

Corporate valuation and intellectual capital

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Abstract. The status of intellectual capital elements has a strong correlation with the level of the company's corporate value. Traditional corporate valuation techniques take into account the affect of intellectual capital but do so in an indirect way.

How could we better utilize the information gained from intellectual capital analysis in corporate valuation? Could intellectual capital management become a fundamental part of value based management?

The paper intends to describe a possible way of utilizing intellectual capital related information (IC elements, capacity status, risks, contribution to value creation) in corporate valuation and value based management, therefore linking the 'soft' elements to hardcore financial figures.

In the paper, we overview the traditional approaches of corporate valuation and go through the recent techniques of intellectual capital analysis. Finally, we link the two areas and suggest an approach, which can enrich value based management.

Keywords: intellectual capital, intellectual asset, valuation, value based management, real option

1 Valuation approaches

There are various reasons why a company might be valued. Listed companies are constantly valued as their share prices indicate the proportional shareholders' value¹. Unlisted companies are mainly valued during acquisitions, though the owners (and managers) might continuously monitor their enterprise's value and utilize this knowledge during value based management.

There are several approaches available for corporate valuation.

1.1 Asset based approach

By using an asset based corporate valuation approach we measure the value of assets owned by the investigated company. A starting point of such an evaluation is the records of the company's assets. The company's accounting records properly provide this information. However, the accounting records might not reflect the current market value of the assets as it is originating the assets' value from the purchase price and taking into consideration the accumulated depreciation. Accounting regulations are not forcing companies to closely follow and update each asset's market value unless there is a significant drop in value (in such a case impairment charge is applied). Companies have an option to indicate an upward change in asset values in accounting records, but this technique is rarely used. As a result, during the asset valuation we cannot automatically rely on the value presented in the accounting records.

A typical use of asset based valuation is done at the time of liquidation, when the executor of the valuation is not interested in the going concern of the enterprise but in the maximum cash inflow from the sale of the assets.

¹ When talking about 'value' we need to clarify a basic definition: enterprise value = shareholders' value + value of debt.

1.2 Comparable approach

Using comparables during valuation means that we try to capture the company's value by looking at similar companies (mainly from the same industry) where the overall enterprise value is known (e.g. from a previous transaction). The figures we can investigate might refer to sales, profitability and/or cash flow generating capability. If we know for example that a similar company was sold for 6 million €, and its EBITDA margin was 1,5 million €, then the multiple of 4 might be applicable to our case, too. In this respect, we base our valuation on past data and on information gained from other transactions.

This approach is widely used by investors for quick evaluation purposes when detailed information relating to the future is not available. This approach is useful for double-checking the valuation derived from another approach, too.

1.3 Cash flow based approach

The cash flow approach is focusing on the company's cash flow generating capability. When we talk about cash flow in valuation we mean free cash flow. Free cash flow takes into consideration the re-investment necessities of the business and the working capital's cash requirements². A special element of free cash flow is that it is looking at the company as if it was only financed by its shareholders. Free cash flow therefore is a basis for the calculation of enterprise value (=the value of business)³.

For the calculation of future free cash flow we need a business plan for the next few years from which free cash flow might be derived from. During the calculation of current enterprise value we need to calculate with the time element (therefore discount future cash flows) and integrate the terminal value of the enterprise at the end of the planning horizon.

The discounted cash flow (DCF) approach is considering the associated risks through the discount rate.

1.4 Option based approach

Real option is the right to make or not make certain decisions in the future. While in discounted cash flow techniques, only the most likely outcomes are valued and management's decision making flexibility is ignored⁴; real option technique calculates with typical cases like: delay a decision, abandon a project, divest or make an investment. Option based valuation is originated from financial option pricing models and is often used for the valuation of projects (especially projects with high uncertainty, like R&D projects). Option based valuation might be extended to entire companies especially when the value of the company is strongly linked to certain events and related decisions.

Real options might be valued by Black-Scholes option pricing model⁵, originally developed for financial option pricing, or by binominal option model [4].

² An excellent interpretation of free cash flow is provided by Mills [12]

³ Of course we can use this for shareholders' value calculation by deducting the existing net debt.

⁴ Copeland and Tufano [5] point out, that cash flow based valuation models implicitly assume that all future investments are precommitted (that the company has already decided to make those investments).

⁵ Sudarsanam *et al* [15] provides a great overview of the use of Black-Scholes option pricing model.

1.5 Different approaches – different results

As we saw, there are several approaches to value an enterprise. These approaches could easily result in different outcomes. There can be many reasons behind the fact that different valuation approaches might lead to different results: as we saw, certain techniques are not handling certain information; in some cases the result is very much dependent on certain elements of the valuation formula (like the discount rate in DCF method, or the level of multiple in case of comparable approach). Another important factor that we should consider is the person who makes the valuation: a manager of a corporation has far more information about the business than an external analyst⁶. The more detailed information we have about the business, the more complex valuation we are able to present.

A typical reason why the different valuations might end up with different results is the fact that they consider intellectual capital differently. In the followings we will concentrate on intellectual capital and the role it plays in valuation and value based management. The uncertainties associated to valuation are in many cases due to improper management, therefore we intend to go beyond the value itself and investigate the management consequences. Similarly to activities where we can say that what cannot be measured, cannot be properly managed⁷, we can state that if the value of the enterprise cannot be reliably measured, we cannot talk about proper corporate management.

Let us first understand what mean on intellectual capital!

2 Intellectual assets / intellectual capital

The existence of intellectual assets and their contribution became widely accepted among economists during the last two decades. In the invisible balance sheet Sveiby introduced three asset categories (external structure, internal structure and individuals' competence) as an extension of the traditional asset categories [16]. Due to the conservative rules of accounting only small proportion of these assets are represented in the accounting balance sheet (like certain patents, property rights) among intangible assets. The major obstacles are associated to the recognition and measurement issues of the intellectual assets.

Intellectual assets and intellectual capital terms are often used as synonyms for each other. However it is important to mention that individual intellectual assets always have an ownership dimension (who owns them?). This can be presented in the liability section of the extended balance sheet⁸.

⁶ This is why external analyst mainly rely on comparables and simplified cash flow models.

⁷ Womack – Jones [18] p. 37.

⁸ The correct approach would therefore be differentiating among the terminologies of intellectual asset and intellectual capital. During the article we will refer more to the asset characteristics of these items, therefore more use the intellectual asset name. As an overall terminology however we keep sometimes (like in the title of the article) 'intellectual capital'. When using this, we would like to emphasize the ownership related information, too.

2.1 The dynamic characteristics of intellectual assets

Intellectual assets are fundamental for the operation of an enterprise. The complex production formula introduced by Boda and Virág [3] is helping us to better understand what role intellectual assets play.

In the equation (see Fig. 1.) Y refers to the overall value generated by the enterprise. The formula describes eight elements (production factors) that are necessary for value creation. Five out of these eight elements form knowledge capital.

- I^E represent ‘*External immaterial assets*’, which include explicit knowledge about and all relationship with the environment of the enterprise (customers, suppliers, regulative decision makers, etc.). Brands, image and references all belong to this category. Sveiby’s ‘*external structure*’ category covers the same intellectual assets.
- I^I represent ‘*Internal immaterial assets*’. These explicit knowledge elements refer to the capability of ‘being organised’ and the capability of solving challenges and problems following internal procedures. The documentation of processes, the manuals, internal regulations, the recipes of products belong to this group. Sveiby’s ‘*internal structure*’ is identical to this category.
- I^K (personal knowledge of employees), I^S (skills of employees) and I^M (motivation of employees) are mainly tacit knowledge elements that belong to the employees (Sveiby’s ‘*individuals’ competence*’ category). These assets only belong to the company until the employees are employed.

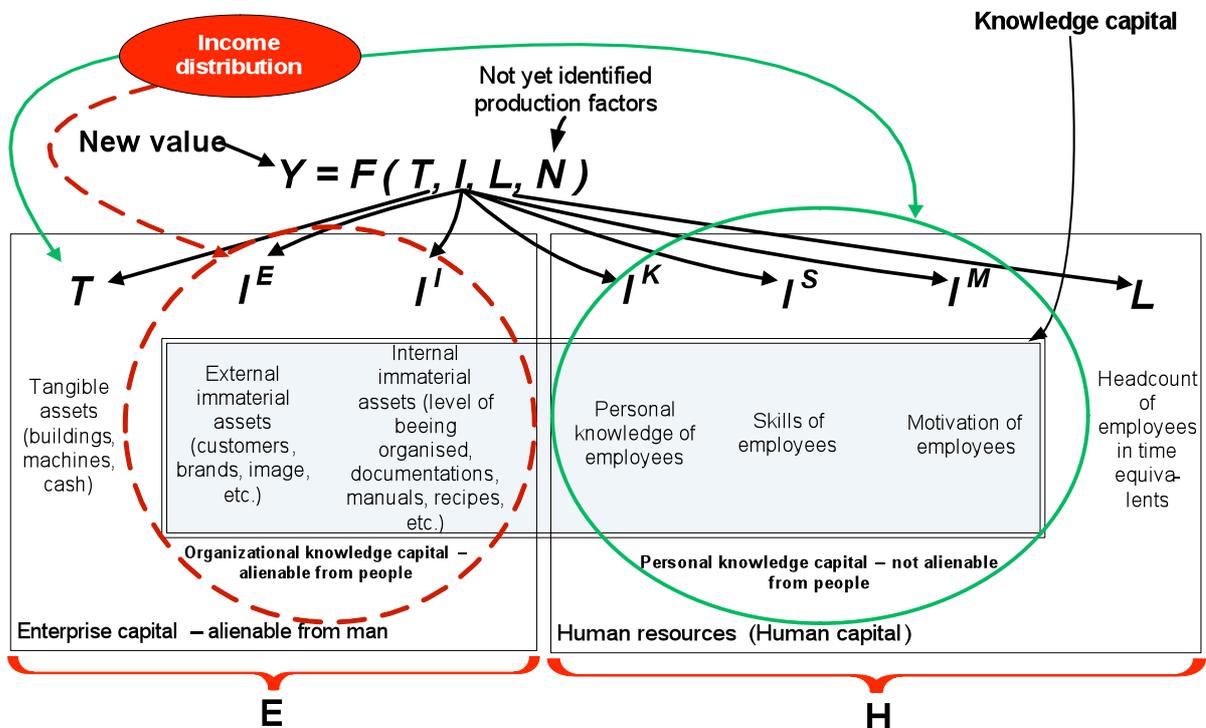


Fig. 1. Complex production formula [3]

Production factors are essential for the company's operation. All previously listed elements are necessary for value creation; in case any of the elements are missing, the operation itself is in danger. For better understanding of how these factors interrelate, let us see some examples for typical suboptimal operation:

- One production factor is behaving like a bottleneck – *e.g. a company has the necessary physical assets, the qualified and motivated workforce but the customer base is underdeveloped: due to this, the company is running with idle capacities (both tangible and knowledge assets) and not generating enough profit for the shareholders* – The bottleneck might be due to missing capacity or might be quality driven (not proper capacity). In either case the bottleneck limits the output.
- The individual production factors exist, but there is no harmony among the elements – *e.g. the employees are not aware of the fact that certain internal immaterial assets (process manuals, product recipes) are available at the company and are operating without the use of them* – The value creation is not perfect in this case.
- There is significant risk associated to some production factors – *e.g. the competition is targeting certain key employees* – In this case there is no immediate affect on value creation but the long-term value creation is in danger.
- There is significant excess capacity for certain production factor(s) – It means utilized capacities with unnecessary cost associated. Therefore the value creation is not optimal.

Marr [10] rightly underlines that without appropriate intellectual assets, physical assets are just commodities and that the identification and proper management of intellectual capital is becoming a key differentiator between successful, mediocre and falling enterprises.

2.2 Intellectual Capital and the value of the corporation

In the first paragraph we have reviewed the traditional approaches of corporate valuation. Let us see how these approaches are taking into consideration the intellectual assets!

The asset-based valuation is only considering those IC elements, which are represented in the accounting records of the enterprise, therefore neglecting the majority of intellectual production factors.

The comparable based valuation is a combination of information regarding past performance (φ is the reference figure: Sales data, EBITDA or other margin figure) and future outlook (this is where they decide upon the level of multiplier, α).

$$V = \alpha \times \varphi$$

The exact level of the applied multiplier is depending on the valuator's experience relating to a similar type (size, shape, risk) of company's performance figure and corporate value. Intellectual assets are not considered directly but their affect is calculated indirectly both in the case of φ and α .

Cash flow based valuation (DCF model) follows the same logic that we saw during the overview of complex production formula: it concentrates on the value creation potential of the

enterprise. The business plan is the basis of the calculation of free cash flow. When constructing a business plan, the planner should directly or indirectly consider the characteristics of intellectual assets. When taking into consideration the risks associated to the business plan cash flow based valuation is using the discount factor: the higher the associated risk, the higher the discount factor is.

In most of the cases the cash flow based valuation is done without the detailed investigation of intellectual assets, these factors only indirectly influence the analyst when putting together the business plan and considering the related opportunities and risks.

DCF model receives criticism⁹ that it does not properly handle the complexities of intellectual assets. Sudarsanam *at al* [15] describe in details that intellectual assets should be handled as real options. They even define two categories among the intellectual assets: the ones that provide ‘*exploitative*’ options, while the others generating ‘*exploratory*’ options. They define the following equation for corporate value:

$$\begin{aligned} \text{Firm value} &= \text{value of assets in place} \\ &+ \text{value of future growth opportunities from assets already in place} \\ &\quad (\text{exploitative elements}) \\ &+ \text{value of future growth opportunities from new assets (exploratory elements)} \end{aligned}$$

As we saw under point 1.4, using the option approach we have an opportunity to take into consideration the managerial flexibility regarding intellectual assets and the investment into those assets. While the standard DCF model cannot handle situations when the managers can delay an investment or divestment decision, make partial investment or decide upon abandonment, real options allow calculating the effects of these elements. Sudarsanam *at al* [15] provides us a visualization of the difference between base case valuation (e.g. with DCF model) and valuation expanded with option pricing:

$$\text{Expanded NPV} = \text{direct NPV (calculated as if the follow-on investments were undertaken immediately)} + \text{value of options (value of flexibility)}$$

There are three main techniques we can utilize for complex valuation, where optional elements are considered¹⁰:

1. Black-Scholes optional pricing model borrowed from financial option pricing practice
2. Binominal option model, or
3. We can expand DCF valuation model with Monte Carlo simulation

There are plenty of studies available that are concentrating on the value of intellectual assets (intellectual capital). Our view is that the value of intellectual assets is inseparable from the value of the entire enterprise therefore our focus should be on understanding the corporate value which takes into account the knowledge relating to the company’s intellectual assets.

⁹ Sudarsanam *at al* [15]

¹⁰ For more details please refer to Copeland and Tufano [5] and Sudarsanam *at al* [15].

3 How can we utilize the information gained from intellectual assets?

We saw in the previous section that intellectual assets have an unquestionable effect on corporate value. The better structure we have among the production factors (including many intangible elements), the higher the value creation will be. The higher the value creation capability of an enterprise, the higher its value is. Investors are paying for the promise of future cash generation. Thus investors are paying for mix of production factors, which has a likelihood of creating future value (i.e. free cash). The higher the associated risk, the higher discount they apply as discount factor for future cash flow.

Managements are interested in increasing the value of their enterprise therefore they should spend more time on discovering and understanding their company's complex production formula: the mix of tangible and intangible assets.

In chapter 2.1 we saw some examples for suboptimal operation. Let us see now what kind of tasks we have in case we intend to better understand our company's operation!

3.1 Discovering what we own

The first task is to understand what we have. We need to systematically go through the production factor groups (please refer to Fig. 1. in chapter 2.) and understand what we possess in each group. There are many studies that are helping this discovery. Marr [10] provides a five-step approach for the management of intellectual capital (identification, visualization, measurement, management and reporting) of which the first two steps relates to the discovery. He suggests an inventory check for all major categories.

We should analyze what we have in each IC asset group and how much it is necessary for the fulfillment of our strategy. The visualization of main intellectual assets, their relationships and their link to the company's strategic goals both helps the discovery of what we own and eases the internal communication¹¹.

3.2 Exploring the capacities + understanding the quality

We saw earlier that each production factor is necessary for the company's operation. It means that there is always a bottleneck element in the formula. For finding the bottleneck we need to be aware of the capacity status of each production factor (in fact the capacity status of each asset). We will see in the next point that significant excess capacity is not favorable either as it can destruct value creation due to unnecessary costs associated to the spare capacity.

Similar to machines among tangible assets, each intangible asset has its own capacity. As an example let us consider what the sales potential of a given sales network can be.

Capacity is inseparable from the quality of the asset. Even if their output capacity is identical, the associated quality might vary. As an example let us assume that there are two companies with operating ERP systems, but one of the companies has a database setup, which

¹¹ For this visualization Marr [10] suggests the use of 'Value Creation Map'-s.

doesn't allow certain statistical queries. We cannot say in this case that the two companies have the same standard of production factor. Another – more intangible example – is the difference between two colleagues who translate: both have excellent language skills, but while one of them is excellent in every situation the other tend to be passive (and therefore less supportive) in certain situations due to his personality type.

3.3 Analyzing the value creation – how efficiently the production factors work together?

Production factors depend on each other. The more they fit each other (let us say the higher the interdependence or correlation among them) the higher the output will be. As an example let us assume that we have skilled workforce and excellent modern machinery but our employees are not particularly trained for utilizing the extra capabilities of those machines. In this case the standalone factors are excellent, but they are not matched properly.

The most important information is the conceptual maximum we can target with a given mix of production factors. Given the seven elements of the production formula we face a multidimensional structure. In order to effectively visualize this we can switch to two dimensions by grouping using the two major parts of the production formula: enterprise capital and human capital¹².

On Figure 2., the theoretical maximum of the output is marked with $Y_{Optimum}$. In case our output is below this level, let us say it is at the point represented by Y_{Actual} , the following reasons might be behind this:

- some of the production factors have idle capacities (unutilized time for machines, workers, underutilized sales network, etc.),
- the capacities are utilized but correlation of production factors is not perfect (the machines are used, the workers are busy but due to a mismatch the targeted output is not the optimum: e.g. we make word processing on high capacity computers with over skilled workers), or
- one of the production factors inside enterprise capital or human capital is acting as bottleneck.

¹² In this visualization the research of Prof. Gyorgy Boda provided me a starting point and inspiration.

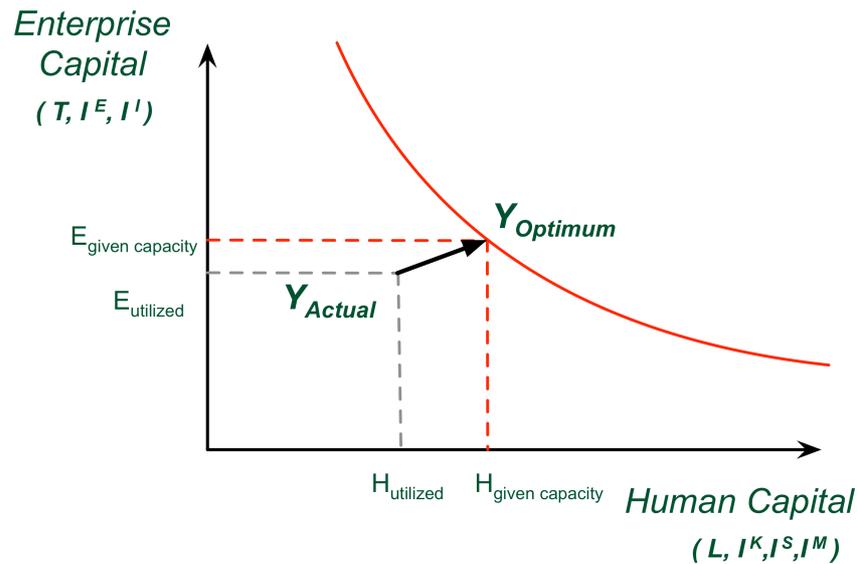


Fig. 2. Optimizing output

In case our target is to increase the output level, we have the following options:

- eliminate the underutilized elements
- improve the interrelationship among the production factors
- identify the bottleneck element (and decide upon extension)

Figure 3 is visualizing the different levels of output the company might target. For each output level many different combination of enterprise capital and human capital is possible. This is why the output is represented as a curve. According to the aims of the shareholders the company is setting its desired output level in its strategic plan. Once it is decided they should set the necessary level of enterprise capital and human capital.

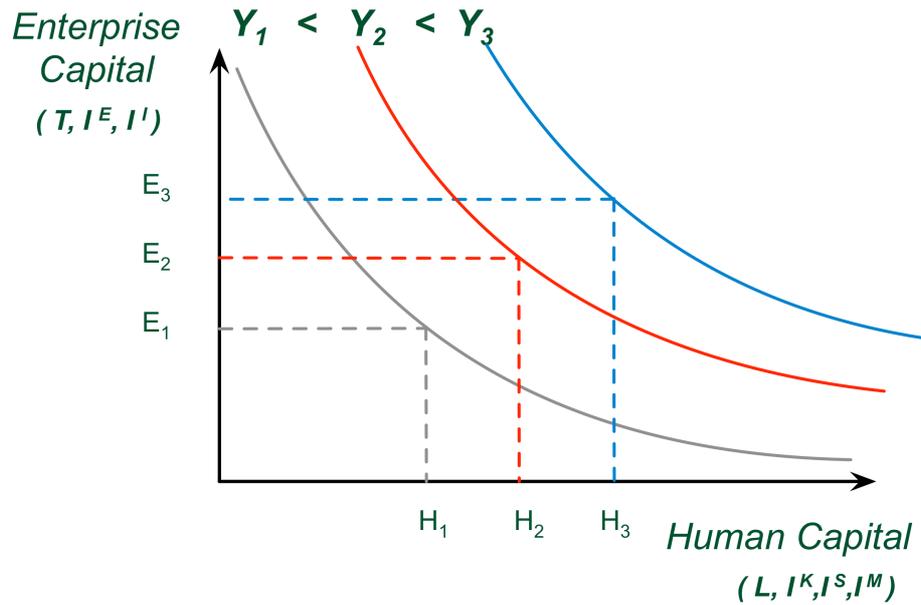


Fig. 3. Production curves

When talking about value creation we mean profit generation, for profit generation we need to understand the costs associated to each production factor¹³.

Every asset (regardless whether it is a tangible or intangible asset) has two types of costs. One part of the associated cost is relating to the keeping and maintaining the asset, while the other part is associated with the operation of the asset¹⁴. In case the asset has spare capacity it means that we keep a certain part unnecessarily¹⁵, therefore a certain portion of the cost is a loss element in value creation.

As we saw earlier, value creation capability is strongly associated to corporate value. We should, however also assess what might affect value creation.

3.4 Assessing the risks and opportunities

Production factors require risk analysis. Risk management has a wide range of approaches that might be utilized in this respect ([6] and [7]).

Risk analysis – among others – should cover the following aspects:

- possibility of losing certain production factors – especially the risks associated to the ownership of production factors
- operational risks of productions factors
- relative cost level of production – this might refer to the long-term competitive position of the company

¹³ For the non-profit sector value creation means other elements than profit (e.g. social return on investment) but the cost related information is similarly important.

¹⁴ More details in Boda – Szlávik [2], especially figure 5. in the article.

¹⁵ Of course there can be temporarily idle capacities due to seasonality, or reserve capacities for safety situations. In these cases we cannot automatically define them unnecessary.

The ownership of intangible production factors is especially critical, as the human capital's elements are mainly owned by the employees.

During valuation the overall risk level will be reflected in the discount rate – as we covered it earlier.

For the analysis of opportunities associated intellectual assets we can follow one of the option pricing models and collect the necessary information (like value associated to certain scenarios, volatility of project's return, etc.). The same approach might be used for the analysis of intellectual asset related key risk scenarios.

3.5 Identifying the gaps and the necessary developments

When we covered the value creation in point 3.3 we saw that once the target output level is defined there might be necessary developments.

The results of the risk assessment might also require certain developments.

One of the challenges associated to developments is that they require the investment of financial resources and management time. In most of the cases these two elements are bottleneck resources. Decision makers face difficulties when they should select among competing development projects therefore we should make sure that the decision making is supported by cost benefit analysis and risk analysis.

3.6 Putting everything together

Value based management (VBM) is focusing on maximizing the shareholders' value. VBM's main question is what should the management do both during strategic decision-making and during everyday operational decisions in order to ensure that the corporation's shareholders' value is increased. According to the concept, corporate strategy-making, controlling (planning and measuring corporate performance), management and employee compensation frameworks should all be linked to shareholders' value.

In previous chapters, we saw how fundamentally intellectual assets are linked to corporate value. Therefore we can define intellectual assets as value drivers in VBM.

According to Koller [8] there are four key management processes that collectively govern the adoption of VBM: strategy development, definition of performance targets, preparation of action plans and budgets and operation of performance measurement and incentive systems.

If we would like to enrich our value based management practice we should consider the analysis of intellectual assets (and their affects) during these four processes according to the steps we covered in points 3.1 to 3.5.

3.7 Communicating the results

Visualization and communication of what we possess and what we might reach is essential towards those stakeholders who are interested in the value of our company. Therefore the

targets set in VBM could only be fulfilled in case the intellectual asset related information is shared with the stakeholders.

Widely accepted fact that traditional financial reporting standards are unable to present the intellectual capital related information. There are many efforts which all aim the standardization of intellectual capital reporting¹⁶. Tichá [17] provides an excellent overview of the existing intellectual capital reporting concepts.

Until a comprehensive standard is defined and accepted (which is not likely to happen soon) companies should select one of the developed concepts and start making voluntary reporting of intellectual capital.

4 Conclusion

The growing importance of intellectual capital unquestionably changes the way we ought to manage our corporations. We saw how intellectual assets contribute to corporate value creation and therefore to the value itself. There are plenty of efforts among academics and researchers to make intellectual capital more identifiable and understandable. Parallel to this, managers and consultants are working on making intellectual capital more manageable. Widely accepted management techniques, like value based management are providing great platforms for the integration of intellectual capital management.

In this paper we intended to highlight the complex way intellectual assets contribute to corporate value. We reviewed the traditional ways of grasping enterprise value and examined how intellectual assets are taken into consideration.

Managers should systematically uncover what kind of intellectual assets their corporation possesses, understand their interdependencies, and capture their contribution to the company's strategy. For judging efficiency the capacity status of assets and their cost status need to be investigated while for the appraisal of the asset structure's effectiveness the correlation among intellectual assets should be in focus. Exploratory work needs to be concluded by assessing the risk status of assets.

By linking intellectual capital analysis with value based management we can make sure that it gets the necessary, continuous management focus and – above all – increases corporate value.

¹⁶ Like Ricardis [14] by the European Commission or MERITUM Guidelines [14].

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