the journal will be printed using a financial grant from the Scientific Research Fund – Agreement № KP-06-NP4-36 from Bulgarska Nauchna Periodika – 2023 competition.

© Academic Publishing House “Tsenov” – Svishtov
© D. A. Tsenov Academy of Economics – Svishtov

ECONOMIC ARCHIVE

YEAR LXXVI, BOOK 4 – 2023

CONTENTS

Metodi Kanev

On Social Reality, Theory and Economics Education /3

Antonio V. Dichev

Discriminative Ability in Estimating Probability of Default with Certain Machine Learning Algorithms /16

Yordan S. Yordanov

Possibilities for Overcoming Issues in the Phase of Old-Age Pension Payments from an Universal Pension Fund /28

Ventsislav Dikov

Intellectual Capital and Market Capitalization of Public Companies /46

Andrey Zahariev, Atanas Atanasov, Galina Chipriyanova

Finance and Economic Accounting – Faculties, Scientific Research and a 70-Year Tradition /66