

Measuring Intellectual Capital

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Abstract Steady knowledge production and a great innovative capability are crucial attributes, if not necessary prerequisites, that companies need to be and remain competitive on today's market. The open innovation approach provides an opportunity within this article to increase companies' innovative capability. The article also deals with the question as to how intellectual capital can be measured in the innovation process.

Key words: Intellectual Capital, Open Innovation

1 Introduction

As the knowledge society has developed, there has been a considerable shift over the last 25 years in many sectors of industry in favor of the knowledge production factor. As early as the year 2000, the proportion of this production factor in total corporate added value was 60 % on average [e.V00]. A great innovative capability and the successful generation of innovation essentially holds the key to sustainable corporate success and positive growth, even for the *SME stimulus for innovation*. In the light of these facts, the demand for more information about the knowledge production factor on the part of many boards of management is understandable. In addition, intangible factors, including the knowledge production factor, increasingly play a major role in business valuations (i.e. from the shareholder's point of view). Even when the market value of the so-called intangible assets exceeds that of the

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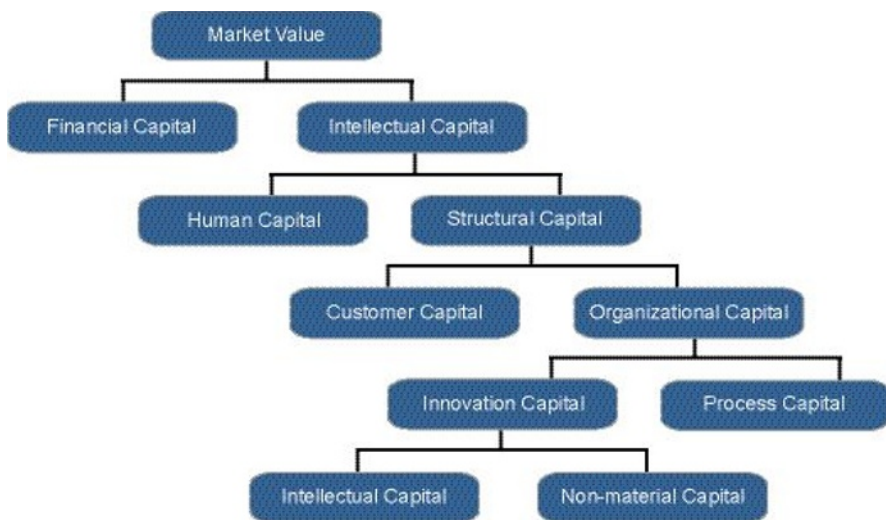


Fig. 1 Categorizing intellectual capital according to Edvinsson and Brünig [EB00]

book value [Hel01], balance sheets these days also show almost exclusively tangible assets. Interim reports are increasingly obligatory, for instance as stipulated by the regulations of the International Accounting Standard (IAS) and the International Financial Reporting Standard (IFRS).

The terms intangible assets, intellectual capital, knowledge capital and intangible assets are used interchangeably in many cases in literature as well as in business practice. The term intellectual capital is used below as a result of the BMBF International Monitoring Project focusing on the central theme of *Enabling Innovation* and the core area of “human potential as an innovative and competitive advantage” (translated by author).

Against the background described above, this article deals with the classification and valuation of intellectual capital and with the clarification of the significance of relationship capital as part of the same. This is demonstrated in the example of the open innovation concept.

2 Classification of Intellectual Capital

Edvinsson and Brünig [EB00] differentiate between financial capital and intellectual capital, which together account for a company’s market value, see Fig. 1. While financial capital is being formed from the company’s tangible and fixed assets, the intellectual capital is being specified. Edvinsson and Brünig then differentiate further between human and structural capital. In their opinion, human capital is based on experience, skills and knowledge. In contrast, structural capital consists for its

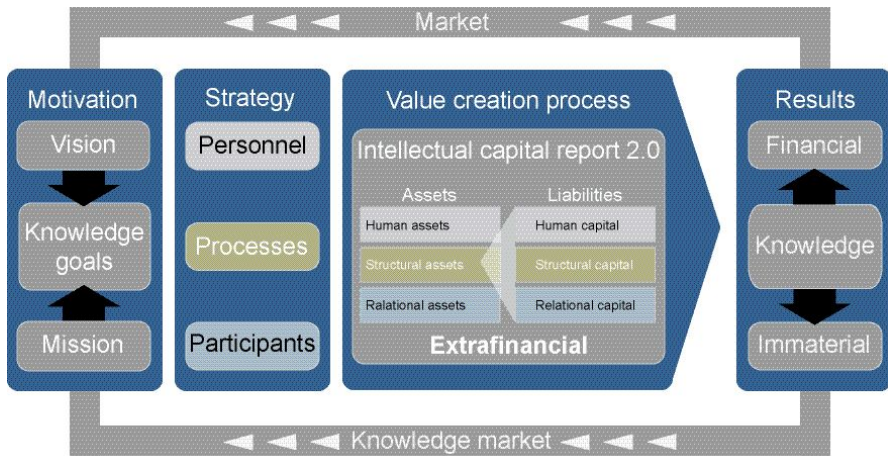


Fig. 2 Intellectual capital report 2.0 [KLB00]

part of customer capital (characterized by the customer base, customer relations and customer potential) and organizational capital. The latter differentiates again between innovation capital and process capital.

Another widespread classification in German-speaking areas is one that differentiates between human, structural and relationship capital. Koch and Schneider developed this new structure in 1998 and thus presented the first concept for a so called “financial knowledge report”. The Austrian Research Centre Seibersdorf applied the new concept in 1999 which today still consists of the first ideas [KLB00]. In 2007, Koch and Leitner refined the concept and developed an economic oriented concept of the knowledge report. It was publicized in 2008 [KL08].

3 Measuring and Evaluating Intellectual Capital

The company’s innovative capability does not just depend on the knowledge and potential of individuals, but specifically on their interdisciplinary and interactive thinking and action. The prerequisite for emerging innovation is embedded in networks and is initially derived from the relationship and/ or interaction between the individuals [LA]. The potential and innovative capability can therefore be found in “knowledge resource networks” [LC99] and may produce innovations, depending on the quality of the relationships between the individual intersections of a network. Innovation in this sense can be understood as the effect of synergy in the relationship of separate individuals. In order to be able measure and evaluate the innovative capability within an organization [BAF10], there is, however, a lack of academically funded models that examine and describe the individual’s intellectual capital. Ap-

propriate evaluation procedures therefore need to be developed, which describe and objectively evaluate intellectual capital so that it can be recorded as company assets as part of the relationship capital. Consequently, no conclusion is yet possible about a company's innovative capability.

Existing procedures for including important intangible results such as, for example, the balanced scorecard [KN96], are not specific enough in view of their generic nature to serve as an adequately funded model. There are many other approaches and methods, however, for evaluating working knowledge [Sve01].

The best known method is the “Skandia Navigator” [EM97] of the Swedish insurance and finance group, Skandia. By the middle of the 1990s, they had already begun publishing intangible assets in so-called interim reports. The output of this method is the *Intellectual Capital Report*. This is a report on operational intellectual capital in addition to the annual report. The value of intellectual capital is determined by the so-called Skandia Market Value Scheme, which places the market value within a hierarchical structure.

Another method is the “intangible asset monitor” [SH02]. This is a system based on the knowledge organization for measuring the intangible asset. As a non-financial scorecard system, the intangible asset monitor should be regarded as an additional demonstration of a company's financial success and its shareholder value.

Sveiby sums this up as follows:

No one method can fulfill all purposes; One [...] must select methods depending on purpose, situation and audience [Sve01].

4 Processes of Innovation and Open Innovation

Having demonstrated how intellectual capital can be classified and how important it is for a company to measure intangible assets, a relatively recent theoretical concept will be discussed here, based on the example of open innovation, with the aim of showing the importance of a company's external relationships for its innovative capability and also, therefore, for its success.

Increasing the efficiency of product development and companies' own innovative capability has always been an important prerequisite for success. By utilizing ideas and technologies in innovations, companies are able to tap new markets and maintain their competitiveness. Whereas large enterprises have the necessary financial and human resources to carry out their own research and development projects, meager resources and limited know-how characterize small and medium-sized enterprises (SMEs). It therefore proves difficult for them to find new ways and tackle challenges created by changing market conditions on the one hand and the realignment of large enterprises on the other hand [BDH⁺07]. In this context, companies and SMEs are particularly dependent on the involvement of external resources and know-how for increasing their innovative capability and therefore their competitiveness in cross-linked cooperation.

Potential groups of external partners in the innovation process, according to von Hippel (1987), are:

1. Customers and suppliers
2. Universities, public institutions
3. Competitors and
4. Other nations.

In the context of knowledge management, Sveiby concedes that external players have a significant role in a company and refers to the acquisition of new knowledge as “intangible income” [Sve98](translated by author). It is important for companies that know their own customers well to be able to offer the best solutions. Satisfied customers also have a positive impact on image-building because companies are able to refer to them. However, the opportunity to use and integrate the knowledge and experience of customers as well as business partners (suppliers, for example) into the company’s own process of innovation is particularly important. In the search for appropriate solutions, the company is able to use external know-how for the purposes of improving profits and growth [Sve98, vH87].

The *open innovation approach* provides companies with new opportunities for structuring external relationships and the flow of knowledge, but also sets new challenges for innovation management [VDJvdVdR08]. In the past, companies preferred to use internal research and development (R&D) and innovation resources for developing and marketing new products, and did not really involve the external environment [Che03, GB06]. A wide variety of factors, such as globalization, new market participants, shorter product life cycles, smaller R&D budgets and rising R&D costs superseded this *closed innovation* strategy at the end of the last century [GE06, GR99]. Chesbrough coined the term *open innovation* as a response to the new challenges. External resources in the innovation process were accorded a significantly greater importance in this approach than was the case in the closed innovation strategy.

The new innovation strategy is defined by Chesbrough 2003 as follows:

Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology [Che03].

Chesbrough extended this definition in 2006 as follows:

[...] open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively [Che].

A comprehensive *open innovation strategy* offers companies many opportunities, but also poses new challenges. The knowledge-intensive innovation processes must to some extent be reorganized to include external players and the knowledge gained to be transferred to the organizational knowledge base.

The significance of the informal transfer of knowledge and informal relationships with external cooperating partners, customers, suppliers and even competitors

within the open innovation process and the development of an appropriate internal knowledge base should be emphasized here [Che, vH87]. These relationships that are difficult to grasp and formalize have a decisive influence on the success of the innovation phase, even at the stage where ideas are being generated [Con95]. Nor should the significance of relationships among internal experts be underestimated. Informal relationships, however, are unstructured and, if anything, transparent [Por08, Str10]. The nature of knowledge disseminated by socialization is usually implied and remains in the individual knowledge base of those employees who are directly involved [Por08, Epp07, NT95, EE07]. SMEs are faced with the challenge in their innovation processes of evaluating relationships and knowledge and structuring the processes of associated organizational learning [CL90]. The identification of experts and the exchange between them in particular must be guaranteed in order to improve the progress of the innovation process [Epp07, EE07] and to establish how the company can successfully integrate internal and external sources of knowledge [BH02].

In summary, it can be said that the exploration and inclusion of external experiences and knowledge and the organization of an external network is usually a natural continuation of well-structured, consistent innovation management deep-seated within the company. The strategic opening of the innovation process is only sensible and advisable if the company's in-house structures are prepared for it. Functioning innovation management creates the framework in which it is possible to make the best possible use of external resources. Structured management of knowledge that incorporates the three levels of *technology*, *organization* and *human resources* in equal measure is essential for managing complex innovation processes and becomes particularly important when companies cooperate with external bodies [VM10].

The focus in innovation management by companies is increasingly changing against the background of these developments. Incorporation of the external environment increasingly needs to become an integral part of the entire innovation management concept. New opportunities then arise for medium-sized enterprises for strengthening their innovative capability and long-term competitive position. In order to make use of these opportunities, companies need to control, speed up and optimally plan their own (open) innovation process using a variety of methods. Similarly, individual core skills should therefore be enhanced and concepts developed for protecting intellectual property.

5 Summary

This article has demonstrated that the knowledge production factor has clearly grown in significance over the last ten years, both for large enterprises as well as for SMEs. Business valuations increasingly frequently include intangible factors as well. The term *intellectual capital* emerged in this connection. This intellectual capital combines a company's structural capital, human capital and/ or relationship

capital. These items are combined in what are referred to as intellectual capital reports and their asset and liability values issued.

Companies continue to be challenged by limited internal resources, particularly financial and human resources, in their innovative capability. Limited know-how is, of course, also associated with this. The closed innovation paradigm, which has been predominant to date, has been discouraged by including external players in the process of innovation. The innovative *open innovation approach* makes it possible for companies to supplement their internal ideas with external ones and to increase the innovative capability with this additional knowledge potential. No limits have been set on the possibility of including external ideas, whether these involve customers, suppliers, competitors, academics or other institutions. It is important in this context to create appropriate structures in the company for exchanging knowledge in both directions. This integrated concept of innovation management strengthens the competitive position of companies and, in so doing, their chances of operating successfully on the market.

The question arises in this context as to how recently acquired knowledge, the intellectual capital, is measured. Two concepts were briefly envisaged here with the Skandia Navigator and the Intangible Asset Monitor. Which method will ultimately be applied in the company remains unresolved due to the specific situation of the company at the time. Indeed, the thinking here shows that in future, the processes of generating and transferring knowledge and therefore of measuring and evaluating it, will increasingly be the focal point.

6 Future Research Requirements

Future research requirements can be deduced from the current gaps in research in the area of measuring intellectual capital. They therefore also lie in the development of structures for supporting the transfer of knowledge between employees. In addition, it is still not possible at present to visualize informal internal and external relationships so that the knowledge *tucked away* there can similarly be externalized without loss.

To this end, the open innovation conceptual model needs to be synchronized with existing theories of knowledge management in future research work. Innovation processes are knowledge-intensive processes, in which the transfer of knowledge must be controlled within them in a target-oriented manner. Existing knowledge management theories should also be expanded for this purpose with innovation-specific attributes. Based on the importance of informal networking in (open) innovation processes, there is both a fundamental as well as an application-oriented research requirement on this subject [VA09].

A further problem in this regard is that of the protection of *private property*, because the involvement of external players in the innovation process is not absolutely safe for the independent company. By indicating the intangible assets, i.e. knowledge, in interim reports or the year-end accounts themselves, know-how is

disclosed and therefore possible core skills made accessible to anybody. This disclosure is a major obstacle for companies and employees who do not want to see their work valued in order to protect their own reputation.

In this regard, companies need to some extent to practice knowledge management *the other way round*. Instead of merely pursuing the usual goals of knowledge dissemination for knowledge management, the framework conditions should be adjusted, for example extensions and adaptations of the theoretical approaches towards the protection of intellectual property. These specifically concern the company's internal situations and protective measures used to prevent inflows and outflows of information and knowledge in order to protect itself from knowledge unintentionally draining away (cf. Bahrs et al. 2010). In practical terms, this means banning USB sticks, for example, or other storage media. It is also possible to implement cloud computing here. This involves an approach which makes IT infrastructures (e.g. calculating capacity, data memory, etc.) available over a network and therefore removes them from the company. Professional secrecy clauses and confidentiality agreements have long been an integral part of today's contracts.

7 Outlook

On the basis of what has been outlined so far for Germany as a knowledge center, fundamental approaches like corporate knowledge – the intellectual capital – can be externalized. The designation of so-called intellectual capital reports or the Skandia Navigator approach (interim reports on the annual return) are preliminary steps towards an integrated business valuation.

Changes are also needed on a micro-economic scale. From the buzzword open innovation, relevant recommendations for action need to be drawn up in future for corporate practice – and particularly SME practice, in order to remain competitive in an increasingly globalized world.

At the macro-economic level, from a national economic viewpoint, an investigation should be carried out, for example, into whether certain industries, which tend to operate stronger open innovation, are more successful on the market.

In political terms, the question then arises as to the improvement in legal and economic framework conditions in relation to open innovation in different industries. Finally, both companies and other branches of the economy still not operating open innovation at present should be empowered to apply open innovation by appropriate regulations and laws.

When organizing external political and economic framework conditions for open innovation in companies in the future, the focus here should be on the following areas [DJVKC08]:

- Networks and collaboration as a starting point for cooperation with competent partners.
- Support when setting up firms – an example of this is spin-offs as a source for targeted exchange of knowledge and close profiling.

- IP management as a source of new ideas and opportunities for marketing the company's own know-how.
- Research and development work in the company with the aim of promoting the uninterrupted development and expansion of the company's own knowledge as well as the cooperation of companies and research institutions.
- Well-trained staff with many opportunities for on-the-job-training.
- Adequate funding opportunities for companies operating open innovation.

The focus should not be on certain firms or sectors of industry when implementing appropriate political and economic measures. Rather, the success of these measures depends on looking at open innovation as a change in paradigms and system.

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