STRUCTURE AND FUNCTIONS OF INTANGIBLE ASSETS IN THE KNOWLEDGE ECONOMY

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1. Introduction

In the world where economies are increasingly based on knowledge, technology, communications and information (therefore being called "learning" and "knowledge-based" economies) there is no wonder that the main trend observed is a shift from tangible to intangible value creation, meaning the increasing role of intangible assets and extended volume of research devoted to their identification, categorization and valuation.

Therefore, nowadays intangible assets (IAs) are regarded as critical drivers for development, innovation and economic growth. Although there is no unified definition of such assets, the authors of this paper share the point of view that these assets are "all non-material factors that contribute to the performance of firms in the production of goods or the provision of services, or that are expected to generate future economic benefits to the entities or individuals that control their deployment" [1, p.31].

2. History of the IAs scientific investigation

One of the pioneering works considering IA was written in 1959 by E. Penrose [2, p.128]. According to him all company resources should be transformed into services. Services are the function of experience and knowledge obtained by a company. This thought was widely developed only in 1980s.

Among the first works entirely devoted to intangible assets and intellectual capital the ones by Brooking [3, p.58], Sveiby [4, p.20], Edvinsson and Malone [5, p.463] and Stewart [6, p.18] can be named. In these works the researchers have stressed the strategic importance and the role of intangible resources as key value drivers for companies' competitiveness. These studies were purely theoretical, however at the same time a number of reports of empirical work investigating intangible assets were published: by Aboody and Lev [7, p.3], Barth and Clinch [8, p.15], Lev [9, p.419], Kristen and Gregory [10, p.248] and E. Dedman [11, p.312].

Although intangibles at the firm level have received large investigators' attention in the fields of international business, accounting and economics, these approaches have mostly focused on two main spheres: either on the general process of value creation, e.g. [12, p.9; 13, p.201; 14, p.109], or on the role of IAs as main channels of knowledge generation and transfer [e.g. 15, p.51; 16, p.131].

A growing literature explores the problem of accounting for intangibles and valuing them in the stock market. Important overviews are provided by Lev [11, p.33] and Blair and Wallman [17, p.47]. Apart from this, the literature on the economics of intangibles is reviewed in Corrado, Hulten, and Sichel [18, p.11], and in the introductory comments of Corrado, Haltiwanger, and Sichel. The general opinion shared by this literature is that a broad list of intangibles should be treated as capital expenditures.

2. Structure of intangible assets issue

Talking about the structure of intangible assets, it can be said that this topic was mostly investigated from the accounting, not economic point of view, for instance, by Abernetby, Stolowy and Jany-Cazavan, Wyatt, Siegel.

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Anyway, there is a number of works in the economic field worth mentioning: Sveiby [5, p. 230]; Edvinsson, Mallone, Roos, Brooking. In the main, the authors tried to describe the structure of IA and to define their main component and the way it affects the market value. However, there is no uniformity about the precise IA structure in the scholars' environment, although a certain general understanding of the concept exists.

Some researchers, such as Mayo, Ahonen, provide a narrower definition of intangible assets. They claim that IA are constituted mainly by human capital that can be considered from three points of view: as the amount of employees, as employees' personal properties and as work community. However, there are also scholars rendering a considerably broader definition, for instance Andrissen, Tissen. They distinguish five IA groups: 1) assets and endowments, 2) skills & tacit knowledge, 3) collective values and norms, 4) technology and explicit knowledge, 5) primary and management processes.

Perhaps, the best known approach to IA categorization and structuring is the "Balanced Score Card", which was developed in the USA around 1990 by Kaplan & Norton. According to it, IA comprises three main perspectives they can be regarded from: internal processes perspective, customers' perspective and learning and growth perspective.

3. Functions of intangible assets

Speaking about the role of intangible assets, it can be said that it can hardly be overestimated. Nowadays almost everyone shares the position of Nonaka and Takeuchi who wrote in their book "The knowledge – creating company" that only those companies that can create knowledge (in the form of intangible assets) can be successful in today's world.

In the case of valuation the role of IA is also enormous. A recent Gartner report stated that, by 2007, more than 90% of the value of the Global 2000 enterprises is created by their intangible intellectual assets, compared to 20% in 1978 and 70% in 1998.

Apart from this, according to the latest surveys only from 6 to 30% of company's value are obtained from tangible assets [11, p.34]. So, more than a half of the value comes from Intangible Assets. Other proofs of their importance are the research conducted for American corporations by Hulten and Hao and with the same methods applied to German companies' valuation by Hao and Jaeger. With the intangible investments regarded as an important component of company value, they explained the biggest part of existing market-to-book-gap in value. For instance, Hulten and Hao report that when R&D and organizational expenditures are capitalized and added to the balance sheet, the percentage of the market capitalization rises from 31 to 75 percent. Editors of the Harvard Business School's newsletter, Harvard Management Update, went even further, indicating that intangible assets were worth generally three times more than the physical assets a company may possess, such as equipment and buildings.

With the same purpose (of valuation but in this case at the national level) was the work done by the World Bank to measure intangible capital. The value of intangible capital was obtained as the residual after deducting natural capital and produced capital from total wealth. The dynamics of this value proved to be positive and the proportion of intangibles appeared to be larger than that of tangibles in developed countries.

According to the surveys, about 50% of all investments of companies are made in the sphere of intangible assets: R&D, personnel development, infrastructure, etc., meaning that another function of IA that can be distinguished is investment function. The importance of investment in intangibles is also stressed by recent estimates by Corrado, Hulten, and Sichel [17, p.31] who suggest that there were approximately $3.6 trillion in intangible assets in the U.S. nonfarm business sector in the period 2000-2003, compared with some $11 trillion in tangible plant and equipment and the proportion of investment in IA is growing. Estimates by Nakamura suggest that U.S. businesses invest as much in their intangibles as they do in their plant and equipment (including IT). Moreover,

on the basis of the volume and quality of the intangibles possessed by the company very often decisions are made about investing into in. Apart from this, Heirman and Clarysse observed that speed of innovation among start-up firms depended on IAs (such as team experience or collaboration networks).

Along with these functions IAs also play an important role as income drivers for the companies and, as a result, they become drivers of economic growth and a source of national wealth for the entire countries. For instance, November 2002 McKinsey & Co. study found that while the 40 technology and innovations companies studied could add 10-20% to their operating income by better exploiting IP, only a small number even reached the 0.5% mark. One such underutilized IA, according to Arrow (and, therefore, with weak impact on cash flow) is technology licensing by technology-rich companies.

The role of intangibles as the source of competitive advantage(while tangible resources are almost the same for all the players) is also worth mentioning. Barth [8, p.32] found that IA, in the form of R&D and advertising expenses, increase the likelihood of analysts' coverage of the firm, which makes such stocks more attractive to investors. One should also remember that IA data are complex and difficult to interpret for analysts, as noted by Gu and Wang. At the same time, many companies avoid disclosure of reliable information about their intangibles and official regulations may be needed to ensure issuance of honest IA data, as Dedman [11, p.330] has found out, to ensure full access of investors to high-quality balance sheets, as noted also by Wyatt.

Therefore, main functions of intangible assets are the following: knowledge creation and development, valuation, investment, income drivers and a source of competitive advantage.

4. Different approaches to classification of intangible assets

Possessing the correct structure and list of intangibles is necessary for their separation and accounting within the companies and further valuation and usage. Sometimes, improvement in IA management (which is beneficial for the company's stakeholders) can be accomplished even with non-quantitative visualization of combinations of strategic targets, knowledge goals and value-adding potentials.

However, the preliminary problem is the very identification of such structure. Neither there exists an exhaustive classification of intangible assets, nor is it anywhere near a complete listing of intangible assets. Another issue is the fact that meaningful, measurable intangible assets are continuously being created. Therefore, there is no consensus among scholars about the optimal IA structure.

The main problem that exists in terms of IAs is the difference between general economic and management and accounting approaches. Today only 20 percent of a company's market value is reflected in its accounting system, meaning that the structure of intangibles used by accountants in the balance sheets is not sufficient and current accounting practice excludes most of the intangible assets developed within a corporation from the company's balance sheets. Usually the problem is that the money spent on, for instance, R&D and brand development is treated as current expenses by accountants, while managers and economists treat them as investments. It should also be remembered that companies also invest in organizational development (e.g., strategic planning, new management systems) and worker training; however, we also usually do not see them in financial statements. Moreover, it is not clear if elements like software, R&D expenditure, patents, economic competencies and employee training have to be considered as current expenses or capital accumulation.

However, surprisingly, there is even no one single accounting approach to the structure of intangibles. To show this, US GAAP and IFRS can be compared. US GAAP requires all costs related to research and development to be expensed as they incurred. Therefore, the fair value of in-process R&D needs to be determined and expense immediately.

There are only a few exceptions where different rules apply and US GAAP prohibits the capitalization of development costs. Revaluation of intangible assets is possible under US GAAP.

In contrast, under IFRS intangible assets cannot be revalued entirely. R&D expenditure can be expensed not simultaneously with its incurrement. Relocation costs following a business combination are not capitalized while such practice is normal under GAAP.

Another accounting classification is the one developed by International Federation of Accountants – IFAC. According to it, there are three elements of IA: human, relationship and structural (organizational) capital.

Apart from the accounting approach, there are many other ones, of economic and managerial nature. The quantity and variety of them has continued to grow exponentially over the last two decades because of the development of knowledge-based economy. Here we will mention a few of them.

According to Sveiby [5, p.34] intangible assets are divided into internal (patents, concepts, licenses, administrative system, organizational structure etc.) and external (brands, trademarks, relations with customers and suppliers etc.). According to Petty and Guthrie [3, p.57], intangible assets of a company include organizational and human capital (internal and external). This approach is also shared by Edvinsson and Mallone; Roos et al. Brooking [4, p.89] suggests his own approach and singles out the following constituents of intangible assets: market assets, intellectual property assets, human-centered assets and infrastructure assets.

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Perhaps, the best known approach to IA categorization and structuring is the "Balanced Score Card" developed by Kaplan and Norton, which was developed in the USA around 1990. According to it, IA comprises three main perspectives they can be regarded from: internal processes perspective, customer's perspective and learning and growth perspective. Kaplan and Norton expanded their analyses with the strategy map concept which can be further refined by distinguishing the top-down phase (IA identification process) and the bottom-up phase during which the relationships between IAs of the organization and its financial performance are established, as it has been found out by Chareonsuk & Chansa-ngavej.

According to a definition by OECD cited by Petty and Guthrie [3, p.44], intellectual capital is the economic value of two categories of intangible assets of a company: organizational ("structural") capital and human capital. Structural capital refers to e.g. software systems, distribution networks and supply chains. Human capital refers to human resources within the organization (employee's resources) and external to the organization (customers and suppliers). Also Edvinsson and Malone divide intellectual capital into human capital and structural capital. Human capital according to Edvinsson and Malone consists of, e.g., the knowledge, skills and innovativeness of employees. Structural capital consists of customer capital and organizational capital. Customer capital refers, e.g., to strength and loyalty of customer relationship. Organizational capital includes innovation and process capital. Process capital consists of the organization's processes and techniques used, e.g., to increase efficiency.

The macro approach uses the categorization of intangibles proposed by Corrado, Hulten and Sichel [17, p.38]. They identify three main categories of intangible assets: economic competencies, innovative property and computerised information. Economic competencies include spending on

strategic planning, worker training, redesigning or reconfiguring existing products in existing markets, investment to retain or gain market share and investment in brand names. Innovative property refers to the innovative activity built on a scientific base of knowledge as well as to innovation and new product/process R&D more broadly defined.

5. Recommendations and conclusions

However, despite all the discrepancies, the authors of this paper consider the Reilly & Schweihs as the best one, however, not optimal. According to this approach, the structure of IAs includes ten categories, arranged by the similarity in their nature: marketing-related (trademarks and service marks, trade names, brand names, logotypes, colors), technology-related (design patents, process patents, patent applications, business method patents, technical documentation), artistic-related (literary works and copyrights, musical compositions, photography, maps, engravings), data process-related (platform software, software copyrights, automated databases, integrated circuit masks and masters), engineering-related (industrial designs, trade secrets, engineering drawings and schematics, technical know-how, blueprints), customer-related (customer lists, customer contracts, customer relationships, open purchase orders), contract-related (license agreements, franchise agreements, operating licenses, subscription rights, futures contracts), human capital-related (trained workforce and wages, union contracts, employment contracts), location-related(mineral exploitation rights, easements, air rights, water rights), Internet-related (domain names, URLs, linkages, website design). Another category that is present in other approaches is worth adding here- goodwill-related intangible assets (e.g., institutional goodwill, professional practice goodwill, personal goodwill or a professional, celebrity goodwill, general business going-concern value). Considering the ways of optimization and improvement of this structure, the following steps should be taken. First of all, the human capital-related dimension should be extended, comprising the qualifications, competencies, experience and motivation of employees that should be also effectively measured.

Apart from this, knowledge-related and organization-related dimensions should be added to the list. The organization-related dimension should include organizational structure, communication systems, reengineering processes and organizational design as intangible assets contributing to the overall effectiveness of the company. Speaking about knowledge-related (or internal information-related) dimension, it should include systems of knowledge acquiring, storage and development within the company and company's know-how in practices of retaining best people and stimulating the knowledge-sharing. Interner-related dimension can be extended to include Intranet systems of the company and then it should be called network-related; it should also comprise not only website design, but also all information acquired by the web-site, together with the clients' feedback in the terms of questionnaires etc.

The separate international research entity should be established in order to make a continuous inventory of the new intangible assets and to investigate the methods of their valuation and the most effective usage together with developing the ways for the legal protection of them.

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Summary

The main step that should be taken is the unification of accounting and managerial approaches to intangible assets' structure, that can be made possible via treating R&D, human and organizational capital that has been internally generated by the company as investment and add it as the supplement to company's balance sheets.

Keywords: intangible assets; knowledge economy.

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