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IT EDUCATION STRATEGY ORIENTED TO THE ALIGNMENT BETWEEN BUSINESS AND INFORMATION SYSTEMS

Abstract

In this paper we analyze the significance of IT education strategy oriented to the alignment between information systems and business systems. We establish goals and develop concepts, and present a methodological frame of strategic IT education. We report the results of our research and investigate the way and intensity of the impact of strategic IT education on the factors influencing the alignment and linking between information systems and business strategies.

From the point of view of our research, we have focused on factors that have an influence on the alignment between information systems and business strategies, and factors affecting organisational effectiveness. Factors influencing strategic IT education have also been systematized within the categories of business/information system alignment, and organisational effectiveness. Since strategic IT education has been recognized and organized in different concepts, we have included three concepts in our questionnaires: strategic IT education for managers, organisational learning and e-learning.

Keywords: IT education, strategy, information systems, business systems, alignment, research

1. Introduction

The object of our research is the significance of IT education strategy oriented to the alignment and linking between information systems and business strategies. We have started from the assumption that strategic IT education, based on systematic implementation and development, innovation, creativity and use of advanced information systems and technology, significantly influences the alignment and linking between information systems and business strategies.

In the first part of this work, we define the object of our research, elaborate the structure of the work, and establish the scientific hypothesis.

In the second part, we discuss the idea, significance and goals of strategic IT education.

In the third part, we systematize and describe the concepts of strategic IT education. We have established different concepts of strategic IT education through the research process on factors that influence the business informatization in Croatian companies, and described the concepts of IT education strategy oriented to managers, organisational learning and e-learning. The concepts have been systematized and defined based on the results of our research on factors influencing the business informatization in Croatian companies.

In the fourth part of this work, we discuss the goals and characteristics of the alignment and linking between the information systems and business strategies.

In the fifth part, we describe our research on the business informatization in Croatian companies. We have analyzed and presented the research results on the factors that have an influence on the business/information system alignment, and concepts of strategic IT education.

In the final, sixth part, we discuss correlations within and between the concepts of strategic IT education and the factors affecting the alignment between information systems and business strategies. We created a diagram to correlate the factors and concepts aimed at presenting the way and intensity of the impact of strategic IT education on the alignment between information systems and business strategies.

2. Goals of strategic it education

Every educational programme has its specifics which describe what their graduates should know and be able to do. They need to satisfy general criteria, i.e., they have to be precise, realistic and measurable [2]. Accordingly, IT education and training for professions for business informatics (BI) should be brought together by teaching staff able to relate business economics and information and communication technologies.

Future graduates, on the basis of acquired economics, organisational, and IT skills, will become professionals who will be able to intelligently lead a business and have understanding that organisational and IT systems are complementary. This will make them unique in comparison to other faculties where graduates are trained in specific type of IT education. Systematic IT education and alignment of student affinity towards professions in business informatics (BI) will enable the creation of skilled professionals who will be able to transfer their skills and experiences into business and contribute to their employer's strategic market positioning [16].

Information technology is delivering an extraordinary improvement to all areas of human activities, it is opening up the possibilities of improving the quality and the quantity of production and the standard of living, and it is generally broadening the scope of new opportunities in all areas of life [8]. The goals of strategic IT education have been aimed at increasing knowledge and capability of people who participate in the creation of strategy of development of the informatization, or strategic process of implementation and use of the information technology. The most important goals in strategic IT education can be defined as the following [7]; [15]:

- a clear conception of the possibilities offered by computers and computer applications for a given problem area,

- the ability to accept the information science thinking process and the understanding of computer logic in problem analysis,

- an understanding of the logic and the advantages of this new way of solving tasks by the use of modern information technologies,

- the ability to apply knowledge gained at university to the development and the use of applications in dealing with strategic problems,

- the ability to create, sustain and develop one's own user programs (applications) for performing given work tasks,

- a positive attitude about the introduction of information technologies to solving strategic problems and a positive influence on the work environment (for example, groups, teams, management),

- to master the use of a computer and all of its units,

- to master the information technologies synergy,

- to gain basic information science literacy to the level of solving complex problems in non-structured situations, with the application of information technology,

- to gain and to develop logic and creative abilities in selecting and writing programs in solving non-

structured problems, given for a specific problem situation,

- to get introduced to the goals of the society and the dimensions of informatization and information resource management,

- to get introduced to the possibilities and the advantages of network communication,

- to develop the correct relationship towards the use and the protection of programs and data,

- to observe the role of team work in information science.

3. Concepts of strategic it education

In this part, we have systematized and described the concepts of strategic IT education. We have established different concepts of strategic IT education through the research process on factors that influence the business informatization in Croatian companies, and described the concepts of IT education strategy oriented to managers, organisational learning and e-learning. The concepts have been systematized and defined based on the results of our research on factors influencing the business informatization in Croatian companies.

3.1. IT education strategy oriented to managers

Managers should be able to know how to use advantages of information systems, and are expected to be ready to make decisions on the strategy of development and implementation of information systems. This means that a manager is expected to be a competent user of advanced information systems, and capable of managing information and communication technologies to integrate them in his or her job and business strategy. It is the task of the manager, not technical staff, to know how to formulate an idea about information systems, allocate resources and ensure that the IT system is built in a way which will enable creating added value and competitive advantage of the company [10].

Accomplishing goals of strategic IT education is the fundamental factor in mastering relevant strategic knowledge and capabilities in managerial deve-

lopment of information systems and use of information technology. This kind of education and training is likely to result in managers' active participation and support in the development of business informatization, especially in the alignment and linking between information systems and business strategies. The goals of strategic IT education have been described in the Part 2.

3.2. Organisational learning

Nowadays companies are operating in a continuously changing, and turbulent business environment that requires changes and learning at individual, group, organisation, and inter-organisation level. Organisational learning is a process of acquisition of all types of information (knowledge, comprehension, know-how, technology and procedure), in various ways, and at the organisational level. Jones emphasizes the importance of organisational learning for organisational performance defining it as a process through which managers try to increase organisational members' capabilities in order to understand better and manage an organisation and its environment to accept decisions that increase organisational performance on a continuous basis [3], [9].

Integral, computer-supported organisational learning is based on on-line learning methods (e-learning), and integrates four aspects of organisational learning: information, interpretation, strategic and behavioural approach to organisational learning. In this way, organisational learning can be defined as a process of information acquisition, information interpretation and resulting behavioural and cognitive changes, which should in turn have an impact on organisational performance [3].

In a wider sense, learning organisation can be defined as a social system whose members have mastered conscious, common processes to create, maintain and stimulate individual and collective learning on a continuous basis aimed at improving organisational outcomes in a way that will satisfy all organisational members with the purpose of increasing business results and improving organisational performance on a continuous basis. An organisation's capability to learn should be bigger and faster than the changes which are occurring in its environment.

The only sustainable source of competitive advantage on a long-term basis is an organisation's capability to learn faster than its competitors. To accomplish it, the overall organisational effectiveness must be bigger than the effectiveness of the sum of its sub-units [1].

Today's organisations are still mostly task-based organisations, while dynamic competitive environment suggests for transition into value-based organisations. Task-based organisations are characterized by an imperative type hierarchical structure where a relatively small number of higher level managers make decisions and create corporate policies. In such organisations, most often employees who perform their duties and tasks in a pre-established way are likely to get a promotion. On the other hand, a value-based organisation is characterized by a more open frame. The more it develops, the more emphasis is placed on the values. A learning organisation has the following advantages: ensuring organisational success on a long-term basis; continuous improvements become reality; success and best practices are transferred and imitated; increasing creativity, innovation and adaptability; attracting people who wish to succeed and learn, and keeping them to stay; ensuring that employees are prepared to satisfy present and future needs of an organisation [1].

3.3. E-learning

E-learning as the concept of strategic IT education is a strategic educational tool. It can be used to educate employees, and clients on new products and services, as well as suppliers and distributors, and to coordinate supply chain management processes. Sharing knowledge may generate new ideas, which are the main generator of growth. The character of e-learning "Just-in-Time" (JIT) allows employees to have access to that part of information that relates to their job exactly when required. This enables employees to perform their duties and tasks in a more efficient way. Learning related to a real business process allows us to create added value [5].

It is vision of e-learning to create a learning organisation which is characterized by a proactive and technologically advanced approach in acquiring new knowledge and skills, strategy oriented learning and self-learning as preferable capability. The main goals of e-learning are the following: increasing knowledge availability, standardization and alignment between managers and employees' training, decreasing costs and learning time, and encouraging managers and employees' creativity and innovation [12].

New software known as knowledge technology allows us to efficiently manage, organise and link strategic parts of information to build advanced forms of corporate education. Thanks to Internet, such information is easily accessible on the desktop of knowledge on an employee's PC. The world's largest companies have taken approach of sharing and transferring knowledge that is essential for building their competitive advantage and success.

A.T. Kearney's study reveals that leading manufacturers who participated in a study on best practices vis-à-vis knowledge sharing have realized Return on Assets (ROA) of 40%, comparing to an average group having in average 18%, and Return on Sales (ROS) of 21%, with respect to an average group characterized by 9% ROS, and 9.8 times Total Assets Turnover, with respect to an average of 2.9 times [5].

Following the above, and similar research, it can be concluded that e-learning is likely to develop during the next years under the assumption that its share in corporate education costs will be growing. Corporate e-learning market will grow. According to the American Society for Training and Development (ASTD) an average American company has been educating more employees than ever before, and has been spending more dollars on technical training than any other kind of training. E-learning has become increasingly important in large-sized companies' education. These were the key results in the 2011 ASTD Report. The report revealed that corporations are choosing a mixed approach that combines the best elements of traditional learning in classrooms and e-learning. Both ways of learning will continue and complement each other. It is likely that the traditional way of learning will never be eliminated entirely. On the other hand, the importance of web-based learning (for instance, web 2.0 technology) will grow. Thanks to the omnipresent Internet, e-learning has become the fastest growing area of corporate education, and demand for software that can convert individual knowledge into organisational intelligence has never been higher [5], [11].

4. Business/information system alignment

The alignment between business and information system brings organisational challenges and imperatives both for company management and IT directors and managers, or software designers. Company managers are dealing with challenges to recognize and appraise business effects of every single proposed IT solution or improvement. This can be achieved only by thoroughly knowing, understanding and coordinating information systems and business strategies. Successful alignment and linking between business and information system requires a number of activities to be performed, from permanent analysis of information systems, improvement planning, strategic planning, and understanding business processes, to document management and cost-effectiveness and feasibility studies in accordance with the world recognized project methodologies.

Managers are becoming aware that an IT organization is not a separate and disconnected process from other business activities in a company. A successful informatization of business systems can only be achieved by integrating IT investment in a company's development budget and reaching a high level of information and close cooperation in realization of projects. In this way, management ideas and company goals such as cost optimization, productivity growth or business process improvement will be easier to understand and communicate. Practice reveals that without consolidating and aligning IT solutions and implementing innovations, cost-cutting measures are not enough to solve long-term business problems. In this context, business/information system alignment has been recognized as an important asset [6].

Organisations today cannot function effectively without the use of information technology. Successful business informatization is based on the alignment between information systems and business strategies. The problem is that very often information technology develops independently of business processes. Even when standards aimed at organising a business process, defining policy and goals such as ISO 9001, are applied, IT is excluded in most cases and is not developing in a way that would enable its alignment with the established organisational and strategic guidelines. This is confirmed in daily practice, and implied by a large number of relevant studies on insufficient effectiveness of IT investment. Simultaneously, this reveals a strong correlation between a business and an information system, as well as a need to improve their relationship and achieve a higher level of alignment. Hereinafter, we analyze key factors that have an influence on the alignment between business and information systems [13].

5. Research on factors influencing the alignment between business and information systems

In our research on the impact of strategic IT education on the alignment between business and information systems we have used data collected by questionnaire methods about factors influencing IT management in Croatian companies. The research concept has been based on a study on the development of information technology in USA companies performed by the Management Information Systems Research Centre (MISRC) at the University of Minnesota, and Society for Information Management (SIM) [4], [14].

Identification and systematization of factors affecting IT management has been performed based on a concept proposed by the authors Neiderman, F., Brancheau, J.C. Wetherbe J.C. and Janz B D. This methodology allows us to systematize the factors in four categories : Apl – factors influencing software application support, Inf – factors influencing technological infrastructure, Pov – factors influencing business/information system alignment, and IS – factors influencing IT development [4].

From the point of view of our research, in this work we have put attention on factors that have an influence on the alignment between information systems and business strategies, and factors affecting organisational effectiveness. The following factors that have an influence on business/information system alignment have been identified: strategic IT education, organisational learning, e-learning, organising and positioning of IT department, understanding the role and effects of information systems at cognitive level, strategic planning of IT development, alignment between IT development and organisational structure, alignment between IT development and corporate business strategy, business planning

methodology, business restructuring and re-engineering, and IT outsourcing.

Factors influencing strategic IT education have also been systematized within the categories of business/information system alignment, and organisational effectiveness. Since strategic IT education has been recognized and organized in different concepts, we have included three concepts in our questionnaires: strategic IT education for managers, organisational learning and e-learning. We have collected data from 57 large-sized and mid-sized companies in Croatia in the period from 2009 to 2012 through the research process on the concepts of strategic IT education and business/information system alignment.

Table 1 shows correlations computed between the factors influencing business/information system alignment. We have used partly modified Petz scale (2007; 211) to evaluate correlation level. The data in the table have been marked in the following way: bold and underlined to mark high level correlations (0.58 – 0.70), italic to indicate real, significant correlations (0.40 – 0.58), and simple numbers to show values of poor or insignificant correlations.

6. Model of correlation between strategic IT education and factors influencing the alignment between business and information systems

After analyzing the factors that have an influence on the alignment between business and information systems, we have noted that all factors have been interrelated up to a point, with different levels of intensity.

Diagram 1 shows the model of IT education concepts and factors influencing business/information system alignment. The model of correlation reveals a synergic approach to IT education for strengthening and integrating factors affecting IT education, and factors affecting the alignment between information systems and business strategies, information processes and educational processes. The synergic approach to IT education enables us to conceptualize problems in educational contents in an easy-to-understand way, as well as methods used by users during educational processes.

Table 1 and Diagram 1 reveal a high level of correlation between all three factors in strategic IT education.

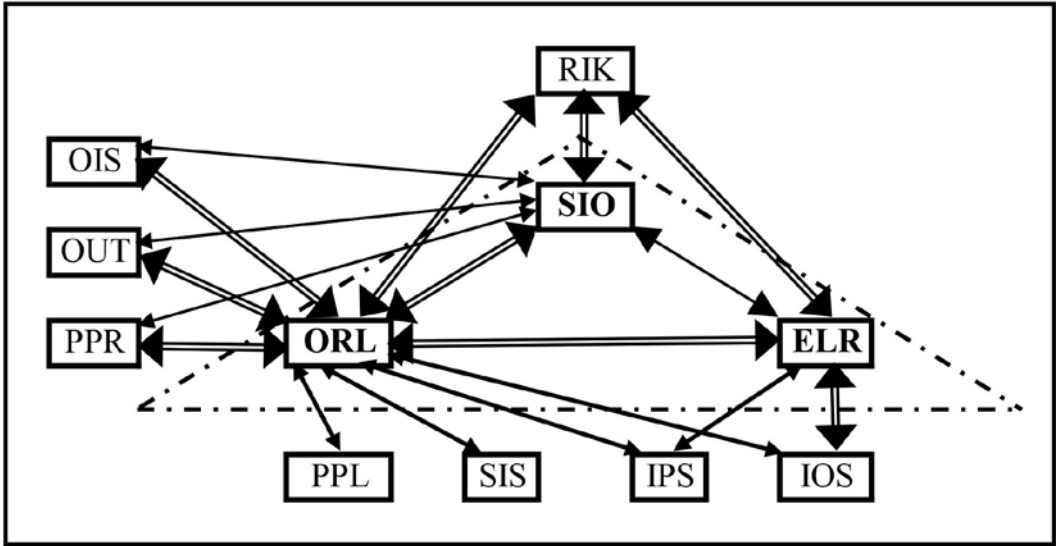*Table 1: Correlations between the factors in Business/IT Alignment*

Factors influencing the alignment and linking between information systems and business strategies.	Organisational learning	Strategic IT education	E-learning
Strategic IT education for managers (SIO)	1	**0,62**	*0,52*
Organisational learning (ORL)	**0,62**	1	**0,66**
Organising and positioning of IS department (OIS)	*0,52*	**0,66**	1
Understanding the role and effects of IS at cognitive level (RIK)	*0,46*	*0,5*	0,36
Strategic planning of information system (IS) development (SIS)	**0,62**	**0,58**	**0,61**
Alignment between IS development and organisational structure (IOS)	0,31	*0,48*	0,14
Alignment between IS development and business strategy (IPS)	0,39	*0,46*	**0,64**
Business planning (PPL)	0,31	*0,5*	*0,42*
Business process redesign and re-engineering (PPR)	0,26	*0,46*	0,27
Outsourcing (OUT)	*0,42*	**0,55**	0,36
E-learning (ELR)	*0,41*	**0,56**	0,39

Diagram 1: Correlation diagram between the concepts of strategic IT education and factors influencing the Business/Information System Alignment

The table also indicates that each factor that has an influence on business/information system alignment is in a significant or high correlation with at least one of the factors that affect IT education. The biggest influence of the factors in IT education is seen in understanding the role and effects of information systems at cognitive level. This is essential to strategic development of the business informatization considering that managers' decisions on IT investment primarily depend on real (not just declarative) cognition on the significance of information technology and information systems in corporate business.

7. Conclusion

Strategic IT education should encourage the management and employees to create, maintain and promote individual and collective learning, education and training on a continuous basis to improve business systems in a way that will satisfy all organisational members with the purpose of improving organisational performance and increasing business results on a continuous basis. The methods of strategic IT education should be aimed at offering suggestions and guidelines instead of giving direct answers to questions, and resolving practical problems coming from the real world, or concrete, practical situations.

In our research on the impact of IT education strategy oriented to the alignment between information systems and business strategies we have used data collected by questionnaire methods about factors influencing IT management in Croatian companies. The results of the research on the factors influencing business informatization in Croatian companies have revealed a synergy to strengthen and integrate the factors affecting IT education, and factors influencing business/information system alignment. Synergic approach to IT education allows for the conceptualization of problems in educational contents in an easy-to-understand way as well as methods used by users during educational processes.

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Pregledni članak

Strategija obrazovanja za informacijske tehnologije usmjerena na usklađivanje poslovnih i informacijskih sustava

Sažetak

U ovom radu analiziramo važnost strategije obrazovanja za informacijske tehnologije (IT) koja treba biti usmjerena na usklađivanje informacijskih i poslovnih sustava. Odredili smo ciljeve, razvili koncepte i predstavili metodološki okvir za strateško IT obrazovanje. Iznosimo rezultate svog istraživanja i razmatramo način i intenzitet utjecaja strateškog IT obrazovanja na čimbenike koji djeluju na usklađivanje i povezivanje između informacijskih sustava i poslovnih strategija.

Što se tiče našeg istraživanja, usmjerili smo se na čimbenike koji djeluju na usklađivanje i povezivanje između informacijskih sustava i poslovnih strategija, kao i na čimbenike koji utječu na organizacijsku učinkovitost. Nadalje, čimbenici koji utječu na strateško IT obrazovanje su sistematizirani u kategorije usklađivanja poslovnog/informacijskog sustava, te organizacijske učinkovitosti. S obzirom da je strateško IT obrazovanje prepoznato i organizirano u različitim konceptima, u naš upitnik smo uključili tri koncepta: strateško IT obrazovanje za menadžere, organizacijsko učenje i e-učenje.

Ključne riječi: IT obrazovanje, strategija, informacijski sustavi, poslovni sustavi, usklađivanje, istraživanje