Intangible Assets – the Fourth Production Factor

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Abstract

The increasing importance of the tertiary sector, the [introduction and] establishment of new technologies supported by the shift of the production focus of the classical factors of production to a new "fourth factor of production" (Stewart , TA (1998) and Edvinsson , L. / Malone , MS (1997) , p . 23), recently challenged equally the scientific world as well as the industry.

It is about the "incognisable", it is about the intangible assets of a company. (Hamel , G. / Prahalad , C. K. (1995) , p . 57) This paper deals with the influence of intangible assets on the company's value. We examined selected CDAX companies within the period from 12/31/2001 and 06/13/2016. As a proxy for intangible assets, R & D expenditures have been used

Key words
Intangible Assets, Digitalization, Innovation, Valuation

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1. Introduction

The three classic economic factors, labor, capital and land, form according to classical economic [theory] by Adam Smith respectively David Ricardo always the basis for any business. Any optimal combination was a guarantor for any company's success in the so-called industrial resp. manufacturing economy. In recent years, however, a new development can be observed. Companies with little stocks of fixed assets, achieve compared to companies with high value of fixed assets disproportionate success. The bottom line therefore must be that there is a kind of asset that is not covered by/included in the balance sheet, but still determins primarily the company's success. This involves the so-called intangible assets / intangible capital. Both terms are used interchangeably within scientific literature, although the expression intangiable assets is used accounting driven, whereas intangible capital considers the influence of intangible resources to the economic value of a company. (main ideas come from the work of Uzik, M. (2009))

2. Definitions and Terms

In the new era of "knowledge-economy" intangible [corporate] assets developed into a significant resource of success. The intangible corporate assets "(...) rather than physical assets drives innovations, revenue and profits growth, and nurtures new competitive advantages." (Seetharaman, A. / Bin Zaini Sooria, HH / Saravanan, AS (2002), p. 128) In spite of our acquired knowledge about the value driving capabilities of intangible [corporate] assets defining boundary and putting it into a systematic grid remains a challenge. The physicall feature of an intangible assets is its intangibility. Hence it is immaterial, i.e. not obeserveable by humans.

The terminology used within [scientific] literature ranges from intangibles or intangible assets (IAS 38), to intellectual capital (Edvinsson, L. / Malone, MS (1997)) or knowledge assets and knowledge capital (Bodrov, W. / Bergmann, P . (2003)) lastely intangible capital (Cummins, JG (2004)).

Finally, most experts are of the opinion that "(...) it is too early to talk about IC definition[s],(…) according to them" (referring to the experts opinion with respect to the IC-Definition), [as] too much of the nature of IC is quiet unknown and hard to capture in explicit terms. "(Seetharaman, A. / Bin Zaini Sooria, HH / Saravanan, AS (2002), p. 129).

Basically, [scientific] literature agrees that any economic organization has intellectual capital (intellectual possessions). These are assets, resources, implicit or explicit knowledge, data, sets of information, intelligence [in the sense of collected information], experience and insights, that all [in combination] can be called a collective corporate inteligence. Stewart stresses that the distinction between data, information, knowledge and intelligence is somehow irrelevant. Rather, the intellectual capital originates in two ways. Firstly, it is the employees' knowledge of specific job roles. These include

communication or special leadership skills. The second way extends the "knowledge foundation" by considering new facts, data or information. A more detailed analysis of each individual structure shows that the intellectual material is to be found within the customer base, the employees themselves and the companys processes (Stewart, TA (1998), p . 80 and p.83).

At this point most authors from the eighties and nineties of the last century identified several terms of intangible capital in [their] numerous works, and hence developed different structures of intangible capital further. [Most] [scientific] works take into account a more or less chosen trichotomy of intangible assets by Hubert Saint-Onge: customer, human and structural capital (Stewart, T. A. (1998), p. 83 and p. 248).

2.1 Knowledge

The input variable information prepared in accordance with the "techne semiontike" a meaningful character that is the purpose of reaching an objective of interest (Picot, A. (1998), p. 67ff). If individual information is bundled in context to enable the information carrier to build specific assets and perform actions, [it] is [understood as] knowledge (Bodrov, W. / Bergmann, P. (2003), p. 35ff). The economic perspective considers knowledge and its application and not sole collection and interpretation. Knowledge contributes [directly] to business value and enables the maintenance of competitive advantages. The information and its generated knowledge [after analysing this knowledge] is [directly] and closely connected to human capital and thus with people. The intangible nature of knowledge and its ability to form intangible capital, move it in the sportlight of each company (Müller, C. (2006), p. 5). In addition to the information, data constitutes another input factor and a resource of knowledge. The computer science refers to data as logical grouped information units (Lipinski, K. (2004), p. 180). Data includes information, terms and commands that are used by human capital for the processing, use or interpretation, and thus represents a resource. So Fritz-enz gives data no special position in comparison to any other resource.

Rather, he stresses that only knowledge of how, why and when data will be tranmsfered makes date a significant resource (Fritz-enz, J. (2000), p. 24). Thus, he puts human capital into the focus of the value chain generated by data.

2.2 Intangible Assets

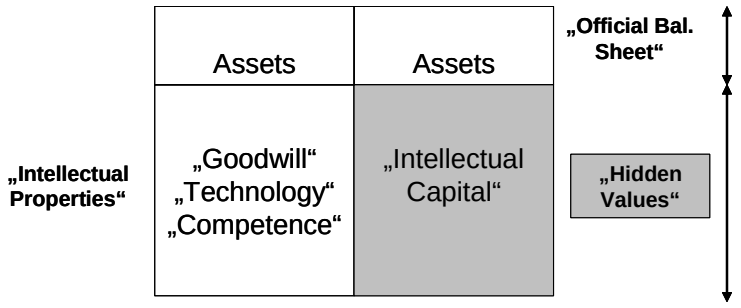
„The best way to define the term might be to define its component parts first. A dictionary definition of the Word intangible is ‚incapable of being felt by touch' or"not readily discerned by the mind". An asset is an item of value or a source of wealth. Thus, an intangible asset is an item of vallue or source of wealth thaht cannot be felt by touch or is not readily discerned by mind" (Berry, J. (2004))

From a German perspective intangible asset is defined as an asset, which is does not treflect material possessions or in investments respectively a financial investments, however, it is of value for the company.Thus it is of long-term value that can only be quantified in the event of a corporate sale . They are referred to by the term "goodwill" and [booked in] the balance sheet of the acquirer under the item derivative goodwill (Müller , C. (2006), p . 6).

2.3. Intellectual Capital

According to Edvinsson and Malone , intellectual capital is composed of the human capital and structural capital (Kaufmann , L. / Schneider , Y. (2006), p . 26ff . And Müller , C. (2006), p . 18f). Intellectual capital shall not be considered as equity. Rather, it is attributable to the [liabilities] because it is borrowed from stakeholders, customers, employees , etc. (Edvinsson , L. / Malone , M. S. (1997), p . 43).

Graph 1. Intellectual Capital based on Edvinsson und Malone

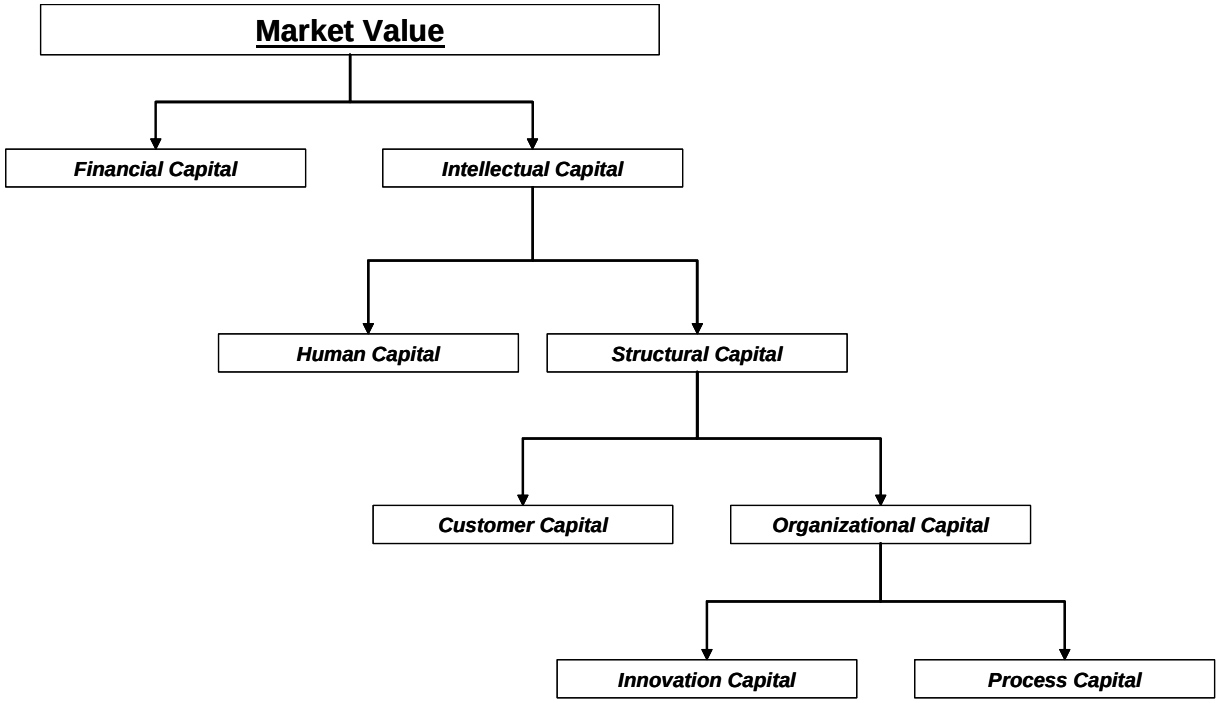


Source: Edvinsson, L. / Malone, M. S. (1997), p. 43

The individual relationships which interact are shown by Edvinsson and Malone in the below market value scheme , which has been already used Edvinsson at Skandia.

By definition, intellectual capital and financial capital accumulate the market value of a company, which can be further differentiated into human capital and structural capital. The latter combines customer capital and organizational capital, which differentiates itself in innovation and capital process capital.

Graph 2. Skandia Market Value Scheme



Source: Edvinsson, L. / Malone, M. S. (1997), p. 52

The quintessenz of the above is, that the identification of knowledge, intellectual capital and intangible assets [are considered] as three main factors which have to be used in [our] digital age by companies to successfully survive in the [current and future] markets. However to delimitate these terms is not easy.

Since knowledge is a separate component and was delimitated already above one needs to differ between intangible asset and intellectual capital [unfortunatly] they are used synonymously within reference material. Intangible assets are considered intangible resources of the company. These intangible resources are however understood as knowledge capital or intellectual capital that can be converted into profit and in value for the company (Müller , C. (2006) , p . 7). Thus, intangible assets are to be seen as part of the intellectual capital of the company.

3. Influence of intangible assets to the company's value

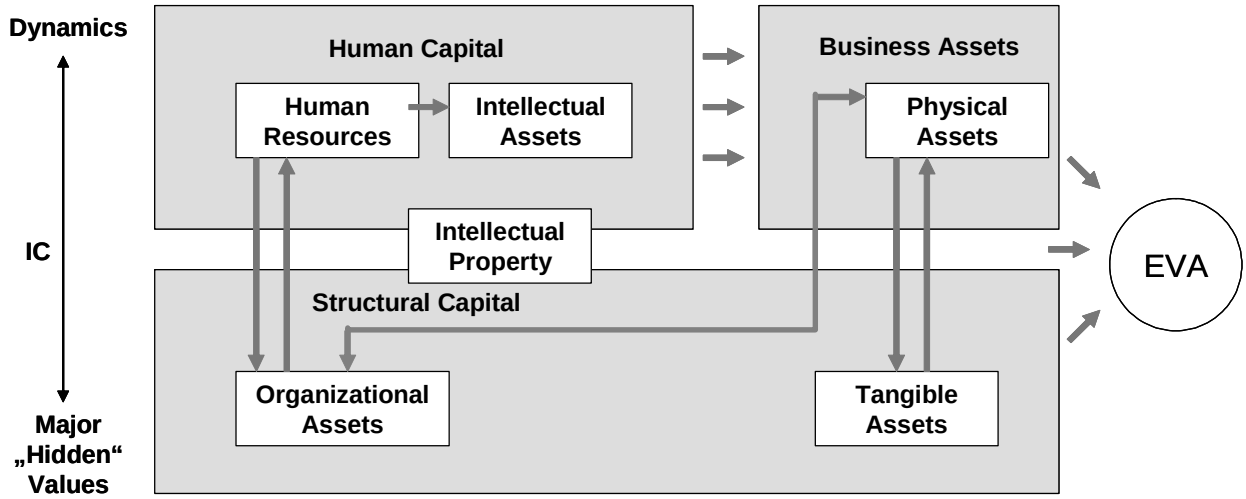
It can be deducted from various scientific studies (Aboody , D. / Lev , B. (1998)) that shareholder value is influenced by [several] components of intangible assets.

As examples the works of Heiens , Leach and McGrath (Heiens , AR / Leach , RT / McGrath , LC (2007)) aswell as Nakano (Nakano , M. (2006)) shall be mentioned here, as they specifically investigate the influence of "intangible assets " on shareholder value . [It should be stressed, that] not only the authors of this scientific contributions see [themselves] particularly confronted with the problem of quantifying intangibles.

Most empirical studies [investigate, focus on] spending on research and development [R&D] in order to obtain a quantifiable amount of intangible capital. (Lev , B. / Sougiannis , T. (1996) and Chan , L. K. C. / Lakonishok , J. / Sougiannis , T. (2001)). So, this literature determines a significant positive impact of expenditure on research and development on shareholder value. In this context, Nakano says : " While R & D investments reduce current- year earnings, they build the R & D capability of the organization for the future. Accumulated R & D capability can be expected to create future earnings , Which Relates to shareholders' value " . (Nakano , M. (2006), p . 189).

[On the other hand] Heiens , Leach and McGrath conclude that advertising, goodwill and expenses for research and development do not have a significant influence on shareholder value. "Instead, only intangible assets other than goodwill, Which include the value of patents, copyrights, licenses, and trademarks, have a positive impact on shareholder value" (Heiens , AR / Leach , RT / McGrath , LC (2007) , p . 149).

Graph 3. Intellectual Capital Management



Source: Edvinsson, L. / Malone, M. S. (1997), p. 59

3.1 Methodology

In this work, we examine the influence of R & D investments on shareholder value using suitable proxis. R & D spendings are used by taking the incurred R & D costs weighted by net sales. Thereby we eliminate the influence of scale effects. As proxy for shareholder value, we use the continous yield over the respective closing prices. The investigated time frame starts on 12/31/2001 and ends on 06/13/2016. Starting with the 12/31/2001, we consider a return window of 130 trading days (half of 260 trading days). This parameter makes our periodicity. Overall, we examine 30 datapoints. In addition, we assume a delayed impact of R & D investments on shareholder value. We investigate the impact delayed in intervals of 6, 12, 24, 36 and 48 months.

3.2 Data

We have analyzed 369 selected CDAX companies. The study sample based on the R & D investments, counts 11,280 data values. Afterwards we adjusted for missing values and pairing with the corresponding yields. Lastely we excluded all values that do not have complete time series covering the investigation horizon from the study sample. The [clean data sample] consists of 38 companies with 1,170 data points over the investigation period. [Excluding] for outlier eventually lead to a [data sample] of 1,138 sets.

3.3 Results

The scientic question asked: Is there a correlation of the level of R & D investments and shareholder value? The hypothesis H0 is: There is no correlation between the level of R & D investments and shareholder value. After analyzing the data it is to be noted that we can not reject the hypothesis H0.
As part of our analysis, we have not found any context or correlation between the R & D investment and the respective returns (proxy for shareholder value) .

Table 1. Statistics

		Model	1-1	+6M	+12M	+24M	+36M	+48M
		R	0,05	0,08	0,04	0,03	0,02	0,03
		R-Square	0,00	0,01	0,00	0,00	0,00	0,00
		Adjusted R-Square	0,00	0,00	0,00	0,00	0,00	0,00
		Standard Error of the Estimate	0,47	0,47	0,46	0,46	0,47	0,46
ANOVA	Sum of squares	Regression	0,55	1,35	0,42	0,20	0,04	0,13
		Residual	249,52	236,63	227,17	207,16	194,92	175,78
		Total	250,07	237,98	227,59	207,36	194,96	175,91
	df	Regression	1	1	1	1	1	1
		Residual	1138	1090	1052	976	900	824
		Total	1139	1091	1053	977	901	825
	Mean Square	Regression	0,55	1,35	0,42	0,20	0,04	0,13
		Residual	0,22	0,22	0,22	0,21	0,22	0,21
		F	2,53	6,23	1,94	0,95	0,21	0,62
		Sig.	0,11	0,01	0,16	0,33	0,65	0,43
Coefficients	Unstandardised Coefficients	B	0,00	-0,01	0,00	0,00	0,00	0,00
		Std. Error	0,00	0,00	0,00	0,00	0,00	0,00
	Standardised Coefficients	Beta	-0,05	-0,08	-0,04	-0,03	-0,02	-0,03
		T	-1,59	-2,50	-1,39	-0,98	-0,46	-0,79
		Sig.	0,11	0,01	0,16	0,33	0,65	0,43

4. Conclusion

The digital age, also considered as a new era, is characterized by a fundamental change, which affects all areas of life. It also affects the economy and their productions factors. Thus, the issue shall be discussed, if one should introduce a new fourth production factor in the economy - the intangible asset. In this [scientific] work, we analyzed whether the intangible assets represented by R & D investments have an impact on shareholder value (shown by the steady returns). The results could determine no influence.

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