The Impact of Intangible Assets on the Company's Market Value

RITA BUZINSKIENE[1] and DALIA RUDYTE[2]

[1] Associate Professor, Siauliai State College, Siauliai, Lithuania e-mail: ritabuzin@gmail.com
[2] Associate Professor/ Expert in Public Private Partnership, Central Project Management Agency, Vilnius, Lithuania
 e-mail: daliarudyte@gmail.com

ABSTRACT

This study investigates and measures the effect of intangibles on the company's market value in Lithuania. We provide a model of the impact of intangible assets on the market value of companies, based on theoretical assumptions about normative and positive accounting, efficient markets, signaling and representation, which underpin the practical relevance of the developed model. The developed model of the impact of intangible assets on the market value of companies can be applied to investigate a) the impact of intangible assets on the business value of companies and b) the effect of intangible assets on the market value of companies by including new or other factors that may affect the market value of an entity. We analyzed the value of the intangible' assets' recorded in firms' books according to international accounting standards (financial information) and we focused on information about additional intangible resources – as recorded expenditure into annual reports (nonfinancial information). The results provide empirical evidence that the value of intangible assets is divided into two kinds of value, financial and nonfinancial information, which have different effects on the market value of companies. Findings confirm that the value of intangible assets is important for companies to maximize their market value.

INTRODUCTION

Intangible assets play an important role in maintaining the competitive advantage of a company. To maintain competitive advantage and enhance share value, it is important to know the real value of the intangible assets of a company (Abu-Musa, 2009; Ipate and Parvu, 2016,). Only a small part of the intangible account is recognized, measured and disclosed as intangible assets in the balance sheet (Svensson, 2014). Most companies account for intangible assets as expenses, while the costs necessary to create these assets are regarded as an expenditure in that period, resulting in a decrease in owners' capital. Reporting intangible assets together with other company expenses has a direct impact on companies' outcomes related to profit and taxes (Jaara and Elkotayni, 2016). A similar approach is taken by scholars (Ifeanyi and Caroline, 2016; Mihai and Parvu, 2016) who claim that the recognition of intangible assets has not yet been sufficiently investigated and that, therefore, the estimation of intangible assets is a complex task, resulting in a gap between true and present values. In this study, two research issues were revealed in this study: a) The problem of disclosing the real value of intangible assets; b) The bene-

fit of the impact of intangible assets on the market value of companies. Researchers (Mohamad et al., 2014; Kimouche and Rouabhi, 2016) agree that determining the value of intangible assets is one of the most relevant research fields, as it relates to the asymmetry in accounting information due to inside information about the true value of intangible assets, which also affects the company's market value. The value of intangible assets may have a different effect on the market value of the entity, depending on the value of the publicly disclosed and undisclosed information, on the fair value of the property and on the reaction of market participants to that information. Both researchers and investors agree that intangible assets in the knowledge economy are a significant factor in increasing competitive advantage and shareholder value, which undoubtedly affects a company's market value (Gamayuni, 2015).

Scientists looking at the impact of intangible assets on a company's market value come from a variety of countries: Indonesia (Gamayuni, 2015), Albania (Prasnikar et. al., 2012), France (Kimouche and Rouabhi, 2016; Tanfous, 2013), Italy (Taliento, 2017), Slovenia (Prasnikar, 2010), Bangladesh (Ferdaous and Rahman, 2019), India (Supriyo, 2009), Brazil (Bottaro et. al., 2013; Dutz and et. al., 2012), Malaysia (Salamudin et. al., 2010), Jordan (Jaara and Elkotayni, 2016; Salameh and Bashir, 2013), Japan (Ramirez, 2010), Portugal (Oliveira et. al., 2006), Iraq (Tamimi et. al., 2013), Turkey (Ocak and Findik, 2019) and Nigeria (Ifeanyi and Caroline, 2016). These researchers emphasize the importance of intangibles for a firm's market value and have used intergroup and panel regression models to analyze these assets. The findings of scientific research have revealed that the value of intangible assets does not always have a positive and strong relationship with the market value of an enterprise. The established negative relationship has confirmed that the real value of intangible assets is not disclosed. The undisclosed value of intangible assets exaggerates the value of the return on investment, which reflects the lack of information about the true value of the intangible assets. The main reason identified by scientists for this phenomenon is the limited application of general accounting principles in accounting. The balance value of assets does not reveal the true value of intangible assets in a company.

The research purpose. To compile and test a model for determining the impact of intangible assets on the market value of companies. *The research problem.* To identify the impact that intangible assets have on the market value of companies by revealing the benefits of intangible assets for companies. *The research design/methodology.* To determine intangible assets, an analysis of financial reporting data for the period 2009–2015 is performed. The analysis is based on data from 18 companies with different activities whose shares are listed on the stock exchange. The financial method of intangible assets measurement (FiMIAM) is applied to measure intangible assets (Rodov and Leliaert, 2002), and the study of the impact of intangible assets is conducted using cross-sectional and panel data regression models (GRETL software).

1. INTERACTION OF INTANGIBLE ASSETS WITH THE MARKET VALUE OF A COMPANY

The effect of the presenta-tion of intangible assets to the market on the the market value of an enter-prise is based on basic financial economics theories: efficient market theory, agency theory, and signaling theory. Efficient market theory is based on the proposition that intangible assets must reflect fair value. The behavior of participants in the market is assessed according to the obtained information. In an efficient market, the price already includes everything that happened before that moment, and changes in behavior depend on the obtained information and the response of the participants in the market. A completely random change in prices is inherent to capital markets. It is impossible to predict the change, as it is impossible to predict events that could influence the change in prices. In addition, vice versa, a capital market shall not be considered efficient if a change in price can be predicted using old information or information that is available to only a few participants in the market (Rupulyte 2013). According to the scientists, agency theory emphasizes the interrelationships between principals and agents, for example, between shareholders and managers, and the relationships depend on the asymmetry of information, creating uncertainty (Dreven and et. al., 2007). When the managers of an enterprise have access to such information, which is not always available to owners, asymmetry of information emerges, and the possibility that managers will act in their own favor increases, which does not always best reflect the needs of shareholders (Schroeder and et al., 2001). When some managers have access

to all the information and others have access only to publicly available accounting information, the problem of information asymmetry arises. When unfair traders receive more profit with less risk, the inequality among investors grows. Over time, confidence in the securities market decreases, and liquidity and market efficiency also decrease (Andrulyte and Jurksas, 2015). To avoid asymmetry of information, it is helpful to analyze signaling theory. The idea behind this theory is to encourage managers to use particular signals to communicate information to consumers so that the consumers can make the right decisions (Martirosianiene et. al., 2016). The degree of information asymmetry depends on the intensity of the signal, which may cause an incorrect assessment of newly issued equity. Asymmetry in the available information may cause an unfavorable selection of investments. Alves and Martins (2010) state that great information asymmetry is inherent in companies with many intangible assets. Thus, managers should be encouraged to disclose information that is as accurate as possible to capital markets about intangible assets may obtain a positive response from the capital market. When investors do not know the fair value of intangible assets, they cannot accurately assess the price of shares issued on the market, and any clear information about investments in intangible assets is not available (Rajiv et. al., 2019).

2. CONCEPTUAL MODEL OF THE IMPACT OF INTANGIBLE ASSETS ON A COMPANY'S MARKET VALUE

The purpose of the model is to reveal the impact of an intangible asset on the market value of an entity when the entity publishes accounting information about the fair value of the intangible assets it holds in a proper and timely way (Figure 1).

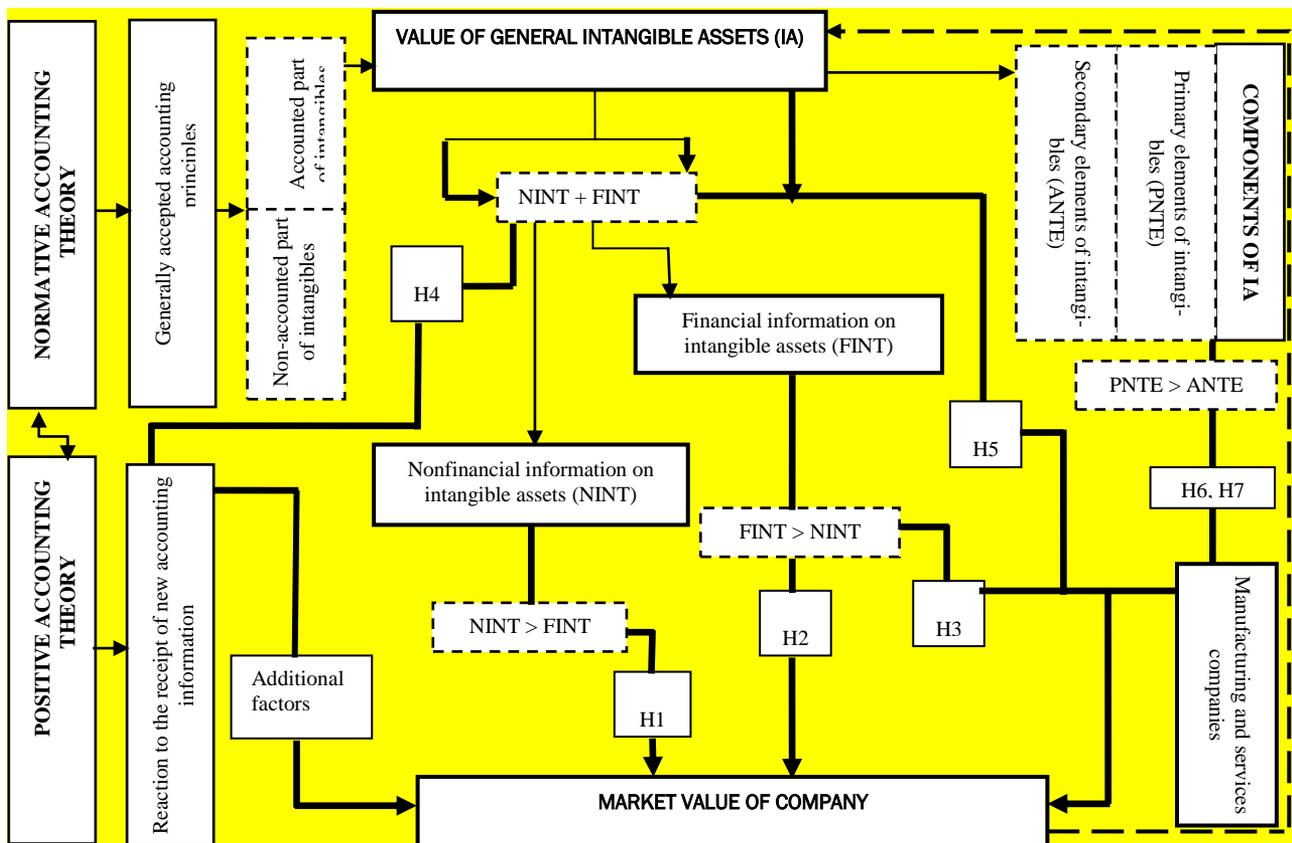**Figure 1.** The model of the impact of intangible assets on the market value of companies

Accounting disclosure aspects are addressed by *positive accounting theory*, which emphasizes the relationship between accounting information and share price movements. Publicly disclosed information is regulated by GAAP and is therefore reflected in the company's balance sheet as the value of the finan-

cial information on intangible assets (FINT). This value depends on the acquisition cost (historical cost) and subsequently on the revaluation cost: current acquisition or actual disposal. In contrast, nonpublic information is associated with the value of nonfinancial information on intangible assets (NINT). Strict accounting requirements for intangible assets make it more difficult to determine the value of NINT, and the improper choice of method may result in a material misstatement. A wide variety of alternative valuation methods are proposed for NINT, classified into market capitalization, direct, return on assets and balanced accounting methods (Ramirez, 2010; Savickaite, 2014).

Researchers have proposed various scientific hypotheses regarding assessing the impact of intangible assets on the market value of companies. Some researchers have focused on evaluating trends in the growth of intangible assets, and others have focused on the degree of immateriality (gap) and its impact on the market value of companies. In most cases, the value of financial information on intangible assets has been used in empirical studies. Therefore, the impact of nonfinancial information on intangible assets on the market value of companies is unclear, as is the impact of the value of general intangible assets when evaluating the distribution of this value across different groups of companies. Regardless of the rise or fall in the value of NINT, these assets are expected to have a direct impact on the market value of the company, as they relate to the transparency of information. The question then arises regarding how the share price will change when information on the value of NINT is published unexpectedly. According to efficient market theory, the price will reflect the news as soon as the news is announced. Investors' reactions will be lightning fast—to acquire more shares in this company, they will raise the price to a level that corresponds to the changes that have taken place. Disclosure of the value of NINT indicates that the company has many more intangible assets than it discloses in the balance sheet. The market value of a company, according to positive accounting theory, is also influenced by investors' reaction to the new information provided on the fair value of intangible assets and the availability of the intangible assets in an efficient capital market.

Based on the information presented above, the first research hypothesis is as follows: **H1.** *The impact of the value of nonfinancial information on intangible assets on the market value of companies is stronger than the impact of the value of financial information on intangible assets.*

The first aim of the study is to determine the impact of financial and nonfinancial information on intangible assets on the market value of companies and to compare their impact on each other. It is likely that the impact of nonfinancial information on intangible assets on the market value of companies is stronger and higher than the impact of financial information on intangible assets. The reaction of investors to the value of financial information on intangible assets can have different kinds of impact: direct or reverse. This may be because this information includes only the publication of data and does not relate to changes in cash flows. Additionally, financial information on intangible assets (FINT) are valued at the historical price, and nonfinancial information on intangible assets (NINT) are valued at the market price; hence, the value of FINT represents a smaller amount of intangible assets than the value of NINT (FINT < NINT). If the financial information on intangible assets were valued at market price and not at the historical price (FINT > NINT), the impact of financial information on intangible assets on the market value of companies would change to a direct effect. Based on theoretical arguments, a second research hypothesis that extends the first hypothesis is proposed: **H2.** *With a relative increase in the value of the financial information on an intangible asset, the impact of financial information on intangible assets (FINT) on the market value of companies will be greater.*

The second research hypothesis assumes that relatively higher growth in FINT than in NINT (even though the FINT value is lower, in comparison with the previous year, its ratio is increasing) has a greater impact on the market value of companies. It is likely that to a certain extent, the relatively high value of FINT can have a direct impact on the market value of companies. When analyzing changes in the value of financial and nonfinancial information on intangible assets and their impact on the market value of companies, the question arises whether the impact of these assets depends on the industry and the nature of the company's operations. To explore this question, the third hypothesis of the research is formulated: **H3.** *The impact of the value of financial and nonfinancial information on intangible assets on the market value of companies is stronger for manufacturing companies than for services companies.*

The third research hypothesis complements the first hypothesis and is intended to determine the difference in the impact of financial and nonfinancial information on intangible assets on different groups of companies. When dealing with accounting information, the issue of transparency is often raised. It is understood that the value of accounting information depends on the disclosure of information about the general value of the intangible asset. If managers are not motivated to properly disclose this information, based on signaling theory, there is an opportunity to increase the information asymmetry between executives and investors. Therefore, publicly disclosed information, together with a legal presentation, provides more transparent accounting information about intangible assets and increases investors' confidence, and this determines the company's market value. The fourth hypothesis of the research is as follows: **H4.** *As the value of general intangible assets (IAs) increases, the market value of companies increases*.

This hypothesis is based on the fact that changes that are associated with the provision of new accounting information to the market depend on the accuracy of the information, revealing the general value of the intangible asset. The fifth hypothesis of the research is formulated to assess the differential effects of IAs on the market value of companies in different industries: **H5.** *The impact of general intangible assets on the market value of companies is stronger for manufacturing companies than for services companies.*

The fifth research hypothesis is related to the fourth hypothesis, and the aim is to compare the effect of IAs on the market value of companies in the manufacturing and services groups. It has been observed that in the scientific literature, individual subelements of intangible assets are often analyzed, but there is a lack of research on assessing the impact of elements of intangible asset on the market value of companies. Management's decision to provide information on intangible assets might further enhance information efficiency in capital markets. The sixth hypothesis of the research is as follows: **H6.** *The primary elements of intangibles cause stronger effects on the market value of companies than the secondary elements of intangibles.*

An intangible asset that is properly used for its intended purpose helps ensure the company's success. Disclosure of the impact of the abovementioned intangible assets on the market value of companies in different industries is further elaborated in the seventh hypothesis of the research: **H7.** *The impact of the primary and secondary elements of intangibles on the market value of companies is stronger for manufacturing companies than for services companies.*

Taking into account the composition of intangible assets and the diversity of their subelements, the aim is to confirm that the primary elements of intangibles not only have a stronger impact on the market value of companies than the secondary elements but also have a different effect on manufacturing and services companies. To obtain reliable research results, the model must include other additional factors that affect the company's market value. This will prevent intangible assets from affecting the firm's market value. The conceptual model of the impact of intangible assets on the market value of companies does not escape certain restrictions. The main limitation of this model, based on normative accounting theory, is related to the determination of the value of financial information on intangible assets. The value of FINT is governed by general accounting principles and constitutes the total value of the intangible assets. This value cannot be changed to the value of another type of property.

The assessment of the impact of an intangible asset on the market value of companies is derived from the theoretical and practical insights of representation theory and signaling theory. This paper does not evaluate the relations between managers and shareholders or their interests and conflict situations. The formation of capital structure and dividend policy in financial signaling and the existence of information asymmetry between executives and market participants are not taken into account. The model involves changes in the meaning of disclosed (FINT) and undisclosed (NINT) information. It is important to note that the model of the impact of an intangible asset on the market value of companies is suitable for listed companies but may also be used by other companies with certain reservations: 1. Based on empirical research, one can measure the impact of an intangible asset not only on the market value of companies but also on their profitability, added value, competitive advantage, etc. Against this background, the company's market value can be changed according to the chosen research direction. 2. For the calculation of nonfinancial information on intangible assets, one should choose another valuation

method or a relative index; the market value and the equity value (MV/EV) should be changed to the relative value of the business value and the equity value (BV/EV).

3. METHODOLOGY OF THE IMPACT MODELS

Panel data methods of analysis are applied to assess the impact of intangible assets on the market value of companies: the first-order difference (FD) method and the fixed-effects (FE) method (Table 1).

Table 1. Description of the variables in the analysis of the impact of intangible assets on the market value of companies

Variable notation	Indicator method	
mktval	Market value = market price per share at financial year-end x number of shares at year-end	Dependent variable
intass_finfo	Financial information on intangible assets = carrying amount of intangible assets at financial year-end + amortization of the reference year	Independent variable
intass_nonfinfo	Nonfinancial information on intangible assets = (market value/equity capital) x financial information on intangible assets	
relative gap	Gap of ratio = (intass_finfo / intass_nonfinfo) x ld_intass_finfo	
tot_intass	Value of general intangible assets = financial information on intangible assets + nonfinancial information on intangible assets	
PNTE	Primary elements of intangibles = innovation-related + human-centered + customer-related	
ANTE	Secondary elements of intangibles = market-related + contract-based + technology-based + goodwill + artistic-related	
net_prof	Net profit (loss) = in the year accumulated net profit	Control variables
turnover	Turnover = total annual net turnover	
tass	Carrying amount of the tangible assets at financial year-end	
working_cap	Working capital = current assets - current liabilities	
lt_debt	Long-term debt (bank, financial leasing, leasing & factoring, suppliers, etc.)	

Based on the formulated hypotheses of the research, seven econometric models were created. The hypotheses of the research were empirically verified using the GRETL statistical program.

The first econometric model *(Model 1)* was developed to test the first hypothesis of the research *(H1)*.

First-order difference method:

$\Delta ln(mktval_{i,t})=\alpha+\delta_3 td2011_t+...+\delta_6 td2015_t+\beta_1 \cdot \Delta ln(intass\_finfo_{i,t})+\beta_2 \cdot \Delta ln(intass\_nonfinfo_{i,t})+c_1 \cdot \Delta(net\_prof_{i,t})+c_2 \cdot \Delta lnb(turnover_{i,t})+c_3 \cdot \Delta ln(tass_{i,t})+c_4 \cdot \Delta(working\_cap_{i,t})+c_5 \cdot \Delta ln(lt\_debt_{i,t})+\Delta u_{i,t}$ (1)

Fixed-effects method:

$ln(mktval_{i,t})=\alpha+\delta_2 td2010_t+...+\delta_6 td2015_t+\beta_1 \cdot ln(intass\_finfo_{i,t})+\beta_2 \cdot ln(intass\_nonfinfo_{i,t})+c_1 \cdot (net\_prof_{i,t})+c_2 \cdot ln(turnover_{i,t})+c_3 \cdot ln(tass_{i,t})+c_4 \cdot (working\_cap_{i,t})+c_5 \cdot ln(lt\_debt_{i,t})+u_{i,t}$ (2)

H1 is confirmed if $\hat{\beta}_1$ and $\hat{\beta}_2 > 0$ and $\hat{\beta}_1 < \hat{\beta}_2$

To test the second hypothesis of the research *(H2)*, a second econometric model *(Model 2)* was created.

First-order difference method:

$\Delta ln(mktval_{i,t})=\alpha+\delta_3 td2011_t+...+\delta_6 td2015_t+\beta_1\cdot\Delta ln(intass\_finfo_{i,t})+\beta_{1S}\cdot\Delta ln(intass\_finfo_{i,t})\cdot(santykinisatotūkis)+\beta_2\cdot\Delta ln(intass\_nonfinfo_{i,t})+c_1\cdot\Delta(net\_prof_{i,t})+c_2\cdot\Delta ln(turnover_{i,t})+c_3\cdot\Delta ln(tass_{i,t})+c_4\cdot\Delta(working\_cap_{i,t})+c_5\cdot\Delta ln(lt\_debt_{i,t})+\Delta u_{i,t}$ (3)

Fixed-effects method:

$\Delta ln(mktval_{i,t})=\alpha+\delta_3 td2010_t+...+\delta_6 td2015_t+\beta_1\cdot ln(intass\_finfo_{i,t})+\beta_{1S}\cdot ln(intass\_finfo_{i,t})\cdot(santykinisatotrūkis)+\beta_2\cdot ln(intass\_nonfinfo_{i,t})+c_1\cdot(net\_prof_{i,t})+c_2\cdot ln(turnover_{i,t})+c_3\cdot ln(tass_{i,t})+c_4\cdot(working\_cap_{i,t})+c_5\cdot ln(lt\_debt_{i,t})+u_{i,t}$ (4)

H2 p is confirmed if $\widehat{\beta}_{is}>0$

To test the third hypothesis of the research *(H3)*, a third econometric model *(Model 3)* was created.

First-order difference method:

$\Delta ln(mktval_{i,t})=\alpha+\delta_3 td2011_t+...+\delta_6 td2015_t+\beta_{1\cdot(manuf\_sec)}\cdot\Delta ln(intass\_finfo_{i,t})+\beta_{1\cdot(serv\_sec)}\cdot\Delta ln(intass\_finfo_{i,t})$ serv_sec$+\beta_{2\cdot(manuf\_sec)}\cdot\Delta ln(intass\_nonffo_{i,t})+\beta_{2\cdot(serv\_sec)}\cdot\Delta ln(intass\_nonfinfo_{i,t})$serv_sec$+c_1\cdot\Delta(net\_prof_{i,t})+c_2\cdot\Delta ln(turnover_{i,t})+c_3\cdot\Delta ln(tass_{i,t})+c_4\cdot\Delta(working\_cap_{i,t})+c_5\cdot\Delta ln(lt\_debt_{i,t})+\Delta u_{i,t}$ (5)

Fixed-effects method:

$ln(mktval_{i,t})=\alpha+\delta_2 td2010_t+...+\delta_6 td2015_t+\beta_{1\cdot(manuf\_sec)}\cdot ln(intass\_finfo_{i,t})+\beta_{1\cdot(serv\_sec)}\cdot ln(intass\_finfo_{i,t})$ serv_sec$+\beta_{2\cdot(manuf\_sec)}\cdot ln(intass\_non finfo_{i,t})+\beta_{2\cdot(serv\_sec)}\cdot ln(intass\_nonfinfo_{i,t})$ serv_sec$+c_1\cdot(net\_prof_{i,t})+c_2\cdot ln(turnover_{i,t})+c_3\cdot ln(tass_{i,t})+c_4\cdot(working\_cap_{i,t})+c_5\cdot ln(lt\_debt_{i,t})+u_{i,t}$ (6)

H3 is confirmed if $\widehat{\beta}_{1\cdot(manuf\_sec)}>0$, and $\widehat{\beta}_{1\cdot(serv\_sec)}<0$, but $(\widehat{\beta}_{1\cdot(manuf\_sec)}+\widehat{\beta}_{1\cdot(serv\_sec)})>0$ and

$\widehat{\beta}_{2\cdot(manuf\_sec)}>0$, and $\widehat{\beta}_{2\cdot(serv\_sec)}<0$, but $(\widehat{\beta}_{2\cdot(manuf\_sec)}+\widehat{\beta}_{2\cdot(serv\_sec)})>0$

To test the fourth hypothesis of the research *(H4)*, the fourth econometric model *(Model 4)* was created.

First-order difference method:

$\Delta ln(mktval_{i,t})=\alpha+\delta_3 td2011_t+...+\delta_6 td2015_t+\beta_3\cdot\Delta ln(tot\_intass_{i,t})+c_1\cdot\Delta(net\_prof_{i,t})+c_2\cdot\Delta ln(turnover_{i,t})+c_3\cdot\Delta ln(tass_{i,t})+c_4\cdot\Delta(working\_cap_{i,t})+c_5\cdot\Delta ln(lt\_debt_{i,t})+\Delta u_{i,t}$ (7)

Fixed-effects method:

$ln(mktval_{i,t})=\alpha+\delta_2 td2010_t+...+\delta_6 td2015_t+\beta_3\cdot ln(tot\_intass_{i,t})+c_1\cdot(net\_prof_{i,t})+c_2\cdot ln(turnover_{i,t})+c_3\cdot ln(tass_i)+c_4\cdot(working\_cap_{i,t})+c_5\cdot ln(lt\_debt_{i,t})+u_{i,t}$ (8)

H4 is confirmed if $\widehat{\beta}_3>0$

To test the fifth hypothesis of the research *(H5)*, the fifth econometric model *(Model 5)* was created.

First-order difference method:

$\Delta ln(mktval_{i,t})=\alpha+\delta_3 td2011_t+...+\delta_6 td2015_t+\beta_{3\cdot(manuf\_sec)}\cdot\Delta ln(tot\_intass_{i,t})+\beta_{3\cdot(serv\_sec)}\cdot\Delta ln(tot\_intass_{i,t})$serv_sec$+c_1\cdot\Delta(net\_prof_{i,t})+c_2\cdot\Delta ln(turnover_{i,t})+c_3\cdot\Delta ln(tass_{i,t})+c_4\cdot\Delta(working\_cap_{i,t})+c_5\cdot\Delta ln(lt\_debt_{i,t})+\Delta u_{i,t}$ (9)

Fixed-effects method:

$ln(mktval_{i,t})=\alpha+\delta_2 td2010_t+...+\delta_6 td2015_t+\beta_{3\cdot(manuf\_sec)}\cdot ln(tot\_intass_{i,t})+\beta_{3\cdot(serv\_sec)}\cdot ln(tot\_intass_{i,t})$serv_sec$+c_1\cdot(net\_prof_{i,t})+c_2\cdot ln(turnover_{i,t})+c_3\cdot ln(tass_{i,t})+c_4\cdot(working\_cap_{i,t})+c_5\cdot ln(lt\_debt_{i,t})+u_{i,t}$ (10)

H5 is confirmed if $\widehat{\beta}_{3\cdot(manuf\_sec)}>0$, and $\widehat{\beta}_{3\cdot(serv\_sec)}<0$, but $(\widehat{\beta}_{3\cdot(manuf\_sec)}+\widehat{\beta}_{3\cdot(serv\_sec)})>0$

To test the sixth hypothesis of the research *(H6)*, the sixth econometric model *(Model 6)* was created.

First-order difference method:

$\Delta ln(mktval_{i,t})=\alpha+\delta_3 td2011_t+...+\delta_6 td2015_t+\beta_5\cdot\Delta ln(PNTE_{i,t})+\beta_6\cdot\Delta ln(ANTE_{i,t})+c_1\cdot\Delta(net\_prof_{i,t})+c_2\cdot\Delta ln(turnover_{i,t})+c_3\cdot\Delta ln(tass_{i,t})+c_4\cdot\Delta(working\_cap_{i,t})+c_5\cdot\Delta ln(lt\_debt_{i,t})+\Delta u_{i,t}$ (11)

Fixed-effects method:

$$ln(mktval_{i,t})=\alpha+\delta_2 td2010_t+...+\delta_6 td2015_t+\beta_5 \cdot ln(PNTE_{i,t})+\beta_6 \cdot ln(ANTE_{i,t})+c_1 \cdot (net\_prof_{i,t})+c_2 \cdot ln(turnover_{i,t})+c_3 \cdot ln(tass_{i,t})+c_4 \cdot (working\_cap_{i,t})+c_5 \cdot ln(lt\_debt_{i,t})+u_{i,t} \quad (12)$$

H6 is confirmed if $\widehat{\beta}_5$ and $\widehat{\beta}_6 > 0$ and $\widehat{\beta}_5 > \widehat{\beta}_6$

To test the seventh hypothesis of the research *(H7)*, the seventh econometric model *(Model 7)* was created.

First-order difference method:

$$\Delta ln(mktval_{i,t})=\alpha+\delta_3 td2011_t+...+\delta_6 td2015_t+\beta_{5\cdot(manuf\_sec)}\cdot\Delta ln(PNTE_{i,t})+\beta_{5\cdot(serv\_sec)}\cdot\Delta ln(PNTE_{i,t})serv\_sec+\beta_{6\cdot(manuf\_sec)}\cdot\Delta ln(ANTE_{i,t})+\beta_{6\cdot(serv\_sec)}\cdot\Delta ln(ANTE_{i,t})serv\_sec+c_1\cdot\Delta(net\_prof_{i,t})+c_2\cdot\Delta ln(turnover_{i,t})+c_3\cdot\Delta ln(tass_{i,t})+c_4\cdot\Delta(working\_cap_{i,t})+c_5\cdot\Delta ln(lt\_debt_{i,t})+\Delta u_{i,t} \quad (13)$$

Fixed-effects method:

$$ln(mktval_{i,t})=\alpha+\delta_2 td2010_t+...+\delta_6 td2015_t+\beta_{5\cdot(manuf\_sec)}\cdot ln(PNTE_{i,t})+\beta_{5\cdot(serv\_sec)}\cdot ln(PNTE_{i,t}) serv\_sec+\beta_{6\cdot(manuf\_sec)}\cdot ln(ANTE_{i,t})+\beta_{6\cdot(serv\_sec)}\cdot ln(ANTE_{i,t}) serv\_sec+c_1\cdot(net\_prof_{i,t})+c_2\cdot ln(turnover_{i,t})+c_3\cdot ln(tass_{i,t})+c_4\cdot(working\_cap_{i,t})+c_5\cdot ln(lt\_debt_{i,t})+u_{i,t} \quad (14)$$

H7 is confirmed if $\widehat{\beta}_{5\cdot(manuf\_sec)} > 0$, and $\widehat{\beta}_{5\cdot(serv\_sec)} < 0$, but $(\widehat{\beta}_{5\cdot(manuf\_sec)} + \widehat{\beta}_{5\cdot(serv\_sec)}) > 0$ and

$\widehat{\beta}_{6\cdot(manuf\_sec)} > 0$, and $\widehat{\beta}_{6\cdot(serv\_sec)} < 0$, but $(\widehat{\beta}_{6\cdot(manuf\_sec)} + \widehat{\beta}_{6\cdot(serv\_sec)}) > 0$

The explanations of the mathematical model are as follows: α – constant; δ_3 td; δ_4 td; δ_5 td; δ_6 td – time variables representing the reference period; β_1 - the impact of financial information on intangible assets on the market value of companies; β_2 – the impact of nonfinancial information on intangible assets on the market value of companies; c_1, c_2, c_3, c_4, c_5 – dependent and independent variables (other than negative) interpreted as the coefficient of elasticity because they are logarithmic; $\beta_{1(manuf\_sec)}$ – the impact of financial information on intangible assets on the market value of manufacturing companies; $\beta_{1(serv\_sec)}$ – the difference in the impact of financial information on intangible assets on manufacturing and services companies; $\beta_{2(manuf\_sec)}$ – the impact of nonfinancial information on intangible assets on the market value of manufacturing companies; $\beta_{2(serv\_sec)}$ – the difference in the impact of nonfinancial information on intangible assets on manufacturing and services companies; β_3 – the impact of the value of general intangible assets on the market value of companies ; $\beta_{3(manuf\_sec)}$ – the impact of the value of general intangible assets on the market value of manufacturing companies; $\beta_{3(serv\_sec)}$ – the impact of the value of general intangible assets on the market value of services companies; $\beta_{3(manuf\_sec)}$ – the impact of the value of general intangible assets on the market value of manufacturing companies; $\beta_{3(serv\_sec)}$ – the difference in the impact of the value of general intangible assets on manufacturing and services companies; B_5 – the impact of intangible assets of primary elements on the market value of companies; B_6 – the impact of intangible assets of secondary elements on the market value of companies; $B_{5(manuf\_sec)}$ – the impact of primary elements of intangible assets on the market value of manufacturing companies; $B_{5(serv\_sec)}$ – the difference in the impact of primary elements of intangible assets on manufacturing and services companies; $B_{6(manuf\_sec)}$ – the impact of secondary elements of intangible assets on the market value of manufacturing companies; $B_{6(serv\_sec)}$ – the difference in the impact of secondary elements of intangible assets on manufacturing and services companies.

4. RESULTS OF THE RESEARCH ON THE IMPACT OF INTANGIBLE ASSETS ON THE MARKET VALUE OF COMPANIES

The valuation of the impact of an intangible asset on a company's market value is based on a conceptual model that is built on seven scientific hypotheses. The empirical investigation aimed to prove the validity of the scientific hypotheses. Two panel data analysis methods, the first-order difference (FD) and fixed-effects (FE) methods, were applied to ensure the validity of the study. Based on these methods, seven econometric models were created. The study revealed that the models based on the fixed-effects method did not meet all the requirements for model testing, although results were obtained that were

similar to those obtained from the models implemented by the first-order difference method. Therefore, we decided to use the results of the first-order difference method to formulate the findings of the research.

Model 1 represents the impact of financial and nonfinancial information on intangible assets on the market value of companies (Table 2).

Table 2. Cross-Sectional Results for Model 1

Independent variables of the model	Estimates of the coefficients and significance		
	FD	HAC	FE
Constant	0,254 ***		7,065***
td 2010			0,270***
td 2011	-0,173*		0,328***
td 2012	-0,308 ***		0,279***
td 2013	-0,338 ***		0,212**
td 2014	-0,286 ***		0,198**
td2015	-0,072		0,407***
intass_finfo	-0,682 ***	-0,682***	-0,576***
intass_nonfinfo	0,804 ***	0,804***	0,720***
net_prof	0,000003 ***		0,000003 ***
turnover	0,118		0,183***
tass	0,138		0,050
working_cap	0,0000002		0,0000004
lt_debt	0,022		0,001
n	99		119
R^2_{adj}	0,700		0,680
White test (p-value)	0,212		0,005
DW test (p-value)	0,004 ***		0,0001***

The independent variable is significant at the following levels: *-0,1; **-0,05; ***-0,01.

The results of the analysis suggest that the impact of the value of financial and nonfinancial information on intangible assets on the market value of companies is significant. However, this impact of the value of intangible assets was observed in different directions. A growth of 1 percent in the value of financial information on intangible assets (FINT) reduced the market value of companies by 0,682 percent. A growth of 1 percent in the value of nonfinancial information on intangible assets (NINT) increased the market value of companies by 0,804 percent. The results of the research assume that the lower value of FINT increases the market value of companies. This means that the value of FINT has a negative and significant impact on the market value of companies. The reason underlying this finding is that the value of FINT is measured at cost price, which reflects the historical cost. The cost price is not competitive and cannot compete on the market. Therefore, FINT hurts the market value of companies. In contrast, the value of NINT has a positive and significant impact on the market value of companies. The value of NINT is measured at the market price, and it is characterized by high growth and a positive effect on the market value of companies. It can be argued that investors adopt accounting information because it is new information and therefore increases the quality of the information available regarding the value of equity, income and cash flow (Kimouche and Rouabhi, 2016). According to Gamayuni (2015), accounting information on intangible assets can be effective when it is presented properly and on time. The share prices of companies increase and will increase as long as the new accounting information reflects recent changes in the capital market. The new accounting information shows that companies have more intangible assets than they disclosed in the balance sheet. These results are opposite to those that most researchers have found. When researchers studied the impact of intangible assets on the market value of companies, they included only the value of FINT cost price in the base econometric model, but the value of FINT is often different in the market. The integration value of NINT in the base econometric

model revealed that the value of FINT cannot always have a positive and significant impact on the market value of companies. The results of Model 1 confirm the accuracy of the hypothesis (H1) that the value of NINT has a stronger effect than the value of FINT. Bottaro and Benetti (2013) proved the validity of the test results. They revealed that public disclosure of accounting information on the real value of intangible assets can have a positive impact on the market value of companies and thus showed the impact of the value of NINT.

To analyze the impact of financial information on intangible assets on the market value of companies in more detail, the second model (**Model 2**) was applied (Table 3).

Table 3. Cross-Sectional Results for Model 2

Independent variables of the model	Estimates of the coefficients and significance		
	FD	HAC	FE
Constant	0,252 ***		7,056***
td 2010			-0,106
td 2011	-0,171 **		-0,053
td 2012	-0,302 ***		-0,100
td 2013	-0,327 ***		-0,166**
td 2014	-0,305 ***		-0,159*
td 2015	-0,086		0,473***
intass_finfo	-0,765***	-0,765***	-0,473***
santykinis atotrukis	0,028**	0,028***	-0,026**
intass_nonfinfo	0,802***	0,802***	0,675***
net_prof	0,000003***		0,000002*
turnover	0,147**		0,102
tass	-0,111		0,166*
working_cap	0,0000002		-0,0000002
lt_debt	0,015		-0,029
n	99		100
R^2_{adj}	0,712		0,652
White test (p-value)	0,864		0,003
DW test (p-value)	0,010***		0,019**

The independent variable is significant at the following levels: *-0,1; **-0,05; ***-0,01.

Model 2 revealed the expected results. The relative value of FINT, when increased by 1%, reduced the reverse effect on the market value of companies in 95% of cases in the range of 0.028% ± 0.019% points. The corrected coefficient of determination shows that 71.2% of the market value depended on the distribution of the independent variables included in the model. Consequently, the relatively higher growth in the value of FINT reduced the reverse effect on the company's market value. The impact of FINT on the market value of companies will be positive. However, it should be emphasized that in comparison with the value of NINT, the value of FINT should be 27 times higher, so that the reverse effect on the market value of companies would change to a direct effect. The results of the study explain why the value of FINT, based on the results of the first model, has a reverse effect on the firm's market value and allows us to confirm that the historic price of FINT will not always have a positive impact on the market price of stock.

To analyze the differences in the impact of financial and nonfinancial information on the intangible assets on the market value of manufacturing and services companies, a third model (**Model 3**) was implemented (Table 4).

Table 4. Cross-Sectional Results for Model 3

Independent variables of the model	Estimates of the coefficients and significance		
	FD	HAC	FE
Constant	0,275***		7,391***
td 2010			0,294***
td 2011	-0,242 ***		0,297***
td 2012	-0,312 ***		0,262***
td 2013	-0,357 ***		0,207**
td 2014	-0,285 ***		0,210**
td2015	-0,107		0,382***
intass_finfo	-0,837 ***	-0837***	-0,725***
intass_finfo serv_sec	0,462 ***	0,462**	0,459***
intass_nonfinfo	0,928 ***	0,928***	0,847***
intass_nonfinfo serv_sec	-0,409 ***	-0,409 **	-0,413***
net_prof	0,000002 **		0,000002
turnover	0,095		0,135**
tass	0,103		0,073
working_cap	0,00000008		0,0000005
lt_debt	0,009		-0,008
n	99		119
R^2_{adj}	0,730		0,717
White test (p-value)	0,856		0,006
DW test (p-value)	0,02 **		0,00007***

The independent variable is significant at the following levels: *-0,1; **-0,05; ***-0,01.

The results obtained in the research confirm the hypothesis (H3) that the impact of financial and nonfinancial information on intangible assets on the market value of companies is higher for manufacturing companies than for services companies. Although unexpected, this difference was statistically significant for the impact of FINT (0.462) and the impact of NINT (0.409) on manufacturing and services firms. In the manufacturing sector, an increase of 1% in the value of FINT reduced the market value by 0.837%, and in the services sector, the same increase reduced the market value by 0.375%. When the value of NINT increased by 1%, the market value increased by 0.928% in the manufacturing sector and by 0.519% in the services sector. In the manufacturing sector, in 95% of cases, an increase of 1% in FINT reduced the market value by 0.837%, ± 0.175% points, and an increase in the value of NINT by 1% increased the market value by 0.928%, ± 0,140% points. In the services sector, in 95% of cases, this effect is lower than it was in the manufacturing sector (0,409% ±, 0,244% points, and 0,462%, ± 0.283% points, respectively). The value of these indicators explains that the value of the market depended 73 percent on the change in the independent variables included in the model. To analyze the impact of general intangible assets on the market value, a fourth model (**Model 4**) was applied (Table 5).

The results for **Model 4** showed that a growth of 1 percent in the general value of intangible assets (IA) increased the market value of companies by 0,249 percent. According to signaling theory, the accounting information on the value of IAs reduced the value of the information asymmetry between managers and investors. Accounting information is an important signal to investors because the market value of companies depends on how managers signal the information in the capital market. This relation allows us to justify the hypothesis (H4) that a company's managers expect profitability and benefits from investment in these assets. The value of IAs is related to the market value of companies and the potential for growth in profitability in the future. According to Gamayuni (2015), a high value of intangible assets generates a high profit for companies because investors believe that the companies will earn higher profits in the future, and this will have an impact on share price growth.

Table 5. Cross-Sectional Results for Model 4 and Model 5

Independent variables of the model	Estimates of the coefficients and significance			
	Model 4		Model 5	
	FD	FE	FD	FE
Constant	0,394 ***	7,529***	0,411 ***	7,534***
td 2010		0,349***		0,350***
td 2011	-0,451 ***	0,247*	-0,464 ***	0,248*
td 2012	-0,424 ***	0,209	-0,437 ***	0,210
td 2013	-0,458 ***	0,196	-0,482 ***	0,196
td 2014	-0,486 ***	0,166	-0,481 ***	0,168
td 2015	-0,144	0,316**	-0,143	0,319
tot_intass	0,249 ***	0,156***	0,292 ***	0,158***
tot_intass serv_sec			-0,09	-0,008
net_prof	0,000001	0,0000002	0,0000001	0,0000002
turnover	0,116	0,225***	0,103	0,227***
tass	-0,151	-0,169	-0,135	-0,170
working_cap	-0,0000001	0,0000003	-0,0000002	0,0000002
lt_debt	0,09	0,125*	0,08	0,125*
n	99	119	99	119
R^2_{adj}	0,263	0,303	0,260	0,303
White test (p-value)	0,112	0,195	0,184	0,231
DW test (p-value)	0,587	0,007***	0,576	0,009***

The independent variable is significant at the following levels: *-0,1; **-0,05; ***-0,01.

To analyze the differences in the impact of general intangible assets on the market value of manufacturing and services companies, a fifth model **(Model 5)** was adapted (Table 5). The results of **Model 5** showed that the impact of the general value of intangible assets was more intense in the manufacturing sector than in the services sector. The impact of the market value of companies increased by approximately 0,292 percent in the manufacturing sector and 0,202 percent in the service sector. However, the gap in value between these sectors of companies (0,09) was not statistically significant. Therefore, hypothesis 5 can be adopted only in part. Hence, the general value of intangible assets is significant in the manufacturing and services sectors. With 1 percent growth in the value of IAs, in the manufacturing sector, the market value of companies will increase in the range of 0,291 ± 0,158 percent with 95 percent probability. With 1 percent growth in the IA value, in the service sector, the market value of companies will increase in the range of 0,09 ± 0,239 percent with 95 percent probability. The adjusted determination coefficient indicates that the variables included in the model explain 32,7 percent of the market value of the dispersion indicator.

Model 6 represents the impact of primary and secondary elements of intangibles on the market value of companies (Table 6).

Table 6. Cross-Sectional Results for Model 6 and Model 7

Independent variables of the models	Estimates of the coefficients and significance			
	Model 6		Model 7	
	FD	FE	FD	FE
Constant	0,397 ***	8,347***	0,404 ***	8,195***
td 2010		0,383***		0,398***
td 2011	-0,435 ***	0,330*	-0,421 ***	0,320***
td 2012	-0,432 ***	0,293**	-0,438 ***	0,286**
td 2013	-0,481 ***	0,226*	-0,498 ***	0,228*
td 2014	-0,475 ***	0,201	-0,459 ***	0,202
td 2015	-0,135	0,450***	-0,110	0,424***
ANTE	-0,078	-0,235***	-0,002 ***	-0,297 ***

ANTE serv_sec			-0,179	-0,165
PNTE	0,294***	0,391***	0,285***	0,441***
PNTE serv_sec			0,051	-0,148
net_prof	0,000002	0,000002	0,000002	0,000001
turnover	0,107	0,209***	0,098	0,179**
tass	-0,101	-0,149	-0,073	-0,105
working_cap	-0,0000001	0,0000004	-0,0000001	0,0000004
lt_debt	0,08	0,042	0,07	0,047
n	99	119	99	119
R^2_{adj}	0,334	0,452	0,327	0,460
White test (p-value)	0,129	0,009	0,062	0,01
DW test (p-value)	0,495	0,037**	0,620	0,057*

The independent variable is significant at the following levels: *-0,1; **-0,05; ***-0,01.

The results confirm that based on the company's market value, the elasticity of the primary intangible assets (PNTE) is stronger than that of the secondary intangible assets (ANTE). An increase in PNTE value by 1% increased the company's market value by 0,294%. The opposite effect was revealed in regard to the secondary elements of intangible assets: a growth of 1% reduced the company's market value by 0,08%. The results of the study did not explain why PNTE has a stronger market power than ANTE. However, it can be assumed that growth in PNTE's value, which is linked to innovation, relationships, and assets invested in people, reflects changes in market prices and that the value of ANTE reflects the historical value of the property. By analyzing the impact of PNTE on the market value of companies, the study showed that 95% of this effect can range from ± 0,132% within the limits of the points, while the ANTE effect is ± 0,171% within the limits of the points. However, the effect of ANTE was not statistically significant, so the relevant hypothesis (H6) can be accepted only in part. The adjusted determination coefficient indicates that the variables included in the model explain 33,4 percent of the market value of the dispersion indicator.

Model 7 represents the differences in the impact of primary and secondary elements of intangibles on the market value of manufacturing and services companies (Table 6). Contrary to what was thought, the impact of the primary and secondary elements of intangible assets on the market value of companies was stronger in the services sector than in the manufacturing sector. In assessing the effect of PNTE, PNTE increased the market value of companies by 0,285% in the manufacturing sector and by 0,336% in the services sector. However, the difference between the manufacturing and services sectors in terms of the impact (0,05) was not statistically significant. ANTE reduced the market value of companies by approximately 0,002% in the manufacturing sector and by 0,177% in the services sector. The difference the manufacturing and services sectors in terms of the impact on enterprises (0,179) was also not statistically significant. Hence, hypothesis (H7) can be only partially rejected.

CONCLUSION

The conceptual model of the impact of an intangible asset on the company's market value explains the significance of the value of intangible assets and enables increased transparency of accounting information in the capital market. The originality of the model is reflected in the integration of the value of nonfinancial information on intangible assets since thus far, researchers have evaluated only the impact of the value of financial information on intangible assets on the market value of companies. The model expands the possibilities to determine the value of a fair intangible asset. FINT is calculated using the historical price accounting system, and the value of nonfinancial information on intangible assets (NINT) is determined by alternative valuation methods: content analysis and the financial method of in-tangible assets measurement (FiMIAM). The impact of an intangible asset on the market value of companies is measured using the panel data analysis method. To obtain more reliable research results, additional factors are integrated into the basic evaluation model: net profit (loss), turnover, tangible assets, working capital, and long-term debt.

The results of the study showed differences in the effects of financial and nonfinancial information on intangible assets on the market value of companies. The integration of the value of NINT into the basic valuation model revealed that the value of FINT may not always have a direct and significant impact on the market value of companies. It was confirmed that the value of NINT, which has a positive effect, has a stronger impact on the market value of companies than the value of FINT. Growth in the value of NINT increases a company's market value. However, an increase in the value of FINT reduces a company's market value.

This finding allows us to recognize and demonstrate the inadequacy of the historical price system, which evaluates the value of FINT in the balance sheet. This effect could change if the value of FINT were measured with the actual rather than the historic price. As the results of the research shows, the relatively high value of FINT may prevent a reversal in the company's market value. However, the value of FINT must be 27 times higher than the value of NINT. When assessing the impact of total intangible assets (IAs) on the market value of companies, the positive and significant magnitude of the effect was determined. Although the difference in the impacts of IAs on the market value of companies is not significant between manufacturing and services companies, it is significant between financial and nonfinancial information. However, the impact of IAs on the market value of companies was higher for services companies than for manufacturing companies. It was determined that the primary elements of an intangible asset (innovation-related, human-centered, customer-related) have a stronger effect on the market value of companies than the secondary elements of intangible assets (marketing-related, contract-based, technology-based, artistic-related, goodwill). An increase in the value of the secondary elements of intangible assets decreases the company's market value, as this group of assets reflects the historical value more than the market value and forms the bulk of the value of financial information on intangible assets. The primary elements of the intangible assets more closely reflect the market value and represent the bulk of the value of nonfinancial intangible assets. Notably, although the impacts of the primary and secondary elements of intangible assets on the market value of companies are different, they remain significant for both the manufacturing and services groups.

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