

The evaluation of intellectual capital influence on innovation

Irena Mačerinskienė¹, Rasa Aleknavičiūtė²

Abstract As market becomes more and more competitive, only innovation can determine competitive advantage. The creation and implementation of knowledge becomes essential for business success. The effective management of intangible assets in companies is needed. The aim of this article is to present main perspectives of innovation and to analyze intellectual capital relation to innovation capability. To reach the purpose scientific literature analysis and statistical data analysis methods were used. The research has shown a positive impact of intellectual capital elements on innovation capability. The strongest correlation was with structural capital, which was evaluated at the lowest level in the Lithuanians' organizations.

Keywords: Intellectual capital, Perspectives of innovation, Factors influencing Innovation.

I. INTRODUCTION

In the globalization process the flow of information has increased. Tangible assets are becoming less important for a competitive advantage due to easy imitation. Researcher's attention is concentrated on intangible assets management. Factors influencing organizations capability to adapt changing market conditions and with same tangible and financial resources gain better results have been started to explore. The notion of intellectual capital first appeared in the business world at the beginning of the 1990s (Dobre, 2009). The first company, which created and started to use this model, was Skandia. Leif Edvinson, at that time the employee of Skandia, created the Skandia Navigator model and computer program to use as an implement for quantifying intangible assets. Since then the theory of intellectual capital has been developing. Intellectual capital can be defined as "Knowledge that can be converted into value" (Leif Edvinsson and Pat Sullivan, 1996). Knowledge has become more important as new opportunities can get noticed and exploited because of asymmetries in knowledge across organizations (Hargadon & Sutton, 1997). Knowledge management influences the use of other capital forms efficiency. High intellectual capital lets companies note and use opportunities leading to higher efficiency.

¹ Irena Mačerinskienė, Head of Department of Banking and Investments, Faculty of Economics and Finance Management, Mykolas Romeris University, Ateities st. 20 LT-08303 Vilnius, Lithuania

² Rasa Aleknavičiūtė, master student, Faculty of Economics and Finance Management, Mykolas Romeris University, Ateities st. 20 LT-08303 Vilnius, Lithuania

Leading companies are creating their knowledge management system to use their intellectual capital potential. Intellectual capital involves high part of companies' value. Intellectual capital is changeable and hardly measurable, though by evaluating intellectual capital, perspectives of organization could be defined more accurately. Knowledge management leads to innovation and higher competitiveness.

At macro level the main factor of economy development has become knowledge based production, which needs permanent innovation process. The creation of new knowledge is promoted. The importance of innovations was emphasized in the Lisbon process. The innovation is seen as main factor which influences development and competitiveness of EU. The research and development (R&D) activities are promoted at the EU and state level. The target of the Lisbon process (2000) is to increase general investment in research for 2010 to 3% of gross domestic product (GDP). But this target stays not reached. The situation in Lithuania is even worse: in 2006 the total expenditure to R&D activities was 0.8 % GDP (Eurostat, 2009). Lithuania innovation performance is well below the EU average. It recorded comparatively weak results in intellectual property creation. Also it was indicated that Lithuania was below the EU average in transforming innovation inputs into outputs (Eurostat, 2009). Such results show that Lithuanian companies face difficulties in innovation activities. In order to exclude the strengths and weaknesses of knowledge management system intellectual capital and innovation should be analyzed.

II. VARIOUS PERSPECTIVES OF INNOVATION

Innovation is the process that translates knowledge into economic growth and social well-being. It is the main factor influencing progress of our civilization. First comprehensive innovation analysis was presented by Austrian economist Joseph Schumpeter in the 1920s. Schumpeter is famous for analysis of the theory of business cycles and development. According to this theory, new innovations and creative destruction process determine business cycles and economic growth. The main element of this process is entrepreneurship. Schumpeter regarded innovation as a collective product, culturally coded, and historically constructed. Nowadays there can be defined three schools depending on Schumpeterian tradition, which address the economic, social and cultural issues of innovation.

Economic perspective on innovation is presented by the capability school. Innovation as institutionalized capability characterizes technological change. Institutionalized capabilities crystallize into routines, which are relevant to innovation. There are three classes of routines: the operating routine, the investment routine and the search routine. The most important is search routine, which carries out innovation and resides in the research and development department where innovations occur. This school treats information as a commodity and regards innovation as a production of information (Arrow, 1962). So the management of innovation shrinks to managing intellectual property rights (Aghion & Tirole 1994). A decision whether to invest on innovation or not is made by calculating the cost and benefit of each innovation project. Investment could be made if the expected revenue of invention exceeds the expected cost. In order to get profit new invention should be protected from copying. If firms cannot protect new information, which they get from R&D projects, it discourages firms from conducting R&D activities.

Social perspective on innovation is presented by the corporate entrepreneurial school (Tceng, 2009). Grassroots impetuses present the pattern of corporate innovation. Grassroots impetuses emerge from a scene of identity and, as such, engage many actors. Innovations are borne out of an insider's sense of loyalty. Loyalist's sense of responsibility 'push men into alternative creativity' (Hirschman 1970: 80). Autonomy and entrepreneurship is crucial to innovation too. Burgelman (1983) found that innovation resided in the autonomous strategic impetus of individuals at the operational levels. Innovation cannot be individual work either of one person, or one department. Different departments should communicate to assure that innovation project will succeed. Communication with suppliers and customers is also important. Saxenian (1990) found that firms in Silicon Valley developed relationships of mutual commitment and dependence with their suppliers. Thus, firms spread the cost and risk of innovation and quickly adapt to changing technology. In order to reduce risk customers should also be involved in the backstage of innovation (Sutton and Kelly, 1997). Loyal customers can give valuable advice and teach designers how to interact with outsiders. Through the conscious and purposeful engagement in networks, entrepreneurs can creatively respond to different opportunities in real time (Drucker, 1998). Followers of corporate entrepreneurial school believe that innovation is something that happens in human relationships and it cannot be economically calculated. According to Kanter (2002), innovation is an improvisational theatre, wherein the stages are the sunken works and the actors are the grassroots corporate entrepreneurs.

The cultural school of innovations proposes that high-tech innovation is deep craft per se. The technical innovation cannot be created by digging information out of books or journal articles (Arthur, 2001). Instead it takes craftsmanship. Graham and Shuldiner (2001) after investigating the 150 year history of Corning noted that, firstly, deep craft is not the technique, because it is a set of

skills and sensibilities that cannot be reduced to science. Secondly, deep craft is an intergenerational heritage, which is shared through time and renewed as well as reinvented in each era in accordance with its peculiar circumstances. There are three ways to encourage the development of intergenerational relations: apprenticeship, documentary films and innovation conferences. These learning methods help to understand the knowledge, which was created and implemented in the company, and to concentrate to future knowledge creation. Thirdly, as innovation is driven by vision, deep craft is motivated by purposes that go beyond simple materialism. Innovative firms envision transcending the status quo of the market. That is why these firms should ignore their customers and concentrate to new future market imaginatively. Technology and market environments are not so much objective as they are subjective. Craftsmen through vision and intergenerational relationships comprehend the past, the present and the future simultaneously. The craftsmen's unconsciousness reels over consciousness and melts away the linearity of time. In this process innovation occurs.

All these schools differently understand sources of innovation. The capability school argues that innovation is pushed by technology. Attention is given for financing R&D department, where innovation occurs. Corporate entrepreneurial school regards innovation as a response to societal communities at large. It maintains that innovation is pulled by the market. Cultural school argues that the source of innovation is affective identification. Innovation will not occur if one does not have affective identification with both scientific and societal communities. The source of innovation depends on type of innovation. These schools define innovation in different ways. The capability school argues that innovative change is incremental because technological change evolves in a path-dependent way, and there is no great leap forward. Such mentality reflects the 1950s' conformist norm and represents a commitment to counter-revolution. In contrast, the corporate entrepreneurial school maintains that innovative change is radical because innovating, by its very nature, runs 'against the grain' (Kanter 1983: 69). In trying to strike a balance between the above two schools, the cultural school argues that innovative change is both radical and incremental. The innovation is radical in the technical aspect and it is incremental in cultural and social aspects. It is true that the theory of innovation needs all economic, social and cultural perspectives. These perspectives analyze different aspects of innovation process. As innovation is multidimensional process, there can be many factors, which have influence upon it.

III. FACTORS INFLUENCING INNOVATION

Summarizing the Schumpeterian tradition the main factors influencing innovation can be defined. Main factors influencing capability to innovate from the economic viewpoint is capability to invest to R&D projects. The formal rules and communication systems between departments should be assured. Also there should be routines of new R&D projects to stay innovative and save competitiveness in the market. The huge companies or clusters of companies have better opportunities to invest, because for them it is easier to attract investors or borrow in the market. Also these companies have enough resources to assure the commercialization of new innovative ideas. Having enough resources is important for innovation, especially for radical innovations, but there are other factors that are more favourable for small companies.

From cultural viewpoint the main factors of innovation are vision and intergenerational relations. The experience and future expectations together create innovation. Only craftsmen can create innovation. The continual learning process should be assured. Organization should invest in employees' training. Also employees should clearly understand the vision of their organization and keep the strategy, so ensuring the innovativeness of organization.

According to the corporate entrepreneurship school, innovation mainly depends on companies' intangible assets. Followers of corporate entrepreneurship school emphasize such human capital factors as employee's loyalty, entrepreneurship and communicational skills. Employees should have autonomy from central management to have space and motivation to improve company's work. Also loyalty is important to keep employee's innovative ideas inside the organization. Favourable organizational structures, processes and systems have influence on new knowledge generation and implementation in organization. The corporate entrepreneurship school defines such structural capital factors as teamwork, companies' decentralization and effective incentives promotion system. These elements are the most important for innovative activities. Teece (2009) was investigating hierarchical structures influence on ability to innovate. He found out that hierarchical structure in organization led to bureaucracy, where decisions were been made slowly. In these companies innovative ideas frequently do not reach the authorities. Teece (2009) suggests creating the incentives promotion system. The organization's culture should encourage employers to lay innovative ideas. It has to be discussed with whether to implement these ideas or it should not be made soon. The last element, which influences innovation, according to social entrepreneurship school, is mutual commitment relations with external entities. Such relations mainly involve communication network with customers and suppliers, which helps a company to share innovation risk. These relations could also involve communication with science and research institutions, communication in an alliance. From social perspective main factors of innovation are good atmosphere

and established communication networks, which let loyal employees to use their creativity and entrepreneurship.

Explicitly influence of relations with external entities to innovation is analyzed by the cluster school (e.g., Porter, 1990). Followers of this school study how geographical proximities between firms and its suppliers, customers, and competitors can lead to more innovative products (Theng-Hua Tzeng, 2009). Three main streams of thought may be envisaged. The first may be linked to economic geographers, whose interest is to understand the genesis and dynamics of clusters of innovative firms. They suggest that in modern production systems local knowledge plays an important role in the clustering process, which, in its turn, gives rise to a cumulative and self-reinforcing mechanism of knowledge acquisition, thanks to local knowledge spillovers. Cluster develops around specific knowledge. The empirical analysis of local networks in Silicon Valley (Saxenian (1994) showed, that they were important in the exchange and sharing of knowledge between individuals and regional institutions, such as universities and associations.

The second stream may be related to industrial economists, who define innovation determinants, and seek to test whether the processes of knowledge acquisition are facilitated by spatial proximity and sectorial specialization. It is argued that geographic proximity is important in facilitating the personal exchange of new knowledge between organizations. Spatial proximity facilitates learning processes through mechanisms of sticky knowledge spillovers. Von Hippel (1994) defined sticky knowledge as highly contextual and uncertain knowledge, which was best transmitted via face-to-face interactions and frequent contacts. For this reason high number of firms of the same sector located in a limited geographical area can facilitate knowledge acquisition, since sticky knowledge can easily spill over and be applied in each company.

The third stream of thought is spatial-relational approach. This stream started to analyze not geographical proximity but relational proximity influence upon innovative capabilities. Economists try to envisage the role of spatial effects like synergies, cooperation, and collective learning in innovation activities developed at the local level (Capello, 2002). The learning mechanisms that enhance innovative creativity are those of collective learning. Collective learning may thus be defined as a dynamic and cumulative process of knowledge production, transfer and appropriation, taking place in an area where a strong sense of belonging and strong relational synergies take place. The channels through which collective learning takes place are in fact thought to be (Camagni, 1995): a high mobility of specialized labour within the area and a low mobility outside the area, stable linkages between suppliers and customers, intense innovative interactions with suppliers, customers and mechanisms of local spin-off.

The main factors influencing innovation from the cluster school perspective are relations with external entities. Economic geographers and industrial economist perspective analyzes physical space between entities influence on innovativeness. Followers of spatial-relational approach

measure relationship capital. Relational capital is defined as the stock of relations that a firm can entertain with other firms, institutions, research centres, measured through the intensity of cooperation among local actors. Followers of cluster school have proven that both geographic proximity and intensity of relations have influence on innovation capabilities.

To sum up, we can define that innovation depends on economical, social and cultural factors. The main factor from economical viewpoint is the level of investment. From the social viewpoint innovation capabilities are influenced by culture of an organization. The structure of an organization should leave autonomy for employees to implement innovative ideas; also new promotion system of ideas should be created. The employees should be loyal to their organization and have good communication skills. Besides, communication with external entities is emphasized. From the cultural perspective an organization should have strong strategy and invest in training activities. These investments let qualified employees to create innovation.

IV. INTELLECTUAL CAPITAL AS ONE OF INNOVATION FACTORS

It is widely accepted that an organization's capability to innovate is closely related to its intellectual capital, or its ability to utilize its knowledge resources. Stewart (1997), described innovation as a knowledge management process and Nonaka & Takeuchi (1995) characterized innovative companies as knowledge creating. There are close ties in the research of innovations and intellectual capital. It is common to use knowledge or intellectual capital as antecedent of innovations (e.g. Ahuja, 2000; Dougherty, 1992, Subramaniam, 2005, Capello, 2002). Intellectual capital is the sum of all knowledge firms to utilize for competitive advantage (Nahapiet & Ghoshal, 1998; Subramaniam, 2005). According to Edvinsson and Malone (1997), the notion of intellectual capital refers to the value of intangible assets accumulated by the enterprise. Predominantly intellectual capital is divided into three parts (Bontis, 1999): human capital, structural capital and relational capital.

Human capital is defined as the knowledge, skills, and abilities residing with and utilized by individuals (Schultz, 1961). Grantham & Nichols underlined the importance of four aspects: analytical thinking, experiment, system integration and cooperation. Employees have become the main capital of organization, which generates profit. Enterprises by investing in training increase the value of personnel and intellectual capital. It is the investment to the development of organization. This investment is risky, because the enterprises themselves are not the owner of human capital (Chuang-Fah Huang and Sung-Lin Hsueh, 2007). Human capital changes when employee leaves the organization. So it is important to keep loyalty of employees.

Structural capital is the total of systematic studies, aimed at providing a lever by making the knowledge and skill, which are stated as the employee capital, institutional and forming as well as united organizational memory (Andriessen, 2001:103). Youndt et. al. (2004) defined structural capital as the institutionalized knowledge and codified experience residing within and utilized through databases, patents, manuals, structures, systems, and processes. This capital includes knowledge of an organization, communication system inside an organization and organizational culture, which influences training efficiency and innovativeness. The structural capital contains four elements: system, structure, strategy and culture (Hubert, 1996). As these elements are closely interrelated, they must be properly fitted to bring structural capital into full play, and improve the productivity of human capital through rapid knowledge-sharing, retention and well-organized procedures (Chuang-Fah Huang and Sung-Lin Hsueh, 2007).

Relational capital puts forward the value of the relationship of an enterprise with customers, suppliers and the rest of the society for consideration and states the loyalty of mentioned ones to the enterprise (Zernler et. al., 2008). Relational capital is sometimes defined as customer's capital, so emphasizing importance of customers. The major considerations include customer's satisfaction, procurement frequency and time, characteristics of customers, quantity of transaction, interactions, product quality and services etc (Chuang-Fah Huang and Sung-Lin Hsueh, 2007). Relational capital shows how well company interacts with external entities. Importance is given to long lasting, based on mutual trust relations.

These three intellectual capital elements include individual knowledge, organizational knowledge and social knowledge, which is important in innovation capability. Some of these factors are included into Schumpeterian innovation perspectives on innovation. Intellectual capital let to evaluate intangible assets from which innovation accrues.

V. INTELLECTUAL CAPITAL AND INNOVATION CAPABILITY EVALUATION IN LITHUANIA

In evaluating intellectual capital we refer to comprehensive research framework, which was introduced by Bontis in 1998. The construct of intellectual capital in this and subsequent studies has been conceptually divided into three sub-domains – human capital, structural capital and relational capital. The three sub-domains together group the entire knowledge base of the organization (Anskaitis et. al., 2006). These sub-domains are later divided into the range of basic elements taken from the basic activities and realities surrounding the practice of management. The items of our research are referenced from these past research (Huang Hsueh, 2007; Dzinkowski 2000; Bilich and Silva 2006; Youndt Snell 2004). Also by

defining items we referenced to three Schumpeterian perspectives on innovation. These perspectives define factors influencing innovativeness, which can be attributed to intellectual capital. Human capital was divided into five basic elements, which include employees' loyalty, qualification and specialization, interest to innovation and training, inventiveness and communication skills. Structural capital was explored by excluding nine elements, which include elements of communication inside an organization and organization culture. Relational capital includes seven elements, which evaluate relationship with customers, partners and other external entities. Innovativeness of organization was measured by evaluating nine components, which included experience in research and using high technologies, current efficiency of manufacturing, organizations' ability to change and level of investment on R&D. Respondents were asked to evaluate the condition of these factors in their organization. These factors were ranged in five point Licker scale (from 1- very low, to 5 - very high).

The data was collected in April 2010. In total 428 questionnaires from various organizations in Lithuania were collected. The highest part of enterprises (55%) were settled in Vilnius county, 22% were settled in Kaunas county and the other differs from other regions. As we can see from the results, the main part of organizations was settled in two biggest Lithuanian cities. 54.8% of the respondents were employees of a company, 31.2% were managers, 10.2% were owners of a company and 3.8% were unemployed at the moment and presented the company they had worked. The majority of the respondents (83.8%) has finished higher education or was seeking higher education diploma at the moment.

The results showed that the respondents evaluated companies' intangible assets at middling level. To highlight the differences the meaning of each factor was calculated. The mean of innovativeness components was higher in larger companies than in micro and small enterprises. Overall the highest assessment is given to ability to

implement innovation. The respondents think that their company has experience in using new technologies, always searches for new opportunities and is able to implement innovative ideas. These results have shown that environment is estimated as innovation friendly. The lowest rating is given to investment to R&D activities and experience in research. The respondents as less important factors for their company noted investment to research (mean 3.66), creation of intellectual property (mean 3.7) and relations with science institutions (mean 3.29). Lithuania for intellectual property production is one of catching-up countries in the EU, but still organizations do not accent these intellectual property creation activities as their priorities. And, if private sector does not invest in these activities, the situation is likely not to change. 54% of the companies have low or very low experience in research, what shows that companies are not concentrating to creation of knowledge as to knowledge implementation. This year the investment on innovation decreased in 30.8% of companies and this may affect their future innovativeness. The ability to create knowledge becomes more and more important to keep competitive in the global market; Lithuanian companies may harm future development opportunities by neglecting this. The problem also could be seen in all EU level. In the beginning of the Lisbon process (2000) the target to increase general investment in research for 2010 to 3% of gross domestic policy (GDP) was brought, but since now it is not reached (Frans van Vught, 2009). In 2006 R&D expenditure as a share of GDP (R&D intensity) in the EU-27 remained stable at 1.84 %. Only Sweden (3.73 %) and Finland (3.45 %) exceeded the 3% target set by the Lisbon strategy (Eurostat). The EU share of GDP devoted to R&D in 2005 was significantly lower than that of Japan (3.32 %), Switzerland (2.90 %) and the United States (2.61 %). Almost two thirds (1.17% in 2005) of investments in R&D came from private sector. The investment in R&D activities mainly influences radical innovation capability.

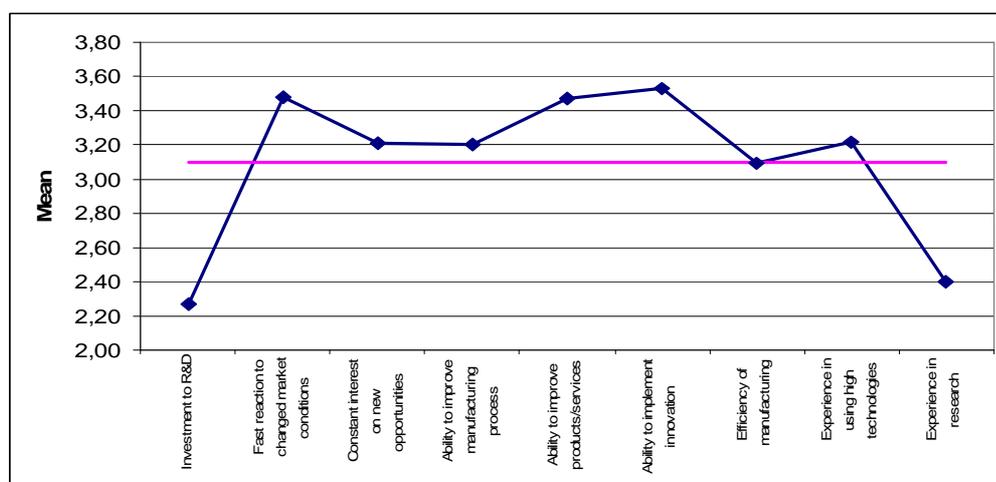


Fig. 1. Level of innovation capabilities in Lithuanian organizations

The respondents evaluate companies' human capital as middling level. The highest assessment is given to employees' communication skills, qualification and specialization. These attributes are accentuated as one of the most important factors for cultural viewpoint to innovation. After ANOVA analysis of data, the statistically significant differences (significance level 0.05), were seen. The companies where communication skills and qualification of the employees are evaluated at higher level usually are more innovative. But this perspective analyses mainly

incremental innovations capabilities and still for radical innovations high level of investment is needed. The lowest rating is given to the employees' loyalty to organization. Micro enterprises (less than 10 employees) have higher level of loyalty than bigger companies (with significance level 0.017). Low level of loyalty means that it is hard for companies to keep good employees and their ideas inside. So companies loose opportunities to improve their activities and gain higher profit.

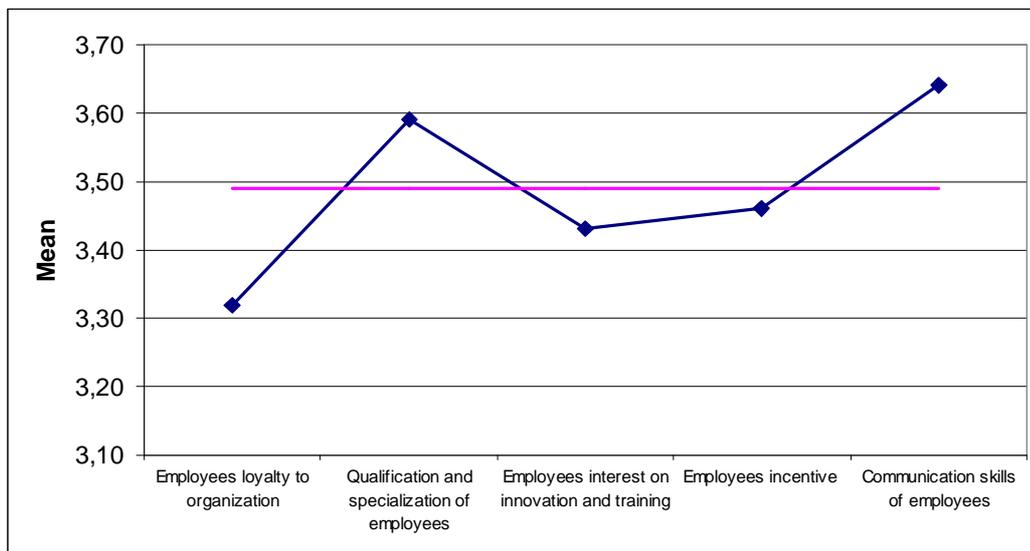


Fig. 2 Level of human capital in Lithuanian organizations

Structural capital is evaluated as having the lowest level from all elements of intellectual capital. Promotion system and investment in training was defined as having the lowest level of all structural capital elements. This shows that companies still do not invest enough to employees to earn their loyalty. The results have shown that managers evaluate promotion system and investment in training at higher level than employees. The highest level of structural capital elements was given to employees' incentives

promotion system, companies' strategy and values. The communication inside an organization and organization culture is evaluated as average level. The intangible environment in an organization is valued at high level as material promotion system and investments in training are valued as inadequate.

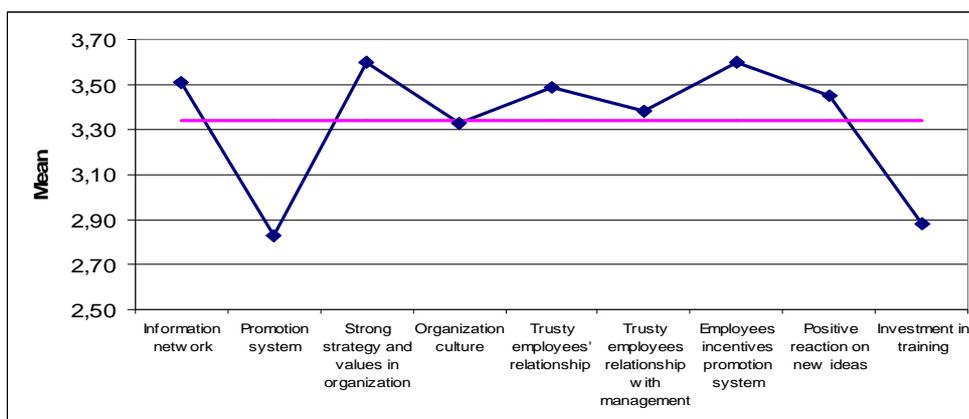


Fig. 3 Level of structural capital in Lithuanian organizations

The average level of relational capital is the highest of all intellectual capital elements. Organizations pay their attention to the market. The evaluations of relational capital have shown that the highest level is customer service and reputation, prestige of an organization. The lowest level is marketing efficiency and sharing information with partners.

After taking ANOVA test significant differences with significance level lower than 0.05 have been seen. Larger companies (more than 50 employees) have higher level of relational capital than micro and small enterprises. These differences might show that higher companies have more resources to ensure good relations with external entities.

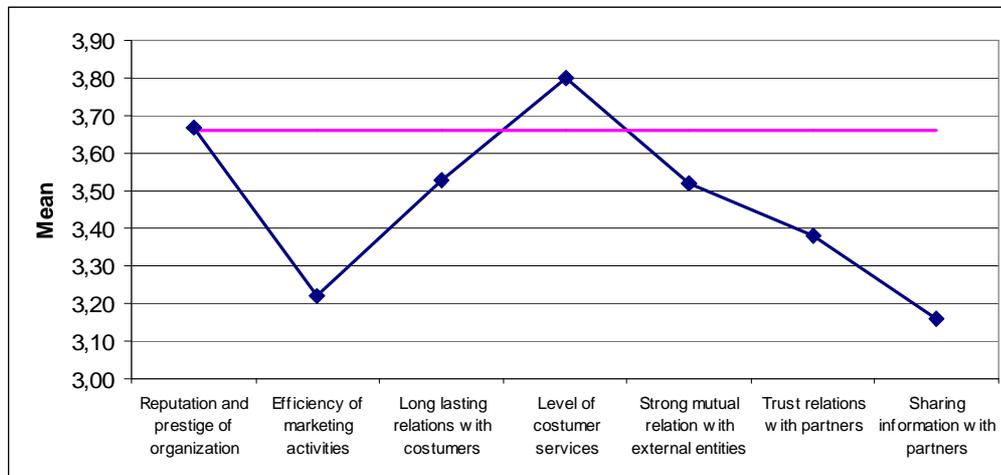


Fig. 4 Level of relational capital in Lithuanian organizations

To sum up the strengths of Lithuanian companies can be defined as having strong values and vision, good communication capability. New ideas are encouraged by creating good working atmosphere and trusty relations. Main attention is given to level of customer service. The weaknesses of Lithuanian enterprises are low investment level to research and development and to training. Little attention is paid to creating new knowledge and protecting it with intellectual property rights. The communication with science institutions and universities is evaluated as unimportant for companies'. But these relations may give reliable information and innovative ideas. The low level is of sharing information with partners. The results show that there is a shortage of trust in external relations with partners that may harm formation of clusters.

In order to establish the dependence of intellectual capital and innovativeness factors the Spearman's rank correlation coefficients were calculated. This non-parametric correlation coefficient is used to measure statistical dependence between two variables. The correlation matrix and significance of correlation were calculated. The results have shown that correlations between innovation and intellectual capital sub-domains are significant at the 0.01 level. The intellectual capital sub-domains have positive correlation with innovation capability.

Structural capital has the highest influence on innovation (0.569). Structural capital elements having the highest influence to innovation capabilities are information network (correlation coefficient 0.485), promotion system (0.471), trusty employees' relations with management (0.422) and organization culture (0.420). High level of organization culture and promotion system motivates employees to be creative and reach higher results. Though the level of

promotion system in Lithuanian' organizations is low. Positive reaction to new ideas (0.212), employee's incentives promotion system (0.224) as well as strategy and values of organization (0.230) has the lowest influence upon innovative capabilities. From the cultural perspective on innovation the strategy should be one of main elements of innovativeness, but empirical results of this study have shown that it is not.

Human capital has positive influence to innovation capabilities (0.486). Highest influence to innovation has qualification and specialization of employees (0.425) and loyalty of employees (0.348). Loyalty is thought to be as one of the main innovation factors by followers of social perspective. Though, low correlation has been found between innovation and employees' communication skills (0.275). This factor is also very important for the corporate entrepreneurship school, but empirical results have shown weak correlation of communication skills to innovation.

Relational capital elements also have positive correlation with innovation (0.485). Relational capital elements that have the highest influence to innovation capabilities are reputation and prestige (0.476) and level of customer service (0.416). High concentration to customer may influence the innovation as the last consumer of all innovation is customer. The innovative ideas may come from market. No significant correlation have been found between innovation and mutual and trust relations with partners (0.022), sharing information with partners (-0.004). Companies, which have high level of communication network with partners, do not find these relations essential for innovation.

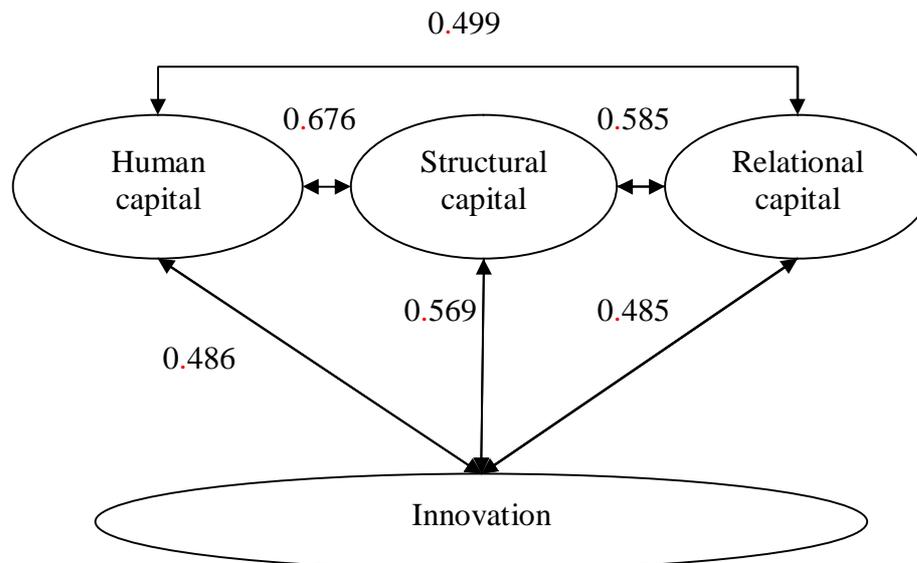


Fig. 5 Model of intellectual capital and innovation

Correlation between intellectual capital elements was also calculated. The highest correlation coefficient is between structural capital and human capital (0.676). Human capital is the primary factor of all other capital forms and can create value only through organization structures. High dependence of these factors again validate Cabrita and Vaz (2008) research results, it also mentioned that the highest correlation is between human and structural capitals.

The results of our research have confirmed that there is a positive relation between factors of intellectual capital an innovation capability. The strongest correlation is with structural capital. In the parallel study, which was accomplished in Turkey (2008), the similar conclusions were made (Zelner, 2008). There was also found that structural capital had the strongest influence to innovation capability, although the level of structural capital in organizations was the lowest of all parts of intellectual capital. More or less the same situation is in Lithuania.

VI. CONCLUSIONS

There can be defined three perspectives on innovation, which are built on Schumpeterian tradition. These perspectives analyze innovation from economic, social and cultural viewpoint. Looking from economic perspective innovation as institutionalized capability characterizes technological change. Radical innovations are analyzed. From cultural perspective innovation involves grassroots impetuses, which create mainly incremental innovation. From cultural perspective innovation is a deep craft. The main attention is given to a craftsman. All perspectives analyses different types of innovation and there is a need to explain innovation process obviously.

Innovation is multidimensional process and there can be defined many factors influencing it. What is more, there can be defined internal and external also tangible and intangible factors. Factors differ dependent on type of innovation. In

this survey components of intellectual capital were taken as factors of innovation. The positive correlation between these factors was calculated. Structural capital had the highest influence to innovative capability. Innovation capability was mostly related to the level of information network, reputation and prestige of the company and promotion system. As we could see, the companies' internal environment is highly important for human innovative idea to become innovation. The level of companies' relations with partners has shown no correlation to innovation capabilities. External relations are one of the main factors influencing innovation from cluster school perspective. Our research has shown that external partners have no influence to innovative capability.

The intellectual capital interrelationship was calculated. Structural capital was highly related to human capital. Human capital can be defined as primary source of other capital forms. Human capital through structural capital creates innovation in organization.

The level of intellectual capital in Lithuanian organizations is middling. The highest evaluated is relational capital. The lowest level is of structural capital. Lithuanian companies can be defined as having strong values and vision, good communication capability. New ideas are encouraged by creating good working atmosphere and trusty relations. Innovation capabilities are evaluated at lower level than components of intellectual capital. Extremely low evaluations are of investment on R&D activities and research experience. It shows companies aim to implement knowledge, but not create it. The respondents as less important factors for company noted investment to research, creation of intellectual property and relations with science institutions. Lithuania for intellectual property production is one of the lowest in EU. Companies do not see investment in intellectual property as opportunity for the growth. Investment on R&D activities is decreasing. And this may harm its future development.

REFERENCES

- [1] Aghion P and Tirole J (1994). The management of innovation, *The Quarterly Journal of Economics* 109(4):1185-1209.
- [2] Ahuja, G. (2000). Collaborative networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly*, 45: 425-455.
- [3] Andriessen, D. (2001). *Making Sense of Intellectual Capital*, New York: Elsevier.
- [4] Anskaitis et.al (2006). Constructivist and Analytical Approach to Intellectual Capital. *Engineering economics*, No.4. p. 63-68 – ISSN 1392-2785
- [5] Arrow KJ (1962). Economic welfare and the allocation of resources to invention, in Nelson RR (ed) *The Rate and Direction of Inventive Activity: Economic and Social Factors*, p. 609-625, Princeton University Press, Princeton NJ.
- [6] Arthur WB (2001). How growth builds upon growth in high-technology, Annual Sir Charles Carter Lecture, Northern Ireland Economic Council, Belfast, Northern Ireland.
- [7] Basdevant O. (2004). Some perspectives on human capital and innovations in growth models. *Compare* Vol. 3, 15-31p.
- [8] Bilich F and Silva R. (2006) Valuation and optimization or intellectual capital. *Brasilian Journal of Business*, 6(2). 37p.
- [9] Bontis N. (1999). Managing organizational knowledge by diagnosing intellectual capital: Framing and advancing the state of the field. *International Journal of Technology Management*, 18, 5-8, 433-462.
- [10] Burgelman R. (1983). A process model of internal corporate venturing in the diversified major firm, *Administrative Science Quarterly* 28(2):223-244.
- [11] Camagni, R. (1995) Global network and local milieux: towards a theory of economic space, in S. Conti, E. Malecki and P. Oinas (Eds) *The Industrial Enterprise and its Environment: Spatial Perspective*, pp. 195-216. Aldershot: Avebury.
- [12] Capello R. (2002). Spatial and Sectoral Characteristics of Relational Capital in Innovation Activity. *European Planning Studies*, No. 2 Vol. 10, -177-200p- ISSN 1469-5944
- [13] Cheng-Hua Tzeng (2009). A review of contemporary innovation literature: a Schumpeterian perspective. *Innovation: management, policy & practice*, Vol 11. 373-394 p.
- [14] Chuang-Fah Huang and Sung-Lin Hsueh (2007). A study on the relationship between intellectual capital and business performance in the engineering consulting industry: a path analysis. Taiwan: *Journal of civil engineering and management*, Vol. XIII No. 4, 265-271p. ISSN 1822-3605
- [15] Dobre I. (2009). Intellectual capital evaluation in the current knowledge era. *Bucharest Academy of Economic studies, Metalurgia international*, Vol.14 No.9. -36-42p.-
- [16] Dougherty, D. (1992). Interpretive barriers to successful product innovation in large firms. *Organization Science*, 3: 179-203.
- [17] Drucker PF (1998) *The discipline of innovation*, Harvard Business Review 63(3):3-8.
- [18] Dzinkowski R.(2000). The measurement and management of intellectual capital: an introduction. *International management accounting study*, February. -32-36p.-
- [19] Edvinsson L and Sullivan P. (1996). Developing a model for managing intellectual capital. *European management journal*. Vol 14. No 4. p. 356-364.
- [20] Edvinsson L. & Malone, M. S. (1997). *Intellectual Capital: Realizing Your Company's True Value By Finding Its Hidden Brainpower*. New York: Harper Business.
- [21] Eurostat statistical books. 2009 edition. Science, technology and innovation in Europe.
- [22] Frans van Vught (2009). *The EU innovation agenda: challenges for European higher education and research*. Belgium: Higher education management and policy. Vol 21/2 p. 13-34. ISSN 1682-3451
- [23] Graham M.B.W. and Shuldiner A.T. (2001) *Corning and the Craft of Innovation*, Oxford University Press, New York.
- [24] Grantham, C. E.; Nichols, L. D. (1997). A framework for the management of intellectual capital in the health care industry. *Journal of Health Care Finance*, 23(3), p. 1-19.
- [25] Hargadon, A. B. and R. I. Sutton (1997). *Technology Brokering and Innovation in a Product Development Firm*. *Administrative Science Quarterly*, 42: 716-749.
- [26] Hirschman AO (1970). *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States*. Harvard University Press, Cambridge MA.
- [27] Hubert, S. O. (1996). Tacit knowledge: the key to the strategic alignment of intellectual capital. *Strategy & Leadership*, 24(2), p. 10-14.
- [28] Kanter (1983) *The Change Masters: Innovations for Productivity in the American Corporation*, Simon & Schuster, New York.
- [29] Kanter (2002) *Strategy as improvisational theater*, MIT Sloan Management Review 43(2):76-81.
- [30] Nahapiet J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23: 242-266.
- [31] Nonaka I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford Press.
- [32] Saxenian A. (1994) *Regional Networks: Industrial Adaptation in Silicon Valley and Route 128*. Cambridge, MA:Harvard University Press.
- [33] Schultz, T. W. (1961). Investment in human capital. *American Economic Review*, 51: 1-17.
- [34] Stewart T. A., (1997). *Intellectual capital*. New York: Doubleday-Currency.
- [35] Subramaniam M. and Yondt A. M. (2005) The influence of intellectual capital on the types of innovative capabilities. *Akademy of Management Journal*, Vol. 48 No. 3. -450-463p-
- [36] Sutton R. and Kelley T.A. (1997). Creativity doesn't require isolation: why product designers bring visitors 'backstage,' *California Management Review* 40(1):75-91.
- [37] Teece J. D.,(2009). *Managing intellectual capital. Organizational, Strategic and Policy dimensions*. New York: Oxford university press, -300p.- ISBN 978-0-19-829542-6
- [38] Von Hippel, E. (1994) *Sticky information and the locus of problem solving: implications for innovation*, *Management Science*, Vol 40, p. 429-439.
- [39] Youndt, M. A., Subramaniam, M., & Snell, S. A. (2004). Intellectual capital profiles: An examination of investments and returns. *Journal of Management Studies*, 41: 335-362.
- [40] Zernler M. et. al. (2008). Intellectual Capital and Innovation Performance: Empirical Evidence in the Turkish Automotive Supplier. *Journal of Technology Management & Innovation*, Vol. 3. -31-40p.- ISSN 0718-2724