

COMPETITIVE ADVANTAGE AND E-BUSINESS STRATEGY

Neven Vrček, Josip Brumec, Dragutin Kermek
University of Zagreb
Faculty of Organization and Informatics, Varaždin, Croatia
{nvrcek, jbrumec, dkermek}@foi.hr

Abstract: *Frequent changes of modern technologies combined with speed and continuous evolution of electronic business present significant problem for the enterprise. Such fast flow of changes suggests business concepts almost contradictory with strategic approach to management and information system development. The proponents of this business philosophy argue that strategic approach is not suitable in modern, fast changing, conditions. The most important attribute they give to the new enterprise is agility. This paper shows that without proper strategy in electronic business environment enterprise loses its competitive advantage. Electronic business has significant negative impact on competitive advantage. For most of the enterprises agility is not the appropriate answer because organizations are inherently slow. They can be guided only by adequate strategy. Competitive advantage must arise from complementary approach to classic and e-business concept.*

Keywords: *electronic business, business strategy, strategic planning of information system.*

1. INTRODUCTION

Electronic business introduced variety of new business possibilities on the marketplace. In order to capitalize on these new opportunities many enterprises entered race to be first and capture the greatest possible part of the market share. Their quest was well supported by banks, venture funds and other forms of investment capital because they also believed that this was the fastest way to make profit.

The early strategy was focused on fast entry in the market, determining and targeting the desired market segment and establishing sales channel [5, 8]. Such approach was usually named first mover advantage. However only few of these early first movers really succeeded. Global presence of the enterprise in e-business environment combined with empowered customers increased competition to the level at which survival was more essential than profit. Quite soon the "golden rush" was over and those who were left on the market realized that the traditional competition balance was ruined and the new was permanently changing punishing every business mistake.

During all this time the Internet and mobile technologies were also significantly changing. Since they were essential for success in e-business each technological advance was the opportunity for gaining short competitive advantage over competition. Therefore,

they were quickly integrated into the business model. All this was done without real strategy and long-range business concept. The only characteristics that were required from the enterprise were speed and agility.

This was completely inappropriate for bigger enterprises with strong foothold in classic business processes. Their time constant was much bigger than dot com speeders. However it was them that were actually producing something and made real value. The hype of e-business made classic values obsolete. All that was important was selling the goods over the Web.

The epilogue was commercial breakdown of majority of e-business enterprises. It was clear that the whole idea of e-business should be redefined.

Internet and global connection are not always and necessarily “gift from the gods” for business performance. It is the consumers, not enterprises that gain most of the benefits. The consequence is higher pressure of the market competition that destroys many enterprises. This challenge can only be answered by differentiation of products or services. The answer to the competition cannot be found in new technologies for supporting electronic business while selling same or similar products as the competition. The secret of new electronic business is in strategically profiled product sold through combination of classic and electronic business channels. It is not the Internet, on-line auctions, dynamic catalogues etc. that brings profit. The key is in differentiated product and combination of Internet and traditional selling systems. Such approach arises the importance of the strategic management and strategic planning of information systems in e-business environment.

This paper analyses the impact of electronic business on competitive advantage and shows importance of proper strategy in combining traditional and new business models.

2. GLORIOUS FAILURES

The Internet, in its early phase, faced enterprises with completely new challenges and imposed market competition in new and unexplored areas. The market was still forming and enterprises were testing customers and competition to find best approaches. Various options had been tested and overall level of market experimentation was very high. Such approach resulted in unstable market conditions in which great success and disaster stories occurred. As usual the success attracted much more attention and failures were ignored. However now it is quite evident that also the great part of these success stories resulted from misinterpretation of actual business results.

More detailed analysis shows that while competing for market share many companies deliberately reduced prices compared to traditional sales channels [6]. This was additionally supported by vendors in lower levels of supply chain because they also had interest in new market. Therefore they were also reducing prices for e-business channels and contributed in lowering overall costs throughout supply chain. The whole system was in the service of a market experiment. It was natural that such approach increased number of on line customers. Adequate accounting methods reduced expenses of new business opportunities helping the e-business hype and attracted more investors. The real financial relationship between costs and benefits of e-business was never published. The first wave of e-business had few real success stories and others were just unsuccessful attempts.

Distorted benefits and costs data provided illusion of market success but the concept was not sustainable when an experiment had to become every day practice. At that point all internal and external subventions had to be cancelled and .com enterprise was really on the market. This was also the point at which stock exchanges reacted realizing that these were not profitable business cases any more.

3. COMPETITIVE ADVANTAGE

Competitive advantage is the essence of the market survival for every enterprise. However today competitive advantage is harder to achieve and retain than ever before [14]. The reason for that is permanently increasing level of market competition, which is the result of several interrelated factors:

- a) **Empowered customers.** Internet really brought power to the customers. The search costs for better business offers are extremely low and fight for customer acquisition and retention has never been so harsh [10].
- b) **Lower market entry barriers.** Global communication allows easy promotion of new business concepts and proposals helping them in finding way to investment capital and market entry.
- c) **Fast technology development.** Fast and continuous innovation quickly obsolesces whole generations of products. The market is saturated with various new and advanced products and services, which are going to be replaced by new within few months. The lifecycle is shortening permanently. Each position is endangered by new solutions, which tend to enter and conquer market with superior features.
- d) **Extreme production capacities.** Currently installed production capacities go beyond needs of consumer society. Therefore extreme efforts are being made to maximize their utilization within a short market life cycle of a certain product. The sad part of this story is that at the same time majority of human kind fights with hunger and poorness but these production capacities are not in their service. Other sad fact is that we are extremely overconsuming natural resources essential for our survival.
- e) **Deregulation.** Deregulation of former state monopolies (energy, telecommunication, etc.) expands new areas for intensive competition. This process opens new market niches with significant impact on the whole industry.
- f) **Globalization.** Globalization is a controversial phenomenon, which gives new possibilities for global competition. It is tailored for big corporations with excess investment capital, and it significantly disturbs established local market relationships giving competition new, more aggressive, dimension.

Described factors constitute market environment in which modern enterprises try to achieve competitive advantage.

In order to analyze characteristics of competitive advantage we must give it certain measurable attributes. From generic point of view competitive advantage has three important characteristics: sustainability, size and type.

Sustainability of competitive advantage describes capability of the enterprise to retain market position over certain time period. It can be short, medium and long termed. Long termed competitive advantage means that values, which are offered to the customers by the enterprise, cannot be achieved by the competition within a short time period. Short termed means that current offer is soon going to be achieved by the competition. Long-term advantage is extremely hard to generate and retain and in most cases it is attribute of protected market monopolists. Majority of the enterprises lives in the world of short-term competitive advantage fighting for survival with the competition.

The size of a competitive advantage is a measure of the fitness of the enterprise or its certain product to the customers' needs. The greater the size means that a product better suites customer needs than competitors and the greater is customer retention. Sustainability and size are related but independent variables. The enterprise can have sustainable competitive advantage but without sufficient size that gives it undoubtful market superiority overall customer retention is low.

The type of the competitive advantage describes the essence of business model for the particular enterprise. We can divide them in six categories: price, focus, differentiation, operations, and knowledge.

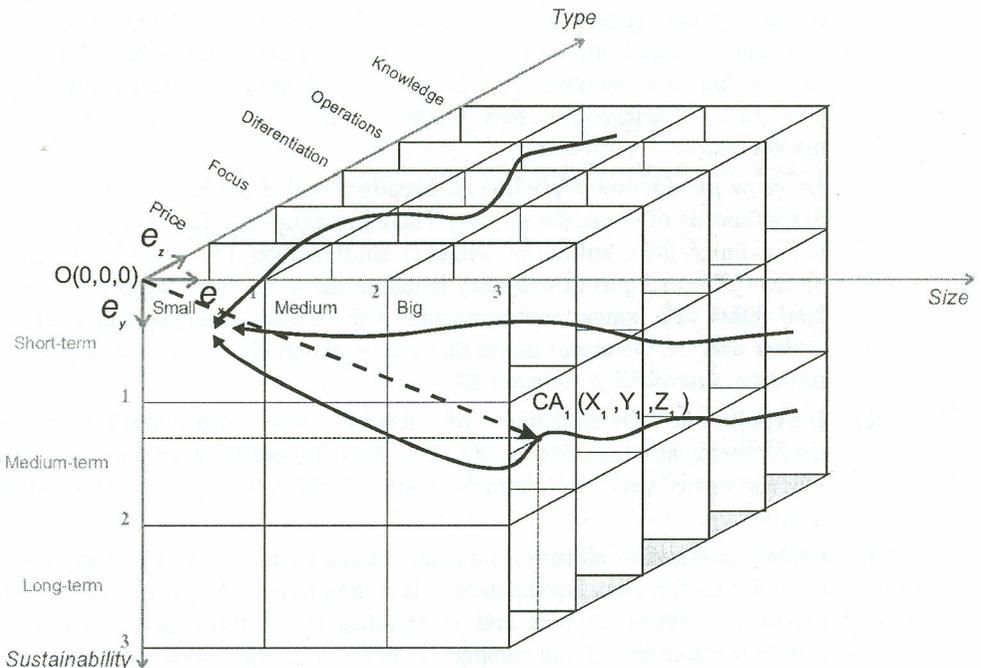


Figure 1. Taxonomy space of competitive advantage

The competitive advantage based on price means that the enterprise is capable to provide products/services at lower price than the competition. Price is partially dependent variable because it is influenced by various costs induced by production, various overheads and supply chain. Therefore enterprise cannot have low price without efficient production,

procurement, etc. However if the price is deliberately chosen area of competition than this denotes the strategy that is committed to outperform opponents with price. At this point the price becomes separate segment of the type axis because it is the essence of the certain strategy. The price competitive advantage is the last resort for mature products in terms of highly saturated market with competitive products.

Focus competitive advantage is tightly linked to certain categories of customers to meet their specific needs (e.g. fashion industry). Such strategies also occur in saturated markets with few uncovered niches, which might bring benefits. They are characterized with high market exploration and marketing activities.

Differentiation means that the enterprise is capable to offer product/service that offers some highly desirable and distinct features. It also implies that the market saturation is lower and that there is significant customer base.

Competitive advantage based on operations describes strategy of the enterprises capable to execute its business processes in a superior manner. This particularly applies to production and customer relationship processes. The efficiency of these processes is so high that they are capable to retain the customer. The examples of such enterprises are majority of car industry, but also the chains of fast food restaurants.

Knowledge based competitive advantage is a characteristic of enterprises with unique knowledge that attracts customers. Such enterprises usually have strong product/service research and development processes, which give them knowledge advantage. Typical examples are pharmaceuticals.

Highest competitive advantage comes from the knowledge and it decreases with other types. Market saturation, which describes the amount of the presence of competition on the market, decreases along type axes.

In the world of e-business sometimes the maneuverability or agility of the enterprise is also mentioned as competitive advantage. Maneuverability based competitive advantage describes business models capable for fast course changes. It actually means that the enterprise is capable to continuously refresh other types of advantages. Therefore it is not drawn as a separate interval on type axis. Also, efficient maneuverability is very hard to achieve and mostly is present in small or new enterprises because larger organizations are inherently slow. Being capable to change business model might be good occasionally but frequent changes indicate absence of strategy and lack of commitment, which usually leads to failure.

If we draw these three attributes of competitive advantage on orthogonal axes we obtain taxonomy space of competitive advantage (*Figure 1*). We can analyze it just as a pure taxonomy space and then we are in the domain of discrete variables. However interesting analysis can be done if we consider them as continuous. Such approach is also closer to reality because it is hard to determine exact borders that separate subspaces. We will present a mathematical model, which might be used to understand some aspects of competitive advantage. This model tries to make certain analogies with classical physics and its well-known phenomena.

Current competitive advantage of the enterprise (or its certain product) should be measured by some norm of presented space. It can be simple Euclidian distance

$$dCA_1 = \sqrt{X_1^2 + Y_1^2 + Z_1^2}, \quad (1)$$

city bus distance or some other adequate measure such as the volume of the cube bounded by the axes and present position of the point in the space

$$V_{CA_1} = X_1 Y_1 Z_1. \quad (2)$$

For our analysis it is important that we chose certain measure of competitive advantage and use it consistently. Once the measure is defined we can measure the distance in competitive advantage between two points in space (enterprises or products).

With defined measure of competitive advantage as:

$$CA(x, y, z) = f(x, y, z) \quad (3)$$

we can see that it is the function of the three variables defined over our space. Now we can further refine our model. For that purpose we should use the gradient of a function $CA(x, y, z)$

$$\text{grad } f(x, y, z) = \nabla f(x, y, z) = \left[\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial z} \right]. \quad (4)$$

The gradient is a vector field, which tells us how the function varies in different directions. At each point of the space it points in the direction in which $f(x, y, z)$ increase most rapidly and its magnitude is the rate of change of $f(x, y, z)$ with respect to distance in that direction. In the context of competitive advantage the gradient shows the change of competitive advantage for displacement in certain direction.

In our model the point in space presents current competitive advantage of the enterprise (or product/service) and it varies by time.

Therefore

$$CA(x, y, z) = f(x, y, z) = f(x(t), y(t), z(t)) = CA(t). \quad (5)$$

All the coordinates are time dependent. This also applies for sustainability because it presents sustainability of competitive advantage over certain time period but it may also vary by time.

The enterprise starts at the certain point in the space of competitive advantage and as the time passes it moves along the curve

$$s(t) = \{x(t), y(t), z(t)\} \quad (6)$$

within the space as presented by *Figure 1*. What is interesting to us is how the competitive advantage changes during way along a certain trajectory.

If the coordinates are given as functions of a parameter t i.e. time then we have parameterized paths. The velocity of the point at any moment is given by the velocity vector

$$\vec{v}(t) = \left[\frac{dx}{dt}, \frac{dy}{dt}, \frac{dz}{dt} \right]. \quad (7)$$

If we are following a parameterized path $s(t)$ in a space where a function CA is defined then we can think of the function itself becoming a one-dimensional function by restricting it to the path. At any moment t , the rate of change of CA is given by

$$\frac{dCA}{dt} = \nabla CA_{s(t)} \bullet \vec{v}(t). \quad (8)$$

Therefore we can calculate the rate of change of competitive advantage as the point travels during time along a given path within a space.

The second problem we want to clarify by our model is how the competitive advantage brings benefit to the enterprise and what work has to be done to gain the competitive advantage. The importance of gradients in physics is that a field in which potential energy $f(x, y, z)$ is defined invariably has associated with it a force field given by

$$\vec{F} = -grad f(x, y, z) . \tag{9}$$

The negative sign denotes that increasing the potential energy means struggling against the force. In order to do work the force must be in direction opposite to potential energy increase. If we apply such reasoning to model presented in this paper then potential energy relates to function of competitive advantage $CA(x, y, z) = f(x, y, z)$.

By moving the point in such space we perform a work given by

$$W = - \int_{P(x1,y1,z1)}^{Q(x2,y2,z2)} \vec{F} \bullet d\vec{s} \tag{10}$$

The sign is minus because the positive work is performed against the force.

If we parameterize the path with time this becomes

$$W = - \int_{tP}^{tQ} \vec{F}(s(t)) \bullet \vec{v}(t) dt . \tag{11}$$

Combined with (8) this gives

$$W = \int_{tP}^{tQ} \frac{dCA}{dt} dt = CA(P) - CA(Q) , \tag{12}$$

which is the expression for conservative (reversible) work. Therefore if we think of competitive advantage as potential energy then it can be transformed into some form of useful results, analog to work. Also we can see that the amount of obtained work is not the function of time or the curve just the difference in competitive advantage between starting and ending point. However in a real world the First Law of Thermodynamics applies and the work should be separated to conservative (reversible) (W_C) and a non-conservative (non-reversible) piece (W_{NC})

$$W = W_C + W_{NC} . \tag{13}$$

Non conservative work stands for heat, sound and all other forms of energy that can not be converted back to the potential energy. Conservative work conserves energy, which means that it can be converted back to the potential energy.

To summarize obtained results about competitive advantage we can say that competitive advantage is analog to the potential energy. The center of gravity is point $O(0,0,0)$ at *Figure 1*. The greater the distance from this point the greater is potential of the enterprise (or product/service) to perform business. The potential of the competitive advantage can be converted to useful results on the market resulting in benefits for customers, workers and shareholders. These results are made of conservative and non-conservative part. The conservative part is the amount of money, which is obtained by

selling the product/service on the market, invested back into research and development, operational processes, etc. thus increasing the potential of competitive advantage. Non conservative part is the money spent on taxes, salary, various indirect and overhead costs, dividends etc.

While performing work the potential energy or competitive advantage is being transformed and enterprise loses its potential. Therefore the displacement is made from initial point towards zero point. The enterprise must invest certain amount of its resources to regain the initial level of the competitive advantage and move away from zero point.

The overall amount of results on the market is proportional to the difference in competitive advantage between starting and ending points.

Although not exact, presented model is a good framework for understanding competitive advantage. The important message, which it gives, is that competitive advantage is not enough by itself. It should be seized and transformed into valuable results. It can also be lost, and to regain it the enterprise must make certain efforts.

Each enterprise usually chooses certain strategy and develops strongholds in one or several subspaces. Successful business strategies relate different types of competitive advantage. The impact of the market environment and competition on competitive advantage of the enterprise has certain rules. The initial competitive advantage of certain product usually arises in knowledge subspace. As the competition increases the trajectory of competitive advantage converges to short-term, small competitive advantage based on price. The final act takes place in this subspace with high market saturation and elimination of those who cannot bear cutting down the profit margins.

4. IMPACT OF E-BUSINESS ON COMPETITIVE ADVANTAGE

The Internet has significant impact on competitive advantage. If we analyze this influence we can conclude that it systematically decreases competitive advantage of the enterprise. This is directly opposite to the statements of early e-business proponents who regarded it as the generator of competitive advantage.

There are several important reasons why Internet has negative impact on competitive advantage:

- a) Consumers are extremely well informed and their market knowledge is increasing. This fact pressures the price of every product on the market.
- b) Competition is also perfectly informed about new products and services and uses all possible means to generate equivalent. Absolutely everything becomes matter of copying. This applies also to information systems for e-business support. Therefore their price also drops significantly. If e-commerce information system is so cheap and reachable it can be installed also in small and medium enterprises. Therefore it is widely present and cannot bring any competitive advantage solely by itself. This phenomenon is particularly present in business to consumer (B2C) domain because organizational requirements for establishing e-commerce are significantly lower than in business to business (B2B) area. B2B domain is much more complex but it imposes significant organizational and mental barriers to e-business [9]. The standards like XML, RosettaNet, BizTalk, etc. [11,12] are not sufficient for successful supply chain

management solutions. The organizational issues are the biggest challenge that should be overcome. The relationship between enterprises is based on short-term common interest. Today's partner is tomorrow's competitor or competitor's partner. Therefore level of mutual trust is quite low and information retention is high. Exceptions to this rule are industries dominated by strong top corporations e.g. car industry. They have the power to impose rules and standards to lower levels of supply chain. Therefore supply chain management and B2B concept has significant potential but of limited size and within certain industries.

- c) The part of B2B domain, which is often neglected, is a collaborative product/service development. To gain certain market position enterprises quite often join knowledge and form consortia dedicated to develop new market offers. Adequate standards (e.g. XML, CAD) combined with Internet can very efficiently help in structured data interchange. If cooperation is based on equal amount of knowledge of involved partners such consortia can gain significant knowledge based competitive advantage (e.g. Airbus). However today cooperation has other forms. One of them is outsourcing [7]. It has various modalities, but we can notice the phenomena that a brand name is at the top of a pyramid, and all the operations is placed in lower levels of supply chain (e.g. Dell computers). Such approach is highly recommended by modern business analysts. However if majority of operations and development is in lower parts of supply chain so is the majority of knowledge. These component makers supply top brand name product but also can very easily sell same components to other top-level brands. Direct consequence of this approach is that top-level brand products become same or similar. Low level of differentiation leads to increased price based competition.
- d) Complete electronic business is based on knowledge workers. Knowledge in all of its forms and areas is the most important asset of the modern enterprise. However this segment of workforce is mobile, very well informed and Internet directly increases the amount of just in time information about job market. So called headhunter firms also contribute to workforce mobility. What happens can be regarded as knowledge diffusion and it directly contributes to flattening of features among products/services offered on the market and leveraging of their price.

The abovementioned factors complement each other and overall effect is faster movement in the area of short-term, small, price based competition. This effect evolves like chained reaction and average global competitive advantage deteriorates rapidly.

In the terms of the model described in previous chapter the e-business increase rate of change (8). The trajectories are much shorter (especially by sustainability component) which means that overall potential is lower resulting in lower work equivalent, and they move much faster. To get away from the zero point enterprises are forced to more often invest into various business processes and new initiatives to obtain competitive advantage.

In this way electronic business has extremely strong influence on all market subjects whether they take part in it or not. Extreme competition is one of the most noticeable features of modern market and e-business is directly in its service.

5. REDEFINED STRATEGY

The electronic business market is so concurrent that demands almost absolute quality of product and service. The success derives from continuous and complete customer satisfaction. The e-business solutions must serve this aim but it should be realized that it is not the substitute but the complement to all other parts of business.

Therefore competitive advantage arises from development and operational business processes successfully combined with e-business concepts. This is the essence of redefined e-business strategy. The first wave of e-business movement was too much externally oriented. Majority of its participants failed because they did not realize the importance of strong internal focus.

Competitive advantage in a modern world heavily relies on the information system. Information system should collect important internal information and seamlessly combine them with external to achieve full control over complete value chain.

Electronic business will give success only when it is fully integrated with the enterprise strategy. It is the starting point for strategic planning of information system and e-business part is its fully integrated subsystem.

The Internet by itself does not give any competitive advantage. It became cheap and reachable commodity present in every enterprise. The saturation of a market does not allow significant generation of extra profit over the Internet any more.

The real potential of the e-business lies in B2B domain. It should be carefully analyzed and collaborative models should be established. This especially applies for collaborative development with strong aggregation of knowledge. That way enterprises gain knowledge based competitive advantage. Increasing the amount of complementary knowledge results in product/service heterogeneity, which is hard to copy. This is the area in which e-business will play important role.

Strategic planning of information system should understand e-business and drag it deeply into business processes [1, 13]. We have developed and practically proved methodology for strategic planning of information systems (SPIS) [2, 13]. It consists of many methods and techniques, but the core idea is to increase the amount of useful (conservative) work of the enterprise (12,13). This is the only work, which might bring the potential of the competitive advantage back. Everything else is overhead that cannot be completely avoided but should be minimized. This will be the winning philosophy of the e-business enterprise in the economy of the future, deeply placed in its strategy. Such approach has strong impact on organization and its internal structure. It should become completely process oriented. Good strategy should monitor all market changes and give enough time to organization for adaptation. Comparing to technology and market changes organizations are quite slow. This is logical because they are much more complex. The strategy has to eliminate outside world chaos and give clear directions. Our experiences in strategic planning of information systems [2, 3, 4] show that there are no simple solutions and recommendations.

Every concrete strategy should derive from deep and detailed knowledge of business processes, foreseeable market changes and capability of strategy deployment. In this process there is always uncertainty element, and e-business environment significantly

contributes to it. In these terms every strategy presents possibility of choice and bearing consequences for a chosen way.

REFERENCES

- [1] Boar, B. (2001): *The Art of Strategic Planning for Information Technology*, John Wiley and Sons, Inc., New York, NY, USA.
- [2] Brumec, J. (1998): *Strategic Planning of Information Systems*, Journal of Information and Organizational Sciences, Vol. 23., Varaždin, Croatia.
- [3] Brumec, J., Dušak, V., Vrček, N. (2001): *The Strategic Approach to ERP System Design and Implementation*, Journal of Information and Organizational Sciences, Vol. 24., Varaždin, Croatia.
- [4] Brumec, J., Vrček, N. (2002): *Genetic Taxonomy: the Theoretical Source for IS Modeling Methods*, Proceeding of ISRM2002 Conference, Las Vegas, NV, USA.
- [5] Deise, M., Nowikow, C., King, P., Wright, A. (2000): *Executive's Guide to E-Business: From Tactics to Strategy*, John Wiley and Sons, Inc., New York, NY, USA.
- [6] Fingar, P., Aronica, R. (2001): *The Death of e and the Birth of the Real New Economy*, Meghan-Kiffer Press, Tampa, FL, USA.
- [7] Halvey, J., Melby B. M. (2000), *Business Process Outsourcing: Process, Strategies and Cobntracts*, John Wiley and Sons, Inc., New York, NY, USA.
- [8] Hamel, G. (1994): *Competing for the Future: Breakthrough Strategies for Seizing Control of Your Industry and Creating the Markets of Tomorrow*, Harvard Business School Press, Boston, MA, USA.
- [9] Hoek, R. (2001): *E-supply Chains Virtually Non-existing", Supply Chain Management: An International Journal*, Volume 6, Number 1, MCB University Press, UK.
- [10] Hoffman, D. L., Novak, T. (2000): *How to Acquire Customers on the Web*, Harvard Business Review, May-June 2000, Harvard Business School Press, Boston, MA, USA.
- [11] Kermek, D., Vrček, N. (2001): *The Issues of Defining Data in XML*, Proceedings of CASE 13, HIZ, Opatija, Croatia.
- [12] Kermek, D., Vrček, N. (2002): *Global Standards for Electronic Business Data Interchange*, Proceedings of e-biz 2002, HIZ, Opatija, Croatia.
- [13] KORIS (2002): *SPIS Methodology*, internal materials, KORIS, Zagreb, Croatia.
- [14] Porter, M. (1998): *On Competition*, Harvard Business School Press, Boston, MA, USA.

Received: 9 January 2003

Accepted: 9 October 2003