The Efficiency Analyses of Croatian Sugar Industry by Using the Concept of Intellectual Capital

Marko KOLAKOVIĆ [1] (✉)
Dražen HOLMIK [2]

Summary

During the last five years the sugar industry has become one of the most important branches of Croatian food industry. It is connected with a significant number of various industries in a complex way and employs a significant number of people. A development of the sugar industry stimulates development of commerce, logistics, and a number of correlated industries whose products are necessary in sugar production. Croatian sugar factories have been present at the neighbouring markets and the European Union market for several years. The share of sugar in the total export of agricultural products increases every year and in the year 2004, it was 26.8% with the tendency of increasing in the year 2005.

The foundation of the Intellectual capital (IC) concept, as a method of increasing the entire business efficiency, can be found in the papers of economic theoreticians in the middle of the last century but it reached its real break through in the past 15 years when the concept got more applied and the theory of intellectual capital was developed.

In order to prepare Croatian economy for the competition that is expecting Croatia by joining the European Union with full membership, especially the agricultural sector, the application of the IC concept is expected to result with an increase of business efficiency. The intellectual capital concept represents a recommended base, which will help Croatian sugar mills in achieving a better position at the highly competitive market of the European Union.

Key words

intellectual capital management; sugar industry; measuring efficiency

[1] University of Zagreb, Graduate School of Economics & Business
Trg J. F. Kennedy 6, 10000 Zagreb, Croatia
✉ E-mail: mkolakovic@efzg.hr
[2] Sladorana d.d. Županja
Trg kralja Tomislava 13, 35000 Slavonski Brod, Croatia

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Introduction

In the last five years the world economy has undergone great changes. Under the influence of globalization, traditional activities have become secondary and now are serving only as assistance to the activities based on knowledge, information and high technology. Globalization, which has affected even the most isolated parts of the world, is daily changing the rules of market competition. The biggest world corporations are combining their knowledge and technologies, creating new industries, but development and research have decreased, technologies are improving and changing which leads to market insecurity.

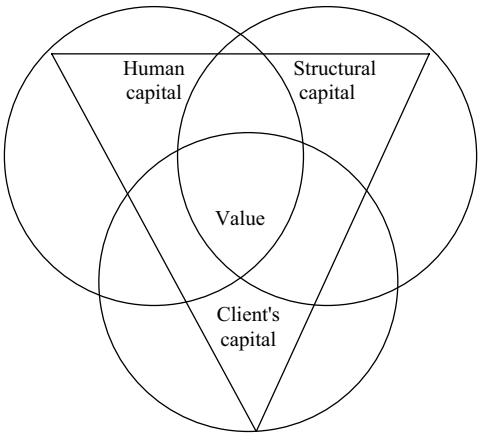
Due to the global competition, it is not enough to be good, it is necessary to be the best. It becomes more and more difficult to manage the companies due to lack of single-valued success guaranties and the lack of successfully made strategic decisions. Long term success can not be based on instruments, tools and techniques that are more or less applied by others (Tipurić, 1999). Companies need to use their capability and knowledge in order to be competitive, develop strategies to manage their most competitive source of advantages: their intellectual capital.

Intellectual capital

Intellectual capital management has been recognized as a fundamental activity for achievement, growth, and sustainability of this vital resource in companies. Therefore, a management of intellectual capital is closely related to knowledge management. Intellectual capital is represented by intellectual resources collected, reinforced and formalized in order to create highly valued asset (Prusak, 1997).

Edvinsson and Malone describe the significance of intellectual capital for the company by comparing it to a tree (Edvinsson and Malone, 1997). Analyzing the tree superficially, we can clearly see the direction of growth, shape and size, but usually, while this is done, many forget that almost half of the tree mass is located in its roots. The condition of the roots represents the tree's foundation and its future value creating capability. Similar to this, financial information gained by accounting provides only superficial insights into the situation of a company since it does not include information about intellectual capital. Accounting information provides a review about business activities of the past.

The accepted theory of intellectual capital is based on human, structural and customer capital. Intellectual capital creates value by forming patterns that consider a correlation of all three dimensions. A value model represented in picture 1 shows shared segments of all three parts that participate in value creation. The power of intellectual capital is manifested by the mutual coherence of all the elements mentioned. If only one of the elements is too strong or inappropriate, the value creation will be interfered. Intellectual capital management is a force that attracts different dimensions to mutual interaction and equalization.



Picture 1.
The model of intellectual capital value creation
Source: Edvinsson L., Malone M. S.: Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower, Harper Business, New York, NY, 1997.

Human capital

Human capital is defined as the knowledge, experience, capability, skills, creativity and innovation capability of individuals/employees. These elements are intrinsically linked and all together they contribute to the business success (Pulić, 2004). However, clever individuals are not enough for a company's success. In order for the employees to become human capital it is necessary to direct their knowledge, skills and creativity toward the creation of value added; in other words, that, what is also required for reaching the objective is an equally intelligent organization.

In order to create more value added based on human capital, it is necessary to support and develop creativity continuously. Creativity represents the collection of cultural possibilities to embrace the relations among things, changes, as well as qualitative changes, in order to create ideas about value added. The ideas about added value and innovations increase the knowledge base and create new ways of thinking. The possibility of creating knowledge and its use are fundamental characteristics of all business activities. However, the ideas of value added are always determined by the users.

The fact that a company can not posses its human capital differentiates the dimension of human capital

from other company means. Uncertainty about employee's loyalty to the company limits the efficiency of investing in human capital. This is particularly stressed if more branches apply the same skills and if they are easily transferable.

Structural capital

Structural capital is made by human capital efforts and it includes patents, concepts, models, operating and administrative systems and organizational culture. Edvinsson and Malone defined structural capital as an improving context of employees and structures that support human, organizational, innovative and procedural capital. Employees' improvement is based on distributive decision making and cooperative leading models. It requires an increased commitment of employees towards the company and its objectives. Highly committed employees will take more responsibility to plan and develop tasks. It is possible to create commitment by supporting the sense of responsibility towards company activities and by providing the employees with information, skills, means and authorities for decision making.

A company's knowledge base accumulates a large number of decisions and experiences daily. Decisions and experiences are stored in the work processes, instructions etc., and the result is organizational learning. It is possible to observe organizational culture as organizational learning. Organizational culture affects the behaviour of company members in a subtle way; and it is expressed as a function that transfers the way of thinking, experiencing and recognizing problems to new company members.

The accumulation of structural capital during a company's growth and development is a natural process. Different from human capital, structural capital is owned by companies, which enables the companies to sell, replace and gain new structural capital.

Customer capital

Customer capital is related to clients, buyers and suppliers, brand names, the company's reputation and clients' opinion about the company. Customer capital embraces the interaction with and commitment to the customer; it also includes their satisfaction, continuity, price reactions, and good relationship with loyal customers. By engaging time and means it is possible to create customer capital by accustoming clients to the activities of the company. The trust of customers is a vital element, whereby a permanent relationship with them is the most valuable one.

Assessment of the level of relationship is based on assessing the penetration, covering rate, commitment measurement, as well as the probability of partnership extension (Stewart, 1998).

The other domain of customer capital represents the correlation with other companies through different networks. Companies whose aim is to organize different networks are mostly those based on high technologies since these companies are highly dependant upon each other. Such companies create networks, and if networking has been seen as a benefit for the company, the networks have strong influence on the company and are able to cause expense increment.

Intellectual capital measurement

Intellectual capital measurement presents a necessity. In order to successfully manage its intellectual capital, the company must have methods to measure its value its contribution to value creation, the possibility to compare, and the application of corrective activities. Companies that monitor intellectual capital try to find the relation between intellectual capital and accomplished financial results. Robert Kaplan stated: "what you can not measure you can not manage" (Kaplan and Norton, 1996). Measuring is necessary in order to provide information on a company's status and for the development of growth and development guidelines by applying methods that the companies cannot affect. In order to progress, first of all the company needs to understand the current situation.

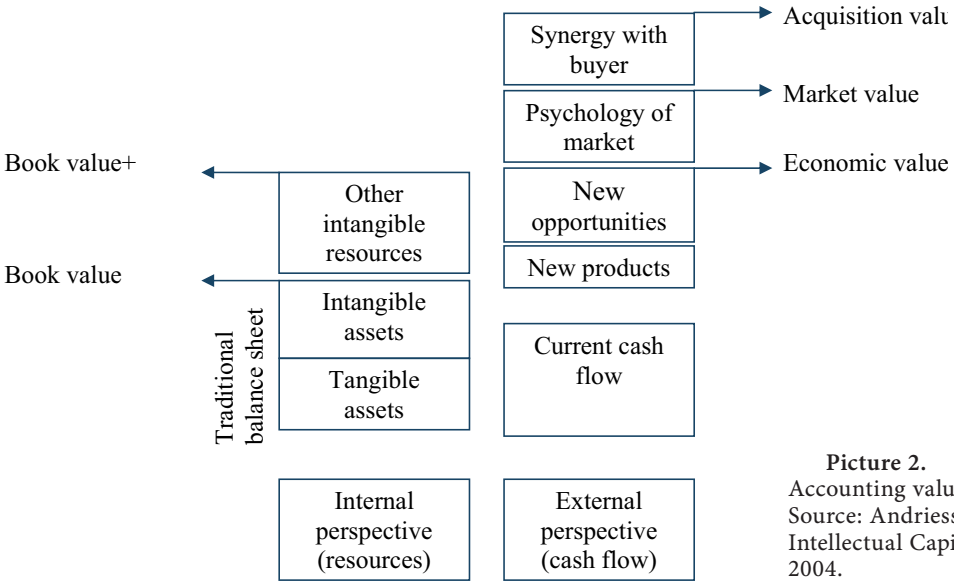
By assessing its intellectual capital it is possible to determine the real value of the company more exactly. From the intellectual capital point of view, the difference between book value and market value is based on intellectual capital. Traditional accounting methods, which present a company's value based on material assets and historical information, are not able to cover intellectual capital value. The average ratio of market value and accounting value of a company was 1:2 in late 1970s, 3:1 in middle 1990s and today's companies increased their market value six times over the accounting value.

Intellectual capital can be used to complete the picture provided by accounting and to represent the market value, which is the sum of financial and intellectual capital.

However, the following equation:

market value = accounting value + intellectual capital

is not as simple as it seems. Interdependence is the reason why it is not easily possible to separate elements individually as they are in the equation mentioned above.



Picture 2.
Accounting value versus market value
Source: Andriessen D.: Making Sense of Intellectual Capital, Elsevier, Burlington, MA, 2004.

It is possible to divide measurement methods of intellectual capital into two fundamental groups. The first group includes methods when measuring does not include financial indicators, such as Balanced Scorecard, Scandia Navigator etc. The other group of methods includes those that are trying to determine the contribution of financial value of the intellectual capital, such as the Value Added Intellectual Coefficient™ (powered by VAIC™), the Economic Value Added, Tobin's Q and others.

Results gained by the measurement of intellectual capital are helpful with investments. Despite the fact that such a method of selection brings specific levels of insecurity, more and more investors make decisions to invest based on intellectual capital results. Intellectual capital measurement is useful when checking the accomplishment of a company's strategic objectives; it is useful for research and development situations; it helps providing useful information for project adaptation; as well as it supports the introduction of the training programs and education in the company. Intellectual capital measurement is useful as an inner management tool and communication tool for dealing with owners and investors. Intellectual capital measurement includes monitoring of success indicators for structural and customer capital.

The Croatian sugar industry structural features

The Croatian sugar industry is highly concentrated due to the specifics of the entering barriers; however, there is a strong rivalry. Strong rivalry consists of three factors at least: competitive structure, demand features, and exit barriers (Tipuric, 1996).

Sugar production takes place during a period of time which corresponds with sugar beet harvest every year (September through October) or it means the processing of raw sugar from sugar cane which occurs when needed. In the neighbouring countries, particularly the EU, sugar production is strictly conducted by law because sugar is a strategic product. In those countries, the producers receive stimulation and subvention for sugar production, which guarantees a protection of sugar prices. Different from their neighbours, Croatian sugar producers receive neither stimulation nor subvention, except for the sugar beet producers.

Sugar has become one of the main export products in the past years. Sugar took 26.8% out of total export of agricultural products in 2004. In order to additionally increase export, the Government enabled sugar factories to import raw sugar without customs. Sugar factories have benefited from this for several reasons. The price of sugar produced from sugar cane is lower than the price of sugar produced from sugar beet which leads to extra profit; the foreign market achieves better prices, payment is faster and safer than on the domestic market. The Government also supported export increase, since it decreased export deficit. As far as sugar export is concerned, it is necessary to point out that only the sugar produced from sugar beet with a certificate of the origin of goods (domestic origin) can be exported into the EU countries, while the sugar from sugar cane can not be exported because it is not of domestic origin.

The sugar industry is a very important link in the commercial chain that links primary agricultural pro-

duction with various other branches of industry. The starting point for sugar production is sugar beet as the raw material. It is also necessary to ensure a large quantity of different chemicals, various power sources (gas, coke, and brown coal), stone for lime making, as well as the packing materials etc. That is why it is true that sugar production is driving the whole economy force of the region. Sugar production involves about 800 subcontractors and 400 suppliers. The large number of sub-contractors and suppliers represents not only the driving force of the region but the driving force of the state.

Sugar production and sugar market

A slight increase in the world sugar production can be seen every year. The largest producer is Asia, while the second place is taken up by America. The world sugar production can be divided into groups according to the origin of raw sugar material. In Europe sugar is produced from sugar beet, but in South America, Asia and Australia sugar is produced from sugar cane.

Sugar is an exchange commodity whose price is determined not according to the raw material it was made of (sugar beet or sugar cane), but according to the quality of sugar. Due to that, countries that produce cane sugar have cheap raw material and low labour cost, make extra profits and decrease price of sugar on the world market. It is necessary to mention that the costs of sugar production from sugar cane are lower than the costs of sugar produced from sugar beet.

In order to avoid the overproduction on the market, governments inducted import quotes and limitations. The market of the European Union is the most protected one. There are several reasons for that. One of the strongest is the protection of primary production, 76% of overall sugar production from beet is carried out in European countries. If European countries allow excessive import of sugar, it can damage sugar production, which can have wide-ranging consequences on overall agricultural policy of the European countries. The elimination of sugar beet from agricultural production can have influence on soil process and crop rotation with a direct influence on sugar factories.

The sugar lobby in the world is very strong. It has recently been trying, by WTO, to diminish the regulations of the EU market and increase the import of sugar from the Third world countries. Considering the constant pressure, diminishment of regulation shall occur, either by increasing the import of sugar produced from sugar cane or by diminishment of subvention for sugar producers. Any of the methods for diminishment of regulation will strongly affect the sugar production in the EU and neighbouring countries, and long-term consequences on overall agricultural production in the European countries can be expected.

Analysis of intellectual capital in Croatian sugar industry

Knowledge and intellectual capital represent the fundamental source of competitive preferences in new economy. Rapidity of changes on the market and industry, as well as the strength of competition, leads companies to the edge. This situation means that the only way to win the advantage of competition is by internal strength of each company. Components of intellectual capital are human, structural and customer capital, and in order to increase this resource, the company has to recognize its intellectual capital, constantly invest in it and stimulate its development.

According to the research of consultant Arthur D. Little who managed in September 2004, based on the specimen of 155 examinees, four most known methods for success measurement founded on human knowledge are: Balanced Scorecard, EFQM, Intangible Asset Monitor and Value Added Intellectual Coefficient™ (powered by VAIC™).

The Value Added Intellectual Coefficient™ (VAIC™) is the method that will be used for the analysis of intellectual capital efficiency in Croatian sugar industry in this article. The method is easily applicable to the company level, the levels of each part of the organization, as well as the levels outside the company: county or state levels. The VAIC™ method has been developed and is constantly improved by Professor Dr. Ante Pulić, University of Law, Zagreb.

Value added (VA)

Value added is a newly established value which is calculated as an operative profit enlarged with employees' costs and amortization. Value added is calculated by the following formula:

VA = operative profit + employees costs
+ amortization

Value added is the basis for the calculation of the efficiency of resources and it features the capability of a company to create value in an observed period. Each company makes efforts to create as much value added as it is possible by using its own means, capital and knowledge. The increase of value added strongly depends on the capability of employees and management. The objective is constant increase of value added, by using the existing level of means. In order to achieve what is mentioned above, it is necessary to manage the process of value creation at all levels of the company.

In the observed period of three years, Sladorana d.d., and Viro d.o.o. were successful in creating value added. In both companies, an oscillation of value added is visible, due to a growth in 2003 and fall in 2004. The Sugar Factory Osijek shows the oscillations too but is the least successful in value creation in 2003 achieving the lowest VA.

Human capital (HC)

Human capital is presented by the all expenditures for employees that include salaries, education, trainings etc. According to the VAIC™ concept, the expenditures for employees are considered to be investment, not cost.

Sladorana d.d. achieved the largest grew of human capital value during observed period, due to largest investment into human capital. At the same time Sugar Factory Osijek reached lowest grew of human capital value. Viro d.o.o. achieved the largest grew of human capital value in 2003, when it highly grew, followed by low grew of human capital value in 2004.

Human capital represents the employees and their skills and knowledge. Investment in employees will be reflected by the future results of the company. Human capital efficiency shows how efficient it is to invest into human capital and how much VA is created by investing in human capital.

Human capital is represented by all employees who create value. Employees who do not invest their knowledge and skills interrupt the value chain and do not represent human capital. Human capital uses its knowledge and skills, and together with the structural and physical capital, it is engaged in value creation.

Structural capital (SC)

Structural capital is the result of the human capital activities in the past. Structural capital is made of a company's organization, licenses, patents, norms, relations with customers and other factors. The formula for structural capital is:

SC = VA – HC

The analysis shows that, in the observed period, Sladorana d.d. had the highest level of structural capital with some oscillations. In the observed period, the height of parameters in Viro d.o.o. shows similarities with the results from Sladorana d.d. On the other hand, in 2003 and 2004, Sugar Factory Osijek had negative value of structural capital, because the created value added was lower than the investments in people (human capital).

Capital employed (CE)

The used physical and financial capital represents all material and financial means used in the creation of added value. The value of used physical and financial capital is calculated from credits and business outcome minus amortization enlarged with wages, salaries and levies.

Table 1. Value added in sugar industry (VA)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek
2002	86,836,309	31,942,767	70,874,130
2003	146,883,933	114,728,037	21,185,545
2004	98,134,029	66,686,218	44,561,015

Table 2. Human capital (HC)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek
2002	30,336,389	10,342,314	42,434,733
2003	40,963,329	25,530,558	44,721,340
2004	49,750,737	28,328,114	48,719,123

Table 3. Structural capital (SC)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek
2002	56,499,920	21,600,453	28,439,397
2003	105,920,604	89,197,479	–23,535,795
2004	48,383,292	38,358,104	–4,158,108

Table 4. Capital employed (CE)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek
2002	389,311,653	135,572,482	576,788,005
2003	458,543,237	315,156,971	671,286,791
2004	372,393,825	304,901,025	584,256,635

The analysis of engaged physical and financial capital shows that the Sugar Factory Osijek made the greatest investments in CE during the analyzed period. An assumption for large amount of capital employed is low efficiency, big business cost or business load with credit. Sugar Factory Osijek is the factory with the largest capacity and number of employees. The technology used in the production is more or less the same in all three sugar factories, but Sugar Factory Osijek has the lowest CE efficiency.

Human capital efficiency (HCE)

Efficiency of human capital is presented by the ratio of added value and human capital. Human capital efficiency is used as an index which represents the contribution of

Table 5. Human capital efficiency (HCE)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek
2002	2.86	3.09	1.67
2003	3.59	4.49	0.47
2004	1.97	2.35	0.91

Table 6. Structural capital efficiency (SCE)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek
2002	0.65	0.68	0.40
2003	0.72	0.78	–1.11
2004	0.49	0.58	–0.09

Table 7. Capital employed efficiency (CEE)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek
2002	0.22	0.24	0.12
2003	0.32	0.36	0.03
2004	0.26	0.22	0.08

Table 8. Intellectual capital efficiency (ICE)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek
2002	3.51	3.76	2.07
2003	4.31	5.27	–0.64
2004	2.47	2.93	0.82

added value from one money unit spent on employees. The index is calculated by the following formula:

HCE = VA / HC

The table shows that all three companies have lower HCE in 2004 than they had in 2002. Viro d.o.o had the best human capital efficiency, 3.09, at the beginning of the measuring period, an increase in 2003 to almost 5, and the worst result in the end, with 2.35. This means that on 1 kn (Croatian currency) in HC, 2.35 kn were created. A similar trend is obvious with Sladorana dd, with the best result of 3.59 kn return on investment in employees. In contrast to Sladorana d.d. and Viro d.o.o., Sugar Factory Osijek had the lowest human capital efficiency index in 2003., which means, that for one kn spent on human capital the return was 0.47 kn.

Structural capital efficiency(SCE)

Structural capital efficiency is represented by the ratio of added value and structural capital. It indicates the amount of structural capital in value making. The structural capital efficiency index is calculated by the following formula:

SCE = VA / CE

Accordingly to the obtained results, in 2003 structural capital efficiency in Sladorana d.d. and Viro d.o.o. increased. In 2004 it declined below the starting position. Differently from Sladorana d.d. and Viro d.o.o., Sugar Factory Osijek had negative value of structural capital efficiency due to high investments in human capital and sinking trend of the created VA , which directly affected SCE.

Capital employed efficiency (CEE)

The efficiency of physical and financial capital is represented by the ratio of value added and used physical and financial capital. It indicates how much added value is achieved by investing one monetary unit into CE.

CEE = VA / CE

Once again, the numbers featuring capital employed efficiency look similar for all three sugar factories observed in the research. The only difference is the index that refers to the slightly more efficient use of CE in Sladorana d.d. in 2004 than in Viro d.o.o. The reason for this is_that Viro's loan obligations rapidly grew in the year 2004.

Intellectual capital efficiency (ICE)

Starting from the point that intellectual capital consists of human and structural capital we come to an indicator for intellectual capital efficiency. It is calculated as human capital efficiency plus structural capital efficiency. The index shows how efficiently intellectual capital creates value.

ICE = HCE + SCE

Intellectual capital efficiency is a new measure. In the industrial era, efficiency was measured by the number of products. Workers who made more products in a time unit were more efficient. For the new economy and the knowledge worker this way of measurement is not adequate any more. Knowledge workers produce value. According to that, it is necessary to measure how much value they create and how efficiently they do this.

In 2003, the second analysed year, intellectual capital efficiency slightly increased in Sladorana d.d. and Viro d.o.o., but Sugar Factory Osijek, had the worst results in the entire analysed period. The IC- efficiency index in 2004 was lower than in the beginning of the observed period for all tree factories. These results imply that all tree factories must pay more attention to the efficiency of their human and structural capital.

Overall value creation efficiency (VAIC™)

The overall value creation efficiency, or the intellectual capability of a company, indicates the degree of success in using all company's resources. An advantage of this indicator is the possibility of application on the micro level or specific organization units or the profit centre of a company. Value creation efficiency analysis is calculated by the following formula:

VAIC™ = ICE + CEE

Table 9. Value creation efficiency analysis (VAIC™)

Year	Sladorana d.d.	Viro d.o.o.	Sugar Factory Osijek	Average value
2002	3.74	4.00	2.19	3.31
2003	4.63	5.64	–0.61	3.22
2004	2.73	3.15	0.90	2.26

During the observed period the sugar companies functioned in different ways. Sladorana d.d. and Viro d.o.o. had better overall efficiency in 2003, but in 2004 it felt below the result achieved in 2002. Generally speaking, the sugar companies became less efficient during the observed period, and we could say that value was destroyed rather than created. This is indicated by the average value of VAIC™ for all three sugar factories, which decreased from 3.31 in 2002 to 2.26 in 2004. Sugar Factory Osijek registered a negative trend of overall value creation efficiency, which corresponds with the accomplished commercial result.

Conclusion

Current economy essentially differs from the economy that characterized the end of 20th century. The share of knowledge in the newly created value (VA) represents the main feature of the transition from *industrial* to the *new economy*, also named *knowledge economy*. Companies which daily compete on the markets are confronted with many changes; such as an increase of competition, opening of new markets, expansion of new technologies etc. These events are impossible to be fully predicted. The speed of changes and the way of doing business lead companies to focus stronger on employees as the key business resource. Knowledge management, that is intellectual capital as a concept of knowledge management, became the foundation of competitive advantages of the company.

Business efficiency monitoring becomes harder and harder because the traditional financial monitoring of business efficiency does not include the most important starter of new economy – intellectual capital. Intellectual capital has become the most important topic in economic circles for the last 15 years.

The objective of intellectual capital managing is to increase the general level of efficiency. It positively affects general business results and enlarges company's market value. Research of the group of authors, led by Chen M. C., speaks in favour of that. They investigated the connection of intellectual capital with profitability and company value based on the VAIC™ index. The research was conducted on the companies which rate on Taiwan stock exchange in 2005. The results of the research show that intellectual capital managing increases the market value of a company and intellectual capital is recognized as the most important factor of the growth and development of the company (Chen, 2005).

A similar result was achieved by the research of intellectual capital made by consultants of Arthur D Little. This research was conducted through specimen of 155 large companies that rate on stock exchange in Germany, Austria, and Switzerland. Out of the entire number of the companies 8% claimed to use the methods of intellectual capital in order to raise the market value and efficiency. 40% of the examined companies use the concept of intellectual capital to provide investor and owners with a better insight into the quality of the company (Little, 2005).

The Croatian sugar industry still suffers from the consequences of failing privatization. Sugar Factory Osijek and Viro d.o.o. have private owners, while the status of Sladorana d.d. is still open. Current business results show the possibility of improving the production and increasing production results. This will, definitely, be necessary for the competition on the European Union market.

At the moment Croatian sugar factories are placing much of their production on the European Union market where they achieve good economic terms and good earnings thanks to the current legislative regulations. Sugar factories need to use this advantage, take steps to increase their resource's efficiency and to prepare for the high quality market which they will be a part of.

At this moment, none of the three sugar factories apply any concept of intellectual capital management. The company Sladorana d.d. intends to include a review on their intellectual capital into the business report for the year 2005. The company has already taken some steps concerning the measures to observe intellectual capital and raise its efficiency.

The general conclusion is that the intellectual capital concept, its measurement and management, affects the

increase of competitive abilities of the company. Croatian companies have to adopt systems of intellectual capital managing as soon as possible.

The message is clear here: managers have to learn about the intellectual capital concept and be motivated to implement measurement systems and manage intellectual capital. The lack of understanding of the importance of intellectual capital for the company can bring incalculable loss in the long term. Consequences can not be restored. Therefore, everyone has to be aware of the fact that intellectual capital represents an important concept in order to reach the desired competitiveness on the domestic, as well as on the global market.

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