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Shared Domain Knowledge and its Influence on the Success of Application of New Technologies and Solutions

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Abstract: **The present moment is characterized by a permanent development of new technologies and solutions which presuppose a global knowledge. In this matter, the decision maker's shared knowledge of the domain and its usage has a strong influence on the success in its practical business application. The designed model consists of four constructs (shared domain knowledge, attitude, planning and financing). The model is a result of a statistical analysis of the scientific research of the strategic planning of an integrated business-information system (SP-IBIS). The research participants were 61,6% of the university and other higher education institution managers of the Republic of Croatia. It was proven that shared domain knowledge is the most influential factor for long-term alignment, for strategic decision-making on the application of new technologies and solutions, and which can be initially used when applying other solutions - such as WSN application in healthcare.**

Keywords: **academic managerialism, model, new technologies and solutions, shared domain knowledge, strategic planning.**

1. INTRODUCTION

In times when we witness new business trends, ever growing global knowledge based on information is implied, as well as vigorous interfusion of all information society elements with the activities of higher education as a whole. Analysts of these relationships more and more stress the development of the theory of academic capitalism, by which they explain the process of integrating higher education institutions into the new economy. Ever larger demands that are placed before university management in terms of overall management of all business segments, aiming at managing the complete business in the most efficient manner, assume utilisation of modern ICT technology and solutions that enable integrated monitoring of all business information being utilised for reaching operative, tactical, strategic and financial decisions. Viewed from the aspect of scientific research, the study of information system strategic planning is by no means simpler, especially if the fact that the discipline is as yet insufficiently researched within information science is taken into account, as well as that it is quite young, since the initial works date from the 80s of the preceding century.

With the introduction of the Bologna process in the higher education of the Republic of Croatia, optimization of the use of available resources has become an acute issue: budget funds, own revenue, personnel, space and equipment, and especially the optimization of the distribution of funds by introducing financing based on overall amount. Therefore, it is necessary, in order to develop and manage such a complex system as the single business and

information system of the university, to conceive a single information strategy as the link between academic strategy and information system strategy. The complexity of the process requires specific forms of strategic conception, planning and management of activities, and, finally – strategic profiling of the university. Each new contribution to advancing knowledge, financing, attitude and planning aiming at improving the success of university becoming information enabled, which in turn makes possible more efficient use of budget funds, surely does have full social justification as well.

2. KNOWLEDGE SOCIETIES IN EDUCATION

While economists tend to think of 'knowledge society' as a global economy, other social scientists tend to think of it as a smaller level social collective. Thus, a knowledge society may exist on at least four levels: a global, national or cultural system, a social organization like a professional society, and a smaller community. A knowledge society is generally defined as an association of people with similar interests who try to make use of their combined knowledge.

Of course, knowledge societies are not new, but what is new is that there has been a quick rise with them and they are much more visible now. Their rise follows digital networks which make them possible without members cohabiting in the same region while the technology enables accessing and sharing the knowledge that emerges from the knowledge economy. Unless the educational unit devotes particular attention to knowledge-related activities, it is not particularly useful to call it a knowledge society. When an educational group invests considerable effort toward sharing and producing new knowledge, then it can be called a knowledge society. Communities of practice, typically groups of teachers that work with each other to improve their teaching, are good examples of knowledge societies, especially those that use all the tools, electronic and other, to facilitate their goals. [1]

3. THE DEVELOPMENT OF AN INFORMATION SOCIETY (HOW TO MEASURE PROGRESS?)

The information society is a society in which the making, distribution and handling of information represents a significant economic and cultural activity. The root of these activities is in the information-communication technology (ICT) which is actually the tool for setting the changes in motion.

The research of the degree to which an information society is developed contains the indicators, Figures 1. and 2. [2][3], which measure the degree of development of the information society of European Union (eEurope, i2010):

- the internet indicators
    - citizens – access and usage of Internet
    - business subjects – access and usage of ICT
    - costs of Internet access
- modern public services in the Internet
    - e-Government
    - e-Education

- e-Health(care)

- dynamic business environment
  - on-line buying and selling
  - the readiness to accept electronic business activities

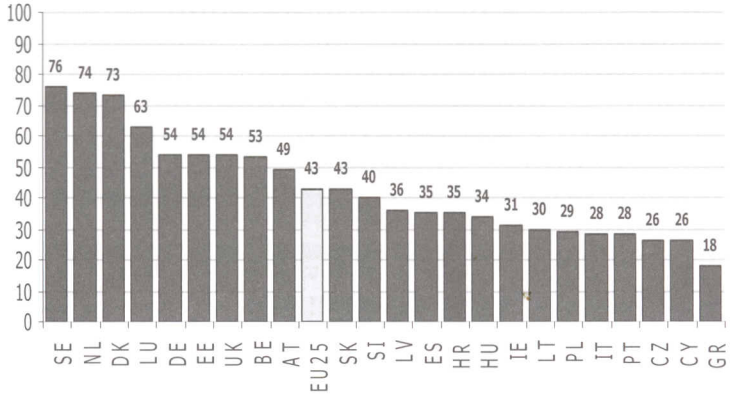
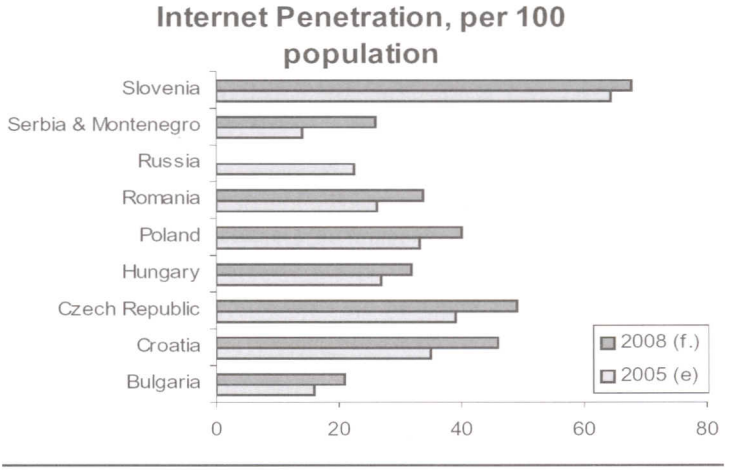


Fig.1. Internet indicator – citizens



Source: BMI research

Fig.2. Number of Internet users pro 100 citizens in the region

Despite a mainly positive attitude toward it, the potentials of electronic business activities in the EU countries are not sufficiently utilized. Major obstacles to a further expansion of electronic business activities are: preference of personal communication, insufficient acceptance of electronic business activities in the area, lacking employee knowledge and their mistrust of information technologies, insufficient level of awareness of national standards, laws and regulations in connection with the electronic business activities.

- safe information infrastructure

- the experiences of Internet users with the safety of their information

- broadband
  - the indicator of the number of broadband users

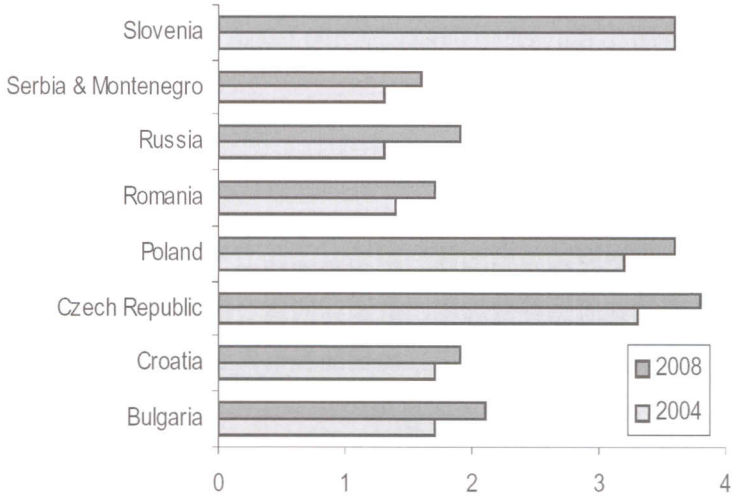


Fig.3. Portion held by information sector in the GNP (Gross National Product)

All sectors of economy depend on the information technology. The usage of information technology is the main influential factor of the efficiency of business activities, and therefore also of the growth of productivity, Figure 3. [4].

For example, Croatia needs to reform its business and administrative processes and simultaneously implement the information technologies. When it comes to information technology and its usage, all sectors of economy, excluding tourism, banking and B2B communication, are falling behind.

The size of information market is one of the factors of information society development, and thereby of the development of a knowledge society. Figure 4. [5] gives a comparative presentation of the countries in the region.

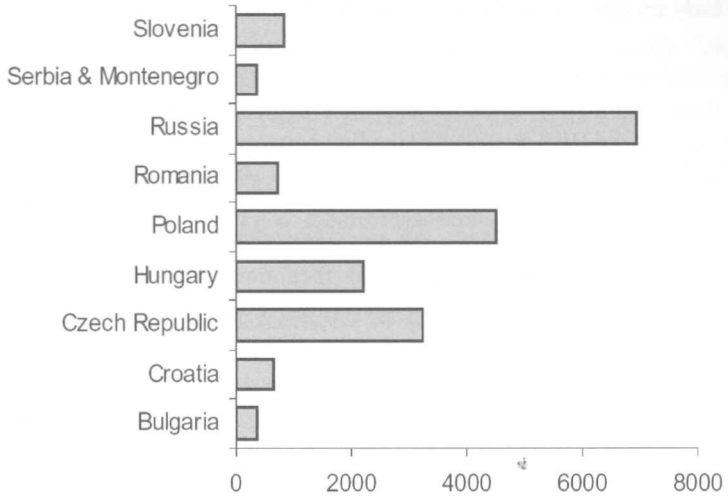


Fig.4. The size of information market

For instance, information society in Croatia is predicted to grow from 672 million US$ in 2005 to 984 million US$ by 2010. It is expected that the private sector investments in information technologies will be increased and the market will become consolidated.

4. DISCERNING PROBLEMS

Business and information systems of higher education possess certain specific characteristics, when contrasted to other business systems. These do not obtain information merely to manage the university, but to manage other components and members of the university community too. Because of the high degree of autonomy of individual components, they must be flexible enough, on account of the great range of users, they must be usable, reliable, efficient, maintainable and secure, and their use simple. However, most university business and information systems of today do not sufficiently meet required preconditions. Most frequent disadvantages are insufficient coverage of university information requirements and lack of connectivity between individual business components, as well as between its members.

Because of specific characteristics and complexity of the university business and information system, the requirements and expectations from management, administrative staff, academics and students are far more complex in comparison with requirements in other organisations, especially those profit-oriented.

Also, high levels of the independence of individual components, departments and employees within the university exercise strong influence on strategic planning of the university business and information system, as well as regular and frequent changes in university administration (the election of chancellor, vice-chancellor, dean), which entail different approaches in planning, developing, constructing and implementing the integrated business and information system.

4.1. The Subject, purpose and Goals of the SP-IBIS

Taking into account the challenges of 'the fourth era', that organisations of higher education are exposed to as well, the work effect of which also by and large depends on the potential of their information systems and their degree of integration, it is necessary to conceive and develop the IBIS strategy (as the link between academic strategy and information system and business strategy). Society as a whole and academic public in particular, expect from the university to enable achieving numerous academic, scientific, business and social goals that do not have equal importance, nor are independent.

It is the complexity of the links between goals mentioned in particular that requires specific forms of strategic conceiving, planning and managing the activities which should result in them being achieved. [6]

5. STRATEGIC PLANNING

5.1. Strategic Business Planning

Business planning determines how overall funds and resources of an individual business system will be engaged. It also determines which organizational and technical changes need to be implemented in order to realise desired goals. Plans, including those strategic, are efficient if they achieve their purpose at optimal cost, as measured by money, time but degree of employee satisfaction as well.

Even though specific steps in the formulation of the strategy are different, the overall process of business strategic planning can be, at least in terms of notions, divided into four phases, which include situation appraisal, strategy formulation, strategy implementation and strategic management.

During the overall process and within each phase, it is necessary to ensure total quality management in order for mistakes to be brought down to minimum.

Success of implementing business strategy by and large depends on plan quality, its adoption and change management – which are why strategy control is crucial. Control i.e. supervision as a function of strategy management represents measuring and correcting actions with the purpose of fulfilling organisational goals and corresponding plans. In order to reap success, it should be shaped to indicate deviations at critical points, in an objective, flexible and cost-effective manner, suitable to organisational culture, as well as to point to corrective actions. Controlling strategy means ensuring the system to achieve its goals regardless of changes in its environment – it means ensuring efficient implementation of the strategic plan and monitoring of its realisation per envisioned steps.

The complexity of strategy control stems from the fact that its results are visible but long-term, and since the very survival of the business system depends on these, it is necessary to react as fast as possible. [7]

5.2. Information System Strategic Planning

Information system of a business system is exceptionally important for its survival and business, which is why its strategic planning is as equally important as strategic planning of a business system.

Based on this premise, the development of contemporary information systems is, as can be expected, a demanding and broad organisational and financial endeavour in case of each business system, that must be strategically planned pursuant to the business strategic plan.

Information Strategy

Information strategy acts as the link between business strategy and information system strategy. It addresses the issues of which information are required and where, in order to support key, primary tasks or key goals of the business strategy. It also questions the suitability of critical assumptions in the background of the business strategy, in the context of changeable environment and perception.

It is important to discern that the influence of information technology must be appraised already when shaping long-term business strategy – and not as an independent factor when selecting the technological foundation of the information system. Accordingly, the development of information technology has but intermediary impact on IT strategies that will be selected by management in order to achieve strategic goals. Guidelines for information strategy stem from the business strategy, it being the foundation for shaping business technology and shaping the information system, which will support this business strategy.

Furthermore, the IT strategy must stem from information strategy, taking into account the nature of information technology as the technical infrastructure of business. [8]

5.3. Integrated Planning of Business and Information Strategy

In discussions on the so-called 'fourth era', where work effects of any organisation will by and large depend on the potential of its information system, the role of IS/IT is recognised as an integral role in most business processes and operations. During previous eras, strategies of the information system were directed at selecting the best cluster of IS/IT investment, and managing these investments until the successful completion of the implementation.

Depending on results gained by appraising the impact and dependency on effects of IS/IT on the business system, it is possible to determine four types of business and information systems constructed based on contemporary information technology. (1) Supporting information system that is useful but not critical as well for business success. (2) Operative information system that success of current business hinges upon. (3) Prospective information system that could impact the success of future business. (4) Strategic information system that is critical for the future business strategy.

Except for positioning the information system given its significance for a certain business system, and before the very creation of the strategic plan, it is necessary to define input and output parameters that can, as can be expected, influence the planning process of the integrated business and information system, such as: *outer business environment* (economy, competition), *inner business environment* (existing business strategy, success, goals, resources, organisational culture), *inner IS/IT environment* (existing IS/IT and the level of their inclusion in business, existing applications, maturity of the organisation, common knowledge), *outer IS/IT environment* (trends of the development of information system and technology and their use in partner organisations), *strategies of managing the IBIS* (common strategy elements for the overall organisation, ensuring consistent policy), *strategy of IBIS development* (manner in which each business function will develop and the single planned business and information system applied), *strategies of IBIS selection* (standards for the manner and procedures of

selecting and implementing IS/IT) and *approaches, tools and techniques* (formalised methods, techniques and approaches to IBIS planning). [9]

6. MANAGING HIGHER EDUCATION

It no longer seems universities are 'elitist' institutions in charge of transferring the values of rationality and intellectual rigour between generations, but are organisations that have been assigned the role of meeting the requirements of a mass audience in the contemporary industrial economy. Such a transformation from the 'Platonic academy' into a more urbane and commercial 'shopping mall' left profound consequences for the way contemporary observers portray the university.

6.1. Organization Models

The university by and large stops being an institution that serves but public good. Contemporary trends in economy and politics influenced the transformation of the university from an academic institution to a market-oriented institution, implying changes in the organisation of the University of today. The influence of the central state authority, especially that coming from the relevant ministry, is a factor that significantly impacts the type and form of university organisation, and is primarily defined by the degree of university financial autonomy and the degree of the authority of its central administration (the chancellery). Apart from this, enforced rationalisation of the administrative structure of the university additionally contributes to stronger state supervision, which still retains bureaucratic characteristics. Such an organisational form is based upon hierarchical management structure, with traces of the organisation virtual aspect mirrored in the existence of managerial teams responsible for tactical and strategic planning, which decrease the role and authority of academic councils and their influence on reaching key business decisions and creating policies. However, academic influence and the responsibility for issues of teaching and scientific research is still strictly in the hands of academics, while the responsibility for managing resources is transferred to departments, which points to larger autonomy of university management.

In contemporary conditions, the university organisation resembles more and more the characteristics of a corporative organisation, where individual departments and components are starting to be responsible for managing resources assigned to them, and are approached as cost or profit centres, especially when more aggressive approach in promoting counselling services and research results is assumed. [10]

6.2. Academic Managerialism

Attractiveness of the university concept as a corporation partly stems from the changing nature of the contract between the state and universities. In earlier times, the state was convinced universities produce students and scientific research for which, even though these do not always directly contribute to economic development, can at least be said that they add value to individual and social wealth of the country.

However, the experience of more developed countries indicates that, during the early 1980s, states started redefining their contracts with universities. By designing performance indicators, introducing external verification of teaching and scientific research, and changes in

the manner of financing the university, the state has, through the investment council, effectively created a market out of higher education that is being managed. Since then, universities must, more than before, compete for resources. Moreover, since the emphasis was placed on producing students and scientific research that have direct impact on economy, institutions, departments and individual academics were under ever growing pressure to seek financing for their work in the private sector. The intention is creating a system the goals of which can be monitored and controlled more easily, and the final products of which, students and scientific research, can be targeted more directly.

Managerialism in higher education is based on the assumption that the institution and the system it is subordinate to can specify the goals that can also contain the goals of basic units. Furthermore, it assumes that the possibility of determining and controlling the realisation of goals can be hierarchically distributed. Its moral justification is that finished products of higher education need, and sometimes must, be determined and judged by something out of its scope, from the viewpoint of social – rather than intellectual needs. It is therefore to be expected that the universities of less developed countries as well, but also all those that wish to develop and thrive, must adopt the principles of business planning, and that those that do not permanently and efficiently plan will find in time they are vulnerable to outside forces that jeopardise their existence in the final analysis. It seems managerialism is an omnipresent force at many universities of today. Universities now do not resemble the institutions of colleagues and bureaucrats of old times. Likewise, even if only because information can never be devoid of value, they neither resemble cyber models.

Insufficient resources and complex and fast changing nature of requests placed before higher education institutions imply that sound management requires different structures and styles from those that are traditionally given to academic democracy. Universities must act quickly to attract financing; they also must reach tough decisions on priorities and undertake unpleasant steps in order to control costs. [11][12]

7. IMPORTANT INSIGHTS OF THE SP-IBIS RESEARCH UNDERTAKEN WITH MANAGEMENT OF HIGHER EDUCATION INSTITUTIONS IN THE REPUBLIC OF CROATIA

The dilemma on who constitutes top management level, as viewed from the aspect of elective positions, was non-existent, so chancellors, vice-chancellors, deans and vice-deans were defined with no additional analysis as the primary respondent cluster. Taking into account the fact that the business and information system is primarily based on financial processes, and by and large relies on organization and human potential that make an important segment of strategic envisioning, it was estimated that research must also include management members in permanent positions; i.e. general secretaries and heads of finance and accounting.

The final sample based on previously stated stratification was composed using the Sumsion typology and was seen dually, through the prism of legal entities, 73 public institutions in the higher education system of university character, and 365 natural persons from stated institutions, aiming at the creation of a representative i.e. statistically significant sample. Out of 73 institutions, 45 of them accepted to participate in research i.e. 61.6%. Out of 7 chancellor offices, 6 participated in research, and out of 66 faculties – 38.

The first insight from the research conducted points to the fact that the management of higher education institutions, when it comes to strategic planning of the integrated business and information system, exhibits the greatest interest for the topic of aligning the business and academic information systems, followed by use of information and communication technology, while their interest is least directed at planning the development of the integrated information system. Even if not the highest, a significant part of management hold the influence of applying the ICT does not impact the success of their institution's current work, but that it is critical for their work and business in future.

Furthermore, most of management actually recognise ICT as a necessity for the integration with European higher education and as a necessity for implementing the Bologna process, while they recognise themselves as leaders of future projects of implementing information technology in their institutions.

The second principal insight confirms that management occupying elective positions give significantly greater importance to systematic approach to constructing IS, which includes project planning and is primarily based on getting existing processes and information flows in order, when contrasted with management occupying permanent posts who all but do not register these activities, which points to the fact that management occupying elective posts primarily see themselves and state officials from the relevant ministry in defining strategic goals of new IS is justified.

The following insight points to the fact that the planning mechanism for investments into IS/IT in larger universities is represented more than in smaller universities. As viewed from the aspect of financing source, it can be said most money from the state budget is spent on IT equipment, followed by system and application programmes and training IS/IT users. Speaking of own revenue as financing source, means are equally distributed to all parts necessary for the construction of the information system. Also, results received point to the fact managers' opinion, in case of those occupying elective posts, is significantly more represented in decisions connected to the issues of implementing information technology in their institutions, when contrasted to those managers occupying permanent posts, the reason for which should be sought in their disproportionate representation (2/3 in contrast to 1/3), but in sufficient levels of required knowledge as well, for which it was established they do not possess.

Speaking of the perception of expected results, elective management significantly recognise shortening the time intervals for reaching business decisions as one of the results of implementing information technology. Also, they are more skilled in computer use in comparison to permanent management. The frequency of computer use in everyday work in both respondent groups is at an enviable level, even though it is still mostly at an operative level according to the opinion of a decisive majority.

Analysing the previous insights in a complete manner, it can be said strategic conceptions of the utilisation of information sources are significantly more present on larger universities than in smaller ones, which implies the assumption that management of larger universities are more inclined to strategic planning of integrated business and information systems.[13]

8. CONCLUSION

The principal insights point to the fact that higher education institution management, speaking of strategic planning of the integrated business and information system, exhibit the greatest interest for the topic of aligning the business and academic information systems. They hold that the impact of implementing ICT is critical for their work and business in future and necessary for integrating with European higher education. Further, gained results point to the fact that elective post managers' opinion is significantly more represented in decisions connected to the issues of implementing information technology in their institutions, in contrast to those managers occupying permanent positions.

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