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THE IMPACT OF INTELLECTUAL CAPITAL ON FIRM'S PERFORMANCE

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1 INTRODUCTION

1.1 Background and introduction to the topic

The first emergence of Intellectual Capital (IC) in the academic literature was addressed in 1969 when Galbraith (1969) described IC as the difference between company's market and book value. In the same article, Galbraith depicted intellectual capital as a crucial part of company's value creation process and a bundle of assets simultaneously. Later, a set of intangibles such as knowledge, intellectual property, innovativeness, information, expertise, and the staff's abilities were embedded to the concept of intellectual capital (Stewart 1998, Teece 2000).

The debate over intangible assets as a firm's value creating component has been increasing over the past two decades. In today's highly competitive and ever-changing markets, the importance of physical and financial factors has decreased, whereas investments in knowledge and other intangibles have increased. According to Cegarra-Navarro and Sanchez-Polo (2010), the executives in both businesses and governments are generating sustainable competitive advantage by centralizing their focus on intangibles. Moreover, intellectual capital has been recognized as a factor of production, replacing the tangible assets such as land, job, and production facilities (Martín-de-Castro 2011). Although the impacts of intellectual capital have been recognized, the IC is in its early stages in terms of understanding its impact on management and strategy in the knowledge-based economy (Stahle & Bounfour 2008, Martín-de-Castro 2011).

As the traditional retail and manufacturing based economies have been in a transition towards a more fast-changing, knowledge-based, and technologically intensive economy (Cañibano, Garcia-Ayuso, and Sanchez 2000), intellectual capital (IC) has become a key factor for building companies' sustainable competitive advantage (Conner & Prahalad 1996, Grant 1996). The knowledge-based economy has not only opened new markets for the companies but a completely new way of doing business where obtaining huge amounts of physical capital is not the main target. Real world examples such as Alibaba, Uber, Airbnb (Libert, Wind, and Beck 2014), and most recently Snapchat have all grown rapidly, are more profitable, operate with lower

marginal costs, and have a higher return on assets than the traditional companies. The common factor for these companies is the business model, where the focus is (instead of obtaining physical capital as much as possible) primarily on intangibles (Libert et al. 2014).

1.2 The objectives and structure

This present thesis focuses on the impact of intellectual capital and its components on firm's financial performance. The first aim of this study is to find out the most commonly used methods to measure intellectual capital. The second aim is to provide a conclusion on IC's impact on firm performance through analyzing already existing studies where the company size, geographical location, and industry differ. The structure of this thesis is as follows: the chapter two discusses briefly the background and the division of intellectual capital, and why IC is an essential factor for companies. The third chapter focuses on the relation between IC and firm performance, how intellectual capital can be measured for example what are the most common models developed to measure IC? The fourth chapter is an analysis of three already existing studies where the introduction, research methods, findings, and limitations of each study are presented and analyzed. Lastly, the fifth chapter summarizes this thesis and the results of empirical studies as well as it presents suggestions for the future research.

2 THE CONCEPT AND ORIGINS OF INTELLECTUAL CAPITAL

Since Galbraith first described intellectual capital being a component of company's value creation process in 1969, it has been examined significantly. Through the identifying process of intellectual capital, many arguments have been stated by the researchers in an attempt to define what IC is. Because of the complex and abstract nature of intellectual capital, it is difficult to define, measure, and conceptualize. At first, intellectual capital was considered as the difference between the firm's market value and book value (Galbraith 1969, Sveiby 1997, Edvinsson & Malone 1997) and later Stewart (1998) defines IC as the knowledge, information, intellectual property which all have an impact on firm's wealth. Moreover, Teece (2000) embeds other intangibles such as company's brand and image, customer relationship, and reputation to the concept of intellectual capital. Finally, Chang et. al (2008) summarize the concept of intellectual capital by stating that IC symbolizes all the company's knowledge-related intangible assets.

Martín-de-Castro (2011) explains the evolution of IC by separating it into two main periods:

1. *Emergence*, the last decade of the twentieth century has been described as the stepping stone of intellectual capital in the context of business administration. First questions and propositions of intellectual capital as a company's intangible asset emerged from the business and consultancy activities. During the 1990s, researchers started to centralize their focus on identifying and measuring firm's intellectual capital.
2. *Academic emphasis*, from the year 2000 onwards, examinations of intellectual capital have grown significantly and it has become one of the most interesting fields of study in the academic world. The emergence of knowledge workers and information technology and the recognition of the relationship between intellectual capital and technological innovation (Subramaniam & Youndt 2005) and competitive advantage (Cabrita & Bontis 2008) shifted both the academic world and management towards a more intellectual capital-based view of the company replacing the traditional physical resource-based view.

Often researchers define intellectual capital and its elements through different models and categories. Traditionally, intellectual capital has divided into research and development (R&D), marketing and education. Recent classifications, however, divide intellectual capital into external (customer or relational) capital, internal capital (structural), and human capital. The first capital indicates all the relationships between the company and its customers. Internal capital, on the other hand, includes patents, concepts, organization's information systems, and culture. Human capital comprises staff's abilities to act in different situations as well as knowledge, skills, values, experiences, and motivation. (Brennan & Connell 2000.)

Although the differences between intellectual and physical capital might be self-evident by their nature, Lönnqvist, Kujansivu, and Antola (2005) divide their differences into four categories: concreteness, ownership, selling and purchasing, and simultaneous usage (see Figure 1).

	Physical capital	Intellectual capital
Concreteness	concrete, physical objects	abstract, invisible
Ownership	clear	hard to define
Selling and purchasing	possible	impossible
Simultaneous usage	designed to fulfill one purpose at a time	can be utilized for several purposes at a time

Figure 1. Differences between physical and intellectual capital (adapted from Lönnqvist et al. 2005: 19).

As a concept, intellectual capital is abstract, invisible, hard to define, and subjective. Subjective, because its determination might differ depending on the perspective of a person. The ownership of physical capital is mainly valued at a price presented in the company's balance sheet, whereas intellectual capital does not have such concrete valuation. It is extremely difficult to define who owns, for example, the brand or knowledge of the company, and at which price? The above-mentioned suits also the selling and purchasing category because selling physical capital, in most cases, leaves always an evidence of the item and price but you cannot buy or sell customer relationships or professional skills because they have either built up throughout the

years or educated. In general, physical capital (e.g. machines) are designed to fulfill solely one purpose at a time, whereas the brand is available for a number of people through different channels. (Puusa 2011:10.)

Throughout the identification process of intellectual capital, several lists and classifications have been developed to clarify the characteristics of IC. One of the most used division of intellectual capital in academic studies is The Value Platform (see Figure 2) developed by Petrash (1996) in a co-operative exertion which includes Leif Edvinsson (Skandia), Huber Saint Onge, Patrick Sullivan from Intellectual Capital Management (ICM) and Petrash (Dow Chemical). The Value Platform divides intellectual capital into three components by their nature and together they form the following formula: *Intellectual Capital = Human Capital + Organizational Capital + Customer Capital*

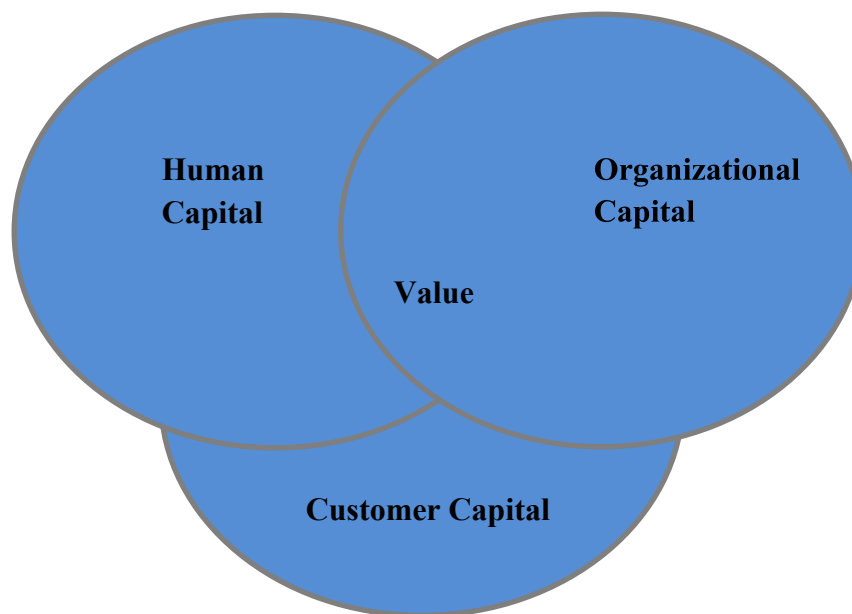


Figure 2. The Value Platform

(adapted from Petrash 1996).

The Value Platform portrays the interrelationships between human, organizational capital, and customer capital. The dotted triangle represents the knowledge flow in the company. Each 'capital' is an independent entity, but to create value in a firm, the knowledge must flow fluently between them (Petrash 1996.)

According to Petrash (1996), intellectual capital consists of human capital, organizational capital, and customer capital. Human capital is the knowledge that individuals have and produce. Organizational capital is the knowledge that has been institutionalized within organization's structures, processes and culture. Lastly, customer capital is the customer's perception of the value obtained from doing business with a supplier.

The Society of Management Accountants of Canada (SMAC) (1998) defines intellectual capital as follows:

“In balance sheet terms, intellectual assets are those knowledge-based items, which the company owns which will produce a future stream of benefits for the company”

The knowledge-based items range from management, technology, and consulting processes to patented intellectual capital.

In the knowledge-based economy, intellectual capital has become a key value creating component for a company. For instance, according to Wu, Tsai, Cheng, and Lai (2006), in terms of value creation, intellectual capital is replacing physical capital. Its influence as a differentiator for creating sustainable competitive advantage has been recognized, and it has become one of the most important agenda for management (Martín-de-Castro 2011).

2.1 Human capital

During the first and second industrial revolutions, the value of tangibles such as machines and production facilities were valued higher than the workers, and thus lower-level workers were not the economists' primary target of examination. (Kiker 1969.) However, the transition towards a knowledge-based era has emerged the importance of the people as the drivers of business and economic growth (Dietz 1975). In order to survive in a highly competitive environment, organizations have started to centralize their focus on human capital by increasingly investing in education, on-the-job training, medical care, and well-being (Bell 1984).

Moreover, human capital is considered as the key component of intellectual capital and the most important factor of creating company's sustainable competitive advantage. It is recognized not only as the primary driver of economic wealth and competitiveness but also as one of the most valuable resources in software development, management consultation, and financial service industries. (OECD 1996, Cabrita and Bontis 2008, Ahmadi 2012.)

What is human capital then? – All the innovativeness, knowledge and creativity of the company. The word human in the capital refers to the individuals within the company. Human capital consists all the individual capabilities. SMAC (1998) define the following abilities as parts of human capital: know-how, education, vocational qualification, work-related knowledge, occupational assessments, psychometric assessments, work-related competencies, entrepreneurial élan, innovativeness, proactive and reactive abilities, and changeability.

Human capital is all the individual abilities to perform and the experiences, information, skills, and knowledge that the firm's managers and employees have. However, the human capital cannot be owned by the firm because the capital might be taken away by employees (Edvinsson & Malone 1997, Hsu & Fang 2009), although according to Roos, Fernström, Piponius, and Rastas (2006: 13), the bond between the employees and firm can be strengthened by making certain contracts.

2.2 Structural capital

Structural capital or organizational capital is considered as a prolongation, embodiment, or an empowerment of human capital (Edvinsson & Malone 1997). A sophisticated approach defining the difference between human capital and structural capital is the ownership. Human capital is possessed by the employees, making its management relatively challenging, whereas structural capital is more controlled and possessed and managed by the company. (Martín-de-Castro 2011). Structural capital includes all the intellectual property rights (IPR), infrastructure assets, software, hardware, databases, research and development (R&D) activities, corporate culture and functions and everything else that supports above-mentioned employee's productiveness (Brooking 1996, Edvinsson and Malone 1997, Hsieh and Tsai 2007).

The organizational capital which includes mechanisms, structures and all the physical resources excluding the employees is often related to structural capital. A company which have strong systems and procedures to employ its workers can help them achieving their goals. However, if a company which does not have a such powerful system could not achieve its main target. (Bontis 1998.)

SMAC (1998) further-divides structural (organizational) capital into intellectual property and infrastructure assets. The first one includes patents, copyrights, design rights, trade secrets, trademarks, and service marks, whereas the latter comprises management philosophy, corporate culture, management processes, information and networking systems, and financial relations.

2.3 Relational capital

Whereas human capital consists all the individual capabilities and structural capital combines them into the knowledge of the organization, relational capital, on the other hand, is all the relationships between the organization and its stakeholders. Stakeholders comprise not only the external stakeholders such as suppliers, shareholders, clients, and media but also internal stakeholders. In fact, firm's innovativeness arises from the relationships between groups, staffs and the organizations. (Hsu & Fang 2009, Ahmadi 2012.)

Relational capital is also known as customer capital. Relational/customer capital consists of many intangible values in the field of sales. Since relation capital is the result of firm's customer relationships, firms can create customer capital by using the already existing knowledge and skills of the employees to provide better services "exploitation processes" or building new external communities of practice "exploration process". (Cegarro-Navarro & Dewhurst 2007, Chang & Tseng 2006.)

SMAC (1998) lists following elements as parts of relational capital: Brands, customers, customer loyalty, company names, backlog orders, distribution channels, business collaborations, licensing agreements, favorable contracts, and franchising agreements.

Well managed relational capital might have significant financial benefits for the enterprise. There is a clear link between customer relationships and cash inflows. Maintaining good relations with the customers and keeping them satisfied with what the company provides, makes them more likely to remain in the business than leaving. (Pottruck 1987.) Furthermore, Edvinsson and Malone (1997) conclude that the customer relationships are the start of cash flows, not the accounting department.

3 INTELLECTUAL CAPITAL AND FIRM PERFORMANCE

The emergence of the knowledge-based economy has caused a significant interest in intellectual capital and its impact on firm performance (Stewart 1998, Thurow 1999, Petty & Guthrie 2000). Studies of intellectual capital focus on its role in effecting the corporate performance as well as understanding the usefulness of intellectual capital. Prusak (1998) defines intellectual capital as an intellectual resource that has been “formalized, captured, and leveraged” aiming at building a higher value of assets. In today’s economy primarily driven by information and knowledge, firms not only produce products and services but also search ways to create value and wealth by exploiting their own resources in building a sustainable business (Venugopal & Subha 2015).

3.1 The link between intellectual capital and firm’s performance

The development of technology and global markets force companies continuously to improve themselves, and thus developing and innovating new strategic advantages are a must for organizations in order for them to survive in this heavily competitive global environment (Cater & Cater 2009). These kinds of developed markets have forced businessmen to understand and recognize the significance of intellectual capital in creating competitive advantage (Ding & Li 2010).

As mentioned earlier in this paper, the transition to the knowledge-based economy has changed the perceptions of intellectual capital. Whereas the production of steel or cars were essential products during the second industrial revolution in the twentieth century, nowadays software based non-physical materials are quickly becoming the most valuable products (Pulic 2004). In order for an organization to survive in a knowledge-based economy, continuous investments in innovations, R&D, and knowledge are necessary.

Organization’s competitive advantage can be divided into cost differentiation and cost-leadership (Porter 1985). The differentiation advantage emerges from the company’s value-adding activities which are then valued by the customers, whereas the cost-leadership advantage is a more traditional financial-based approach where the focus is

on producing complementary products as competitors but at a lower cost (Cater 2009.) Intellectual capital has a remarkable impact on both cost-leadership and differentiation advantage (Holmlund & Kock 1996).

A study made by Menor, Kristal, and Rosenzweig (2007) acknowledged the positive impact of intellectual capital on a firm's ability to operate, and it also improves business performance. Moreover, recognizing the value of intellectual capital will increase the firm's market value which benefits the stakeholders (Junior, Aguiar, Basso, and Kimura 2010). As the studies of intellectual capital increase continuously, it is becoming clear that companies create sustainable competitive advantage by investing in intangibles. When intellectual capital is managed effectively, it becomes the foundation for creating competitive and financial advantage.

Intellectual capital is built within an organization by its personnel, processes, knowledge, and customer relationships, thus it is a unique resource that is hard to duplicate or replicate. Organizations with higher intellectual capital not only respond faster to market changings but also are more innovative in terms of improving and differentiating the already existing products or developing new ones, hence organizations with highly developed intellectual capital are more likely to win the competition. Through the leverage of intellectual capital, companies build sustainable competitive advantage and thus are dominating the target markets. (Menor et al. 2007.)

3.2 Intellectual capital models

Since late 80's researchers have been working on developing different models of intellectual capital. First models focused on measuring and managing intangible resources, which later were extended to comprise also intellectual capital. These models were mainly created for external reporting purposes or to manage intellectual resources and internal intangibles. (Alwert et. al 2009.)

3.2.1 Skandia Navigator

Probably one of the most known models in the field intellectual capital studies is Skandia Navigator (see Figure 3), whereby the intellectual capital consists of two main

categories: human capital and structural capital. Skandia is a large Swedish financial service provider which presented the Skandia Model in 1991. The Skandia Navigator comprises intangible values of which exploiting the management might transform its activities to implement strategies (Ashton 2005). Edvinsson and Malone (1997: 68) describe Skandia Navigator as a house where the financial focus is the roof, human focus and customer focus are the walls, and renewal & development focus is the foundation, and together they are a symbol of an organization.

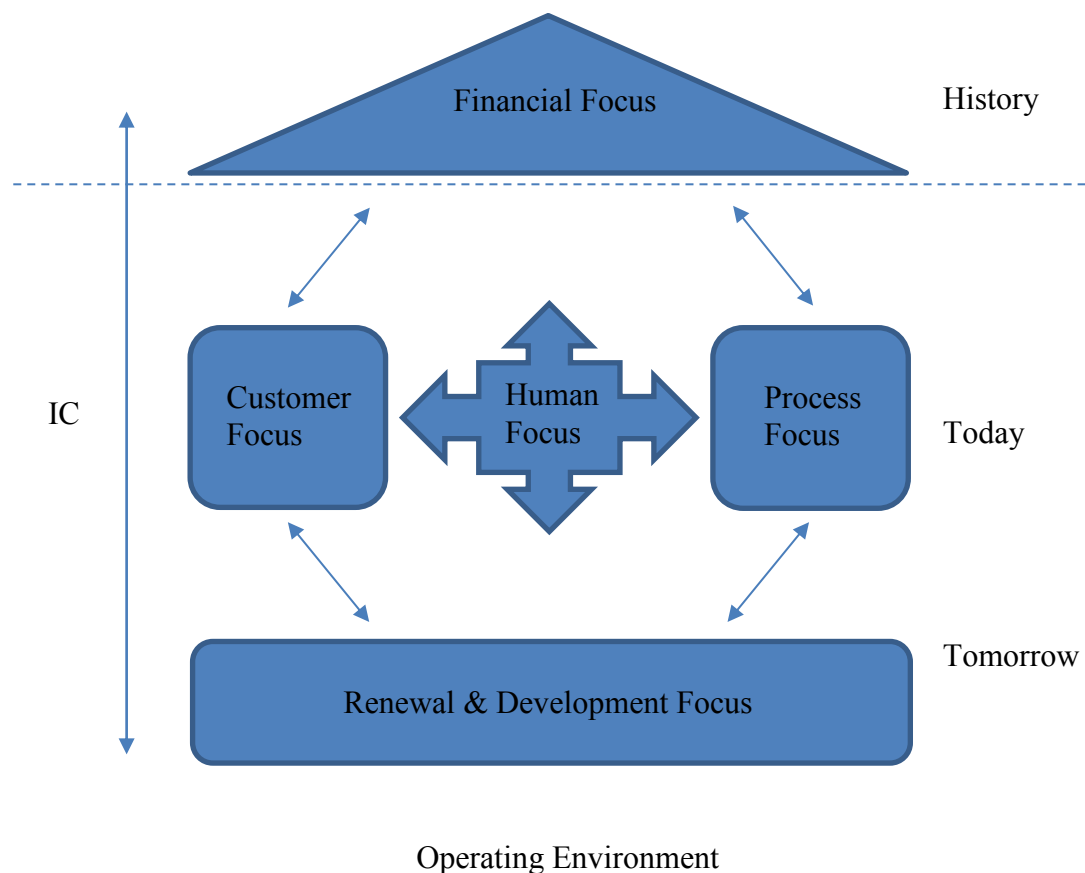


Figure 3. Skandia Navigator (adapted from Edvinsson & Malone 1997: 68)

The financial focus symbolizes the balance sheet of a company. It is an indicator of where the company was at a specific moment. Whereas the customer focus is an indicator of how well the company is filling its customer's needs through services and products, the process focus is a measure of structural capital which includes all the patented information of the company. As we can see from the Figure 3, the human focus is in the center because it is connected to the other focuses. Human focus

comprises all the knowledge, experiences, innovation and capabilities of the company's employees as well as the company's ability to maintain and improve them continuously. The renewal & development focus is the other element of structural capital. Through employee education, and development of new products, renewal & development focus is preparing the company for the future. (Edvinsson and Malone 1997: 68-69.)

3.2.2 Intangible Assets Monitor (IAM)

As the importance of the intangibles as a value adding component was acknowledged in increasingly competitive markets in the last decades of the twentieth century, Sveiby developed a model called Intangible Assets Monitor to measure intellectual capital in an organization. According to Sveiby (2000), the economic value of intangible assets such as customer relationships are no more "invisible". The model measures intangible assets by using relevant indicators which are displayed in a presentation format aiming at presenting a broad overview of the company's intangible assets.

Whereas the indicators of Skandia model are human, process, financial, and renewal and development, the indicators in the IAM are determined depending on the organization strategy which makes IAM more flexible. However, Sveiby (1997) recommends a frame for selecting indicators. The frame includes external and internal structure as well as competence. Each of these structures focuses on growth, innovation, efficiency, and stability.

As an example, investment in information technology could be the indicator for growth in the internal structure, and organic growth for growth in the external structure. The education level could be the indicator for growth in competence. Other indicators for innovation could be revenue per new customer (external), the new process implemented (internal), and education and training costs (competence). Indicators for efficiency, on the other hand, could be profitability per customer (external), the proportion of support staff (internal), and profit per employee (competence). Whereas indicators for stability could be age structure (external), the age of the company (internal), and the turnover of the professionals (competence) (Sveiby 1997, 2001.)

3.2.3 Balanced Scorecard

Kaplan and Norton (1992) developed Balanced Scorecard (BSC) to analyze strategic performance by focusing on intangible assets. The BSC creates a new framework to measure a firm's performance because the traditional accounting models focus primarily on financial measurements. The BSC helps the managers in identifying the current position of the organization as well as future targets for success, and the necessary actions needed to accomplish the objectives. Balanced Scorecard includes both traditional financial measurements and performance aspects of the organization. These aspects of the BSC are divided into four: financial, customer, internal processes, learning and growth aspects. (Bose & Thomas 2007.)

The financial aspect provides for the management an explicit view of the current financial position by measuring the past activities using different methods or ratios such as revenues, return on equity (ROE) or return on investment (ROI) (Kaplan & Norton 1996: 25-26). The customer aspect concentrates on the identification of customer and market segments in which the organization competes (Bose & Thomas 2007). According to Kaplan and Norton (1992), main measures of the customer aspect include new customer acquisitions, customer satisfaction and retention, profitability, account and market share, and success in building sustainable relationships with customers.

Internal processes help the management in identifying the processes that are critical to their success. These processes enable the company to maintain and acquire new customers in their market segments as well as fulfill shareholders' expectations for their financial success (Kaplan & Norton 1996, 26.) The learning and growth aspect has three dimensions which are people, system, and organization. Together these dimensions improve company performance and recognize important structures and processes for building long-term growth and success as well as develop the knowledge of the organization in these fields. (Kaplan & Norton 1996: 28.) Sophisticated measures could be employee satisfaction, days of sick leave and staff turnover (Malmi, Peltola and Toivanen 2006: 29).

Because of the Balanced Scorecard's complex and comprehensive nature, its implementation process is not simple. In fact, Kaplan and Norton (1993) emphasize an eight-step process to implement the BSC into an organization. The steps of the implementation process are as follows:

1. Preparation: a company should identify a business unit where the BSC is truly needed.
2. Interviews (first round): where the senior managers and executives are being interviewed to receive their input into the company's strategic targets.
3. Executive workshop (first round): where the top managers are together developing the BSC by determining the strategy and mission for the organization.
4. Interviews (second round): interviewing individuals to discover the possible issues and improvements for the implementation process.
5. Executive workshop (second round): top management including managers, executives and direct reports discuss and plan the company's vision, mission, and an experimental scorecard.
6. Executive workshop (third round): the team of senior managers meet to finish both the BSC and the plan of implementation.
7. Implementation: the establishment of a new team which is responsible for the introduction and successful implementation of the plan.
8. Periodic reviews: in a certain period of times the managers meet and discuss their experiences, issues, and improvements of the BSC.

The Balanced Scorecard is not only beneficial for commercial organizations but also for non-profit entities. However, the BSC is not suitable for every organization. Its implementation might be expensive and time-consuming. Hoque and James (2000: 12) highlight that the Balanced Scorecard is more practical and it provides better benefits for larger companies.

3.2.4 Value Added Intellectual Coefficient (VAIC)

Since Ante Pulic in 1997 introduced Value Added Intellectual Coefficient (VAIC) model to measure intellectual capital in an organization, it has been used in many examinations of a firm's performance. Ante Pulic's VAIC sets it apart from the rest

because it was one of the first models which solely focused on a firm's financial indicators, i.e. data from financial reports. The VAIC identifies both the extent and efficiency of intellectual capital in the organization (Pulic 2004.)

According to Pulic (2004) the VAIC model calculates the total value creation efficiency of the company. In order to understand the total value creation efficiency and the portion of intellectual capital efficiency in it, it needs to be measured. The formula of VAIC model is as follows:

$$VAIC = ICE + CEE$$

Where the intellectual capital efficiency (ICE) and capital employed efficiency (CEE) are calculated as follows:

$$ICE = \frac{VA}{HC} + \frac{SC}{VA}$$

$$CEE = \frac{VA}{CE}$$

Where the human capital (HC) = employee expenses, structural capital (SC) = VA – HC, value added (VA) = sum of operating profit, employee costs, depreciation, and amortization, and capital employed (CE) = financial capital, i.e. book value of the net assets.

The VAIC measures the amount of new value produced per human capital and capital employed. Generally, the VAIC index ranges from 1 to 3, and the higher coefficient is, the more value is created.

4 EMPIRICAL STUDIES

The purpose of this chapter is to analyze three already existing researches of the link between intellectual capital and company performance in different industries around the world, and by that provide an answer to the research questions presented in the first chapter. This chapter starts with a prompt background introduction of the researches followed by topic analyses and presentation of the results.

4.2 Background, introduction, and results of the studies

Until the emergence of knowledge economy in the 80's, the world economy was primary based on production where the land, labor, and physical assets were the value creating factors. However, as competition has grown increasingly through globalization, intellectual capital has overtaken the physical assets as the most important source of value creation. Traditional accounting methods are lacking the ability to report the increasing value of intangible assets, thus other complementary tools are essential (Bukh 2003, Beattie & Thomson 2007, Yalama & Conskun 2007).

Intellectual capital is especially important for small and medium-sized enterprises (SMEs) (Steenkamp & Kashyap 2010) because normally SMEs do not have great amounts of physical and financial assets, thus they must exploit a higher value of intellectual capital, particularly in terms of human capital, to success (Erikson 2002). Because of the informal managerial systems and organizational structure in SMEs, in most cases, individuals are the primary source of organizational knowledge (Crema 2016).

According to Steward (1997), intellectual capital is knowledge used to add value and generate profits to companies, being the key resource in business. In recent years, intellectual capital has increasingly received attention from investors, managers, and policymakers (Dumay and Edvinsson 2013). However, intellectual capital is an abstract and invisible object which makes it hard to be measured. The Value Added Intellectual Coefficient (VAIC) method developed by Pulic (1997) is used to solve this problem.

4.2.1 Intellectual capital in Turkish banking sector

In the first study, Yalama and Conskun (2007) measure the impact of intellectual capital on the profitability of listed banks on the Istanbul stock exchange market (ISE). The data comprises all the banks which were listed on the ISE over the period 1995 to 2004.

Yalama and Conskun examined the effect of IC on the profitability of the banks by constructing three portfolios. Each portfolio includes different input values to understand how intangible assets, tangible assets, and financial effect influence profitability. The returns of three portfolios were then tested and compared to highlight the significance of intellectual capital for investors. The first portfolio measures the effect of intangible assets on profitability, and the input data is obtained by using the VAIC method. Whereas, the second portfolio measures the effect of tangible assets on profitability by applying the VACA¹ method. Finally, the third portfolio measures the financial effect on profitability where the data was collected from using the market-to-book ratio. The output values for the three portfolios were: return on assets (ROA²), return on equity (ROE³), and loan-deposit ratio (LDR⁴). (Yalama & Conskun 2007.)

Yalama and Conskun (2007) point out one restriction from the data collection and measurement. The three effects on profitability were calculated by applying the Data Envelopment Analysis (DEA) which is a nonparametric measuring method for analyzing the efficiency of a decision-making value (Ray 2004: 1). In order to perform DEA, the numeric data for each input and output value needs to be available and positive. Based on this rule, Yalama and Conskun omitted all the banks with negative input and output values from their analysis.

¹ VACA is a method for measuring the coefficient of physical capital. $VACA = (R - C - DP) * (TBA - IA)$, where R is revenue, C is the cost of goods sold, DP is depreciation charge, TBA is book value of firm's total assets, and IA is intangible assets. (Pulic 1998, 2000.)

² ROA = net income / total assets

³ ROE = net income / stockholder's equity

⁴ LDR = loans / deposits ratio

According to their findings, the first portfolio in which the effect of intangible assets on profitability were calculated, indicated the total return ratio of 12,29. The total return ratio of the second (tangible asset effect) and the third (financial effect) portfolios were 9,81 and 9,83 respectively. Comparing the portfolios annually, the return ratio of the first portfolio was higher in every year excluding the years 1996 and 2004 when the third portfolio was higher. In other words, the first portfolio, which based on the effect of intellectual capital on profitability, provided higher total returns than the portfolios based on physical capital or market-to-book ratio. Moreover, Yalama and Conskun calculated the ratio of converting intellectual capital into profitability by applying Malmquist's Total Factor Productivity (TFP) index. The result of the ratio was 61,3 %, which means that the banks listed on ISE for the period 1995-2004 were transforming intellectual capital into profitability with a rate of 61,3 %.

Based on the results, Yalama and Consku (2007) conclude that intellectual capital has not only become an important factor for companies and investors but also, it has overtaken the traditionally highly valued physical assets as the most important factor for value creation in the Turkish banking sector. Similar kind of results have been found from the banking sectors in Greece (Mavridis & Kyrmizoglou 2005) and India (Kamath 2007).

4.2.2 Intellectual capital in multinational R&D firms

The study performed by Ariff, Islam, and van Zijl (2016) investigated the impact of intellectual capital on the market performance of multinational R&D firms listed on the United States (U.S) stock exchanges. The data for calculating intellectual capital were obtained by applying the VAIC method, and the market performance was measured by using Tobin's q^5 ratio and market-to-book ratio. The sample included multinational firms that had R&D activities and which were listed on the U.S stock exchanges for the period 2006 – 2013. The sample included 1,328 company-year observations. The present study applies VAIC model to calculate aggregate intellectual

⁵ Tobin's q = market value of assets/minimum replacement cost of the assets

capital efficiency and its components: human, structural, and tangible capital efficiency. Descriptive, correlation and multiple linear regression analyses were used to analyze the data.

Based on the expectation that R&D orientated companies exploit all the resources of intellectual capital efficiently, Ariff et al. (2016) developed a hypothesis for each resource:

“H1: Aggregate IC has a positive impact on the market performance of firms engaged in R&D.”

“H2: Human capital has a positive impact on the market performance of firms engaged in R&D.”

“H3: Structural capital has a positive impact on the market performance of firms engaged in R&D.”

“H4: Tangible capital has a positive impact on the market performance of firms engaged in R&D.”

The results reflect a significant positive correlation between intellectual capital efficiency (ICE), market-to-book ratio, and Tobin's q, thus the results support H1. Moreover, the findings support the argument that intellectual capital is an essential resource for companies in terms of generating profit in the future, therefore IC has a significant impact on the judgment of investors in valuing the share price. (Ariff et al. 2016.)

The findings reject the H2 since human capital did not have a significant association between either Tobin's q or market-to-book ratio. Ariff et al. (2016) points out the concern of investors regarding the companies' limited control over the human capital as an argument for the incoherence of the H2. However, the study found that structural capital has a positive and significant correlation with both market-to-book ratio and Tobin's q, and thus the results support H3. The results suggest that structural capital is a vital factor for improving firm's market value, and crucial to the confidence of

investors. Finally, the results support the H4, since tangible capital has a positive and significant association with market-to-book ratio and Tobin's q, which indicates that tangible capital is generating value for the investors. (Ariff et al. 2016.)

This present study investigated the impact of IC on the market performance of multinational R&D firms listed on the U.S stock exchange. The results supported H1, H3, and H4. Although the findings did not support either a positive or significant correlation between the human capital and market performance, we can conclude that intellectual capital is extremely important for firms engaged in R&D, since the results supported the H1 and H3.

4.2.3 Intellectual capital in manufacturing SMEs

Crema and Verbano (2014) conducted a study focusing on the levels and components of intellectual capital, and their impact on Italian manufacturing SMEs. According to Eurostat (2013), Italy has the highest number of manufacturing SMEs in Europe with over 407,000 enterprises, which indicates that the manufacturing sector is relatively important in Italy. The study was performed by conducting a survey and multiple linear regression model. The sample included 2,250 randomly selected manufacturing firms of which the majority were machinery and equipment manufacturers as well as fabricated metal producers. From the 2,250 firms, only 107⁶ CEOs or entrepreneurs responded in the online survey.

Crema and Verbano started the study by performing the survey to obtain data for constructs of intellectual capital in Italian manufacturing SMEs. The constructs for each component of IC (human capital (HC), structural capital (SC), and relational capital (RC) were: versatility, creativity, and competence for HC, patents, internal social capital, employee development systems, organizational structure, and knowledge coding for SC, and finally, relations, and collaborative routines for RC. The online survey included questions from each construct as well as firm performance e.g. "your employees develop new ideas and knowledge" (creativity), "you give your

⁶ Response rate of 4.75 %

employees time and resources to generate new ideas” (internal social capital), “with regard to your innovation process, in the last 5 years have you collaborated with many partners” (relations), or “have you improved the profitability of sales” (firm performance). Based on the data collected from the survey, Crema and Verbano developed a multiple regression model to analyze the relation between intellectual capital and firm performance.

The results of multiple regression analysis confirm a positive correlation between intellectual capital and performance. Moreover, the results emphasized collaborative routines, employee development systems, relations, and creativity as the most significant IC constructs in explaining the correlation between intellectual capital and performance. Therefore, Crema and Verbano (2014) conclude that relational capital, creativity, and employee development systems have a direct impact on firm performance, whereas the development of internal competence impacts indirectly. In general, the results suggest that Italian manufacturing SMEs have high-developed human capital and reasonably developed relational capital.

Although Crema and Verbano (2014) point out certain limitations regarding the validity of results through weak response rate and geographical and industrial sector limitation, they believe their study serves valuable information for managerial discussions and future research in the field.

5 CONCLUSION

The purpose of this paper was to investigate the components of intellectual capital as well as their relation with firm performance through presenting the most employed models of intellectual capital, and examining three already existing studies. This chapter includes discussions regarding the previously presented empirical studies as well as a conclusion and limitations of this thesis.

This study has investigated the components of intellectual capital. The first objective of this paper was to collect information regarding the appearance of intellectual capital within a company from several different sources in the field of intellectual capital studies. The found components of intellectual capital can be categorized into three groups by their nature: human capital, structural capital, and relational capital. Several researchers acknowledged and supported this division of intellectual capital. Each capital has its own characteristic despite the number of definitions that different researchers have stated. Human capital was restricted distinctly to the abilities of individuals, and the structural capital was considered as the continuation of human capital which appeared as company's processes, systems, and intellectual property rights. Lastly, the relational capital was connected to the relationships between the firm and customer. Relational or customer capital not only included the actual relationships with customers but also all the factors that have an influence on stakeholders such as brands, company names, and distribution channels.

Human capital as an impactor on firm performance received contradictory results in the empirical studies. Ariff et al. (2016) did not find a relationship between human capital and the performance of multinational R&D corporations listed on the U.S stock exchanges. They pointed out the management's lack of control over the human capital as an explanatory reason for the result. Whereas Crema and Verbano (2014) found human capital as the most significant impactor on the performance of manufacturing SMEs in Italia. Since small firms do not have great amounts of physical capital and financial resource, we can carefully conclude that the smaller companies are able to exploit intangible assets, particularly, human capital more efficiently than the large ones (Erikson 2002).

Despite the incoherence, in a general view, the results from each study suggested a significant and positive correlation between intangible assets and firm performance. Crema and Verbano (2014) found that manufacturing SMEs have well-developed human capital and reasonably developed relational capital. In the research performed Ariff et al. (2016), the results suggested that structural capital has a significant and positive association with the market performance of multinational R&D firms listed on the U.S stock exchange. Lastly, Yalama and Conskun (2007) found a significant and positive relation between intangible assets and firm performance in the Turkish banking sector. Moreover, according to their results the intellectual capital based portfolio provided better returns than tangible or financial based portfolios. Therefore, they valued intellectual capital higher than tangible assets. The studies, introduced in above chapter, focused on investigating the impact of IC on firm performance. The studies were performed by using different methods and included industries ranging from Turkish banks (Yalama & Coskun 2007), and multinational research and development (R&D) enterprises in the U.S (Ariff 2016) to manufacturing SMEs in Italy (Crema 2016).

The first limitation of this thesis is related to the subject, intellectual capital. Although the research of intellectual capital has increased significantly over the past two decades, intellectual capital is abstract as such, hence only proxy measures can be performed. Therefore, it is extremely important to develop and improve new measuring models, and perform continuously new researches of this topic as intellectual capital has been recognized as a vital factor for firm's growth and value increment. Another limitation addresses to the three studies examined in this thesis as only one was focused solely on manufacturing SMEs. Since smaller companies are exploiting intellectual capital more than the large corporations (Erikson 2002), non-listed SMEs or start-ups from different industries offer great opportunities for further research.

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