

MANAGERIAL ASPECT OF INTANGIBLES: OWN DEVELOPMENT OR EXTERNAL PURCHASED INTANGIBLE ASSETS – WHAT DOES REALLY COUNT?

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Abstract: Managerial decision-making between the purchase of intangible assets and own investment or development of these types of assets is important in a company. From this perspective, the authors have analyzed the intangible assets and research and development expenditures in the position of exogenous variables affecting the business value of publicly traded companies in the paper. The authors use panel data of 313 European publicly traded companies from four time periods (2014 - 2017). The study finds that R&D expenses, as well as intangible fixed assets, can significantly explain market capitalization of the selected companies. The study also finds that increasing investment in the R&D causes an increase in the market capitalization. An analysis of the study expresses that firm with higher intangible investment tends to have higher market capitalization and that investment in intangible assets is rewarded in the form of higher intangible capital as a part of the market capitalization. So, the investment in the R&D is evaluated significantly and positively by the market. However, the strategy of externally acquiring intangible assets instead of their development is not positively evaluated by the market as we see the base on the results of our research.

Keywords: Managerial Decision, Intangible Assets, Business Value, Research and Development, Intangible Fixed Assets, Intangible-intensive Firms.

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Introduction

Intangible assets have undoubtedly been, and even are, a significant component of the company's assets. Managerial decision-making between the purchase of intangible assets and own investment and the development of these types of assets is one of the key decisions in a company. This impact is also being enhanced by the development of information technologies and the related development of society. We can also talk about them as the fourth factor of production. Since the industrial revolution intangible assets have become the substantial foundation of the industrial corporation and indeed it is nowadays commonly believed that the value creation processes of the modern firm as well as of economic systems are largely founded on, and fostered by intangible assets. Also, European Commission in its

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Europe 2020 strategy proposes smart, sustainable, and inclusive growth, where the main determinant of the innovation is the knowledge that helps to strengthen economic growth and sustainable development, employment, and competitiveness in the European Union. Development of information technology also mirrors the importance of knowledge or intangibles. Considering globalization, deregulation of the key industries and exponential development in the area of technology stands behind the birth of economy of intangible assets or more often used a term the knowledge-based economy. Knowledge is anchored in a skilled workforce, sophisticated processes, customer relationships or unique organizational designs and brands. No one would argue that an experienced employee brings more value to the firm than the newly hired one. Well established organizational processes are recognizably more valuable than disorganized management. Such considerations, however, raise the question: How to evaluate that difference? We can review all employee investments, we can look at the proportion of the profit an employee brings to the company, and we can compare profits of well and inappropriately managed firm. But will this be the reliable measurement procedure?

The fact that the topic of intangibles and intellectual capital is very popular and important is highlighted by the evidence that since the Millennium, the European Commission, through its different Directorate Generals, commissioned a number of studies and set up various expert groups devoted to various issues in the area. The most relevant of them are:

- The Intangible Economy – Impact and Policy Issues, Report of the European High-Level Expert Group on the Intangible Economy for DG Enterprise, October 2000 (Eustace et al., 2000);
- Study on the Measurement of Intangible Assets and the Associated Reporting Practices, prepared by the University of Ferrara, the Stern School of Business, and the University of Melbourne for DG Enterprise, April 2003 (Zambon et al., 2003);
- Report on the Feasibility of a Pan-European Enterprise Data Repository on Intangible Assets, prepared by Mantos Associates in association with IASCF and Athena Alliance for DG Enterprise, November 2004 (Mantos, 2004);
- Reporting Intellectual Capital to Augment Research, Development & Innovation in SMEs (RICARDIS), prepared by the High-Level Expert Group on RICARDIS for DG Research, June 2006 (EC, 2006);
- Creating a Financial Market for IPR, prepared by the University of St. Gallen and the Fraunhofer Institute for DG Enterprise, December 2011 (Bader et al., 2011);
- Final Report from the Expert Group on Intellectual Property Valuation, Luxembourg: Publications Office of the European Union, 2014 (Fuehrer et al., 2014).

According to the results of the MERITUS project, the definition and classification of intangible assets is still a very open issue (Sánchez et al., 2001). From the practical perspective, firms seem to group intangible assets into three main categories – human capital, structural capital and relational capital. Human capital

refers to skills, competencies, knowledge, experience, capabilities, and expertise of firm employees. Investments on employees are usually in the form of salaries, training and education. Firms very often seek experienced individuals, who bring know-how to the firm. Structural capital is also denoted as organizational or internal capital and includes all knowledge within the firm that is embedded in processes, databases, information system, and organizations culture and it is not tied to concrete employees. Intellectual property represents identifiable part of the structural capital. When a firm is able to meet all requirements for its issuance, it can be sold in form of intellectual property rights. The last group represents external capital built by relationships with third parties - the most often it is about the relationship with customers and suppliers. Examples might be brand names, marketing strategies or trademarks.

From another point of view, firms also distinguish between intangible resources and intangible activities. Intangible resources are the static term and it can be perceived as assets in a broad sense, which incorporates all intangible capacities of the firm likely to create value in the future. Montresor et al. (2014) describe intangible assets in a broad sense as everything, what is non-physical and thus not touchable and focus on their identification via survey. This definition does not coincide with IFRS definition, which requires identifiability and controllability. If an intangible asset does not fulfill the conditions and cannot be recognized as an asset, IAS 38 requires the expenditure on this item to be recognized as an expense when it is incurred (International Accounting Standards Board, 2016). On the other hand, intangible activities comprise all dynamic investments to purchase or generate intangible assets. Intangible assets in the form of patents, copyrights, licenses, or trademarks can be acquired separately or in a business combination by purchase or by internal generation, e.g. through R&D efforts, marketing research, or investments in organizational capital (Ashton, 2005). In this paper, the authors focus more in detail on two specific financial statements' items: intangible fixed assets from the balance sheet and R&D expenses from the profit and loss account.

In this article, the authors provide an overview of relevant literature with a theoretical background of the researched topic. The study works with the hypothesis that intangible assets in the form of R&D expenditure as well as investments in long-term intangible assets have a positive impact on the market value of the enterprise. In the analytical part of the paper, the authors have performed analysis and based on empirical results the main findings are summarized.

Research and Development of Expenditures as a Determinant of Business Value

Research and development (R&D), as well as expenditure and human resources, affect the value of companies as show several case studies and econometric analyses like Sánchez et al. (2001). In the past, the relationship between R&D expenditure and market value was analyzed very often by the subject of economic.

Sougiannis (1994), among the first, analyzed R&D expenditure as intangible assets and found that R&D expenditure significantly affected reported returns and market value of equity. The one unit investment in the R&D was, according to Sougiannis's analysis, reflected in an increase in the market value of four dollars. As mentioned by He and Wintoki (2016) and Di Cintio et al. (2017) R&D expenditures are often used as proxy variables for innovation intensity or intangible activity of companies as summarized by Boris and Brown (2013) and Peters and Taylor (2017). Griliches (1981) identifies a statistically significant positive relationship between historical R&D expenditure and market value. In one of the most recent publications, Nemlioglu and Mallick (2017) deal with the impact of R&D activities and pre-and post-crisis management practices on company performance, which is expressed in terms of profit. The best performance by their empirical analysis is achieved by companies that invest in both activities at the same time. Canibano et al. (2000) have revealed that investments in intangible assets, especially those in R&D, are associated with higher business performance in the future. Positive addiction is also demonstrated by Boujelben and Fedhil (2011), examining the relationship between intangible investments (R&D investment, quality and advertising) and future operating cash flows on a sample of Tunisian companies. The causal relationship between R&D expenditure and the value of the company is also addressed by Harris and Li (2008) and Ito and Lechevalier (2010). Likewise, Aboody and Lev (2000) consider R&D to be a source of insider gain in insider gains. They point to substantially higher profits for firms that invest heavily in R&D when compared to firms that neglect investment into R&D. They mention a few characteristics that characterize the uniqueness of their use for further analysis. R&D activities are uniquely designed and subject to strict protection, so it is tough to imitate them. Therefore, it is not possible to derive information on the expenses of other companies from information on R&D expenditure of one company in the sector. Unlike physical and financial assets, intangible assets as R&D are not traded on an organized market, and therefore their price cannot be deduced from market prices. Active support for R&D investment can well indicate that the firm will continue to do so in the future. Firms investing heavily in R&D are expected to have a favourable market outlook but, on the other hand, they also bring a higher degree of uncertainty. The products, services, and processes to which investments are made must not always be successful. Decisions on investing in R&D are determined by several factors. Since R&D expenditure represents investments that are generated by generating the company's intangible assets. An alternative procedure is an external procurement from other companies that have already carried out research and development activities and provide returns for their investments, for example, in the form of patents or licenses. In the literature, a number of authors are devoted to examining factors that determine company decisions in relation to purchase (external acquisition) and the creation (internal acquisition) of intangible assets. Xue (2007) identifies the different goals of the make strategy and buy strategy for the procurement of intangible assets in the

technology sectors. As a proxy variable creation strategy, it uses R&D investments, while a purchasing strategy is the external procurement of the final technology. The uncertainty of the creative strategy is associated with both systematic and non-systematic risk. Shareholders have the opportunity to diversify and thus minimize non-systematic risk and therefore the market only appreciates systematic risk. However, unlike shareholders, managers are exposed to different incentives, as their human capital is usually invested in only one company. For this reason, Xue (2007), among the determinants of the company's tendency to acquire new technologies, includes, besides the market variables, the variables related to the remuneration of management personnel. Like Xue (2007), Ciftci and Darrough (2015) apply a GMM method that takes into account endogeneity in choosing between R&D expenditure and intangible assets shown in the balance sheet. At the same time, they point to the inherent difference between firms that internally build and outsource intangible assets. Unlike previous research, Tsai et al. (2016) apply machine learning techniques and identify the predictive model for the valuation of intangible assets. Determinants of intangible assets are divided into five groups: intangible capital, ownership structure, corporate characteristics, industry characteristics, and an analyst and customer feedback. All of these authors deal with a sample of US companies. Harris and Moffat (2011) have used the results of UK companies for their empirical analysis. They analyze the tendency of companies to invest in three activities: R&D, innovation and export. The limitation of their analysis is that they only have information about whether or not the company has implemented individual activities, but the amount of funds spent on individual activities is not known. The consequence and disadvantage of this nature of data are that companies that invest very little in one of the activities will have the same status in the analysis as those who are intensively allocating the funds to individual activities. On the other hand, the sample may also consist of companies that invest in individual activities, but this information does not appear relevant in the financial statements, therefore would not otherwise be included in the sample. It is assumed that each of the explanatory variables approximated the intangible assets capture a certain group of intangible assets and its change affects the value of the firm, taking into account market valuation. The hypothesis is about the relationship between R&D expenditure and business value. It is assumed that R&D expenditures are statistically significant while explaining the business value as a share of market and book value. R&D expenditure is representative of internally generated intangible assets. In most cases, large-scale accounting does not allow capitalization; research and development activities often include new technologies, patents, or designs that represent an essential component of the company's intangible assets. It is expected that *ceteris paribus*, there is a positive relationship between the intensity of R&D expenditure and the value of the firm.

Data and Methodology

The authors have investigated the selected and an improved sample of 313 European public listed companies, which reported profit within the whole period of years 2014 – 2017 from the database Thomson Reuters. The initial data sample consisted of 5113 observations. However, due to missing values of R&D expenses and intangible fixed asset, the authors had to exclude them from our sample.

The authors started their analysis by analyzing a typical panel data model with many individual observations across several time periods. The researchers analyze the effects of three variables expressed by research and development expenses scaled by total assets (RDAS), intangible assets scaled by total assets (IntAS), Rota Rank Measure (RotaRM) on dependent variable expressed by the firm value (MTB). The authors do not consider goodwill to be a part of intangible assets IntAS. The Cross-sectional dimension of our data frame covers 313 individual firms. Time series dimension involves, as mentioned above, four years, from 2014 to 2017. Applying a Chow test for the pool ability of the data suggests considering panel data structure of the model. Time effects are statistically significant. To decide whether fixed or random effects model is more appropriate, Hausman test has been applied, according to which fixed effects model is more relevant. As the model suffers from serial correlation and cross-sectional dependence, the authors have applied the heteroscedasticity robust variance-covariance matrix to estimate unbiased regression coefficients under asymptotic properties.

Table 1. Estimated Results for the Pooled Model (PM) and Fixed Effects Model (FE)

Dependent variable: MTB	PM	FE
Intercept	1.689*** (0.072)	1.812*** (0.218)
RDAS	10.838*** (0.736)	11.233*** (3.287)
IntAS	-0.872*** (0.182)	-1.104** (0.231)
RotaRM	0.653* (0.259)	0.623* (0.248)
Years	2014 - 2017	2014 - 2017
Firm's effects	No	Yes
Time effects	No	Yes
Clustering	No	Yes
R2	0.148	0.087
R2 adj	0.141	0.085

The results of the model in Table 1, the authors empirically affirm that of their three variables expressing the intensity of intangible assets. Only the variable RDAS has a statistically significant positive effect on the value of the firm with a regression coefficient of 11.233 and a p-value of less than 0.001, which means that

R&D expenditures can be used to explain the present value of the company. The regression coefficient of the RDAS variable is several times higher than the other regression coefficients. In addition, unlike Clausen and Hirth (2016), the analysis of the study does not confirm any statistically significant relationship between the ROTA rank measure and the present value of the firm. As table 1 shows there is a statistically significant negative dependency between the intangible assets on the balance sheet and the value of the publicly traded companies. The regression coefficient of -1.104 is statistically significant; indicating that the market evaluates the balance sheet intangible assets differently from R&D expenditures and their increasing value may have a negative impact on the market value of examined companies.

The results presented in the paper are very similar to the earlier results and findings based on different datasets of European publicly traded companies published by Glova and Mrázková (2018) and Mrázková (2018).

Summary

This study aims to explore value creation through intangibles in publicly traded companies within Europe, taking into consideration investment in the research and development as well as intangible fixed assets. It is stated that research and development expenses bring an extra increase in the market capitalization of selected companies and make managers and investors' goals more aligned.

The authors have elaborated a theoretical model and empirically tested the assumption that there is a positive relationship (*ceteris paribus*) between the intensity of R&D expenditures as well as investment in intangible assets to total assets in comparison with the increase in relation to other regressors. The authors use a panel data model of endogenous market capitalization to test how intangibles affect outperforming of a company. The research is carried out on a sample of 1252 observation of 313 European publicly traded companies covering the period from 2014 to 2017.

The study has revealed a positive impact of the proportion of R&D expenditures on total assets on firm value. So, it can be proved that internal or own research and development is evaluated by the market.

From the perspective of practical implications, the research emphasizes the importance of awareness of companies' top managers about the outcomes of their decisions in regard to market assessment. It is proved that internal or own research and development is evaluated by the market. However, the strategy of externally acquiring intangible assets instead of their development is evaluated by the market negatively. This work contributes primarily to the field of corporate finance and financial management in companies that use intangibles. The process of value creation in the form of market capitalization and its attributes is modelled and tested.

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KIEROWNICZY ASPEKT WIELKICH ZMIAN: WŁASNY ROZWÓJ CZY ZEWNĘTRZNE ZAKUPIONE AKTYWA NIEMATERIALNE - CO NAPRAWDĘ MA ZNACZENIE?

Streszczenie: Decydujące znaczenie w firmie ma podejmowanie decyzji menadżerskich między nabyciem wartości niematerialnych a własnymi inwestycjami lub rozwojem tych rodzajów aktywów. Z tej perspektywy autorzy przeanalizowali wartości niematerialne oraz nakłady na badania i rozwój w pozycji zmiennych egzogenicznych wpływających na wartość biznesową spółek notowanych na giełdach. Autorzy wykorzystują dane panelowe 313 europejskich spółek notowanych w obrocie publicznym z czterech okresów (2014 - 2017r.). W badaniu stwierdzono, że wydatki na badania i rozwój oraz wartości niematerialne i prawne mogą w znacznym stopniu wy tłumaczyć kapitalizację rynkową wybranych przedsiębiorstw. W badaniu stwierdzono również, że zwiększenie inwestycji w badania i rozwój powoduje wzrost kapitalizacji rynkowej. Analiza badania wskazuje, że firma z wyższymi inwestycjami niematerialnymi ma zazwyczaj wyższą kapitalizację rynkową, a inwestycje w wartości niematerialne i prawne są nagradzane w postaci większego kapitału niematerialnego jako części kapitalizacji rynkowej. Inwestycje w

badania i rozwój są więc znacząco i pozytywnie oceniane przez rynek. Jednak strategia pozyskiwania na zewnątrz wartości niematerialnych zamiast ich rozwoju nie jest pozytywnie oceniana przez rynek, co potwierdzają wyniki naszych badań.

Słowa kluczowe: decyzja menedżerska, wartości niematerialne, wartość biznesowa, badania i rozwój, wartości niematerialne i prawne, firmy o dużej wartości niematerialnej.

无形资产的管理方面: 自主开发或外部购买的无形资产 – 真正计算的是什么?

摘要: 购买无形资产与自有投资或开发这类资产之间的管理决策在公司中很重要。从这个角度出发, 作者分析了影响公开交易公司商业价值的外生变量无形资产和研发支出。作者使用了来自四个时期(2014年至2017年)的313家欧洲上市公司的面板数据。该研究发现, 研发费用以及无形固定资产可以显著解释所选公司的市值。该研究还发现, 增加研发投入会导致市值增加。对该研究的分析表明, 无形资产较高的企业往往具有较高的市值, 无形资产的投资以较高的无形资本形式作为市值的一部分予以回报。因此, 市场对研发的投资进行了显著和积极的评估。然而, 我们看到基于我们研究结果的基础, 市场并没有积极评估外部收购无形资产而非发展的策略。

关键词: 管理决策, 无形资产, 商业价值, 研发, 无形固定资产, 无形资产企业。