



INTELLECTUAL CAPITAL AND PROFITABILITY: A FIRM VALUE APPROACH IN THE EUROPEAN COMPANIES

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Abstract. Intangibles are, at a knowledge-based economy, the most important resources, driving companies towards systematic and sometimes unexpected returns. This paper follows a positivist approach and aims to investigate the association between the degree of intangibility, value of firms and their profitability. Based on the 500 largest European companies, rated by *Financial Times*, the most relevant insights emerge from the association between firms' knowledge intensity level and its degree of profitability. These insights consolidate the evidences that immaterial resources act as drivers of future benefits and are embodied on firms' profitability ratios.

Keywords: intellectual capital, intangibles, degree of intangibility, profitability, return on equity, return on assets, return on capital employed, return on sales, Tobin's Q.

JEL Classification: O34, L25, G32.

Introduction

To Simai (2003), the assumption that information and knowledge are key drivers, both in the process of production or as an essential part or the final commodities, is unquestionable and always has had impact on value creation. Knowledge emerges to make a spear, as well as a microchip: what have effectively changed was the quantity, the quality, the density of knowledge and information, the speed in which they are disseminated and changed, and the proportion of them which is embodied in the final products and services. In companies, knowledge is embodied in intangible assets. An intangible asset is a differentiating factor of business (Stewart 1997) and can become a competitive advantage, allowing companies to continue their activities. Lev (2001) argues that the increase in competition and the emergence of information and communication technologies has definitely changed the process of business value creation. Thus, intangible assets play an increasingly

important role in the scope of developed economies. Bontis *et al.* (1999) also argue that the most successful companies are those that use their intangible assets better and faster than competitors. To Ichijo (2002), only a company that generates knowledge is able to be successful in the market, and only wins if it innovatively driven. A significant part of the market value of a company is not embodied in the intangible assets recognized in the balance sheet. The difference between the market value and the book value of a company represents the invisible value, embodied in non-capitalized intangibles.

Over the last two decades, new categories of intellectual capital and intangible resources have emerged in the economic literature, in particular in the new age business models structures (Edvinsson, Malone 1997; Schiuma *et al.* 2008; Survilaitė *et al.* 2015). Traditionally, intellectual capital can be split into four categories: human capital, structural capital, organizational capital, and relational capital (Edvinsson, Malone 1997). However, Schiuma *et al.* (2008) and also refer

to social and stakeholder capital, as subsets of organizational and structural capital, respectively. Thus, it is expected that the accounting treatment (recognition and disclosure) of intangible affect the firms' future returns, in particular their performance indicators, in particular their profitability (Zéghal, Maaloul 2010; Mačerinskienė, Survilaitė 2011; Kianto *et al.* 2013; Tudor *et al.* 2014; Salchi *et al.* 2014; Survilaitė *et al.* 2015). As evidenced by Tudor *et al.* (2014), the level of intangibles has a direct relationship with profitability, by comparing the intangibles-to-total-assets ratio and other measures of profitability such as Return of Assets (ROA), Return of Capital Employed (ROCE), and Gross Margin (GM). Based on several models and approaches (Edvinsson, Malone 1997; Survilaitė *et al.* 2015; Mačerinskienė, Aleknavičiūtė 2015), intellectual capital and intangibles have been identified and managed as key drivers of performance and profitability. These immaterial resources are included on the firms' financial statements or disclosed in complimentary reports (Lopes 2010) towards the increase of value relevance of firms. Hence, the management of intellectual capital impacts on performance in terms of competitiveness, as well as financial revenues. According to Kianto *et al.* (2013: 119) "*the management of intangibles is a key managerial mechanism for firms in the knowledge economy*".

This paper aims to investigate the association between the degree of intangibility of European companies and their profitability level, and the association between the degree of intangibility and firms' value. It is structured as follows: the next section addresses the prior literature insights and research hypotheses. Methodology describes the research approach and methods (Sekaran, Bougie 2013; Lopes 2015), the data, the variables, and general descriptive measures. The next section analyses the empirical results and discussion, complemented by final remarks and expected future outcomes.

1. Prior research and hypotheses

Some authors (Brooking 1996; Edvinsson, Malone 1997; Lev, Zarowin 1999; Stewart 1997; Sveiby 1997; Zéghal, Maaloul 2010; Kianto *et al.* 2013; Tudor *et al.* 2014; Salchi *et al.* 2014; Survilaitė *et al.* 2015) argue that intellectual capital explains the difference between the market value and the book value. Broadly, it can be defined as the wealth of knowledge-based companies. It has attracted over the last decades, a significant practical interest and impact (Petty, Guthrie 2000). Stewart (1997) argues that the intellectual resources such as knowledge, information and experience, are the tools for creating wealth and defines intellectual capital as the new wealth of organizations. Sullivan (2000) defines as intellectual capital the knowledge that can be converted into profits. Primarily, due to intellectual capital

measurement issues and difficulties, companies are facing problems with their management (Andrikopoulos 2005). For Kok (2007), a method for determining the intellectual capital, or the intangible side of a company, is comparing the market value with its book value. These arguments are based on the intellectual capital assumptions. Intellectual assets of a company are intangible in nature and therefore do not have a way or a suitable financial value. They are characterized as hidden assets, since it is difficult to identify their unique contribution to a company value creation (Fincham, Roslender 2003). Intellectual capital is not reported in traditional financial statements since some of its elements do not meet the definition or recognition criteria (Lopes 2010). According to the International Accounting Standard (IAS) 38 (IFRF 2004), the definition of an intangible asset is an identifiable non-monetary asset without physical substance. An asset is a resource that is controlled by the entity as a result of past events, for example, purchase or self-creation and from which future economic benefits (inflows of cash or other assets) are expected. Therefore the three critical attributes of an intangible asset are: identifiability; control or power to obtain benefits from the assets; and future economic benefits, such as revenues or reduced future costs. The list of items that should not be included in the balance sheet includes the brands, mastheads, publishing titles, customer lists and items similar in substance internally generated (IAS 38). If an item does not meet the definition of intangible assets and the criteria for recognition as an intangible asset, the expenditure on this item should be expensed when it is incurred.

The research conducted by Riahi-Belkaoui (2003), focused on the relationship between intellectual capital and the performance of selected multinational companies of the USA, suggests that intellectual capital is positively associated with financial performance. In the same trend, the research of Alshubiri (2015) aims to demonstrate the impact of the intellectual capital from market capitalization on profitability in the financial sector, listed in Muscat Security Market of Oman. This research used the market capitalization methods (MCM) to measure intellectual capital as independent variables on profitability. The results indicated a statistically significant impact of Tobin's Q, on market to book value, and on profitability, based on ROE and EPS. Complimentarily, the research conducted by Chen *et al.* (2005) was applied to firms listed on the Taiwan stock exchange (TSE), and has investigated the relationship between intellectual capital and a firm's market value and financial performance. The results support a significantly positive relationship among intellectual capital, market value and financial performance.

Several other researches have been concluded over the last decade, supporting the assertions between intangibles and firms' performance and profitability. Thus, Salojärvi

(2004) found that companies that implement active practices to manage their intangibles obtain better results in innovation and in the development of new products processes. To Liang, Yao (2005), net income is the most significant explanatory capability in market value of Taiwan information electronic company when examined on intangible assets, balanced scorecard and intellectual capital, respectively. Tan *et al.* (2007) evidence that intellectual capital and company's performance is positively related. Intellectual capital is correlated to future company performance, and the rate of growth of a company's IC is positively associated to the company's performance. Furthermore, the contribution of intellectual capital to company performance differs by industry. The researches of Oliveira *et al.* (2010), focused on the companies listed in BM&FBovespa, conclude that companies with higher degree of intangibility perform better. However, the results from Mosavi *et al.* (2012) were emerged from Iranian companies and revealed no conclusive evidence to support a definitive association between intellectual capitals, measured by VAIC. Furthermore, there is just a statistically significant relationship between human capital efficiency and financial performance and the degree of intangibility.

Nascimento *et al.* (2012) has analysed only companies in the Technology, Information and Telecommunications sector, listed in BM&FBovespa. That research investigates the correlation among the degree of intangibility and the performance indicators. These results show that no differences exist among the analysed segments. Vasconcelos *et al.* (2013) observed the behaviour of the degree of intangibility of the largest banks listed on the BM&FBovespa for the period 2007–2010 and found that (i) the explanatory notes were the accounting document most commonly used for the presentation or decomposition of intangibles, (ii) the most representative types of intangible assets were “expenditure on acquisition and software development”, “software and systems” and “acquisition of payrolls” with regard to frequency, and “goodwill” and “acquisition of payrolls” with regard to average volume of investment; (iii) the predominant classification of intangible assets was “infrastructure assets”, (iv) the degree of intangibility decreased over the study period, and (v) no symmetry was observed between variations in the index of investments in intangible assets and market value.

The diversity on intellectual capital models approaches over the last decade (Survilaitė *et al.* 2015) has conducted researches to an increase usage of value added performance indicators. These indicators have the ability to capture the value creation over a certain period of time and can act as significant predictors of expected returns. In this scope, Zéghal, Maaloul (2010), using data from UL listed companies, also concluded that there is a positive association between value added intellectual

capital coefficient and economic performance, financial performance and stock market performance. The same association signal was obtained in relation to the association between value added capital employed coefficient and economic performance, financial performance and stock market performance. Thus, these evidences support the significant role of intellectual capital in creating value for stockholders as well as for other stakeholders. Salchi *et al.* (2014) have examined the relationship between six variables (e.g. structural capital efficiency, human capital efficiency, economic value added) and firms financial performance of the chemical and pharmaceutical firms listed in Tehran Stock Exchange. Their results suggest that all the relationships are significant except for the relationship between structural capital efficiency, economic value added, and financial performance.

Broadly, intangibles and intellectual capital are linked with firms' competitiveness (Kianto *et al.* 2013) and can act as predictors of future performance. Although measured through multiple and diversified approaches and indicators, those resources can be viewed “as strategic assets since their inclusion in the structure of the total assets allows companies to extract a competitiveness rent and, thus, to enhance the outcomes of their activity” (Tudor *et al.* 2014: 292).

Based on prior researches and outcomes, we formulate our hypotheses as follows:

H₁: The European companies with major degree of intangibility are more profitability;

H₂: The European companies with major degree of intangibility are more valuable.

2. Methodology and methods

2.1. Approach and data source

This paper follows a positivist or mainstream approach (Sekaran, Bougie 2013; Lopes 2015), based on the possibility to predict the firms' performance based on its knowledge intensity and intangibility level. Thus, we assume that our research can be replicable, based on its findings generalization. Thus, through a deductive reasoning, cause and effect relations are tested within structured and multilateral frameworks.

This research is based on 486 European companies. In the first step our sample was selected by considering all firms included in the *Financial Times* 2014 classification of the 500 largest European companies, with reference to 2013 market value. Fourteen companies were not included in the sample due to the information unavailability. Largest companies were selected towards the analysis of a set of companies that are economically important and that operate in multiple environments such as legal, institutional and economic conditions. The information about companies was extracted from *Datastream* database over the current year.

2.2. Variables

The degree of intangibility is calculated by dividing the Market Value by Book Value, following the same approach as other researches such as Riahi-Belkaoui (2003), Tudor *et al.* (2014), and Alshubiri (2015). This ratio represents how many times the market value is above, or below, the book value, assuming that higher the intangibility degree more relevant will be the intangible assets in the company. Based on the degree of intangibility of each company, the median was calculated allowing the categorization of companies into two different groups; 1. the intangible-intensive companies with a degree of intangibility equal or higher than the median composed by 244 companies and 2. the tangible-intensive companies with a degree of intangibility below the median composed by 242 companies. Thus, the Knowledge Intensity was classified by splitting companies in two groups, based on the median descriptive measure (Group 1 – *Knowledge Intensive Companies*: with a Degree of Intangibility equal or above its median measure; Group 2 – *Non-Intensive Knowledge Companies*: Degree of Intangibility below its median measure). Profitability was measured by the Return on Assets (ROA), Return on Equity (ROE), Return on Capital Employed (ROCE) and Return on Sales (ROS). These indicators are often used in financial and accounting literature in evaluating the performance of companies. ROA is calculated by dividing a company's annual earnings by its total assets providing insights as to how efficient management is in using its assets to generate earnings. ROE is calculated by dividing a company's annual earnings by its Shareholder's Equity and evidences how well a company uses investments to generate earnings growth. ROCE is calculated by dividing the Earnings Before Interest and Tax (EBIT) by the Capital Employed. This indicator is the difference between Total Assets and Current Liabilities. ROCE measures a company's profitability and the efficiency with which its capital is employed. ROS is calculated by dividing the Earnings Before Interest and Tax (EBIT) by the Sales and is used to evaluate a company's operational efficiency. All of these variables are supported by prior researches such as Lev, Zarowin (1999), Zéghal,

Maaloul (2010), Kianto *et al.* (2013), Tudor *et al.* (2014), Salchi *et al.* (2014), and Survilaitė *et al.* (2015).

The firm value is measured by Tobin's Q, defined as the sum of the market value of shares of the company and liabilities divided by the book value and liabilities. Thus, Tobin's Q is often used in financial and accounting literature in evaluating the companies. Table 1 resumes the variables description.

3. Empirical results and discussion

3.1. Descriptive analysis

The 486 companies were integrated into ten activity sectors and the number of companies from each sector is shown in Table 2. The main representative (24.9%) is the sector “*Financials*” (which includes financial services, nonlife insurance, life insurance, banks, real estate investment and services and real estate investment trusts). The second most representative sector (17.9%) is the “*Industrials*” (which includes industrial transportation, industrial engineering, construction and materials, support services, aerospace and defence, electronic and electrical equipment and general industrials), followed by the sector “*Consumer goods*” (which includes personal goods, beverages, food producers, household goods and home construction, automobiles and parts and tobacco), representing 12.6% of total. Table 3 evidences that the most represented country, in number of firms, is United Kingdom (22.2%), France (15%), and Germany (11.3%). Countries like Luxembourg and Romania evidence a very residual influence in this sample.

Based on the classification according to its activity (Eurostat 2014), the 486 companies included in the sample were split into *KNOWLEDGE INTENSIVE* or *NON-KNOWLEDGE INTENSIVE*, as mentioned above. The first group is composed by 282 companies and the second group integrates 204 companies (Table 4).

Table 1. Variables description

Variable	Description
Intangibility degree	Market Value/Book Value
ROA	Return on Assets: Net Income/Assets
ROE	Return on Equity: Net Income/Equity
ROCE	Return on Capital Employed: EBIT/ Capital employed
ROS	Return on Sales; EBIT/Sales
Tobin's Q	(Market Value + Liabilities) / (Book Value + Liabilities)

Table 2. Activity sectors

Activity sector	N	%
Basic materials	44	9.1
Consumer goods	61	12.6
Consumer services	56	11.5
Financials	121	24.9
Health care	23	4.7
Industrials	87	17.9
Oil & gas	33	6.8
Technology	14	2.9
Telecommunications	21	4.3
Utilities	26	5.3
Total	486	100.0

Table 3. Countries

Country	N	%	Country	N	%
Austria	7	1.4	Norway	10	2.1
Belgium	10	2.1	Poland	10	2.1
Czech Republic	2	0.4	Portugal	5	1.0
Denmark	13	2.7	Romania	1	0.2
Finland	10	2.1	Russia	21	4.3
France	73	15.0	Spain	23	4.7
Germany	55	11.3	Sweden	24	4.9
Greece	5	1.0	Switzerland	38	7.8
Hungary	2	0.4	The Netherlands	22	4.5
Ireland	4	0.8	Turkey	14	2.9
Italy	28	5.8	UK	108	22.2
Luxembourg	1	0.2	Total	486	100.0

Table 4. Knowledge intensity

Company classification	N	%
Knowledge Intensive	282	58.0
Non-Knowledge Intensive	204	42.0
Total	486	100

Table 5 illustrates the main descriptive statistics measures, considering the sample and the classification according company's knowledge intensity. Table 6 evidences the main descriptive statistics measures, not considering the extremes values from the intangibility degree.

3.2. Hypothesis tests

We used the *t*-Student test to verify that the null hypothesis (H_0) would, or not, be rejected. The null hypothesis is rejected in case of ROA, ROE ROCE and Tobin's Q, evidence that there is a difference between those indicators, observed for Knowledge Intensive (intangible-intensive) companies and for Non-Knowledge Intensive (tangible-intensive) companies. In case of ROS, the null hypothesis is not rejected, which supports the evidence that there are no statistically differences between the mean of ROS obtained for intangible-intensive companies and ROS observed in tangible-intensive companies. The same test was run to the sample with no extreme values of the degree of intangibility and the results obtained corroborate the previous results.

3.2.1. Degree of intangibility and the profitability

Degree of intangibility and ROA

Table 7 evidences the descriptive measures of the degree of intangibility and ROA and the tests of the null hypothesis

Table 5. Descriptive measure

Variable	N	Mean	Median	Standard deviation
Intangibility degree	486	3.0643	2.0700	3.4935
Knowledge intensive	282	2.8743	1.8900	3.4202
Non- Knowledge intensive	204	3.3269	2.3750	3.5843
ROA	486	0.0527	0.4087	0.0061
Knowledge intensive	282	0.0490	0.0343	0.0665
Non-Knowledge intensive	204	0.0576	.04702	0.0544
ROE	486	0.1403	0.1203	0.0182
Knowledge intensive	282	0.1332	0.1163	0.1600
Non-Knowledge intensive	204	0.1501	0.1262	0.2086
ROCE	374	0.0746	0.0644	0.0541
Knowledge intensive	183	0.0745	0.0673	0.0575
Non-Knowledge intensive	191	0.0748	0.0634	0.0508
ROS	486	0.1807	0.1218	0.3161
Knowledge intensive	282	0.1876	0.1293	0.3731
Non-Knowledge intensive	204	0.1712	0.1129	0.2143
Tobin's Q	486	1.7738	1.3270	1.5072
Knowledge intensive	282	1.6686	1.1843	1.4418
Non-Knowledge intensive	204	1.9193	1.4645	1.5851

Table 6. Descriptive measure not considering the extremes

Variable	N	Mean	Median	Standard deviation
Intangibility degree	438	2.5293	2.0700	1.6508
ROA	438	0.0496	0.0411	0.0539
ROE	438	0.1290	0.1213	0.1333
ROCE	344	0.0693	0.0633	0.0444
ROS	438	0.1838	0.1214	0.3280
Tobin's Q	438	1.5992	1.3292	0.8793

(H_0). This hypothesis states that the mean of ROA of intangible intensive European companies is equal to the mean of ROA of intensive tangible European companies. Empirical evidence supports that the largest mean is observed in the group of intangible intensive companies. Furthermore, the results from *t*-Student test also supports the rejection of the null hypothesis, evidencing that there is a difference between the indicator ROA obtained in intangible-intensive companies and the same indicator observed in tangible-intensive companies.

Table 7. The degree of intangibility and the ROA

Degree of intangibility	N	Mean	Median	Standard deviation	Max	Min
Intangible intensive	244	0.0750	0.0607	0.0680	0.4519	−0.0959
Tangible intensive	242	0.0303	0.0173	0.0450	0.3932	−0.0584

t Test for equality of means: $t_{(484)} = 8.505$; $p = 0.00$.

Degree of intangibility and ROE

Table 8 includes the descriptive measures of the degree of intangibility and ROE, including the tests of the null hypothesis (H_0), which states that the mean of ROE of intangible intensive European companies is equal to the mean of ROE of intensive tangible European companies. The empirical evidence indicates that the largest mean is observed in the group of intangible intensive companies. Complimentarily, the statistical results from t -Student test indicate the rejection of the null hypothesis. Thus, there is a difference between the ROE obtained by intangible-intensive companies and the ROE obtained for tangible-intensive companies.

Degree of intangibility and ROCE

Table 9 relates to the descriptive measures of the degree of intangibility and ROCE. In this scope, the null hypothesis is described as follows: the mean of ROCE of intangible intensive European companies is equal to the mean of ROCE of intensive tangible European companies. This supports the evidence that the largest mean is observed in the group 1 (intangible intensive companies). Furthermore, the results derived from t -Student test indicate the rejection of the null hypothesis which means that there is a statistically

significant difference between the ROCE obtained by intangible-intensive companies and the ROCE obtained for tangible-intensive companies.

Degree of intangibility and ROS

In the next table (Table 10), we evidence the descriptive measures of the degree of intangibility and the indicator ROS, including the test related to the mean's differences. The null hypothesis states that the mean of ROS of intangible intensive European companies is equal to the mean of ROS of intensive tangible European companies. From the empirical evidence, we can conclude that the largest mean is observed in the group of tangible intensive companies. Thus, null hypothesis cannot be rejected, confirming that there is no difference between the ROS obtained by intangible-intensive companies and ROS observed in tangible-intensive companies.

These results are consistent with the results reported in several previous researches (Riahi-Belkaoui 2003; Chen *et al.* 2005; Tan *et al.* 2007; Oliveira *et al.* 2010; Zéghal, Maaloul 2010; Kianto *et al.* 2013; Tudor *et al.* 2014; Salchi *et al.* 2014). Thus, intellectual capital is positively associated with financial performance, acting as a key driver on the companies' value creation processes.

Table 8. The degree of intangibility and the ROE

Degree of intangibility	N	Mean	Median	Standard deviation	Max	Min
Intangible intensive	244	0.1935	0.1600	0.2075	1.7805	−0.6227
Tangible intensive	242	0.0865	0.0847	0.1321	1.4123	0.3366

t Test for equality of means: $t_{(484)} = 6.773$; $p = 0.00$.

Table 9. The degree of intangibility and the ROCE

Degree of intangibility	N	Mean	Median	Standard deviation	Max	Min.
Intangible intensive	229	0.8806	0.0757	0.0598	0.3608	−0.0338
Tangible intensive	145	0.5345	0.0847	0.0347	0.1687	0.0342

t Test for equality of means: $t_{(372)} = 6.334$; $p = 0.00$.

Table 10. The degree of intangibility and the ROS

Degree of intangibility	N	Mean	Median	Standard deviation	Max	Min.
Intangible intensive	244	0.1601	0.1392	0.1295	0.7415	−0.0684
Tangible intensive	242	0.2009	0.0995	0.4282	5.5302	−0.2449

t Test for equality of means: $t_{(484)} = -1.401$; $p = 0.16$.

Table 11. The degree of intangibility and the Tobin's Q

Degree of intangibility	N	Mean	Median	Standard deviation	Max	Min.
Intangible intensive	244	2.4652	1.8823	1.8840	17.3419	0.2315
Tangible intensive	242	1.0859	1.0239	0.2145	1.9099	0.3963

t Test for equality of means: $t_{(484)} = 11.242$; $p = 0.00$.

3.2.2. Degree of intangibility and firm value

Descriptive measures of the degree of intangibility and ROE, including the tests of the H_0 , is evidenced in Table 11. The null hypothesis illustrates that the mean of Tobin's Q of intangible intensive European companies is equal to the mean of Tobin's Q of intensive tangible European companies. However, the results evidences that the largest mean is observed in the group of intangible intensive companies. The results obtained from *t*-Student test indicate the rejection of the null hypothesis. Thus, there is a difference between the Tobin's Q obtained by intangible-intensive companies and Tobin's Q obtained for tangible-intensive companies.

These results evidences that the relationship between the degree of intangibility and firm value is consistent with the results presented in the research conducted by Chen *et al.* (2005) and Zéghal, Malool (2010), which supports a significantly positive relationship between intellectual capital, market value performance, and companies' financial performance.

3.2.3. Knowledge intensity

Based on the classification of companies above (according the company's knowledge intensity), a similar statistical analysis was carried out separately for both groups (Knowledge Intensive companies and Non-Knowledge Intensive companies, respectively). The results are summarized in the next table (Table 12). Thus, we have a reasonable basis to conclude that for both groups the null hypothesis was rejected, except in the case of ROS. Thus, the mean of ROA, ROE, ROCE, and Tobin's Q, are statistically different, evidencing higher values in the first group (Knowledge Intensive Companies).

In the particular case of ROS, and as mentioned above, the null hypothesis cannot be rejected, concluding that there is no significant differences between knowledge intensity and the operational key performance indicator ROS. This evidence can suggest that knowledge intensity will significantly impact on external measures (*e.g.* ROE, and value added measures), accurately perceived and incorporated by actual and potential investors. In fact, ROS is a current efficiency measure, operational and internally focused, and driven to short run actions and strategies. Relating the sectors of activity under analysis, the null hypothesis is not rejected ($p > 0.05$) for ROE which evidences that there

Table 12. *t* Test for equality of means

Variable	Statistics
Knowledge Intensive Companies	
ROA	$t_{(280)} = 5.916$; $p = 0.00$
ROE	$t_{(280)} = 6.062$; $p = 0.00$
ROCE	$t_{(181)} = 3.232$; $p = 0.00$
ROS	$t_{(280)} = -0.605$; $p = 0.51$
Tobin's Q	$t_{(280)} = 8.775$; $p = 0.00$
Non-Knowledge Intensive Companies	
ROA	$t_{(202)} = 6.173$; $p = 0.00$
ROE	$t_{(202)} = 3.571$; $p = 0.00$
ROCE	$t_{(189)} = 5.967$; $p = 0.00$
ROS	$t_{(202)} = -1.826$; $p = 0.07$
Tobin's Q	$t_{(202)} = 6.824$; $p = 0.00$

is no differences between means across sectors. However, some differences were found for ROA across the following activity sectors: "Financials" and "Consumer Goods" ($p = 0.002$); "Financials" and "Consumer Services" ($p = 0.000$); "Financials" and "Health Care" ($p = 0.000$); "Health Care" and "Utilities" ($p = 0.017$). In the case of ROCE, the statistical differences, at a significance level of 5%, were observed between "Health care" and "Utilities" ($p = 0.006$) and between "Health Care" and "Industrials" ($p = 0.028$). Finally, the most significant differences were observed when using the indicator Tobin's Q. Based on a significance level of 1%, we underline the most relevant differences across activity sectors: "Consumer Services" and "Financials" ($p = 0.000$); "Consumer Services" and "Oil and Gas" ($p = 0.006$); "Financials" and "Health Care" ($p = 0.003$); and "Utilities" and "Consumer Services" ($p = 0.010$). Other significant differences can be observed if we increase the analysis significance level.

As a concluding remark in the scope of our outcomes, we didn't find in previous researches, a direct association between the degree of intangibility and profitability of firms, based on its market value and knowledge intensity. Hence, these new insights constitute a new and important outcome towards the consolidation assertion that intangible resources and intellectual capital drive companies towards value creation and sustainability. Traditional and new measures can be incorporated in new intellectual capital models (Mačerinskienė, Aleknavičiūtė 2015) towards the increase

firms' value relevance and its dynamic perception by markets and other stakeholders.

Conclusions

This paper was focused on the association between the degree of intangibility of European companies (according *Financial Times* classification), its profitability level, and the firms' value. Measuring the profitability through the key performance indicator ROA, ROE, and ROCE, the most relevant findings of the empirical research evidence that there is a difference between the profitability and the firm value observed in intangible-intensive companies and tangible-intensive companies. This supports the accounting and economic traditional assertions that intangibles can act as significant predictors of performance and profitability. Furthermore, it is also possible to support the assertion that financial markets can accurately perceive the importance of intangibles embodied in external key performance indicators such as ROE, ROA, ROCE, or Tobin's Q. However, if profitability is measured using the indicator ROS, we conclude that there is no difference between this indicator distribution and the degree of intangibility across the groups under analysis. This evidence can be supported by the indicator nature, strongly focused on operational and internal efficiency. Across the sectors under analysis, we also found some important differences. This confirms the different levels of knowledge intensity across sectors, and its subsequent impact on performance indicators disclosed to stakeholders. Broadly, our findings corroborate the principles stated on intellectual capital and intangibles literature, and related accounting standards, providing additional empirical evidence towards a positive contribution to the intellectual capital literature and its impact on the performance obtained over the years to come. As research limitations, we can underline the use of a limited set of performance and profitability indicators, the need to perform a similar analysis for a wide range of time, and the simplistic method used in the classification of companies in knowledge intensive and non-knowledge intensive companies. Our research directions are focused on the effort to surpass the mentioned limitations, by using complementary and new research approaches and methods.

Disclosure statement

The authors report no financial interests or potential conflicts of interest.

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