The Effect of Innovation Through Intangible Assets on Company's Profitability

Ivana Medved, Kristina Peštović, and Dušan Saković

Abstract The aim of this paper is to investigate the impact of investment in intangible assets on the companies' business performances which are observed as profitability. Investment in intangible assets is one of the crucial activities and resources that contribute to achievement of competitive advantage, company growth, and development. According to previous research papers and significant impact of intangible assets on firm performance, the effect of intangible assets on companies' profitability in Serbia was conducted. The research is based on the financial statements of 194 observations of companies listed on Belgrade stock exchange during 2017–2020. The sample consisted of small, medium, and large enterprises from manufacturing sector (Section C). The results of the models have clearly documented that there is a significant positive relationship between intangible assets and financial performance of companies measured as profitability ratios. Investment in intangible assets affects profitability of companies positively. This paper has helped to expand the theoretical concept of intangible assets and the impact of investment in intangible assets on profitability of companies. The results of research should encourage the managers of listed manufacturing companies to invest more in intangible assets in order to increase profitability.

Keywords Intangible assets · Investment in intangible assets · Financial performance · Company's profitability · Listed manufacturing companies

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1 Introduction

Investments in various forms of tangible assets are well-known contributors to shareholder wealth and company growth. Tangible assets are traditionally a regular form of material and physical assets investments and also common financial statement positions. However, over the past decades, intangible assets have become increasingly important for knowledge creation, innovation, company's competitive advantage (Kramer et al. 2011; Bagna et al. 2021), and their contribution to company's profitability and value is more noticeable (Seo and Kim 2020). Therefore, there are expectations from those who use information in companies to adequately assess the effect of innovations on intangible assets, and from accounting standards establishment to adapt accounting regulations to the needs of measuring, evaluating, and reporting on intangible assets (Lopes and Rodrigues 2007; Lev and Gu 2016). Intangible assets are often disregarded in favor of tangible assets (Li and Wang 2014).

Intangible assets are a very important part of any company struggling to survive in a changing and uncertain environment. These assets are crucial for modern companies, especially in the circumstances of the increasingly widespread use of digital technologies and other forms of knowledge. Intangibles occur in all aspects of the company (in particular, in knowledge-based company), from R&D, to production and sale, but also have a great impact on company functions and policy, especially accounting, finance, and strategic management. The impact of intangible assets on company operations is important at both the macro and the micro levels. On a macro level, macroeconomic and monetary policy have mostly indirect impacts on companies' intangibles. According to Ahn et al. "only a few intangible assets are currently capitalized in national accounts (SNA 2008/ESA2010 standards), namely R&D, mineral exploration, computer software and databases, as well as entertainment, literary and artistic originals. Expenditures for design, branding, new financial products, organizational capital and firm-provided training are instead currently treated as intermediate costs" (2020, 1). On the micro level, that influence is predominant in terms of measuring changes in financial and non-financial indicators of business success of company, knowledge creation, and competitive advantage creation, determining the degree and importance of their connection, as well as the overall connection with innovation and investment promotion.

Intangible assets are known as "intellectual assets," "knowledge assets," "knowledge-based capital," or "intellectual capital." There are many different definitions of intangible assets. Most of them imply the usual differences between intangible and tangible assets. Intangibles are nonphysical assets with a main focus on investing in human capital, intellectual property, computerized information, and economic competencies in the form of training/education of workers (key personnel), innovation and technology development, public and private research and development expenditures (R&D), market exploration and development (marketing), organizational and management efficiency, customer and institutional networks, and software and information technology (Barker et al. 2021; Thum-Thysen et al. 2017, 2019).

According to Seo and Kim (2020) and Thum-Thysen et al. (2017) intangibles are fundamental, long-run strategic assets because they can provide a company with vital and valuable financial performances and competitive advantages and the economy as a whole. An intangible asset, according to International Accounting Standards 38 (IAS 38), is an identifiable nonmonetary asset without physical substance (IAS 38 is used by European listed companies for financial reporting of intangibles). Such an asset is identifiable when it is separable, or when it arises from contractual or other legal rights. Intangible assets can be a key driver of innovation, which is why both internal and external users of accounting information are interested in reliable information about intangible assets. Despite accounting regulations, accounting practitioners have serious difficulties with the identification, measurement, and systematic disclosure of intangibles. There is a significant gap between market value of companies and reported book values with potential to fail in reporting intangibles (Haji and Mohd Ghazali 2018; Sardo and Serrasqueiro 2018).

The issue of profitability of companies in relation to investments in intangible assets is a twofold issue: firstly, it is important which intangible assets are recognized in the Balance Sheet (intangible assets acquired in acquisitions) and secondly, investments in intangible assets are important for measuring profitability are accounted as an expense (which reduces current income for future benefits) (Barker et al. 2021; Lev 2018).

The aim of this paper is to investigate the effect of intangible assets on companies' profitability in the Republic of Serbia. The research is based on the financial statements of 194 observations of companies listed on Belgrade stock exchange during the period of 2017–2020. The sample consisted of small, medium, and large enterprises from manufacturing sector (Section C). This study contributes to the accounting practice in the Republic of Serbia because of the importance it attaches to the analysis of intangible assets and its connection with the profitability of the listed companies in Serbia. The results of the models have clearly documented that there is a significant positive relationship between intangible assets and financial performance of companies measured as profitability ratios. Investment in intangible assets affects profitability of companies positively. According to these finding, it can be concluded that growth of the value of intangible assets influence on the achievement of the higher rate of return on assets and return on equity.

This paper is structured into five sections. Section 2 illustrates the literature and theoretical framework. Section 3 describes the methodology, sample, and used variables. Section 4 explores results and discussion. In addition, the fifth section provides contributions, further recommendations of study, limitations, and conclusions of paper.

2   Literature Review

Intangible assets appear in many different forms, which have some common characteristics. According to Barker et al. (2021), intangibles can be grouped as relating to human capital (training), organizational capital (intellectual property, processes, IT), and social capital (customer relationships, external networks, reputation). Human capital, according to Radonić et al. (2021) was the first aspect of intangible assets that became interesting for the academic community. From the point of view of the wider academic community, intangible assets are a subject of interest for economic, legal, and statistical disciplines. International Financial Reporting Standards and International Accounting Standards have measurement and recognition principles for intangible assets. Intangibles are resources controlled by the entity as a result of previous events (purchase or self/creation) and from which future economic benefits (inflows of cash or other assets) are expected (IAS 38). According to IAS 38, critical attributes of an intangible asset are: identifiability, control (power to obtain benefits from the asset), and future economic benefits (such as revenues or reduced future costs).

The basic forms of intangibles are: (1) intangibles created through innovation and discovery, (2) intangibles that underlie organization practices (including also investments in customer satisfaction, product quality, and brand reputation), and (3) intangibles related to human capital (Thum-Thysen et al. 2017).

The specifics of intangible assets are systematic risks, high uncertainty, firm-specificity, the absence of rivalry between uses, human capital intensity, high sunk costs, nontradability of most intangible assets, and synergies and complementarities among intangible asset types (Mohammed and Al Ani 2020; Thum-Thysen et al. 2017).

There are many research papers, the last three decades, which investigate the impact of intangible assets on companies' performances, especially accounting-based financial performance indicators (Tadić et al. 2020) displayed by return on assets (ROA), return on equity (ROE), earnings before interest, taxes, depreciation, and amortization (EBITDA) divided by total revenue (EBITDA margin), net and gross profit margin, growth in revenue, current accounts receivables, inventory turnover, operational cash flow and other. This study demonstrates that "new product releases and patent production have the strongest" (Tadić et al. 2020, 993) effect on company performances, in meaning of notable influence on productivity and consequently a very significant impact on profitability.

According to Andrašić et al. (2018), many empirical studies have investigated internal factors of profitability of the company—such as size, sales growth, debt ratio, quick ratio, age, inventory level, fixed assets to total assets ratio, capital turnover, and others. Research by Andrašić et al. (2018) explores the performance of medium and large agricultural companies in the region of Vojvodina in the Republic of Serbia. Data are collected from the financial reports of companies for the period 2006–2015. This study shows a statistically significant impact of company size, current liquidity, debt, market share, sales revenue growth, insurance, and

export on return on assets as the main profitability determinant. According to Andrašić et al. "in order to improve the performance of medium and large companies in the agricultural sector, and primarily profitability, companies should focus on payment cycles of short-term liabilities and collection of receivables. It is necessary to coordinate time for collecting receivables and paying liabilities so companies provide their liquidity and solvency" (2018, 236).

Economic success is increasingly based on the effective utilization of intangible assets, but despite their significance, the literature reveals a low level of interest in their identification, measurement, and disclosure, especially in the public sector (Bunget et al. 2014). Empirical study of intangible assets in Romanian municipalities was conducted by Bunget et al. (2014). The research results indicate the performance of public sector measured through disclosure index is greater in larger municipalities and the municipalities with the largest value of intangible assets. According to these findings, it can be concluded that the higher value of intangible assets have a positive significant effect on performance in the public sector.

Research study by Sardo and Serrasqueiro (2018) analyzed panel data of a dynamic model based on a sample of non-financial listed companies in 14 Western European countries for the period between 2004 and 2015. This research indicates the importance of intellectual capital for companies' financial performance regardless of being high-tech, medium-tech, or low-tech companies. Findings show a positive effect on the relationship between growth opportunities and companies' financial performance with impact of intellectual capital. Also, according to this study, there is a non-linear relationship between growth opportunities and companies' financial performance and between ownership concentration and companies' growth opportunities. Intellectual capital has a positive influence on companies' growth opportunities. According to this research, managers bear in mind that intellectual capital has a positive effect on the financial performance of the company and the exploitation of growth opportunities.

Denicolai et al. (2014) performed the empirical analysis of a proprietary database of 294 listed companies headquartered in Europe. This study shows the impact of intangibles (distinguishing between internally and externally generated intangible assets) on company growth and analyze the effect of company size, measuring if it can alter the relationship between intangibles and performance. The intangibles are vital in boosting company performance, and "this effect varies with firm size and an additional boost is created by externally generated intangibles" (Denicolai et al. 2014, 219).

The research on the impact of internally generated intangible assets on the performance of companies measured as the market value was conducted by Cosmulese et al. (2021). The research includes a sample of 180 NASDAQ and NYSE-listed entities between 2007 and 2016 in Romania. The research results indicate that the using and implicitly increasing the share of intangible assets of the Romanian entities will reach to the higher profitability.

Corrado et al. (2016) showed evidence of cross-country and cross-industry dataset on investment in tangible and intangible assets for 18 European countries and the US. Findings provides the diffusion of intangible investment across Europe

and the USA over the years 2000–2013. Also, this research provided a growth of accounting evidence before and after the Great Recession in 2008–2009. This research model distinguishes free and commercialized knowledge. Free knowledge is freely available to companies. Commercialized knowledge is produced using inputs and the company must pay for it to use it in their production process (knowledge). This type of knowledge is "accumulated over time, generating the stock of commercial knowledge via the standard perpetual inventory relation and with its own user cost (explicit or implicit)" (Corrado et al. 2016, 3). According Corrado et al. (2016) intangible assets are investments that allow knowledge to be commercialized. Findings of this study show that intangible investments are more dynamic than tangibles. Also, intangible intensity and the intangible-to-tangible ratio are positively correlated with the level of GDP per head and negatively associated with the financial shock of the Great Recession (in 2008–2009). Higher intangible investment rates and higher intangible-to-tangible investment ratio, according to this study have countries with higher average company sizes and less stringent regulations in product and labor markets.

Li and Wang (2014) performed a study reviewing the listed technology companies' annual reports for a 5-year period (from 2008 to 2012) in Hong Kong. They examined the influence of intangible assets (R&D cost, employee benefits expense, and sales training) on financial performance by using ROA as a financial measure of the company. The result of regression model in this study demonstrates both R&D expenditure and sales training have a positive relationship to ROA in statistics but employee benefits expense is not.

Wang et al. (2016) analyzed the different effects of R&D policy choices on accounting performances and market values of listed companies in the Chine Stock Exchanges during the period 2007–2014. According to this study, different R&D policy choices provided different implications for company value and company strategy to the market. If the company is choosing to capitalize on their R&D investments, they will have higher market value, implying that the strategy was focused on sustaining their long-term development. On the contrary, the companies selecting to expense their R&D expenditure have higher accounting performance and the focus was on improving short-term gains. The conclusions are that the policy choice on R&D capitalization and expensing is a trade-off result between the accounting performance and the market value of a company.

Mirović et al. (2019) stated in their research that large companies compared to small companies show more interest in improving performance measurement and they are encouraging higher levels of disclosure because of increasing investor confidence. This observation indicates that for stakeholders or external users higher levels of information is necessary.

"The main measure of the success of enterprise, sector, as well as the economy, is a profitability. Profitability indicates the ability of enterprises to generate a profit in relation to investment" (Mijić and Jakšić 2017, 155). With the intent to analyze factors that affect the profitability of agricultural enterprises in the countries of Southeast Europe (Hungary, Romania, Bosnia and Herzegovina, and Serbia), Mijić and Jakšić (2017) guided a panel data analysis for the period 2011–2014.

The profitability determinants of agricultural enterprises in Hungary and Romania are the same, according to this study and positively affected by leverage, quick ratio, growth, and lagged profitability. In Serbia, and Bosnia and Herzegovina important profitability determinants (quick ratio, lagged profitability, and growth, and in Bosnia and Herzegovina, leverage, is also significant) have only positive influence.

Milić et al. (2018) inspected reliability of reported earnings of agricultural companies in the Republic of Serbia. The research was based on a sample of 1983 agricultural companies - a year observation. This study utilized various regression models and univariate tests. The conclusion is that profitability and leverage have a significant influence on earnings management. According to Milić et al. "research shows that the practice of income-decreasing behavior is associated with companies' profitability, while as income-increasing behavior is associated with profitability and leverage" (2018, 127) of companies.

The findings, among academics and practitioners, indicate that there is a positive relationship between intangible assets investment and companies' performance. Seo and Kim (2020) examined the relationship between investment in intangible assets and performance in small and medium enterprises. The research is based on 173 companies in Korea. Results indicate that intangible assets have a positive effect on a company's profitability and value.

According to Dakić et al. "more information about the impact of some internal factors on profitability will enable investors easier choice of the company they need to invest in and which will allow them to return invested funds with greater certainty" (2019, 489). A study (Dakić et al. 2019) performed in the Republic of Serbia in the period from 2007 to 2015 (9 years) on a sample of 657 observations of companies and includes three groups (samples) of food processing companies (meat, fruit, vegetable, and milk processing companies). The business success in this survey was measured by companies profitability (return on assets), while size, debt ratio, quick ratio, inventory, sale growth, and capital turnover ratio were defined as the independent determinants. The results show that among all three types of food processing industry sale growth has a positive significant influence on profitability.

Glova and Mrazkova (2018) investigated the impact of intangibles on firm value. They examine the value relevance of intangibles expressed by R&D expenditures and intangible fixed assets and other variables with the firm value. Using the regression approach for 1520 observations in the years 2011–2015, they found out that R&D expenses to total assets can significantly explain market to book value ratio of selected companies. One of the findings indicates that intangible fixed assets to total assets are not statistically significant (Glova and Mrazkova 2018).

Bagna et al. (2021) investigated the effect of innovation through patents and intangible assets on growth and profitability of European companies. The research was based on a sample of 6677 observations of listed European companies. Among the findings, the results indicate that there are positive relationship between intangible intensity and growth of companies.

A research study by Cordazzo and Rossi (2020) investigates if the mandatory IFRS adoption influenced the value relevance of intangible assets of non-financial firms listed on Borsa Italiana from 2000 to 2015. This study isolates the impact of

several classes of intangible assets on stock prices and then classifies firms according to intangible asset intensity.

Arianpoor (2021) investigated the impact of intangible assets on company performance in the Tehran Stock Exchange companies. The research was based on the use of multiple linear regression analysis and the sample of 1350 companies. This research investigates intangible assets' role in company performances from 2008 to 2018. The findings show that intangible assets positively impact company performance (return on assets, return on equity, net profit, and profit margin). The author observed that, in emerging economies, intangible assets have notable part in company performance.

Mohanlingam et al. (2021) provided the results of the effects of intangible assets on financial performance and financial policies of listed technology firms in Thailand. The research is based on the data of 33 out of 38 technology companies listed on the Stock Exchange of Thailand for the 5-year period from 2015 to 2019. The results indicated that intangible assets have a significant positive relationship with profitability measured as return on equity. Furthermore, the study found that intangible assets also had a significant positive relationship with financial policies measured as debt to equity. Moderating variables such as company size and leverage were found to significantly influence these relationships.

3   Methodology and Sample

In order to investigate the impact of investment in intangible assets on profitability two regression models are defined. Profitability as a dependent variable is defined as return on assets and return on equity as the two most commonly used variables. The following independent variables are defined: investment in intangible assets, fixed assets ratio, size of company, current ratio, and leverage on return on assets. Investment in intangible assets represents the trend of intangible assets between two period (Table 1).

Model 1/ROA:

Table 1 Definition variables of models

Variables	Character	Mark	Method of calculation
Return on assets	Dependent	Y1	Net income/Total assets
Return on equity	Dependent	Y2	Net income/Capital
Intangible assets	Independent	X1	Intangible assets$_t$/Intangible assets$_{t-1}$
Fixed assets ratio	Independent	X2	Long-term fixed assets/Total assets
Size	Independent	X3	Nat Log of Total assets
Current ratio	Independent	X4	Current Assets/Current Liabilities
Leverage	Independent	X5	Total debt/Capital
Sales growth	Independent	X6	Sales$_t$/Sales$_{t-1}$

Sample distribution
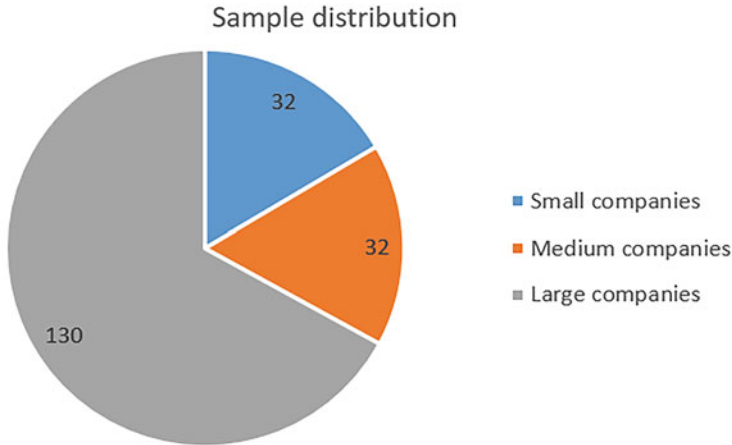
Fig. 1 Distribution of companies by the size in sample

$$Y_{1it} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon i \qquad (1)$$

where $Y_{1it\ t}$—Return on assets (dependent variable); β_0—model constant; βi—coefficiency of independent variables; X_1—Intangible assets (independent variable); X_2—Fixed assets ratio (independent variable); X_3—Size (independent variable); X_4—Current ratio (independent variable); X_5—Leverage (independent variable); X_6—Sales growth (independent variable); E—error with a normal distribution; i—signify each company ($i = 1,\ldots, n$); t—signify the period of time ($t = 1,\ldots, t$).

Model 2/ROE:

$$Y_{2it} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon i \qquad (2)$$

where $Y_{2it\ t}$—Return on equity (dependent variable); β_0—model constant; βi—coefficiency of independent variables; X_1—Intangible assets (independent variable); X_2—Fixed assets ratio (independent variable); X_3—Size (independent variable); X_4—Current ratio (independent variable); X_5—Leverage (independent variable); X_6—Sales growth (independent variable); E—error with a normal distribution; i—signify each company ($i = 1,\ldots, n$); t—signify the period of time ($t = 1,\ldots, t$).

The research is based on the financial statements of 194 observations of companies listed on Belgrade stock exchange during 2017–2020. The sample consists of small, medium, and large companies belonging to the manufacturing sector (C sector) (Fig. 1).

All data were taken from the website of the Business Agency Register of the Republic of Serbia and covered the period from 2017 to 2020. For the data processing, statistical software SPSS v. 23 was used.

4   Results and Discussion

In the assets structure among manufacturing companies the primary is fixed assets. Fixed long-term assets on average represent 49.85% of the total assets of manufacturing companies, while intangible assets represent on average 3.29% of total assets or 5.1% of fixed assets (Table 2 and Fig. 2).

The minimum values of ROA and ROE show that within the analyzed companies there are those with negative profitability. The average value of ROA for the observed sample is 3%, and for ROE 2%, which is relatively low profitability. As for the independent variables, their average values are in line with the expected results (Table 3).

Table 4 presents the Pearson correlation matrix for explanatory variables, showing moderate correlations between them. This is necessary to discover the possible problem of multicollinearity which can cause disorders in estimating the value of parameters, their significance, and the direction of influence on the dependent variable. All values of correlation coefficients are not at a level that could lead to multicollinearity problems. In multiple regression analysis, the variance inflation factor (VIF) is used as an indicator of multicollinearity. The acceptable level of tolerance value is 10 and it is recommended as the maximum level of tolerance (Dakić and Mijić 2020). Since all VIF values are less than 10 (see Tables 7 and 10), it is concluded that there is no multicollinearity between the variables.

Table 2 Structure of intangible assets in total assets and fixed assets

	Average of Intangible assets % of total assets	Average of Intangible assets % of fixed assets
2017	3.4628	5.7721
2018	3.4771	5.3514
2019	3.1451	4.7165
2020	3.1190	4.5822
Grand Total	3.2992	5.1008

Average of Intangible assets growth
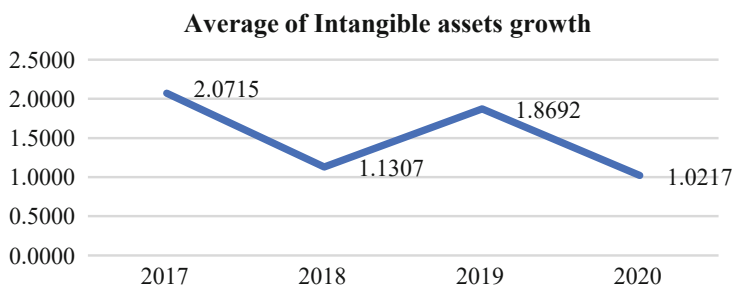
Fig. 2 Trend of average of intangible assets growth

Table 3 Descriptive statistics of dependent and independent variables

Descriptive statistics					
	N	Min.	Max.	Mean	Std. deviation
ROA	194	−0.4017	0.2767	0.032418	0.0841073
ROE	194	−9.3382	3.0589	0.022731	0.7613069
Intangible assets growth	194	0.0163	34.4638	1.522475	3.2018087
Fixed assets %	194	0.0186	0.9211	0.498582	0.2186930
Size ln	194	9.0604	17.8831	14.605450	2.0536015
Current ratio	194	0.2716	17.9751	2.799296	3.4856134
Leverage	194	0.0349	42.7393	2.075730	5.2350954
Growth	194	0.0125	4.4174	1.050215	0.3875414
Valid N (listwise)	194				

Table 4 Result of correlation analysis of variables in the models

	1	2	3	4	5	6	7	8
ROA	1							
ROE	0.172	1						
Intangible assets growth	0.029	0.229	1					
Fixed assets %	−0.101	−0.009	−0.047	1				
Size ln	0.285	0.090	0.109	0.157	1			
Current ratio	0.161	0.037	−0.036	−0.320	−0.091	1		
Leverage	−0.172	−0.292	0.405	−0.149	0.158	−0.175	1	
Growth	0.190	0.160	−0.031	0.065	0.026	−0.110	0.102	1

The results of the regression models show that investment in intangible assets, or intangible assets growth, has a positive and significant impact on profitability measured as return on assets and return on equity. According to these findings, it can be concluded that growth of the value of intangible assets influences the achievement of a higher rate of return on assets and return on equity. The results show that intangible assets are significant at the level of 90%. On the other side, the following independent variables have a significant impact on return of assets at the level of 95%: fixed assets ratio, size, leverage, and sales growth. Size and sales growth have a positive significant impact on return on assets, while fixed assets ratio and leverage have a significant negative relationship to the return on assets (Table 5).

R Square is 0.238 adjusted 0.214 which indicates that 21% of variance of depended variable can be explained with defined independed variables (Tables 6 and 7).

The results of the second model are almost the same as the results of the first model. The difference is that independent variable intangible assets are significant at

Table 5 Model 1 summary

Model summary				
Model	R	R Square	Adjusted R Square	Std. error of the estimate
1	0.488[a]	0.238	0.214	0.0745839

[a] Predictors: (constant), growth, size ln, intangible assets growth, current ratio, fixed assets %, leverage

Table 6 Results of ANOVA model 1

ANOVA[a]						
Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	0.325	6	0.054	9.739	0.000[b]
	Residual	1.040	187	0.006		
	Total	1.365	193			

[a] Dependent Variable: ROA
[b] Predictors: (Constant), Growth, Size ln, Intangible assets growth, Current ratio, Fixed assets %, Leverage

Table 7 Results of regression analysis of model 1

Coefficients[a]								
		Unstandardized coefficients		Standard. Coefficients			Collinearity statistics	
Model		B	Std. error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	−0.201	0.043		−4.695	0.000		
	Intangible assets growth	0.003	0.002	0.118	1.675	0.096	0.827	1.210
	Fixed assets %	−0.068	0.027	−0.177	−2.512	0.013	0.825	1.212
	Size ln	0.014	0.003	0.352	5.348	0.000	0.940	1.064
	Current ratio	0.003	0.002	0.113	1.623	0.106	0.841	1.189
	Leverage	−0.005	0.001	−0.306	−4.142	0.000	0.746	1.341
	Growth	0.052	0.014	0.240	3.710	0.000	0.972	1.029

[a] Dependent variable: ROA

the higher level of 95%. All other variables (fixed assets ratio, size, leverage, and sales growth) have the same level of impact on return on equity. The results also indicate that current ratio does not effect significantly to the profitability ratios in both regression models (Table 8).

R square is 0.305, adjusted 0.282 which indicates that 28% of variance of depended variable can be explained with defined independed variables (Tables 9 and 10).

Table 8 Model 2 summary

Model summary[a]				
Model	R	R Square	Adjusted R Square	Std. error of the estimate
1	0.552[b]	0.305	0.282	0.6449143

[a] Dependent variable: ROE
[b] Predictors: (Constant), Growth, Size ln, Intangible assets growth, Current ratio, Fixed assets %, Leverage

Table 9 Results of ANOVA model 2

ANOVA[a]						
Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	34.085	6	5.681	13.658	0.000[b]
	Residual	77.776	187	0.416		
	Total	111.861	193			

[a] Dependent Variable: ROE
[b] Predictors: (Constant), Growth, Size ln, Intangible assets growth, Current ratio, Fixed assets %, Leverage

Table 10 Results of regression analysis of model 2

Coefficients[a]								
		Unstandardized coefficients		Standard. Coefficients			Collinearity statistics	
Model		B	Std. error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	−0.951	0.371		−2.565	0.011		
	Intangible assets growth	0.103	0.016	0.432	6.442	0.000	0.827	1.210
	Fixed assets %	−0.416	0.234	−0.120	−1.781	0.077	0.825	1.212
	Size ln	0.051	0.023	0.137	2.177	0.031	0.940	1.064
	Current ratio	−0.009	0.015	−0.042	−0.632	0.528	0.841	1.189
	Leverage	−0.078	0.010	−0.538	−7.616	0.000	0.746	1.341
	Growth	0.448	0.121	0.228	3.691	0.000	0.972	1.029

[a] Dependent variable: ROE

The results are according to the findings of other similar research papers (Seo and Kim 2020; Bagna et al. 2021; Qureshi and Siddiqui 2020), which clearly documented that there is a significant positive relationship between intangible assets and financial performance of companies measured as profitability ratios.

In relation to the set models of this research, Seo and Kim (2020) investigated the impact of investment in intangible assets on better company performance by

focusing on specific intangible assets such as human capital, advertising, and research and development. In this sense, the key difference compared to this research which gathers all intangible assets for balance sheet is the inclusion of specific intangible assets. In their model, the authors set the profitability and value of the company as the dependent variable. The independent variables, according to them, are the size of the company, the age of the company, human capital, advertising, and research and development. All VIF values are less than 10, so there is no multicollinearity. R Square is 0.16 which indicates that 16% of variance of a depended variable can be explained with defined independed variables. All results are significant at 1% significance level. The author's conclusion is that managers should increase investments in these three types of intangible assets and as a result, there will be an increase not only in the profitability of the company but also in the value of the company for investors. One of the interesting findings is that investment in advertising affects the profitability and value of the company. Given that companies can invest separately or simultaneously in human capital, advertising, research and development to improve their performance, managers should strategically use these three key factors and adopt investments in intangible assets to achieve their managerial goals.

Bagna et al. (2021) put innovation as one of the most important drivers of company growth. They analyzed whether there is a significant relationship between investment in specific forms of intangible assets, such as patents, and better company performance. In relation to this research, which includes all forms of intangible investments that are recorded in the company's balance sheets, Bagna et al., focused on those that have the patent value shown in their balance sheets. As the first dependent variable, the authors set the growth of the company, which they calculated as the difference in consecutive periods in the position of sales revenue, while as the second dependent variable they set ROIC, as a measure of profitability. The authors emphasize that the use of ROIC in this analysis is more suitable than the use of ROE, primarily because the numerator includes operating profit that is not influenced by the capital structure. Indicators related to patents were set as independent variables, where the intensity of intangible investments (INT) is the most important variable. R-squared is equal to 0.30 in the full Model, supporting good reliability for findings. The regression results are at the significance level of 1%, 5%, and 10%.

Qureshi and Siddiqui (2020) analyzed the impact of intangible assets on profitability, efficiency, capital structure and dividend policy, and market value of technology companies. The main purpose of this study is to determine whether intangible assets affect the financial indicators of a company or not. Unlike this research, where we measured the impact through changes in ROA and ROE, they analyzed the movement of other financial indicators of the company, such as ROIC, Leverage, P/E, P/sales, and P/book value. As a dependent variable, the authors set the value of the company's intangible assets, and as independent variables, they listed the financial indicators of profitability and company value. The first significant conclusion of their research, at the same time the opposite conclusion of this research, is that investments in intangible assets have a significant negative impact on ROE, ROA and other listed indicators, at the significance level of 1%. Also that

they have an insignificant positive impact on the profit margin, P/E, and a significant positive impact on dividends policy. Additionally, looking separately at the countries included in the research in Finland, Japan, Pakistan, and the USA, the intangible assets have a significant positive impact on ROA and ROE, which is fully consistent with the results of this research.

5   Conclusions

Investment in intangible assets affects profitability of companies positively. The objective of the empirical research was to determine whether there is a significant relationship between the growth of investment in the company's intangible assets and its business performance in the form of profitability. From the empirical research, which was set up through two models, two conclusions were drawn: The first is that there is a significant positive relationship between investment in intangible assets and the growth of return on assets (ROA) and the second is that there is an even more significant positive relationship between the growth of investment in intangible assets and return on equity (ROE). These results are supported by previous research that dealt with the relationship between investment in intangible assets and changes in company performance.

This paper has helped to expand the theoretical concept of intangible assets and the impact of investment in intangible assets on profitability of companies. This paper also has practical implications.

The manufacturing sector is a very important part of the overall economy of the Republic of Serbia, with a significant share of the total GDP. It is crucial for a developing country to recognize and invest in those factors that will contribute to faster growth. Investing in intangible assets in the modern economy is a necessity, given the rapid technological changes. Only by consensual investment in software, patents, licenses, and other forms of intangible assets, companies will readily meet the challenges that await them in the business operations of the twenty-first century. The research results can be of interest to managers of listed manufacturing companies in Serbia in order to make decisions about future business policy, adjustment to changes, and as a final goal—achieving a higher rate of profitability, growth, and company value. The results of research should encourage the managers of listed manufacturing companies to invest more in intangible assets that are crucial for their business strategy.

The limitations of research can be observed in the point of based on the one sector manufacturing companies and one country. Future research should include comparative analysis with other sectors and other countries. Another limitation of this research may be that the intangible assets used in the analysis were taken as a whole from the balance sheet. The growth of intangible assets was taken as a change in the complete BS position, and thus it is not possible to emphasize the role of specific forms of intangible assets, which may have a more significant contribution to the profitable growth. The recommendation for further research can be to analyze

the links of specific forms of intangible assets to financial indicators, with the aim of focusing future investments in those intangible assets that create the most value for company.

Investment in intangible assets affects profitability of companies positively. This paper has helped to expand the theoretical concept of intangible assets and the impact of investment in intangible assets on profitability of companies. The research results can be of interest to managers of listed manufacturing companies in Serbia in order to make decisions about future business policy and achieving a higher rate of profitability. The results of research should encourage the managers of listed manufacturing companies to invest more in intangible assets in order to increase the profitability. The limitations of research can be observed in the point of based on the one sector manufacturing companies and one country. Future research should include comparative analysis with other sectors and other countries.

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