

DISCUSSION OF IC EFFICIENCY AND ORGANIZATIONAL PERFORMANCE IN CONSTRUCTION INDUSTRY

Josip Sertic

University of Zagreb, Faculty of Civil Engineering, Zagreb

jsertic@grad.hr

Ivica Zavrski

University of Zagreb, Faculty of Civil Engineering, Zagreb

zavrski@grad.hr

Intellectual capital (IC), a sole source of competitive advantage today, was examined intensively in knowledge intensive industries. On the other hand, construction industry, more precisely contracting sector is characterized as labour intensive. Although labour intensive, knowledge and IC still are a factor of competitiveness on the market. A question is whether IC influence can be estimated. Among numerous methods of measurement of IC, intellectual capital efficiency index was chosen as most suitable. After data gathering and calculation it was confronted with qualitative survey results that focuses on organizational effort to measure, manage and optimize organizational IC.

KEYWORDS: intellectual capital, construction industry, effectiveness, organisation

INTRODUCTION

In today's business, knowledge is considered as the most effective tool for achieving competitive advantage. However, knowledge, commonly called intellectual capital (IC), is immaterial by nature and therefore is hard to define and quantify (Grossman and McCarthy, 2005). A term is best defined by its use, and therefore it is probably still correct to regard Intellectual Capital (IC) and Knowledge Management (KM) as twins - two branches of the same tree (Sveiby, 1998). Intellectual capital was recognized through the market to book value difference (Edvinsson & Malone, 1997, Sveiby, 1997). This difference emerges when intangible elements exist in organisation that is not encompassed in classical accounting. First IC reporting was done by Skandia Company in 1994 in their yearly report using their IC management system Navigator. Among other methodologies for measuring and managing IC, Balanced Scorecard, developed by Kaplan and Norton in 1992 and Intangible Asset Monitor, developed by Sveiby in 1997 are most notable (Bismuth and Yoshiaki, 2008). Importance of IC is recognized in practice in the last two decades (Serenko and Bontis, 2004). Again, numerous authors are pointing at IC as most important source of competitiveness in contemporary business (Nonaka and Takeuchi, 1995, Bontis, 1996; Sveiby 1997, Egbu 2004). According to Henricsson and Ericsson, indicators of competitiveness in construction industry are profitability, productivity, time and cost management, client satisfaction, wage level, working conditions, attractiveness of profession, business ethics, green conscious (ecology) and innovativeness. According to Egbu (2004) the real backbone of business success are innovativeness and dynamic strategy.

Internationalization of engineering is based on big companies whose services are not locked to geographical regions. They provide space flexible services such as planning, management, financing, highly specialized technology and skills (tunnelling, bridges, green technology)

etc. while basic, manual labour on the other hand stays local or regional and therefore is not embraced by global market demands (Eurofound, 2005).

Although construction industry is dominantly labour intensive, these services are defined as knowledge intensive services. Companies that provide such services source competitiveness solely from firms IC. . Such firm uses two kinds of intellectual capital, Management and engineering knowledge on one hand and labour skills on other hand. Both of these influence productivity and performance of the firm. Although the border between one and the other IC logic is rather pale, and both sections are in constant interaction it is obvious that basic IC management approach still focuses on labour skills

Therefore it is easy to conclude that IC or knowledge is major influence on competitiveness on global construction market. In its fragmented environment, that construction market is recognized for, knowledge demands for projects are rapidly increasing. Firms are motivated to learn, to gather and absorb knowledge. Gathering and keeping various knowledge and competences in the company becomes expensive. Efficiency of such knowledge depends on cost of acquisition, frequency of use, sophistication etc. Therefore it would be interesting to further examine IC efficiency in construction.

Contemporary efforts in IC management are focusing on IC or knowledge measurement. In general, there is plenty of theoretical background on IC measurement, but empirical use is lacking. Numerical methods that exist are not precise and insufficiently demonstrate actual benefits of IC to the firm. Numerous methodologies of IC measurement are trying to describe IC through sole IC index. Today, measurement methods are in process of consolidation and there is still no general consensus on IC measurement (Grossman and McCarthy, 2005). It is our opinion that qualitative methods are more precise in IC measurement but they make benchmarking rather complex.

RESEARCH

Objectives

Objective of this research is to examine relationship between Intellectual capital efficiency and organisational performance in contracting industry. Due to numerous factors that influence overall company performance, e.g. market conditions, weather, megaprojects etc., we have concluded that only IC efficiency could take us to conclusion rather than usual business performance indicators. In fact, the main question is whether measuring and managing IC actually influences ICE index in contracting sector. It is logical to expect that organizations that are more oriented toward IC exploitation do have higher IC efficiency.

Contracting industry is chosen as it employs a dominant number in overall construction industry and is characterized as labour intensive industry (Bureau of Labour statistics, 2009). In such industry, orientation on IC should provide wide range of organisational IC management variants.

Constructs and hypothesis

Numerous author have has shown in their research that IC has, in general, dominant impact of business performance and competitiveness. As, last two named are further influenced by numerous external and internal factors, using classical business indexes as comparison wouldn't be correct. Therefore a quantitative IC measurement method will be used to describe trends and IC environment. General idea of this paper is to examine weather awareness of KM and IC and use of IC and KM management methodology can be seen on quantitative indicator such as is VAIC methodology. A data collection will be made for three last years that will enable interpretation regardless of momentary market conditions. In light of all said previously a following hypothesis will be tested: IC awareness, measurement and management leverages IC effectiveness in contracting enterprises. Level of IC will be indicated through a VAIC method index called Intellectual Capital Efficiency index (ICE).

Strategic relevance

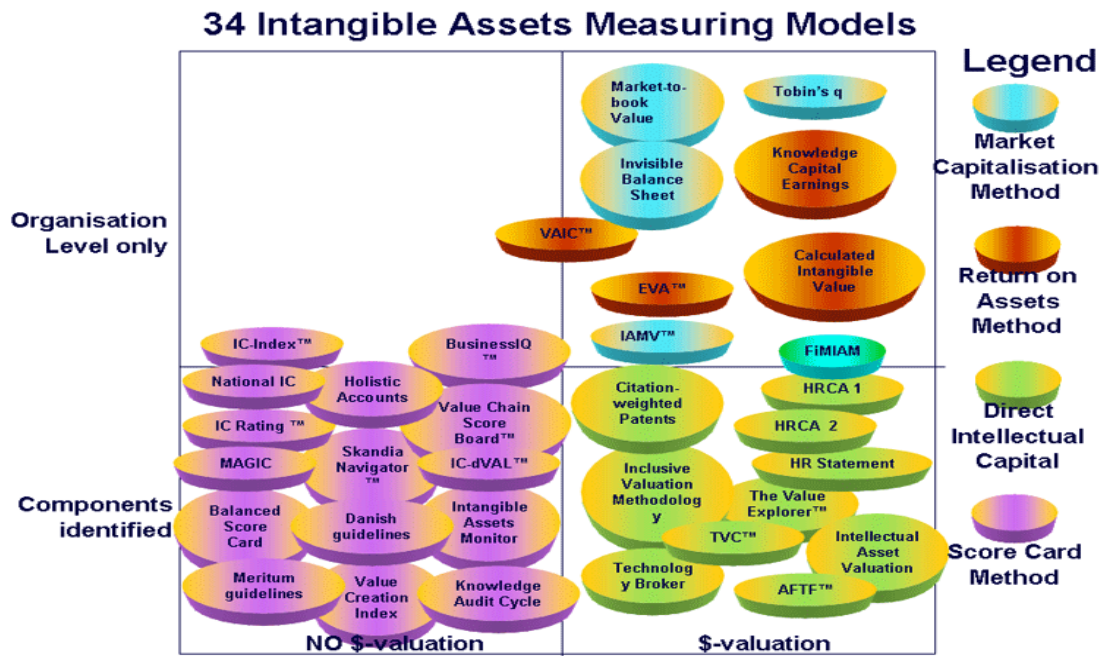
IC management and KM methodologies are widely accepted in business. Big firms in construction industry are first to use modern management tools and methodologies in search of competitiveness. Medium contracting enterprises still source their competitiveness through regional dominance and are usually characterized as followers rather than leaders in management change (Eurofound, 2005). Medium enterprises, on the other hand, are carriers of regional management practice change and are therefore dominant factor in management practices spreading over to SME's. Therefore and examination of IC management practice on regional level is of importance.

SAMPLE AND DATA COLLECTION

ICE Index measurement

There are numerous quantitative and qualitative methods of measurement of intellectual capital. Some of them are listed in figure 1 below.

Figure 1: IC measurement methods according to IC level and weather they are quantitative or qualitative nature (Sveiby, 2002-2007)



All above mentioned methods of IC measurement have they advantages and disadvantages due to reason and time of their development. Among those methods, for this research I find VAIC method as most suitable as it focuses solely on IC efficiency and due to its simplicity. VAIC indicator ICE (Intellectual Capital Efficiency Index) will be confronted with level of organisational orientation towards IC management.

Value added can be calculated from existing information in annual reports as follows: where OP is operating profit, EC is employee costs, D is depreciation, and A is amortization. Consistent with the literature, the value added would be the sum of labour expenses, corporate taxes, dividend, interest expenses, amortization and depreciation, minority shareholders, and retained earnings. VAIC calculates the efficiency of both intellectual capital and financial capital. Partially based on the Skandia Navigator intellectual capital measurement model, VAIC is composed of human capital and structural capital. Based on the theories of compensation and an efficient labour market, the VAIC uses total the compensation paid to employees as the proxy to assess the value of human capital. VAIC does not consider expenditures on employees as a part of input. This denotes that expenses related to employees are not treated as cost but represent an investment. As a result, sum of Human Capital efficiency and Structural Capital efficiency is ICE or Intellectual Capital Efficiency Index.

As construction is dependant on market cycles a longer time period was observed. Data was collected for 2005 – 2008 year period. A mean was used as relevant input for calculation of ICE.

Qualitative survey

For inspection of organizational orientation on IC we have developed a framework that consists of a categorization and a questionnaire. Categorization was done according to IC management practice and its goal is to make distinction between companies according to

their IC management. The methodology adopted is based on a review of the literature and a case study approach. The literature review provides the platform for developing specific themes for the case study investigations. This included the motivation for intellectual capital, choice of models and performance measures, knowledge management, which is central to innovation, and other factors associated with competitiveness. Following are 4 ways of understanding IC: Asset, Benefits, Baseline and Action (Sveiby, web). Questionnaire is made after categorisation and dispatched to ten relevant firms in Croatia that are according to statistical standards medium to large firms.

Table 1: Five categories of corporate attitude towards IC

ADVANCED IC MANAGEMENT – creating competitive advantage on basis of strategically managed IC obtained through practice and learning	IC importance for company is declared in its mission and vision. Competitiveness advantage is strictly based on IC management. IT tools for IC management are used. Referential IC database exists and is used by medium and high management for its allocation. Employee career management is defined through firms protocols with goal to maximise his/hers IC efficiency. Constant monitoring of individual and overall employee IC with profitability maximization goal. Defined policy for IC absorption, creation and measurement. Contract management also considers IC. Internal and external knowledge transfer processes a monitored and supported. Recruiting policy based on IC acquisition strategy. Dealing with IC security issues
SUCCESSFUL IC MANAGEMENT PRACTICE – creating competitive advantage through IC obtained through practice	IC importance is common fact through organization. Competitive advantage is based on IC gained through practice. Referential IC database exists and is used by medium and high management for its allocation. Internal certification for certain knowledge or skill. Employee revenues levelling with their competences progress and their IC efficiency. Interdisciplinary services that demand solid IC management.
BASIC IC MANAGEMENT	Basic understanding of IC management. HR dept. takes in consideration employee competences when recruiting or dispatching employees through organization. There is an institution of mentorship for unexperienced employees. Motivation programmes for employees to acquire knowledge and experience are active although on basic level of complexity. Knowledge is dominantly gained through practice. Internal certification for certain knowledge or skill.
AWARENESS OF IC IN ORGANIZATION	There is awareness about IC but there is no defined approach how to deal with it. HR dept. collects only basic data on employees who exclude competences and individual progress. Sometimes, employees attend lectures, only due to legal requirements.
WHAT IS IC? SORRY, NEVER HEARD OF	IC value is not recognized in the firm. Competitiveness is sought in other way.

RESULTS

Among 10 companies that have received the survey, we have had four respondents. Those respondents will be called as following: Company A, B, C, and D

Table 2: Four tables depicting four companies business performance in period 2005 - 2008

<i>FIRM B (millions HRK)</i>	<i>Operational profit</i>	<i>Employee expenses (salaries + other expenses)</i>	<i>Amortization</i>
2005	51,7	46.04	22.53

2006	-17,71	54.23	19.08
2007	33,5	67.48	30.53
2008	3,1	75.43	29.27
Mean	17,65	60,80	25,35

<i>FIRM A</i> <i>(millions HRK)</i>	<i>Operational profit</i>	<i>Employee expenses (salaries + other expenses)</i>	<i>Amortization</i>
2005	35.31	145.19	14.57
2006	56.09	165.18	16.32
2007	55.31	177.03	16.82
2008	30.29	196.78	20.09
Mean	44,25	171,045	16,95

<i>FIRM D</i> <i>(millions HRK)</i>	<i>Operational profit</i>	<i>Employee expenses (salaries + other expenses)</i>	<i>Amortization</i>
2005	3.43	161.87	16.04
2006	17.23	187.29	15.26
2007	11.98	195.85	15.60
2008	26.56	224.06	17.01
Mean	14,80	192,27	63,91

<i>FIRM C</i> <i>(millions HRK)</i>	<i>Operational profit</i>	<i>Employee expenses (salaries + other expenses)</i>	<i>Amortization</i>
2005	10	56	11
2006	36	63	12
2007	45	73	17
2008	45	82	20
Mean	34	68,5	15

Table 3: Calculation of Intellectual Capital Efficiency Index (ICE) according to VAIC methodology

	<i>Operational profit</i>	<i>Employee expenses</i>	<i>Amortization</i>	<i>Value Added (VA)</i>	<i>HCE = VA/HC</i>	<i>SC = VA - HC</i>	<i>SCE = SC/VA</i>	<i>ICE = HCE + SCE</i>
FIRM B	17	60	25	103	1,707	43	0,414	2,121
FIRM A	44	171	16	231	1,355	60,75	0,262	1,617
FIRM D	14	192	63	270	1,409	78,7	0,290	1,699
FIRM C	34	68	15	117	1,715	49	0,417	2,132

Qualitative survey has provided us an insight in firm's attitude and towards IC. Firm B is a major firm and as a consortium it has developed specific protocols for their IC management of certain aspects. Other methods they use depend on regional office although methodologies and protocols are adapted through the concern. Their approach to IC management was recognized as most developed one. On the other hand, rather developed but completely different was an IC management system developed by A. This system was developed in different environment and it provides good service to the firm and its management but due to lack of connection on today IC management practice its sustainability and evolution is questionable. Third firm in a row is rather young system that has experienced tremendous growth due to market demand. This company is still developing their IC system and for now

it is only on declarative stage of IC management. Fourth firm manages it IC with basic HR tools and hasn't yet recognized intellectual potential to the full.

Table 4: Comparison of two research approaches

<i>ICE</i>	<i>ICE index grading</i>	<i>Qualitative grading</i>	<i>Qualitative survey</i>
1.	C	B	SUCCESSFUL IC MANAGEMENT PRACTICE
2.	B	A	
3.	D	C	BASIC IC MANAGEMENT
4.	A	D	AWARENESS OF IC IN ORGANIZATION

CONCLUSION

Findings and limitations

This research explores correlation between quantitative IC measurement method and qualitative IC management survey. A numerical method was used to evaluate IC efficiency in the firms. In above mentioned survey, companies have expressed their attitude towards IC and the way they manage it. A comparison has been done between these two surveys and a positive correlation among two is visible. Although data collection methods are different in nature a conclusion can be made that IC efficiency is higher in firms that are aware of their IC and are strategically and practically managing it. Also survey results point out that leveraging IC demands organizational orientation towards IC and common effort of employees. Research limitations are recognized in rather low number of examined enterprises due to fact that substantial number of contracting firms still does not recognize IC management as crucial for their sustainability due to favourable market conditions. Another limitation to the research is that examined firms all operate on same market; therefore research depicts single market conditions. Research was conducted in limited period of time. Authors consider that further research, with broader number of firms examined, could provide more balanced results.

REFERENCES

- Edvinsson, L. And Malone, M.S. (1997), Intellectual capital – Realizing your Company's True Value by Finding its Hidden Brainpower, Harper Collins, New York, NY
- Sveiby, K.E. (1997), The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets, Berrett-Koehler, San Francisco, CA
- Skandia (1994), Visualising Intellectual Capital, Annual Report, Skandia

Bismuth, A., Yoshiaki T., (2008), Creating value from intellectual assets, Journal of Intellectual Capital Vol. 9 No. 2, 2008 pp. 228-245

Serenko A., Bontis N. (2004), „Meta-review of knowledge management and intellectual capital literature: citation impact and research productivity rankings“ Knowledge and Process Management, Vol. 11 No 3, pp 185-98

Bontis, N. (1996), „There's a price on your head: managing intellectual capital strategically“, Business Quarterly, Vol 60 No 4, pp 40-7

Sveiby, K.E. (1997), „The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets, Berrett-Koehler, San Francisco, CA

Sveiby Knowledge Associates web site

Egbu C.O. (2004), „Managing knowledge and intellectual capital for improved organizational innovations in the construction industry: an examination of critical success factors“, Engineering, Construction and Architectural Management, Volume 11, Nr. 5, pp. 301-315

Nonaka I. And Takeuchi, H. (1995), The knowledge Creating Company, Oxford University Press, Oxford

European Foundation for the Improvement of Living and Working Conditions (2005) „Trends and drivers of change in the European construction sector: Mapping report“, EF/04/149/EN <http://www.eurofound.europa.eu/emcc/publications/2005/ef04149en.pdf>,

Karl-Erik Sveiby 9 April 1998, updated April 2001.
<http://www.sveiby.com/articles/IntellectualCapital.html>

EMCC – European Monitoring Centre on Change (2004) Sector Futures – The knowledge-intensive business services sector

Grossman, M; McCarthy R.V.(2005);Qualitative approaches to knowledge management assessment, Issues in Information Systems, Vol VI, No 2.

Robinson H. S.;Anumba C. J.; Carillo P.M.; Al-Ghassani A.M.; (2005) Insight from research – Business performance measurement practices in construction engineering organizations, Measuring business excellence, Vol. 9 No.1pp 13-22

Nazri, J.A., Herremans, I.M. (2007) Extended VAIC model: measuring intellectual capital components. Journal of Intellectual Capital, 8(4), 595-609

Roos, J., Roos, G., Edvinsson, L., Dragonetti, N.C. (1997), *Intellectual Capital: Navigating in the New Business Landscape*, Macmillan, London., .

David O'Donnell, Philip O'Regan, Brian Coates Intellectual capital: a Habermasian introduction, Journal of Intellectual Capital Vol.1Nr. 2, 2000, pp 187-200

Bureau of Labor Statistics , United States Department of Labor - Publications – Construction;2009.; <http://www.bls.gov/oco/cg/cgs003.htm>