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TABLE OF CONTENTS

Application of Quality Standards in Knowledge Management.....	2-12
Business Intelligence 2.0 as a Support Technology for Decision-Making Process.....	13-22
Computer Animation: The Impact of Continuing Education on Ergonomics Computer	23-30
Consumers' Information on Genetically Modified Food	31-42
Growing up in a Participatory Media Culture	43-53
How Knowledge can be Managed in Projects.....	54-64
Critical Success Factors in South African Business Intelligence Projects in Insurance	65-74
Knowledge Management Necessary for Occupations.....	75-80
Optimizing Reading Operations for RavenDB.....	81-88
Photography as an Element of Tourist Propaganda in the Digital Era.....	89-98
Possibilities of Vojvodinian Public Media Broadcasting in Times of Personalized Televisions.....	99-108
Multiple Discourses: Framing the Magical Words of Knowledge Management	109-114
The Analysis Bricks from Old Serbian Monasteries Based on Pattern Recognition.....	115-126
Web 2.0 applications and Knowledge Management.....	127-126
Knowledge Management Process.....	137-143
Teaching Business Intelligence in an Undergraduate Liberal Arts Institution	144-154
Information Systems for Small Business.....	155-165

Application of Quality Standards in Knowledge Management

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Abstract

Knowledge, continual employee training in new ways of working, new technologies, new organizational structures, in other words, new approach to management, are all required for a successful implementation of changes. Education has always had a particular importance in all aspects of society.

This paper presents the results of the research in the field of health and safety at work in the relevant selected sample of 86 companies.

The aim of this paper is to prove the hypothesis that a proactive approach achieved by implementing quality standards contributes to better education on all levels, from schools and universities to workplaces and more.

Keywords: quality standards, employee training

Introduction

The specialized literature recognizes the integrated risk management system (IMS) as a risk control system seen from the aspect of the company in which all the risk control systems of the particular organizational parts are integrated, and as being such, they represent one unit. Neither the ISO 14000:2000, nor the ISO 9001:2008 standard, explicitly define the concept of risk. The ISO 14001:2004 standard requirements are indirectly defined, in a way that a company reduces or eliminates the negative impacts on the environment. The OHSAS standard (Occupational Health and Safety Assessment Series) 18001:2007 has been developed as a tool that enables the assessment and the certification in the field of occupational safety and health. Having almost the identical structure, this standard is compatible with the ISO 9001:2008 and ISO 14001:2004 standards, and therefore they should be introduced together.

The synthesis of ISO 9001:2008, ISO 14000:2004 and OHSAS 18001:2007 standards provides a simple way for monitoring and assessment of quality, as well as of environmental protection and occupational safety and health in a unique way.

Importance of OSH Education

Education has always had a particular importance in all segments of society. It is especially important to provide education on all levels, from schools and universities to workplaces and more.

Having recognized the needs arising from work processes, the management is obliged to constantly establish required competences of all employees, such as necessary education, on-the-job training, level of practice, skills and experiences.

Training employees for safe and healthy work, according to the demands of the standard (act 4.4.2) [1, 2], enables employees to become familiar with and aware of:

- a) actual or possible consequences of their work activities and behavior in relation to occupational safety and health, as well as the benefits in terms of occupational safety and health protection in order to improve personal efficiency;
- b) their own role and responsibility in achieving coordination with occupational safety and health policy, procedures and demands of OSH management system, including demands regarding readiness and reaction in case of danger when extraordinary situations occur;
- c) possible consequences in case of deviation from the established procedures [1, 2].

Setting Hypothesis and Limitations

Based on the collected information regarding the current OSH situation in companies which were used as the sample I and the control sample, and the analysis of this information, the main hypothesis has been proposed as follows:

“It is possible to improve the OSH system in the organizations by using the integrated quality management system.”

The main hypothesis is supported by the following sub-hypothesis:

- It is possible to raise consciousness and competence of employees by using an integrated management system.

The suggested implementation of the IMS using the integrated management system by ISO 9001 quality and environmental protection ISO 14001, as well as OHSAS 18001 when working in high risk working conditions, represents a prerequisite for the organization's success in the future.

Combined elements of these three standards provide for the prevention from the risk of developing parallel systems, excessive documentation which transforms a documented system into a system of documents and insufficient installing of key requirements of separate management systems.

The Application of Contemporary Approaches that Include IMS

The integration of safety and protection activities:

1. Health
2. Safety

3. Environment, and
4. Quality

In this way, the company has the complete documentation for the *integrated management system* of the company. The IMS includes the following aspects, i.e. functions according to these three standards:

- OSH (OHSAS 18001),
- ECOLOGY (ISO 14001), and
- BUSINESS QUALITY (ISO 9001).

The three management systems have similarities that enable their integration. The similarities of these management systems refer to the following:

- the top management commitment
- documents and record control
- definition of policy
- planning of the short-term and long-term goals
- employees training procedures
- notifications on the procedures
- audits
- inconsistency control, significant aspects and hazard control
- corrective and preventive actions
- management review.

Mutual Elements of the Standards

Some mutual elements of these three quality standards are provided hereafter:

Responsibilities and authorizations

All three standards demand for responsibilities and authorizations to be defined. That is performed in:

The Code of practice, where it is clearly stated who the management's representative for quality, environmental protection and occupational safety and health is. All those duties can be performed by one person.

Training, awareness and competence

The Code of practice issue the demand for training which includes necessary aspects of all three standards, since it is required by all three standards that all employees (and subcontractors, where possible) are competent to perform entrusted duties – to have expertise, the capability of applying it practically and to be professionally responsible.

Results of the Conducted Research

Information Regarding the Sample

During the research, an investigation of the current state of occupational safety and health in the Republic of Serbia on selected and relevant samples has been conducted.

Characteristics of the study sample

The population of this research consists of 86 companies from the Republic of Serbia.

The general research sample includes both production and non-production companies from various fields of work.

The research included a total of 86 companies, i.e. the experimental group, and 100 representatives of the control group (people who are, according to the hierarchical and organizational scheme of the Public company, in charge of a bigger or smaller number of employees in terms of OSH, and they represented the control sample).

When choosing the companies for the experimental group, both the companies from the production and non-production fields of work were equally included. Also, the companies were of different sizes (small, medium and large).

The sample division

The sample includes:

- 86 companies from various fields of work – **sample I** (the sample on which a research based on the interviews with people in charge of OSH is conducted)
- **Control sample** which represents a large public company in the Republic of Serbia containing six regional units and employing over 1300 people (the control sample is based on interviews and includes 100 respondents – the people in charge of OSH in companies).

The Information Regarding Sample I

While selecting the companies that would comprise sample I, the proportion of companies from various fields of work and the proportion of approximately equal number of companies categorized according to the number of employees were considered.

The observed companies that comprise sample I are classified according to certified quality standards, which is shown in table 1.

Companies from **sample I** are divided into three subcategories:

- The I group consists of companies that have a certified ISO 9001 and/or ISO 1400 and/or OHSAS quality standard.
- The II group consists of companies that have some other certified quality standard (in the observed sample, those standards are: ISO 12647 – standard for graphic industry and printing techniques; ISO 17025 – general requirements for the competence of

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testing and calibration laboratories; SRPS EN 45011:1990 – general criteria for certification bodies operating product certification; HACCP - HACCP system – hazard analysis and critical control points system, and

- The III group consists of companies that do not have any certified quality standards.

Table 1: Structure of sample I

No.	Field of work	Number of companies	Size of company (no. of employees)		
			Small (0-20)	Medium (20-100)	Large (more than 100)
1	Public companies (public utilities supplier, heating plant, energy provider, post, railway, forestry, SPC Vojvodina (SPENS))	15	2	8	5
2	Culture (Cultural centers of Novi Sad and Sombor), theaters (Serbian National Theater, Novi Sad Theatre (Újvidéki Színház)), libraries, television stations	8	1	6	1
3	Health system (Hospitals in Belgrade and Subotica and Institute of Public Health of Serbia “Dr Milan Jovanovic Batut”)	5	0	1	4
4	Education	8	0	6	2
5	Hospitality industry	4	1	2	1
6	Services (banks, consulting and safeguard agencies)	5	3	1	1
7	Commerce and representation	6	4	1	1
8	Agriculture	7	2	2	3
9	Printing businesses	5	1	1	3
10	Meat and leather processing	5	1	3	1
11	Construction	5	1	2	2
12	IT and mechanical engineering (services and manufacture)	8	5	2	1
13	Gas, NIS (production, processing and distribution)	6	0	0	6

Total number of companies	87	21	35	31
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Further grouping of I, II and III group of companies has been done according to the following criteria:

- The I subgroup consists of companies that have a certified management system according to ISO 9001 and/or ISO 14001 and/or OHSAS standard, as well as companies that have some specific management system according to ISO 17025, SRPS EN 45001, HACCP standards, etc.
- The II subgroup consists of companies that do not have any of the certified management systems, which is shown in Table 2.

Using suitable statistical techniques for the sample divided in this way, the statistical processing has been conducted for the answers significant for the testing both of hypothesis and sub-hypothesis.

Table 2: Grouping the companies in sample I

<i>Field of work</i>	<i>Certified quality standard</i>							
	<i>ISO 9001</i>	<i>OHSAS 18001</i>	<i>ISO 14001</i>	<i>ISO 17025</i>	<i>45011</i>	<i>HACCP</i>	<i>ISO 12647</i>	<i>No standards</i>
Production	19	4	3	0	0	10	2	13
Non-production	8	3	1	2	1	0	0	19
Total number of companies	27	7	4	2	1	11	2	32

Companies that have certified quality standards have between one to four certificates according to the requirements of the standard (54 companies have at least one certified quality standard.)

Research Methods

The following research methods have been used:

- the method of analyzing the existing practice,
- descriptive method,
- observational methods (individual interviews), and
- statistical processing of data.

The first sample includes 86 companies from various fields of work – **sample I**.

Research on this sample was conducted through interviews with people in charge of occupational safety and health in those companies.

For **the control sample**, which represents a large public company, the research was conducted through interviews with 100 respondents who are people in charge of occupational safety and health and other experts – division managers, department heads and foremen on regional units who are directly or indirectly in charge of a larger or smaller number of employees within their scope of work.

The topics of occupational safety and health research have been grouped into several groups of questions and they represent the basis on which of hypothesis and sub-hypothesis are tested.

Type of research – the conducted research is operational.

The research is aimed at investigating the state of occupational safety and health in the Republic of Serbia.

Research methods

The paper uses the following research methods:

- **The method of analyzing the existing practice** – used for the analysis of the existing state and the activities in the field of OSH in the period from 2005 to May 2012.
- **The method of theoretical analysis** – the study of the previous theoretical findings in the field of OSH in the Republic of Serbia
- **Descriptive method**
- **Method of data processing.**

The survey was conducted by the means of collecting empirical data using primarily written statements – questionnaires. The survey was conducted by the means of written data collection, and it was used for gathering information about views and opinions of the representative sample of the respondents, using a questionnaire.

Research tools

The research tool is the survey of people in charge of OSH.

The main goal of the survey was to provide insight into the opinions the respondents have of the state of OSH in their companies (for the control sample, in their scope of work – division, regional unit, etc.).

The survey was anonymous, so the respondents could express their opinions freely.

Data processing methods

The testing of the hypothesis was conducted by using the following:

- parametric statistical test – t-test (Student's t-test), and

- non-parametric tests χ^2 TEST (Pearson’s χ^2 test), a test for determination of the statistically significant difference between the results of the control and the experimental group.

Statistical program SPSS 8.5 was used for the data analysis.

Research Results – Descriptive Analysis

Some of the received results significant for the set hypothesis and sub-hypothesis are presented.

Question: How many OSH courses have you attended from 2005 to the end of 2010?

- 50% of respondents (43 people) attended at least one course
- 23 people attended 2 courses
- 9 people attended 3 courses
- 5 people attended 4 courses.

In the control sample – 50% (43 people) attended one course. Five of those people attended two courses.

The respondents were encouraged to grade their capability of applying OSH in their area/scope of work.

The average received values of the results were as follows:

- For **sample I**, the respondents evaluate their capability to be at 63%.
- For **the control sample**, the respondents evaluate their capability to be at 85%.

The respondents were asked to evaluate how knowledgeable they are in the field of OSH.

The answers from the respondents are shown in table 3.

Table 3: Evaluation of respondents’ knowledge in the fields of OSH

<i>Evaluate your knowledge in the field of OSH</i>				
	<i>Sample I</i>		<i>Control sample</i>	
	<i>Number of companies</i>	<i>%</i>	<i>Number of companies</i>	<i>%</i>
Excellent	13	15.1	17	22
Good	18	20.9	26	33
Sufficient	38	44.2	31	40
Insufficient	17	19.8	4	5

Question: Are your subordinates trained in the field of OSH?

The answers are shown in table 4.

Table 4: Are your subordinates trained in the field of OSH?

<i>Are your subordinates trained in the field of OSH?</i>				
	<i>Sample I</i>		<i>Control sample</i>	
	<i>No. of companies</i>	<i>%</i>	<i>No. of answers</i>	<i>%</i>
All are trained in the majority of important aspects	27	31.8	64	78
Partially, in some aspects	30	35.3	14	17
Only individuals are trained	13	15.3	4	5
They are not trained	15	17.6		

Statistical Processing and Analysis of the Gathered Data

The main hypothesis set in this research is:

- **“It is possible to improve the OSH system in the organizations by using the integrated quality management system.”**

The main hypothesis is supported by the following sub-hypothesis:

- It is possible to raise consciousness and competence of employees by using an integrated management system.

Statistical Processing and Analysis for the Companies with a Certified Quality Standard and for the Companies without a Certified Quality Standard I Employees’ training

Table 5 shows a number of courses the respondents attended from 2005 to 2012.

Table 5: The results obtained using the statistical analysis of Hi-square test criterion

<i>Number of courses</i>	<i>Value</i>	<i>Degrees of freedom</i>	<i>Significance level</i>
Pearson’s χ^2 square test	17.033	2	0.000

Table 5 shows the results obtained using the statistical analysis of χ^2 -square test criterion. The checking criterion is **the efficiency check of the implemented measures for the risk reduction.**

Table 5: The results obtained using the statistical analysis of χ^2 -square test criterion

<i>Efficiency check</i>	<i>Value</i>	<i>Degrees of freedom</i>	<i>Significance level</i>
Pearson's χ^2 square test	8.496	2	0.014

The obtained value of the test statistics is 8.466 and the corresponding level of significance is 0.014 (less than 0.05, so it is considered that the obtained likelihood is accidentally acceptably small – the connection in the population most probably does exist).

Table 6 and chart 1 show the results obtained using the statistical analysis of χ^2 -square test criterion. The checking criterion is **the subordinates' training in the field of OSH**.

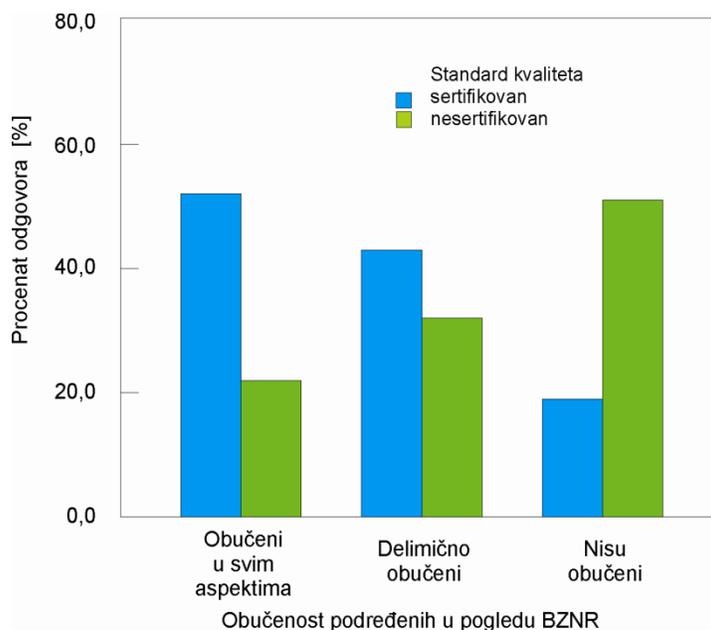


Chart 1: The results obtained using the statistical analysis of χ^2 -square test criterion

The obtained value of the test statistics is 14.839, and the corresponding level of significance is 0.001 (less than 0.05, so it is considered that the obtained likelihood is accidentally acceptably small – the connection in the population most probably does exist).

Tabela. 5: The results obtained using the statistical analysis of χ^2 -square test criterion

<i>Subordinates' training</i>	<i>Value</i>	<i>Degrees of freedom</i>	<i>Significance level</i>
Pearson's χ^2 square test	14.839	2	0.001

Received results can lead to the conclusion that the companies that have the certified quality standards are more attentive to employees' training, which can support the sub-hypothesis:

It is possible to raise consciousness and competence of employees by using an integrated management system,

as well as the main hypothesis:

“It is possible to improve the OSH system in the organizations by using the integrated quality management system.”

Conclusion

The suggested implementation of the IMS represents a prerequisite for the organization's success in the future.

Combined elements of these three standards provide for the prevention from the risk of developing parallel systems, excessive documentation which transforms a documented system into a system of documents and insufficient installing of key requirements of separate management systems.

An integrated control system combines all relevant management components into one coherent system in order to achieve optimisation of various goals of an organization.

Harmonious activity of an integrated management system becomes a recognizable value within an organization. On the outside, it is seen as a new market value, demonstrated through fulfilling customers' expectations, as well as successful meeting of the legal obligations.

References

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B.Gemovic: PhD thesis, FTN Novi Sad 2012.

Business Intelligence 2.0 as a Support Technology for Decision-Making Process in a Modern Enterprise

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Abstract

The paper has been devoted to Business Intelligence 2.0 treated as a new possibility in supporting a manager during the decision making process. It consists of five parts. After brief introduction to the issue, we present traditional Business Intelligence called also BI 1.0. The next part has been devoted to Business Intelligence 2.0. Part four presents the process data warehouse as a key element of any BI 2.0 system. Short summary ends the paper.

Keywords: Traditional Business Intelligence, Business Intelligence 2.0, process data warehouse

Introduction

We are living in times of creating new kind of society called information society that can be seen as an effect of development of technology as well as processes of globalization. Information technology, that is a field of science connected to applied both computer science and communication techniques, is playing more and more crucial role in a modern society, and supports modern economy and science. In knowledge-based economy, knowledge itself can be a source of an enterprise competitive advantage. However, possessing knowledge is not enough. It needs to be managed in a way that allows its added value to reflect it in actions and decisions making processes.

Since 1980's enterprises face the problem of possessing, processing, and gathering more and more data that mostly come from heterogeneous sources. The problem of data integration can be solved by e.g. data warehouses. Analytical processing of data gathered in data warehouses (DW), as well as data mining, can provide a decision-maker with answers to business enquiries that will help him/her in making a business decision. Such a data warehouse is called a traditional one or a DW 1.0. Business Intelligence systems (sometimes called as traditional BI or BI 1.0) base on traditional data warehouses.

Since 2000's a process management (based on a process approach to a management) has been becoming a new paradigm of management which starts to displace functional approach. Process management gives enterprises a set of tools, methods, and technologies. They, by using formal models as well as modern information systems, reach given business goals. It is possible thanks to a better focusing on better realization of processes within and outside an enterprise (Kania K. (ed.), 2010).

Traditional Business Intelligence (BI 1.0)

Enterprises obtain and collect huge amounts of information. Finding the one needed to manage the enterprise takes time and is hard without of a support of a computer system. Ability to foreseen the changes that are occurring in an enterprise business environment, or customers' requirements as well as an ability to react quick to such changes are necessary for an enterprise to survive and function well.

Business intelligence derives from a group of IT tools defined as Business Intelligence (BI). H. Dresner from Gartner Group was one of the first who introduced the BI concept in 1989. He defined it as a set of conceptions and methods that enhance the process of decisions making by using fact-based support systems.

Business Intelligence can be understood as a process of obtaining important and high-quality information of various subjects that will help a person or a group of people in analyzing information, concluding or making assumptions. From a view of information systems, we understand that BI is a system that provides an user, by OLAP technology and data analysis, with answers to important business queries and allows to identify significant trends or patterns. Although, the easiest way to describe it is to say that BI is an information technology that is used to process big volumes of data into information, and the information into knowledge. It is addressed to decision-makers on various levels of management, mostly strategic and tactical management, as well as marketing and personnel analysts, etc.

Traditional BI can be seen as a managerial strategy used to create a more structured and effective approach to decision making. G.Nelson says that “the cornerstone of this fact-based decisioning framework is technology that allows to access, analyze and present information” (Nelson G., 2010). BI 1.0 includes elements of reporting, querying, OLAP, dashboards, scorecards and analytics. We can analyze facts but we can’t say nothing about the processes that have caused the fact/facts.

A place of Business Intelligence systems in a process of IT systems evolution can be shown as in the figure 1.

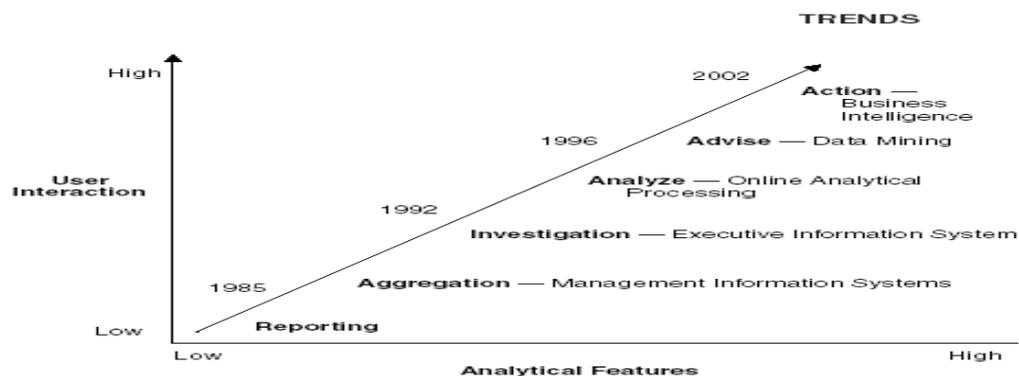


Fig. 1. A place of Business Intelligence in the evolution process of decision support information systems

Source: (Rasmussen N.&Goldy P.&Sollo P.O. 2002)

The Business Intelligence technology uses different IT resources, mainly databases (current and archival) that are available in an enterprise. A place of BI among IT systems that support management can be seen as in the figure 2.

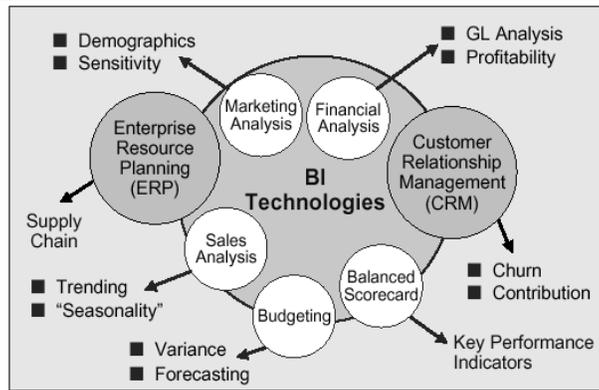


Fig. 2. A place of BI among information systems supporting management

Source: www.solemis.com/Downloads/PROPHIX.ppt, access: 10.01.2010

The BI process starts from business enquiry, which comes from a decision-maker and finishes when a suitable, comfortable, and understandable answer (e.g. tables, charts, etc.) for the manager is delivered.

Business Intelligence 2.0

There are many definitions of Business Intelligence 2.0. Together with dissemination of Web 2.0 technology, the concept of Enterprise 2.0 comes into being to describe an enterprise that uses technology and Business Intelligence 2.0 (BI 2.0) among processes that support decision process (Kania K. (ed.), 2010). As the main features of Business Intelligence 2.0 we can see such as SOA, Web 2.0 architecture, real-time reporting, integration of events, contextual data, greater data insight and action initiated without intervention (Janssen C., 2001).

Main differences between BI 1.0 and BI 2.0 have been well described in the table 1. The table contains a comparison of some features that are characteristic for traditional BI and BI 2.0 according to such criteria as organization, data, analysis, and user.

Table 1. Comparison of traditional BI and BI 2.0 features

Area of BI		Traditional BI	BI in an enterprise 2.0
Organization	purpose	- managers demand for information - tactical and strategic decision-making	- building relations within an enterprise - identifying situation - involvement
	goals	- optimization and reduction of costs	- growth - reaching strategic advantage - knowledge about enterprise and its environment
	orientation	- enterprise and data about it	- employees, contractors, customers' cooperators,

			<i>leaders, etc.</i>
	<i>decision level</i>	<i>- high-level decisions</i>	<i>- decisions on operation level</i>
<i>Data</i>	<i>data sources</i>	<i>- structuralized databases, .CSV, .XLS, .XML files)</i>	<i>- barely structuralized - multimedia - streams of data from processes realization - sensory data</i>
	<i>data management</i>	<i>- ETL processes</i>	<i>- MDM, EIM, ECMS, EII</i>
<i>Analysis</i>	<i>range of data mining</i>	<i>numerical data</i>	<i>- analysis of symbolic data - text analysis</i>
	<i>subject of analysis</i>	<i>- facts</i>	<i>- processes</i>
	<i>type of analysis</i>	<i>- forward chaining</i>	<i>- (RBE)</i>
	<i>metrics</i>	<i>- based on data</i>	<i>- result of a strategy</i>
<i>User</i>	<i>users</i>	<i>- specialists, analysts</i>	<i>- mass participation</i>
	<i>interface</i>	<i>- passive</i>	<i>- active</i>
	<i>character of work</i>	<i>- routine, manual</i>	<i>- interaction - learning</i>
	<i>action</i>	<i>- analyses initiated by an user</i>	<i>- forestall actions, controlled by data, which support process realization</i>

Source: (Kania K. (ed.), 2010)

With such emphasized differences, implementation of BI technology in a modern enterprise of 21st century requires some preparations which have been described by S.Andriole in 5 steps (Andriole S., 2010). In order to prepare an enterprise for BI 2.0 implementation, one must create an introspective infrastructure that will provide wide and deep access to identify the ways an enterprise functions, how does it make and lose money, how does it use “what – if” type analyses to receive answers to such questions, and what kind of influence it has on alternative processes taken up in an enterprise. One should also take a good look of database platforms and their architecture. If there is a lot of different sets of data and custom database platforms in an enterprise, it does not bode well for the future, especially for acquiring optimization in real time. It is good to model enquiries and descriptive and proscriptive responses for our BI environment to work well. Such action will allow to determine requirements for the BI system and will ease thinking about BI both for today (BI 1.0) and for future (BI 2.0). It is also necessary to track systematically how BI tools work to know exactly if they support prediction well, as well as predictive enquiries and responses. Plenty of actions taken in an enterprise are probably not accurately supported by BI. One needs to influence main BI providers. It is hard for small enterprises, but big ones could have an impact on how providers think about real time optimization. It should have an effect of synergy according to results by a proper use of the BI,

BPM tools, rule-based deduction, and other processes that are indispensable to get optimum applications.

Moreover, it is recommended to take solutions which are received “right away” or in a cloud technology (cloud BI), use commercial or open source BI and SOA-type platforms, into consideration. A need to invest in development of strategy and business processes modeling is crucial, because it will ensure a significant return on incurred costs.

Process data warehouse as a key element of the Business Intelligence 2.0.

Data warehouse (DW) is a core element of any Business Intelligence system due to the fact that it integrates data within the whole enterprise. Integrated data are processed using analytical applications that support decision making process. Multidimensional model of data consists of two categories of data: facts and dimensions. Facts are information being analyzed. They are characterized by measures. Dimensions decide about the context of analysis and consist of levels creating hierarchies. Connected relations of facts and dimensions create a data model. There are three main data models in DW: a star, a snowflake and constellation of facts. A star schema is one of the most often implemented within a data warehouse. The exemplary star structure has been shown in the figure 3.

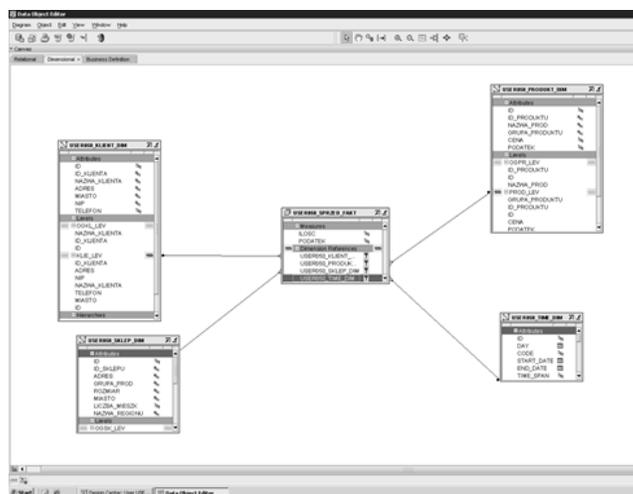


Fig. 3. The exemplary star model in DW

Source: own elaboration

In traditional DW we collect only facts. We do not have any information about relations between facts as well as any information about processes within which these facts appeared. Data analyses can deliver us the answer to such business questions as e.g. How the sale of our products look in the period 2007-2009? The answers are always numbers (the measures are, from the definition, of number type).

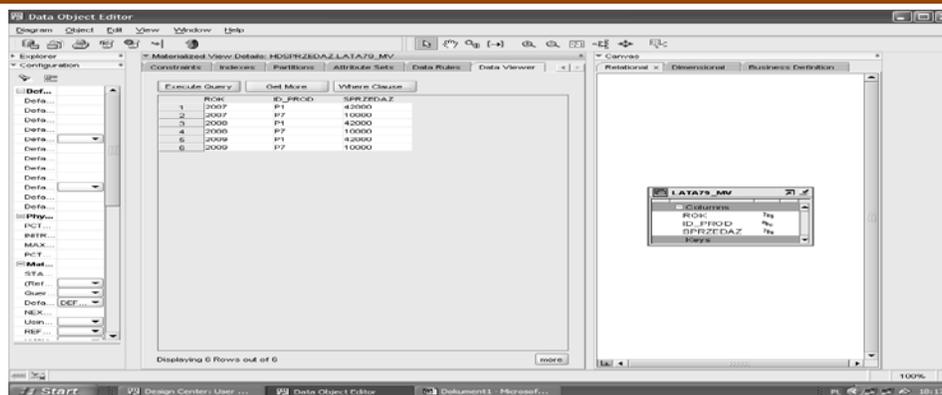


Fig. 4. The exemplary answer to the simply business query

Source: own elaboration

On the other hand, we know that for each manager, information of qualitative nature is also interesting. For example: who among our employees was responsible for the products sale, what are his/her competencies, how long the negotiations were, what problems occurred, etc. The traditional DW is not able to generate the answers due to the fact it has no possibility do analyze the processes within the enterprise.

The process approach toward enterprise management and reorganization of business processes is more and more often realize in modern firms. We can look at process management in the context of declining the costs of our enterprise activity and, on the other hand, fulfilling the client satisfaction. Evolution of the enterprise toward process orientation means that it tries to change its structure and resources in such a direction that all activity of these elements are oriented on the best realization of business processes. The lack of information about the advantages due to making better the business processes, is caused by the lack of measuring and monitoring business process indicators. As a solution we can treat the process controlling and IT tools supporting the processes of measure and monitoring. Among them we can distinguish Business Intelligence 2.0. called also Business Process Intelligence (BPI) technology based on process data warehouse (Dayal U., & Hsu M., & Ladin R., 2001).

The main goal of the process DW realization is knowledge about the current process state and the possibility of analysis of the process course as well as the cost of executed process instances. Information about the process state can be obtained from current monitoring: each transaction initiation, adjustment and confirmation of undertaking the transaction product realization, signaling the realization of the product by the performer for each instances, signaling the product acceptance by the transaction initiator, costs, materials, advanced scheduling, etc. (Chabierski A., 2007).

The traditional DW differs from process DW and the main differences between them rely on this that traditional DW can be seen "from the definition" by Inmon as a thematically ordered, integrated, possessing time dimension and non-violated data file supporting decision making process (Inmon W.H., 2002). Traditional DW presents the effects of the enterprise activity in different dimensions as e.g. product, area, time, suppliers, etc. The measures are always of the numeric type and reflect the result of all realized processes e.g. average profit on product X in period Y or capacity of sales of product X in district Y. But it does not have the possibility to see

insight the particular processes. We can see only the ‘final effect’. Data are concentrated around distinguished topics related with departments within the enterprise (marketing, finances, etc.) and such a division is not the useful in process analyses that usually are realized in some departments.

Remembering the main goal of the process HD, its place in the process oriented enterprise can be seen as in fig. 5.

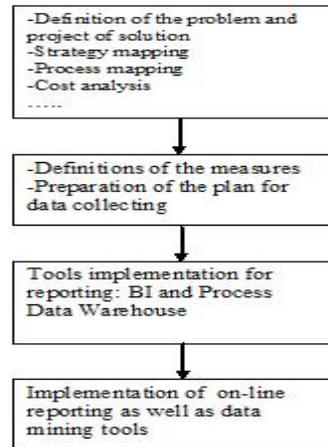


Fig.5. The place of process DW in process controlling

Source: based on www.prometriq.pl

Data warehouse is the core element of any Business Intelligence system. The BI architecture with the process DW can be presented as in fig. 6.

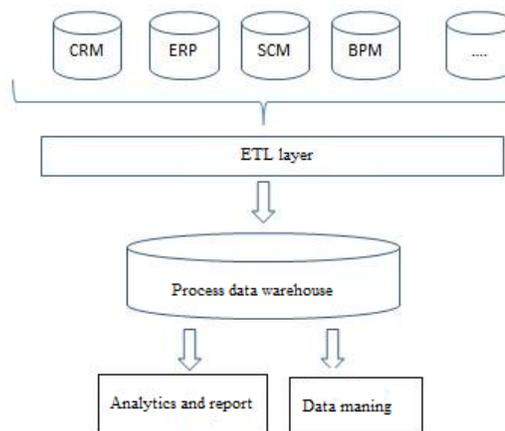


Fig. 6. The architecture of BI with process DW

Source: own elaboration

Within the process data warehouse, data are operational and reflect processes. They enable different analyses (financial, quantative, in time, etc.) of process measures taking into account

e.g. resources engaged in a process realization, roles in a proces, tasks and other criterion important for a process. The scheme of the process DW has been based on the star structure. The central table of facts consists of descriptions of activities written in the system (e.g. circumstances of a given event: who was responsible, resources, processes order, etc.). Dimensions in process DW depict processes in which these activities have occurred, as well as when (time aspect), resources and activity descriptions. Exemplary star model of the process DW can be shown as in fig. 7.

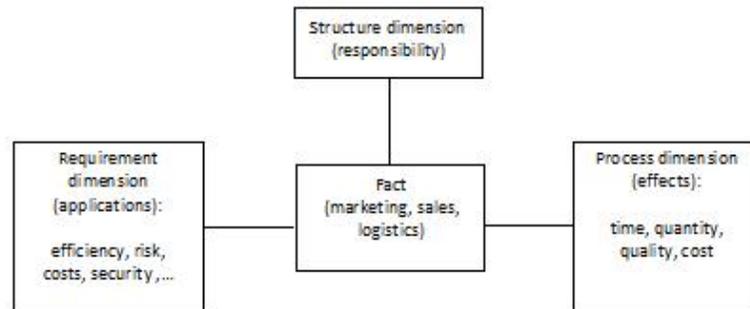


Fig. 7. Star structure in process data warehouse

Source: own elaboration

In the process DW the events do not have to possess measures but they have to be mark in time (time stamp) that enables their localization in time. The set of measures is broader then in traditional DW due to the fact that except traditional measures we have here measures connected with realized activities (e.g. number of repetitions, time duration, deviaton form a given standards as well as KPI (Key Process Indicators). Exemplary process data warehouse has been presented in fig. 8.

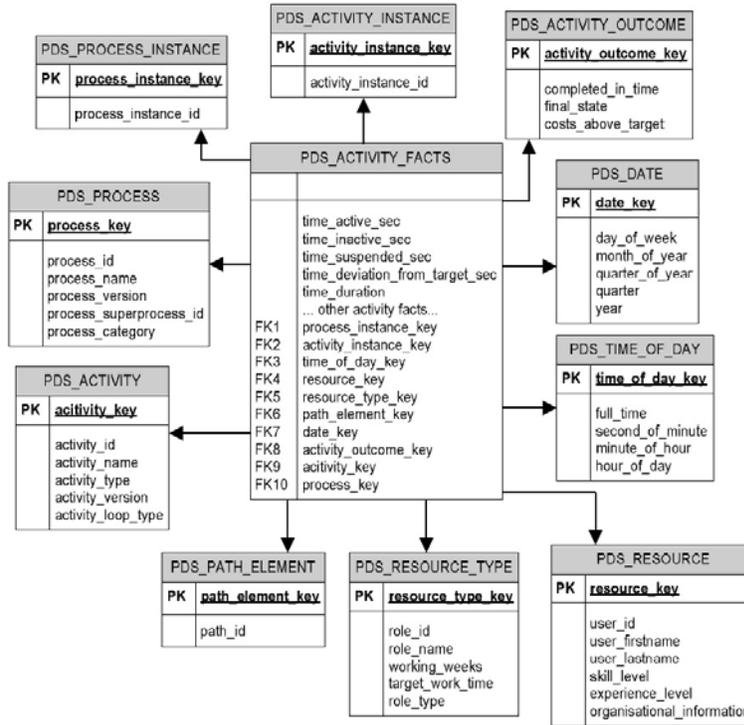


Fig. 8. The exemplary process DW

Source: (Schiefer J.& Beate L.& Bruckner R.M., 2003)

Course of realization of the analysis process of factors we can see in the managerial dashboard. Similar with the process measures (fig. 9).

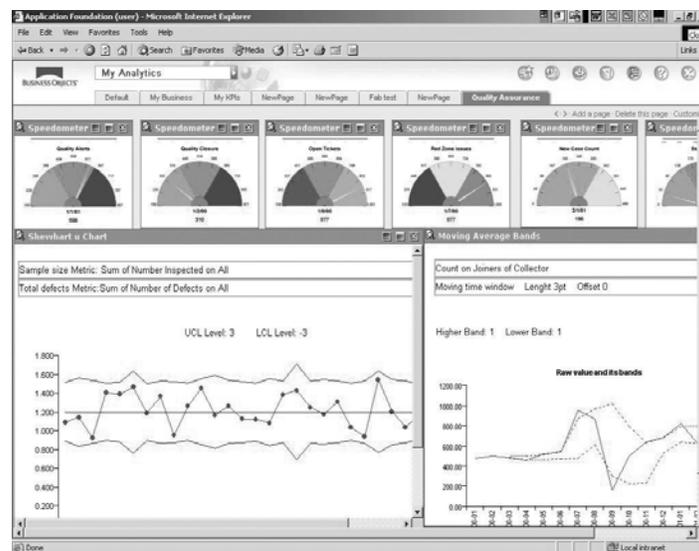


Fig. 9. Exemplary report with the measures presentation

Source: (Chabierski A., 2007)

Summary

Business Intelligence 2.0 as a new technology has been known from several years. It is strictly connected with rapid growth of the Enterprise 2.0 approach. Is it true that ‘traditional’ Business Intelligence systems are not necessary any more in enterprises? Of course not. Traditional BI based on data warehouse delivers information and knowledge about global activity of our firm. BI 2.0 based on process data warehouse enables obtaining information about current process realization. These two types of BI systems can be treated as compatible ones and – in such understanding – deliver complete analytical platform for obtaining full information about activity of enterprise.

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Computer Animation: The Impact of Continuing Education on Ergonomics Computer

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Abstract

Based on a completed research it was determined that several hours working on computers can cause a range of health problems. As a sample of the study there were selected groups of young people professionally-oriented to working on computers, and as a basis we used data from the questionnaire for safe work on the computer that the participants in this study completed. For some of the negative consequences of long-term work on computers, which are linked to long-lasting improper body posture while working on computer, it is planned an impact of animation to constant education and health care. This paper presents the results of the impact of education that has been performed classically so far, as well as the proposal for the constant influence of modern computer animation.

Keywords: computer ergonomics, education, computer animation.

Introduction

In contemporary world, the use of computers is growing almost exponentially. Computers are used in business, education and for fun and communication. Computer use is especially popular in young people who every day spend more and more time searching the Internet, making movies and music, participating in social networks, discussion groups, etc. On the other hand, young people unfortunately play less sports and go rarely to recreation in nature, all of which mainly results in improper body posture, obesity, eyesight problems, unsociability, alienation and other. If a young person is also professionally oriented to working on computers, the risk of the aforementioned health problems is significantly increased.

Several hours working on computers every day causes a range of health problems, starting from minor ones to potentially fatal ones.

We are going to mention only some of the adverse consequences of working on computers: eyesight problems, dry eyes symptoms, glaucoma, addiction, anxiety, insomnia, headache, nausea, discolouration and cancer of skin (due to constant and multi-year holding of laptop in the lap), nutritional problems, obesity, diabetes, thrombosis, as well as injuries that according to (Lj. Ružić-Dimitrijević, Lj. Diković, 2011) can be classified into three groups:

- injuries due to repeated straining (paresthesia of the hand, injuries of tendons and muscle connections, tendinitis, tenosynovitis; a detailed description of the symptoms can be found in (Antić,2013))
- disorders of upper extremities function (reduced movability and pains in upper extremities)
- problems with spine (pains in spine, back, neck, myofascial syndrome; a detailed description of the symptoms can be found in (Antić,2013))

A more detailed description of the diseases that occur as consequences of working on computers can be found in [3-6]. According to these sources, persons who spend more of 30 hours per week working on computers have increased risk of the occurrence of some of the aforementioned health problems.

There is a wide range of measures that can be undertaken with the aim of reducing the risks of diseases occurrence connected with long hours of working on computers. Moreover, there is an array of ergonomic products on the market, products adapted for human body (keyboards, mouses, chairs) which application can significantly reduce the adverse effects of working on computers. We are going to single out only some of the mentioned measures that can help proper body positioning, and a more detailed list and the description of measures can be found in (Lj. Ružić-Dimitrijević, Lj. Diković, 2011) and (7-12). One of the most wanted measures are: proper seating at the table, the monitor should be at a distance of 60-110 cm from the eyes, after an hour of working with the computer make a break of 10-15 minutes, provide quality monitors and monitor the protection of reflections and flashes of light.

The aim of this paper is to show the impact of education on the awareness of proper posture while working on computers. Education in the field of computer ergonomics can help us to avoid above mentioned health problems. With classical education we influence on the awareness of the students as we have demonstrated and shown through the research. Due to the good results obtained with education we continue with our research that has spread in the form of constant influence education. In order to give even more effort in computer ergonomics education we are currently working on a computer animation, which we plan to set up as screen savers on the computers in our computer labs. The animations should remind our student on the correct posture.

Conducted Research

For the needs of this paper we conducted a research regarding computer ergonomics.

The Aim of the Research / Motivation

The aim of the conducted research was to analyse the effects of lecture on computer ergonomics presented to students of Higher Education Technical School of Professional Studies in Novi Sad in the school year 2010/2011 and 2011/2012. The obtained results should serve as a starting point for the preparation of material for lectures on the same topic that should be presented in the school year 2012/2013 to students of the first year of all studying groups in the subject *Computers*. We should single out the questions that the students gave inadequate answers to, therefore pay more attention to additional education of students on the topic during ergonomics lectures.

Having in mind that the test also contains questions about possible consequences to students' health, the authors of this paper got the idea to elaborate a concise manual by the application of computer animation about proper ergonomic position in working on computers. The animation will be going on automatically every single hour on computers in computer laboratories. At the end of school year 2012/2013 the students will be surveyed again.

Research methods

The methods applied for the needs of this research are the following:

Participants : students of Higher Education Technical School of Professional Studies in Novi Sad.

Instruments: Testing in the field of computer ergonomics. The test was a written multiple choice or with questions where students are required knowledge of ergonomics computer or in another part of the test that the symptoms they feel or how they set up the computer at home.

Procedure: Student did the test in terms of lectures in the computer. Testing was carried out individually and anonymously. The test for about 20 minutes as needed to each student do all the questions in the test.

Techniques and tools of the research

The tools for the research is students' test in the field of BZR/computer ergonomics.

The aforementioned surveys/tests contain the following groups of questions :

- questions that test knowledge in the field of computer ergonomics.
- questions that are related to health problems of students that work on computers for many hours.

In the field of computer ergonomics, a survey list is given in the form of a questionaire with questions in the form of essays for which answers are offered.

Survey/test in in the field of computer ergonomics is given in the form of essay, i.e. no answers are offered in advance for a student to encircle.

Conducted research

In October 2012 we conducted the testing of knowledge of students of Higher Education Technical School of Professional Studies in Novi Sad in the field of computer ergonomics.

The total of 305 students of 16 different studying pogrammes participated in the testing. The testing included all the three the years of studying.

With regard to the fact that the testing was conducted at the very beginning of the school year, students of I year were not able to attend the lecture of the mentioned field, therefore their participation in the testing was aimed at obtaining the insight into students' pre-knowledge in the field of computer ergonomics. The obtained results can afterwards be used for a target lecture.

After the first test completion, once a week students attended lecture on computer ergonomics as an obligatory subject *Computers*. During this education the knowledge was being directed to critical points of the first test, i.e. to issues students were bad at or to topics essential to preservation of their health. Then the survey was repeated with questions in the field of computer ergonomics and their attitude to proper working on computers. In the repeated survey there were questions regarding their health problems.

Results of The Conducted Researches

The surveys that the students completed consisted of two parts: part I which represents the test of knowledge containing questions in the field of computer ergonomics and part II which represents

a survey on possible presence of health problems connected to long hours of working on computers in students.

In the part to follow, we presented only some of the results of the conducted research.

The question that represents the starting point in the repeated survey is:

1. After the lecture on proper use of computer, did you decide to change something about computer use?

66% of the examinees answered they changed the way of working on computer, while 34% of them answered they preferred their old way of working on it.

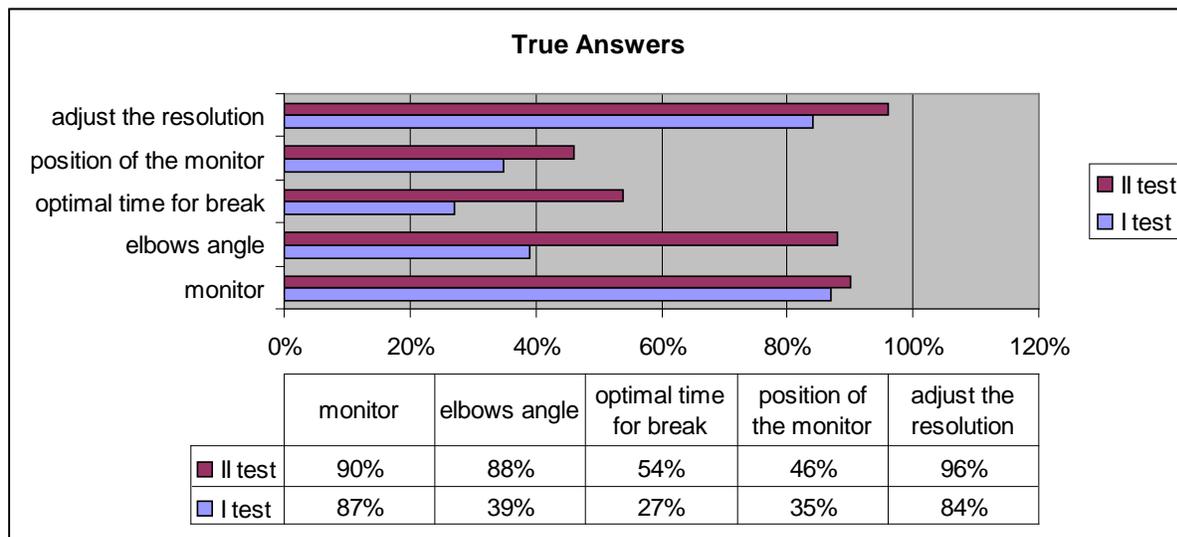
On the basis of greater share of changes in further work, i.e. bigger group that changed something in the way of working, we can continue to analyse the types of changes they made and the extent those changes influenced their health, as well as the influence of education.

During the lecture it was frequently emphasized that it was essential to make breaks when working on computers, to have proper body position, good lighting, adequate distance of eyes from the monitor and to buy ergonomic mice and keyboards.

We are going to single out the questions regarding proper working on computers and make parallel analysis of the first and second test.

Table 1 – Questions that point at additional knowledge on computer ergonomics in the questioned students

Questions	False	True
1. The position of monitor in relation to its user? II test	10%	90%
1. The position of monitor in relation to its user? I test	13%	87%
2. Write the angle under which elbows should be bent while working on a computer? II test	12%	88%
2. Write the angle under which elbows should be bent when working on a computer? I test	61%	39%
3. Write optimal time after which a break should be made when working on a computer? II test	46%	54%
3. Write optimal time after which a break should be made when working on a computer? I test	73%	27%
4. How should we position the monitor in relation to light source? II test	54%	46%
4. How should we position the monitor in relation to light source? I test	65%	35%
5. Did you adjust the resolution of your monitor? II test	4%	96%
5. Did you adjust the resolution of your monitor? I test	16%	84%



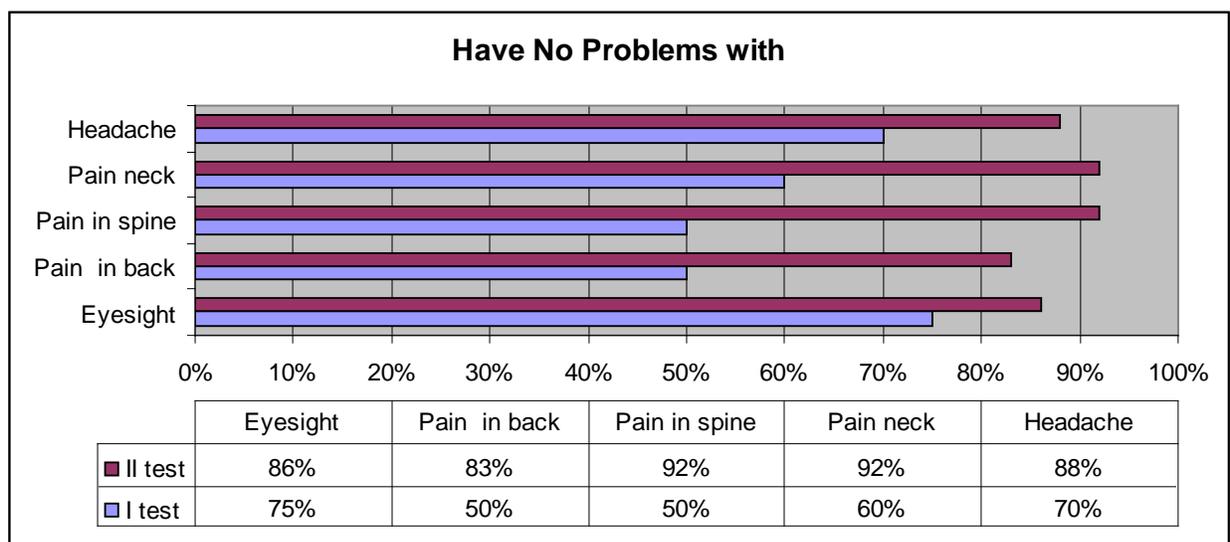
Graph 1 –Graphic presentation of true answers given to control questions in testing knowledge

From the data presented in Table 1 and Graph 1 we can conclude that there is greater percentage of true answers in the second test. On the basis of questions connected to proper computer use, when comparing results of the first and second survey, we can conclude that education influenced proper computer use and computer ergonomics.

We can follow further the changes of students’ health as a result of their education.

Table 2 – Questions that point at the influence on health of examinees via computer ergonomics

Questions	No	Yes
1. Eyesight problems in I test	75%	25%
1. Eyesight problems in II test	83%	17%
2. Pain in back in I test	50%	50%
2. Pain in back in II test	83%	17%
3. Pain in spine in I test	50%	50%
3. Pain in spine in II test	92%	8%
4. Pain neck in I test	60%	40%
4. Pain in neck in II test	92%	8%
5. Headache in I test	70%	30%
5. Headache in II test	88%	12%



Graph 2 - Graph presentation of the NO answers to control questions about the influence of computer ergonomics to examinees' health

We can conclude that surveyed students have fewer complaints about pains in eyes, spine, neck and headaches in the second test, i.e. after the education and application of adopted knowledge on computer ergonomics.

The Application of Computer Animation

Aiming at education that includes previously stated topics in all the classrooms of Higher Education Technical School of Professional Studies in Novi Sad there was set a poster with recommendation on proper ergonomically projected working on computers.

The research established that beside technical recommendations to be fulfilled, the awareness of a computer user on proper working on computers plays a significant role. If the user becomes aware of the position of his body while working on a computer at every moment and is able to sit properly, he will have influence on the preservation of his health. This is the idea that is used for further influence on the awareness of the users, in our case students. Then we passed to periodical presentation of body positioning, i.e. to these three steps. In order to achieve periodicity, we applied computer animation that at certain intervals warns the user.

We are preparing computer animation that will activate itself when starting a programme and also periodically during lectures on monitors, warning and reminding of some basic recommendations of proper ergonomic work. That will serve as continual education of the students and staff. The results of the education will be compared with previously achieved results at the end of school year.

The aim of this action is to increase the level of awareness about ergonomically designed working place and behaviour when working on computers, especially with students of information technologies (IT) and designer (D) studying groups. In the second semester (that is to follow) out of total six obligatory subjects IT students attend five subjects with classes on computers, and IT students of the fourth semester attend all the five obligatory subjects with classes on computers. Design students in the second semester have three of six subjects in

computer laboratory and in the fourth semester they have four of six subjects in computer laboratory.

Conclusion

Risk of the occurrences of health disturbances due to improper body posture when working on computers is of essential importance with students of informatics and design, therefore education of it is necessary.

Suggested measures for the reduction of risk are the following:

- **Education within teaching process:** For three school years in a row, in the subject *Computers* the lectures on safe working on a computer are being held. The subject is attended by students of the first year of all the studying groups. It is recommended to continue with this education, as well as that the lecture on this topic be held on introductory lecture of subjects where the teaching is performed on computers.
- **Setting computer animation:** Safe working on a computer – ergonomic of a working place on all the computers in classrooms of Higher Education Technical School of Professional Studies in Novi Sad. It certainly must not be omitted the care of teaching as well as non-teaching staff (especially administrative services where the employees spend most of their eight working hours sitting by computers).
- **Spreading awareness about the importance of paying sports:** Starting from school year 2012/2013, the students of Higher Education Technical School of Professional Studies in Novi Sad of studying groups of civil and fire protection have the subject *Physical Education* within plan and programme for two times a week. It is being considered the introduction of the same subject for all the other students, therefore for the students of information technologies (IT) and designer (D) studying groups.

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Consumers' Information on Genetically Modified Food

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Abstract

Genetic engineering represents the essential method of contemporary biotechnology. A genetically modified organism (GMO) is the one whose genome is changed in such a way that it could not be achieved naturally. That change usually relates to implementation of genes of one species into the genome of another. The advocates of biotechnology state that there are no proofs that genetically modified organisms have adverse effects on food safety, human health and the environment, however, the opinions are mixed. The right of consumers to use non genetically modified food is accepted, but also the right of the producers to produce it. Consumers are not sufficiently informed about the characteristics of genetically modified food and consequences that may occur when such food is used. This results out of the research conducted in the form of a written questionnaire. The consumers answered to previously prepared questions on the basis of which it was possible to evaluate their knowledge of genetically modified food. It is necessary to further educate people, for only with the knowledge of GMO they will be able to decide on their own whether to use such food or not.

Keywords: food, genetically modified organisms, information, people's awareness

Introduction

Molecular biology (or biochemical genetics) explains basic life processes, their nature and interconnection. Molecular biology should establish initial developmental processes of characteristics at molecular, biochemical level, i.e. the elements the genes are composed of, the way they reproduce, as well as primary products of function of genes.

Hereditary material is consisted of deoxyribonucleic acid (DNA). This molecule could be considered as hereditary substance due to its ability to self-reproduce, transport genetic information and change its structure and function. A gene represents a precisely defined portion of DNA which has its beginning and end and transports information on synthesis of a precisely defined protein (Balos 2004).

Genetic engineering is an aggregation of biochemical techniques by which help genes, their parts or groups of genes are cut out of a DNA of an organism and implemented into previously defined place of a DNA of another organism (most frequently of the kind that has a simple genetic characteristic and can be grown in unlimited quantities). Special laboratory instruments are used to reach the gene transporter of hereditary characteristics and make some possible change or correction.

Genetic engineering and cloning represent basic methods of contemporary biotechnology. Genetic engineering is the essence of the production of genetically modified (GM) or transgenic organisms whose DNA contains foreign genes – the genes of another organism. It is based upon universality of instructions for cell functioning encrypted in genes (genetic code, cipher) of all the living organisms on our planet (Balos 2004).

There are different opinions about the use of genetically modified food. Some claim that genetically modified food is completely safe from health point of view, while other feel strongly reluctant to such claims. However, consumers are frequently at a loss and do not know what to do when they hear contrary opinions. Media (radio, television and printed media) have significant influence on formation of consumers' opinions (Loader, Henson 1998). Thus, from the literature and our researches it can be noted that consumers are not sufficiently educated in that sense, therefore cannot be sure whom to trust. It also proved that consumers who were better educated hold the opinion that genetically modified food is not completely safe for use, and that the consequences of its use to health can be deteriorating. Due to that, it is necessary to transfer as many information as we can in relation to the subject matter, aiming at most thorough knowledge of the majority of people (Kimenju, Grote 2005, Curtis, Wahl 2004).

The Application of Genetic Engineering

The application of genetic engineering is also very wide in the sphere of industrial microorganisms production. According to medical literature data, genetic engineering is applied in the following fields: Discovering hereditary diseases, curing, production of medicines, increase and improvement of the production of plant and animal species, change and correction of hereditary characteristics in humans, selection of sex. It is applied for (Topisirovic, 2011):

- Obtaining of raw materials and renewable sources of biomass.
- Obtaining of alternative forms of energy by the application of biomass and waste material.
- In agriculture for production of feed and fertilizers. The transformation of agricultural crops like new sorts of soya, tomato, rapeseed, cotton, tobacco, potato and others was successfully formulated.
- Obtaining of ecological, less toxic and dangerous pesticides for the health of living organisms and humans.
- Filtering of waste waters and decomposition of pollutants (active chemical radicals).
- In medicine and pharmacy for the production of new antibiotics, vaccines, medicines and diagnostic agents.

Genetically modified organisms

A genetically modified organism (GMO) is the one whose genome is changed in such a way that it could not be achieved naturally. That change usually relates to the implementation of genes of one species into the genome of another (recombinant DNA technology). One of more important roles of genetically modified organisms is biosynthesis of human proteins for medical purpose.

One of the most renown examples of genetic engineering in plants is the formation of so-called BT-transgenic plants. Gram-positive bacteria *Bacillus thuringiensis* produces certain substances acting as powerful insecticides. Genetically modified plants of the first generation are those with modified agronomic features like: tolerance to herbicides, resistance to diseases, etc.

Genetically modified plants of the second generation are those with modified production characteristics: slow ripening, like in genetically modified tomato and changed composition, like in golden rice.

Genetically modified plants of the third generation are the plants to be expected in the future (Kostic 2004): tolerant to salinized soil, resistant to drought, tolerant to metals in soil and with improved efficiency of intaking nitrogen and phosphorus.

By introducing of molecular biology into animal husbandry new animal species are produced by hard-labour intercrossing and selection, while for further insemination the individuals with better characteristics were selected. For the improving of the mass of animals for higher meat quantities hormones were used, but it turned out that hormone residues were found in final meat products and have adverse effects on human organism.

Genetically modified food and health

Supporters of biotechnology state that there are no proofs that GM organisms affect adversely the environment or food safety in relation to their conventionally grown copies and emphasize that GM plants are very useful for modern world.

For numerous researches and public, GM food production represents an unacceptable playing with nature. Natural cyanide content in potato protects it, so that it can grow well. When early ploughing is applied, there occur ecological and agronomy problems. In spring, soil is cooler and plant development is made more difficult, along with the occurrence of denitrification and nitrogen loss in soil. As an adverse effect, it is necessary to mention that in long-term period these organisms may have an unpredictable influence, along with the possibility of soil pollution and loss of biological diversity. Artificially intaken genetic elements may also smuggle unwanted genes into the host cell, which can lead to mutagenic and cancerogenic consequences (Jost 2005).

Under the public pressure, some European countries and Japan introduced obligatory declarations for particular or all the products based upon biotechnology and restricted their usage. The right of consumers to use non genetically modified food is accepted, but also the right of the producers to produce it. Developing countries are yet to introduce laws and regulations referring to biological food safety regarding the fact that in the following five years the most of genetically modified wheats are going to be grown exactly in those countries (in the first place in Brazil, India, etc.).

For the approval of market offer of GMO products on EU market, EFSA – European Food Safety Authority is appointed. EC 1829/2003 Regulation is the initial law act that includes all the products for food and feed which contain genetically modified organisms, including those already present on the market. Detailed rules for conducting this Regulation are included in EC 641/2004 Regulation.

From 2003 all the products that are genetically modified products, contain them or are derived from them, no matter whether being used for food or feed, must always be labelled as GMO products. In such a way, the consumers are offered to decide on their own whether to use those products or not. With the GMO label another goal is achieved, and that is traceability, i.e tracking of GMO products throughout the chain of food production. These two aspects, labelling and traceability, as well as the unique procedure of approval for market offer for EU market are regulated by EC 1830/2003 Regulation. By European regulation it is also determined the labelling of GMO products and products containing GMO, and the methods of qualitative and quantitative analysis of GMO are in accordance with EU standardisation as European norms. EC

65/2004 Regulation establishes the system for development and awarding of unique identifiers for GMO products.

In our country this field is regulated by the Law on Restricted Use, Implementation into Production and Marketing of GMO Products, as well as conditions and measures for prevention and elimination of unwanted consequences of restricted use of products and traffic of GMO products (Official Gazette of Federal Republic of Yugoslavia No 21/01). In addition, there is a Regulation on restricted use of GMO (Official Gazette of Federal Republic of Yugoslavia No 62/02). (Directions for business management with the European Union 2006).

The producers should pay more attention to health and ecological consequences of the use of genetically modified food and invest more into the research in this field. After the start of genetically modified soya import there are 50% more reported cases of soya allergy, especially in children. Since the introduction of genetically modified food the number of nutritional diseases has doubled. There is an increased IGF1 hormone level in milk of cows in whom hormone of growth was injected (Jost 2005).

Researches showed that in females in menopause younger than 50 with high IGF1 hormone level the probability to have breast cancer is seven times higher. In males there is four times higher probability to have prostate cancer.

EU has elaborated a comprehensive system of mechanisms for the process of consideration and approval of genetically modified organisms, as well as for the control of GMO release into the environment respecting certain directives and regulations. The aims of the directives are: protection of citizens and the environment, consumers' rights to be informed and make choices and obligatory declarations.

In order to get the information on how well people are informed about genetically modified organisms, their characteristics and possible consequences to people's health, we conducted research according to the criteria of age and level of education.

Research

This research was performed with the aim of obtaining data about consumers' awareness on genetically modified organisms and genetically modified food. The research was performed in a written form based on randomly chosen samples. The questions about genetically modified food were formulated by the authors. In further data processing the questions were statistically processed and classified according to sex, age and education.

During conducting research on genetically modified organisms, we questioned 231 persons. The answers are classified according to the following parameters:

1. Age: a) from 16 to 35 years
b) from 35 to 55 years
c) over 55 years
2. Level of education: a) primary school
b) secondary school
c) higher education school, faculty

Out of 231 examinees, 32 finished primary school, with 6 of them being between 16 and 35 years old, 5 of them between 35 and 55 years old, and 21 over the age of 55. In the group of examinees with finished secondary school, 134 in total, 71 of them are between 16 and 35 years old, 43 between 35 and 55, and 14 examinees are over the age of 55. In the category of the examinees who graduated from higher education school and faculty there were 65 people out of whom 36 are between 16 and 35 years old, 22 between 35 and 55 years old, and 7 are over the age of 55.

The answers to the first question: "Do you know what genetically modified organisms are?". A means "yes", and B means "no".

Table 1: Answers to the first question

<i>Answers</i>	<i>A</i>			<i>Score</i>	<i>B</i>			<i>Score</i>
<i>Education level</i>	<i>Age</i>				<i>Age</i>			
	16-35	35-55	55+		16-35	35-55	55+	
<i>Primary school</i>	3	2	3	8	3	3	18	24
<i>Secondary school</i>	50	37	11	98	21	12	3	36
<i>Higher education school, faculty</i>	32	21	6	59	4	1	1	6
<i>Score</i>	85	60	20		28	16	22	

71.42 % of the examinees answered they know what genetically modified organisms are, and 28.58 % of the examinees answered they do not know it.

The best informed people are those with university level of education, but the others also show good results and interest for the topic. The least informed are the examinees older than 55, mostly retired persons with finished elementary school. The interest for further education is mostly present in people in the age groups between 16 and 35 years and 35 and 55 years.

The answers to the second question: "Do you know what genetically modified food is?". A means "yes", and B means "no".

Table 2: Answers to the second question

<i>Answers</i>	<i>A</i>			<i>Score</i>	<i>B</i>			<i>Score</i>
<i>Education level</i>	<i>Age</i>				<i>Age</i>			
	16-35	35-55	55+		16-35	35-55	55+	
<i>Primary school</i>	4	2	8	14	2	3	13	18
<i>Secondary school</i>	56	40	11	107	15	9	3	27
<i>Higher education</i>	33	21	6	60	3	1	1	5

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<i>school, faculty</i>								
<i>Score</i>	93	63	25		20	13	17	

78.35 % of the examinees answered positively to the second question, while 21.64 % are not familiar with the notion of genetically modified food. Genetically modified food is the food produced of genetically modified organisms, including additives which contain genetically modified organisms.

Greater number of people was more interested in genetically modified food than in genetically modified organisms. The examinees were more eager to get informed on the final product of genetic engineering than on the very engineering and the process that leads to the final product. The most interested on this topic were the examinees in the age group between 16 and 35 with secondary level of education.

The answers to the third question: "Do you pay attention to the places you go shopping?". A means "yes", and B means "no".

Table 3: Answers to the third question

<i>Answers</i>	A			<i>Score</i>	B			<i>Score</i>
<i>Education level</i>	<i>Age</i>				<i>Age</i>			
	16-35	35-55	55+		16-35	35-55	55+	
<i>Primary school</i>	3	2	15	20	3	3	6	12
<i>Secondary school</i>	33	29	7	69	38	20	7	65
<i>Higher education school, faculty</i>	18	13	3	34	18	9	4	31
<i>Score</i>	54	44	25		59	32	17	

53.24 % of the examinees answered positively to the third question, and 46.76 % declared that they pay no attention to the places they go shopping. Each group had approximate number of answers A and B. Although there is a great selection of shops nowadays, starting from mega markets to healthy food shops, people do not pay much attention to the place they will buy their products. Unfortunately, the major reason of such a standpoint is the fact that consumers are attracted to the price, not the quality of food.

The answers to the fourth question: "Do you pay attention to the expiration date?". A means "yes", B means "no" and C means "occasionally".

Table 4: Answers to the fourth question

<i>Answers</i>	A	<i>Score</i>	B	<i>Score</i>	C	<i>Score</i>
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Education level	Age			Score	Age			Score	Age			Score
	16-35	35-55	55+		16-35	35-55	55+		16-35	35-55	55+	
Primary school	2	1	6	9	1	1	7	9	3	3	8	14
Secondary school	38	21	74	133	12	6	3	21	21	22	4	47
Higher education school, faculty	21	8	2	31	4	2	1	7	11	12	14	37
Score	61	30	82		17	9	11		35	37	26	

45.89 % of the examinees answered that they pay attention to the expiration date, 16.02 % do not do it, and 38.09 % do it only occasionally. More examinees pay attention to the expiration date than to the selection of shops, no matter the food is genetically modified or not. After the date expires, the usage of the food is not recommended.

The answers to the fifth question: “Do you check the ingredients on the declaration?”. A means “yes”, B means “no” and C means “occasionally”.

Table 5: Answers to the fifth question

Answers	A			Score	B			Score	C			Score
Education level	Age			Score	Age			Score	Age			Score
	16-35	35-55	55+		16-35	35-55	55+		16-35	35-55	55+	
Primary school	0	0	0	0	4	2	15	21	2	3	6	11
Secondary school	14	11	3	28	28	13	3	44	29	25	8	62
Higher education school, faculty	7	8	1	16	12	2	3	17	17	12	3	32
Score	21	19	4		44	17	21		48	40	17	

Most answers to the fifth question were C (occasionally), 45.45 %, while 19.05 % of the examinees answered “yes”, and 35.50 % of them “no”. The smallest number of the examinees

with finished primary school pay attention to the declaration, but in other groups the most dominant answer is B, and the least is A.

Due to preservation and improvement of health status it is important the content of the foodstuff, which are potentially harmful additives, nutritive values and the list of ingredients.

The answers to the sixth question: “Do you check the producer?”. A means “yes”, B means “no” and C means “occasionally”.

Table 6: Answers to the sixth question

<i>Answers</i>	A			<i>Score</i>	B			<i>Score</i>	C			<i>Score</i>
<i>Education level</i>	<i>Age</i>				<i>Age</i>				<i>Age</i>			
	16-35	35-55	55+		16-35	35-55	55+		16-35	35-55	55+	
<i>Primary school</i>	2	2	0	4	3	1	15	19	1	2	6	9
<i>Secondary school</i>	34	23	6	63	15	6	1	22	22	20	7	49
<i>Higher education school, faculty</i>	21	13	3	37	4	2	1	7	11	7	3	21
<i>Score</i>	57	38	9		22	9	17		34	29	16	

Out of 231 examinees, 45.02 % of them check the producer, 20.78 % of them do not check it, and 34.20 % check it occasionally. Nowadays, we have a very wide range of foodstuff producers, both domestic and foreign ones. It is important due to the fact that it increases competition for consumers’ attention and trust. In order to achieve the mentioned, they have to work hard on a product’s quality, favourable prices and adequate advertising. The examinees most interested in the selection of producers were in the age group between 16 and 35 with 50.04 % of A answers, and the least in the age group over 55 with 40.48 % of B answers, but in the same group 38.10% of them stated they occasionally check the producer.

The answers to the seventh question: “Is genetically modified food always clearly and visibly labelled?”. A means “yes”, B means “no” and C means “I don’t know”.

Table 7: Answers to the seventh question

<i>Answers</i>	A			<i>Score</i>	B			<i>Score</i>	C			<i>Score</i>
<i>Education level</i>	<i>Age</i>				<i>Age</i>				<i>Age</i>			
	16-35	35-55	55+		16-35	35-55	55+		16-35	35-55	55+	

Refereed Proceedings of KM Conference 2013 - Novi Sad, Serbia

A Publication of the International Institute for Applied Knowledge Management

	35	55			35	55			35	55		
<i>Primary school</i>	1	0	0	1	2	0	2	4	3	5	19	27
<i>Secondary school</i>	8	1	0	9	33	33	7	73	30	15	7	52
<i>Higher education school, faculty</i>	2	0	0	2	18	11	6	35	16	11	1	28
<i>Score</i>	11	1	0		53	44	15		49	31	27	

Small number of the examinees answered “yes”, 5.19% of them, and 46.32% they do not know it. The European Union settled the matter by its Directive EU 2000/13. This Directive declares that the food intended for human and animal use must be labelled with GMO presence. This relates to the products with more than 0.9% of GMO ingredients. No matter whether we speak of an individual ingredient or a compound, the total content of GMO must not exceed 0.9%.

Labeling of these products is applied so that the consumers have the insight into the content of each and every product, actually their ingredients, thus being informed and having the possibility of their own free choice. In case we speak of packaged food, the box must clearly show the ingredients that contain a GMO or are consisted of GMO. The product must clearly and undoubtedly have the label of a genetically modified product. Differing from non-packaged products, bulk products must also be labelled clearly and undoubtedly with GMO in a way that notification is placed in their immediate vicinity.

However, it is not obligatory that only milk, meat and eggs originating of animals that are fed by GM food or treated by genetically modified medical preparations are labelled as GMO products, although across European Union there were initiatives for this kind of labelling.

In Serbia, the labelling is regulated by the Book of Rules on labelling of agricultural and foodstuff products manufactured of genetically modified organisms which Article 3 says: “Manufacturer, i.e. importer of agricultural and foodstuff products manufactured of genetically modified organisms (hereinafter: Manufacturer or importer) is obliged to present the following text in the declaration: ”This product contains a genetically modified organism”. The quoted text is to be written in clearly visible letters and placed at some visible place where the title of the very product is. (Official Gazette of the Republic of Serbia, 2009).

Manufacturer, i.e. importer is obliged to mark the package and label from Paragraph 1 of this Article by logo of an adequate size in the shape of equilateral triangle. The triangle is bordered by a thick red line. The internal field is yellow, and in its middle there is written the word “TMO” or “GMO” with clearly visible letters in Cyrillic or Latin. If the declaration is not printed in colour, instead of being yellow internal field is white (Official Gazette of the Republic of Serbia, 2009).

The answers to the eighth question: “Is genetically modified food health safe?”. A means “yes”, B means “no” and C means “I don’t know”.

Table 8: Answers to the eighth question

<i>Answers</i>	A			<i>Score</i>	B			<i>Score</i>	C			<i>Score</i>
<i>Education level</i>	<i>Age</i>				<i>Age</i>				<i>Age</i>			
	16-35	35-55	55+		16-35	35-55	55+		16-35	35-55	55+	
<i>Primary school</i>	0	0	0	0	3	1	2	6	3	4	19	26
<i>Secondary school</i>	12	4	0	16	29	25	9	63	30	20	5	55
<i>Higher education school, faculty</i>	3	1	3	7	22	15	2	39	11	6	2	19
<i>Score</i>	15	5	3		54	41	13		44	30	26	

Only 9.96% of the examinees believe that genetically modified food is health safe, while 46.75% believe it is not, and 43.29% state they do not know it. Many still argue about the question; while some researches claim the usage is safe, the others deny it. On the other hand, there has been conducted no research yet that would show the influence of the use of genetically modified food over a longer period.

The answers to the ninth question: “Do you know the consumers’ rights about genetically modified products?”. A means “yes”, and B means “no”.

Table 9: Answers to the ninth question

<i>Answers</i>	A			<i>Score</i>	B			<i>Score</i>
<i>Education level</i>	<i>Age</i>				<i>Age</i>			
	16-35	35-55	55+		16-35	35-55	55+	
<i>Primary school</i>	0	0	0	0	6	5	21	32
<i>Secondary school</i>	10	4	0	14	61	45	14	120
<i>Higher education school, faculty</i>	4	4	2	10	32	18	5	55
<i>Score</i>	14	8	2		99	68	40	

10.39 % of the examinees were familiar with consumers' rights about genetically modified organisms, and 89.61. % knew nothing of their rights in this field.

The aim of consumers' protection is the protection of health, safety and economic interest of the consumers, as well as the promotion of consumers' rights to be informed, educated and organized with the aim of preserving mutual interests. Consumers' protection includes the development of legal practice and other measures, as well as including consumers' interests in other European polices.

Conclusion

The question that imposes to be the most important is whether genetically modified food is safe for use and safe for health and the environment. A dilemma about the usage of genetically modified food is fully justified due to the fact that there is no sufficient data on its behaviour once it enters the chain of nutrition. The problem with genetically modified food is the fact there are no adequate testing results after multi-year usage.

Health risk that occurs when using genetically modified organisms is uncertain. Acute and chronic influences to health and the environment cannot be excluded, and there is also primary suspicion of toxicity and allergenicity of genetically modified products as a consequence of food composition change.

On the basis of the conducted research on the territory of Vojvodina, we can say that the information of the population about genetically modified organisms is scarce. Although the majority of the examinees state they know what transgenic organisms are, when analyzing other answers it can be concluded that in most cases we speak of the illusion of knowledge. During the survey, the greatest interest was shown in genetically modified food, the way it is produced and influences the organism and health of people. After fulfilling the given paper, people had a conversation with the survey holder where they got some answers and were stimulated to further investigate and learn about the topic. Allergens, toxic and cancerous influences of genetically modified organisms represented the most alarming data for the examinees which made them aware of the importance to stay in touch with such an important topic for all of us. For now, each individual is left to decide by himself and in accordance with his own standpoints, way of nutrition and beliefs whether or not he is going to use genetically modified food.

The awareness of people should reach higher level via media, forums and organized lectures. It should be organized at least part-time classes in schools where the young should be transferred knowledge. Consumers pay no attention to what they are buying and getting because they are not familiar with risks that are present in consumption of genetically modified food and novel information and further knowledge are the only things that provide them with more healthy and quality way of living.

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Growing up in a Participatory Media Culture

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Abstract

UNESCO report entitled Towards a Knowledge Society pointed out the discrepancy between the enormous information and educational potentials of the Internet and new media, and the failure of schools to take advantage of these creative potentials. Also, the main limiting factors for knowledge management suggest a lack of knowledge sharing. The question that we want deal with in this paper concerns of how the motivation and creativity culture of Open Source can be used in teaching or other purposes.

Media theorist Henry Jenkins (2006, 2008) discusses the importance of participation, participatory culture and participatory media. His knowledge associated with the phenomenological sociology of knowledge (Schütz, Luckmann, 2003), discourse theory of Habermas theory of communicative action (1981) and praxeological approach to using social software (Schmidt, 2006), may also include explore the phenomena of the mentioned research question.

Knowledge management assumes that knowledge are commonly created, expanded, processed, organized, evaluated, expanded into different types of knowledge, which implies the need for further strengthening of unity, team spirit, trust, work-euphoric mood, overcoming individualism and egocentrism.

In this paper we analyze the basic media competencies (Jenkins, 2006), for which we assume to represent a major precondition for successful participation in media participatory processes and overcoming of possible barriers related to knowledge sharing.

Keywords: sharing knowledge, participation, participatory culture, media competences

Introduction

This paper deals with the growing up and development on the Internet (cue "web 2.0"), trying to identify the best form of knowledge on the Internet and thus develop an incentive for a sociology of knowledge on the Internet, which goes beyond the technique, application and context. In this sense, the paper's basis is in the phenomenological sociology of knowledge (Schütz/Luckmann, 2003; Berger/Luckmann, 1995), discourse theory of Habermas' theory of communicative action (1981), praxeological approach using *social software* (Schmidt 2006a, b) as well as in media theory of Henry Jenkins (2006, 2008), which discusses the importance of participation, participatory culture and participatory media.

How does motivation and culture creativity of Open Source can be used in teaching or other purposes?

Such questions have long been tormenting media theorists and practitioners and in this sense the arguments that active creators and users mutually create, expand, process, organize, evaluate and wider variety of types of knowledge are often referred to. The active use of the Internet requires knowledge, routines, patterns of typing, as well as the structures of importance, which are partly taken from life outside the Internet, and partly occur only in association with other active users, but function in the world outside the Internet as well. Thus active users on one hand impart their

knowledge, and on the other hand by using the Internet increase its social and cultural relevance. This leads to the disappearance of boundaries between "online" and "offline" world.

A separate issue concerns the importance of participatory use of media for the educational system. The starting point here is the works of Henry Jenkins on the social and educational-political significance of media participatory culture.

Fundamentals of sociology of knowledge

Social Sciences owe to the phenomenological sociology of knowledge the knowledge that the social reality, which limitedly presents the individual as an objective, static, individual area for individual action and the horizon of possibilities, is actually constructed during the regularly recurring interactions in different circles and contexts and is in constant need of renewal. For identification and character arising out of that knowledge, which commonly share members of a society, responsible are the processes of institutionalization (habitualization, sedimentation, representation in social roles, integration, i.e. segmentation, reification and tradition) as well as socialization and legitimation (Berger/Luckmann, 1995, Münch 2004: 212-224). At the same time, each actor is surrounded by its environment, acquaintances, past and future, that socially, spatially and temporally influence its reality. Transfer of information, scientific and cultural goods between society and individuals are constantly taking place in both directions, from the individual to society and from society to the individual. Phenomenological sociology of knowledge explores the complex relationships of individual and collective reality through analysis of transmission mechanisms between everyday undisputable, highly individual knowledge, mediating institutions and shared knowledge society.

Everyday knowledge related to the experience, which makes a man fit for action and decision making, Schütz/Luckmann have analytically divided into categories that are associated with certain situations and their limitations. Of particular importance are the *routines* that help people in solving problems in everyday life (2003: 156). Primarily included are still skills that are highly automated (e.g. using a keyboard or using a computer operating system), but also – from a certain number of repetitions - more complex operations such as searching for information using a search engine. The routines include knowledge about the use (in terms of ease of use and expanded possibilities of using the Internet) and also receptive knowledge (e.g., about installing a blog or using common programming languages). Knowledge of each actor is quite biographical shaped, so it is affected by the actor's age who gains the experience and specificity of volume of his experiences (ibid: 163). In addition, the structure of the individual knowledge is socially shaped as well through various degrees of familiarity, ranging from high familiarity as the results of habits and their own direct experience all the way through to obscurity and ignorance. Thereat every non-knowledge is a potential knowledge that an actor can actively adopt (ibid: 193).

Determining the Concept and Area of Participation

With the concept of *participatory culture* (Jenkins, 2008) all the phenomena of the mentioned introductory question may be included and explored. Likewise, the concept provides access to research area that is in its infancy - *the media in transition*, which are represented in a variety of shapes, although it mainly concerns the interaction *in* and *with* the media such as television and the Internet.

Etymological research of the concept of *participation* suggests that participation is essentially about taking participation in something greater. In discourses on media and citizenship, politics of culture, and traditional art "the word 'participation' refers to the acts of inclusion in the culture and art by active reception of culture, i.e. reading, attending performances, visiting exhibitions and so on. In contrast, within this discourse the meaning of word 'participation' has changed: People usually 'participate' not only by active reception of art and culture, but primarily by active contribution to the contents of culture to which they have connected to" (Müller, 2009:2).

Participation, as we comprehend it now, is itself part of a culture that shows the participation out of "shared knowledge," "collective intelligence" and "knowledge society" (Jenkins 2008: 27), proves to be more open to comments and suggestions than was previously the case. David Weinberger gives a clear example of it pointing that "chatting in the back benches" (2002:42) on the Internet can not be stopped. In his eyes, this is a very positive feature and it is confirmed by the rule of Bob Metcalfe: "[...] the increase of the size of the network dramatically increases its value" (Weinberger, 2002: 105). Internet offers not only a mass of information and statements, but also creates the necessary tools to process this information and makes them available. Chatting of several thousand *participants* is incomprehensible, but properly filtered it becomes a valuable source of information, reflecting a *participative structure and collective intelligence*.

Yet, despite all the optimism, we should not leave out of sight a few problems. Participation on the Internet primarily requires unrestricted access to the Internet. The term "digital divide" addresses these inequities in access, whether political or technical in the nature. Access itself is not enough, because education and *competences* in the field of media represent the next obstacle to be overcome. Finally, the willingness and tendency to the participation are dependant on the adopted socio-cultural norms and practices, just as the Jenkins (2008: 23) mentions.

Especially interesting in this topic is not so much *how* (technical infrastructure, which is developing so fast that it is impossible to provide a current review). A more interesting question is *why* and *due to what*? What are the motives and motivations, the reasons for participation? What didactic and social changes can be achieved by applying these principles, and which ones have just been created?

Is in "real life" hidden as much participation as it can be found on the Internet? Or it perhaps in the end only it is about something a little new and interesting behind an exaggerated, glamorous facade? Can you keep up with the reality of media widespread cult, or has a flash of hope after a short time already gone?

Online Communities and Online activism

As part of an online community, first analyzed are the methods and tools for the creation of the *Consumer Stories* or better, the narrative context of the conversation. Getting this context more complex patterns of relationship for further research can be developed, and "intuitive findings about the social structure and the nature of the community" can be provided (Feldstein, 2009:14). The label *consumer* indicates that primarily there is the interest of consumers to assess one product, for example one brand. Depending on it, the methods and tools should be useful for any kind of semantic analysis of online discourse.

Feldstein talks about the differences between the Internet forums and social networking sites such as Facebook and therewith implicitly shows the path of demarcation and definition of

participatory structures. When asked whether Facebook is a part of participatory culture, it can be answered by pointing to the fact that Facebook does not have a lot of participatory when you click on the "Become a Fan" or "Join this group". Of course, herein we also need differentiation, because certainly there are people who more intensively use Facebook in participatory purposes than others.

In essence, an *open* structure is authoritative criterion for the success of participation. Here you can set the starting points with the summary "small talk in the rear" and "collective intelligence". Vagueness and the open end should be crucial for the manifestation of participatory behavior in humans. Of course, this assumption can quickly be toppled, by the very project of Hackerspace, it seems that a community without certain guidelines and norms and without the creators of the norms does not make any progress, and that this lack of plan prevents participation more than it encourages it. Here it would be interesting to investigate the circumstances that are necessary for making the participation more attractive than regular observation. Also, there is no guarantee that the participatory culture is more democratic. Ethnic minorities are neglected the same as before, "the white man" still makes most of the users of such services provided by YouTube (Burgess, Green, Jenkins, 2009).

Since this is about a very young and most of all a very diverse field of research, in its tasks included also is the search for appropriate research methods in researching the participatory culture. Is the cooperation of different actors in a period of time estimated by the quantity or quality? And by what criteria, in this case is the quality measured? According to the possibility of re-use or the ease of use?

Today we can find different views/concepts of social and cultural impacts of "new media".

Besides the present optimism related to the possibilities of new media, one can not avoid misuses of the interactive potentials of participatory cultures. Misuse of participation used to be seen as a new form of operation and a new source of revenue of the media industry (Müller, 2009: 2).

Thus, people not only produce new contents, they eventually end up paying so that they could consume them. As commercial TV broadcasters create an audience for the advertising market, more and more Internet platforms try to make the users available to enterprises (Müller, 2009: 12). On the one hand, therefore, we have an optimistic and somewhat utopian view of media capabilities, and on the other hand, the power of the media industry is overestimated, the optimists are dealing with the micro level, and the pessimists, however, with the macro level. However, these two approaches are not opposite, but complementary (Müller, 2009).

Müller provides an interesting difference between the *interaction* and *participation*. He defines the interaction as a physical act of integrating, and participation as social, political and cultural characteristics of the area of participation (Müller, 2009: 5).

Müller also raises a question that has not been answered, whether new forms of participation are really so radically different from traditional forms of culture and cultural conventions (Müller, 2009: 5). So the former custom of barter exchange (barter) or oral transmission is not significantly different from the modern form of exchange of files. Specifically, the cultural contents, such as songs and rhythms, are taken over by the industrial machine, after being orally transmitted for hundreds of years within a nation and between nations. The music industry is therefore laid claim to the public good and over time it turned it into a commercial product. Participation should therefore be one way to overcome the power influence of transnational

institutions, which would bring the cultural property to the original, although now digitized environment. In this sense, the utopian idea using YouTube's statistics is denied: in July 2006 the ratio of people who are uploading videos and photos and of those who have only seen them amounted to 1 to 1538. Most of the users are actually participants in the original sense, they are the consumers of a "tube of plenty" (Müller, 2009: 13).

Principles of 21st Century School

The importance of participatory media culture has for the education system can be formulated by four principles relevant to practice. These principles should serve as a stimulus to thinking about this problem both for teachers, and for those responsible for education policy in their work on the development of the school.

By establishing the participatory media systems (web 2.0, social media, etc.) the use of media in children and adolescents has radically changed in recent years. Today the media is no longer just passively consumed. In the foreground entered increasingly active, in a way, gaming handling of the media and their content, focused on the production. New media culture that has emerged in this way affects all spheres of social life. This raises the question as to whether and how our education system must respond to these developments.

In the white paper on the importance of participatory media for education in 21st century published in 2006, a media theorist Henry Jenkins has attempted the first to systematically deal with these effects (Jenkins, 2006b). The starting points of his thinking are three central challenges that participatory media put before our education system. First, it is the cultural significance of *media convergence* in terms of the use of media convergence. According to Jenkins *convergence of media* is not a question of technology. It takes place inside the head. Therefore, it's not about looking for a comprehensive technology of media, often described as a "black box", but rather on the issue of the ability for the convergent usage of media contents.

As the second challenge Jenkins states *participatory culture* that is currently being developed as the driving force of socio-cultural development. In this sense, participatory culture is primarily limited to the medium. Yet it follows that with the increasing importance of digital media in all social processes, concepts of media participation and social participation can no longer be considered separately. The one who early practices handling web 2.0 technologies will later easily cope with the demands of e-government. Due to media non-participation of certain social groups it may come to social cleavages, and that possibility is described by Jenkins as "participation gap".

The third challenge is the increased importance of the processes that are based on the principle of *collective intelligence*. Jenkins under the collective intelligence includes the ability to coordinate competencies of unrelated individuals in creation of knowledge that is more superior to the classical knowledge of experts in terms of flexibility of creating. Mentioned as the examples are online encyclopedias Wikipedia and the Open Source Linux software. It is important to note that the concept of collective should not be understood egalitarianly. It's not about the equality of individuals within a group, but about the optimal use of the elite multitude of individuals.

To deal with these three challenges, Jenkins describes *eleven* basic media competencies which in his opinion are the main prerequisite for successful participation in media participatory

processes. Thus, according to Jenkins, the primary task of school of 21st century is to develop these core competencies through appropriate pedagogical methods.

- *Experimental game*: the ability to experiment the problem-solving strategies through a game.
- *Playing with identities*: ability to take on and research alternative identities.
- *Designing models and simulations*: the ability of design, implement and analyze dynamic models of real processes.
- *Reuse of contents*: ability to reuse media contents in a creative way.
- *Adaptive multitasking*: the ability of global understanding of the environment and focusing on according as needed.
- *Shared perceptions*: the ability of creative interaction with systems that enable expansion of cognitive skills.
- *Collective intelligence*: the ability to create collective knowledge for the sake of fulfilling a common goal.
- *Evaluation of media content*: the ability to reason about the credibility and ethical acceptability of media content.
- *Transmedia navigation*: the ability to multi-medially monitor the narrative worlds through system media boundaries.
- *Networking of information*: the ability to look through a network, analyze and publish information and knowledge.
- *Relationship to the alternative standards*: the ability to understand different values of social systems and to adapt to alternative norms.

This list is in any way interesting and has the potential to permanently change our current approach to media pedagogy.

The problem with this representation is that it can not adequately lead teachers in their practical work. Core competencies described by Jenkins manifest differently depending on the age. While some of the basic competences of the young are thoroughly practiced already at the early age, others are associated with the reflexive processing of life experience. This means that in a typical situation in a class particular competences are intensively rediscovered, whereas others are and remain the privilege of the teacher.

How can these core competencies be transferred in an appropriate manner? What consequences arise from everyday relationships with students? And which system changes should be expected in school and teaching to make this situation resolved in an appropriate manner?

To clarify these issues, four principles of the 21st century school will be stated that directly derive from Jenkins' assumption, and which relate to the expert hypothesis of the transfer of approach to the theory of the media. In the foreground is not scientific discourse, but rather the applicability focused on the practice. Here, these principles do not require the completeness or

scientific exactness. They are in a certain way designed as the incentives to reflection that should and could lead the teachers but also those responsible for education, in their contact with the medial participatory culture.

Principle 1: There are no teachers, but only students

Media participation means actively dealing with the production of media content. Children and young people through this active use to a certain extent learn self-motivated and independently. In the "Convergence Culture," Henry Jenkins states as an example the case of Heather Lawver, a 14-year-old girl, who with the help of the novels on Harry Potter independently adopted the professional knowledge in literature and passed it on to other peers through a participatory website (Jenkins, 2006a).

The set of such learning effects as a result of participatory culture is still not fully recorded extensively in the literature. Yet it is worth noting that in recent years there are more and more writing about scientific observations of informal acquisition of the most varied professional knowledge in adolescents and children. Therefore, teachers must assume that some students come to school with very specialized expertise and that this development in the coming years will boost even more.

Thus teaching can not be a one-way street transmission, but must be supported by mutual exchange of experience. The modern teacher is no longer superior or inferior to their students. Its main task is no longer transmitting knowledge, but rather complementing the portfolio of competencies of s students' community and directing the process of exchange as well. In essence, teachers are also life-long learners.

If teachers can not assume their role of a student in an appropriate manner, there is a danger that students increasingly question the importance of the school as an educational institution. Finally, in contact with participatory media, they have learnt that at any time they can independently adopt these competencies as soon as they are in need of them. The school is exposed to danger to be increasingly seen as a system whose sole purpose is certification. In schools one is taught for the ratings, and outside school follows the true acquirement of competencies.

Principle 2: Knowing the facts is worthless

We now live in a society of superfluous information. Anyone can produce information in an arbitrary scale and disseminate it through the network without delay. Such a development in the economy is called the commoditization of goods. From the economic point of view there is an unpleasant side effect: commoditized economic good becomes economically worthless because of its ubiquitous availability. Commercial models that are based on the production of such goods suddenly no longer work and must be replaced with other commercial models.

A similar development can be currently observed in school. Commoditization of information makes declarative knowledge educationally worthless and thus in some way call into question traditional business model of school. As in other areas of the economy affected by the commoditization, the school task shifts to the level of the process. It is no longer about underpinning of "important places" in the textbook and rote learning. The emphasis is on learning how to recognize these "important places" and how to assess their information content. It is irrelevant whether afterwards one will learn by heart or not, because the real content of the information of the "important places" is worthless.

Critics will throw in here that the use of the term "worthless" at this point seems inappropriate. And of course it would be quite logical if some declarative knowledge would be immediately adopted, and not using an electronic system for every little thing. In this sense the complete worthlessness can not exist. However, it is important to understand that the role of declarative knowledge in favor of procedural knowledge about constant innovation of new information and communication technologies increasingly enters into another plan.

Principle 3: Standardized education is poor knowledge

20th century could also be called the century of standardization. The standardization of the economy certainly has great significance. In the school context, this term should still be seen as problematic. From the first two principles directly follows that the task of the school today is very individualized. It is a process of exchange of the competencies between all participants, which means that the teaching situations can no longer be repeated, and this fact leads to the possibility of standardization.

As a counter-argument these days often stated is that although the learning should be individualized the goal of education should be standardized as well. And this argument should be accepted skeptically. If a mountain guide would send a large group of climbers with the task that each of them finds the individual way to the top in the hills in accordance with their needs and abilities, it could not be expected that all climbers eventually reach the same peak. Finally, the saying goes that the way - and therefore the process – is the most important. Why would then all students have to achieve the same goals of education? And if they have to, because we as a society want it, does it not limit their opportunities for individual development? Should not even here the process be in the foreground?

Some time ago, Thomas Friedman with his book "The World is Flat" has gained a great reputation in the world of globalized economy (Friedman, 2007). Friedman argues that standardized processes are globally mobile. If you know in which direction to turn the key, there is no difference in whether the rotation takes place in Vienna, Bratislava or Kiev. This means that standardization commodifies the processes and thus also - as already mentioned - makes them worthless. Therefore, if you standardize knowledge, it is also becoming devaluated. For example, today in the sense of Friedman's flat earth would be possible to perform perfectly standardized online master's degree through tutoring with consultation from a call center in India.

So for us there is no other way from personal individualization of education and goals of a high level of education. Standardized education, on the other hand, is poor education. For teachers, this is a side effect which on the face was not expected. Teaching should be individualized according to people attending it. Therefore, no one should feel obliged to implement certain technologies in teaching just because it now seems up to date. Fully in the spirit of the theorist Paul Feyerabend, from the calls for individualization and in lesson planning comes to "resistance of forcing on a method" and "resistance to technology forcing."

Currently in the United States it can be noticed that the standardization of the education system and the related consequence of economization of educational institutions by comparing standardized statistical results, is a double-edged sword. Diane Ravitch in her book "The Death and Life of the Great American School System" impressively shows that in the United States during the standardization of education in the 80-ies a system of "Testing and Choice" was

introduced which lead the public education system led to the socio-political crisis (Ravitch 2010).

Under the "Testing and Choice" it is implied that schools are ranked by meeting the standards of education, and that parents have the opportunity to transfer their children to better ranked schools at the expense of the body that manages the school. The idea was to increase the quality of the education system, but it has lead that schools are no longer interested in fulfilling the educational mission, but to achieve the statistical results. The mission of public education that is based on long-term goals can not compete with short-term goals of economization of education, with the result that it is being increasingly suppressed.

The question is, will our school systems teach at these mistakes and will not apply the standardization of knowledge in a similarly radical way, which is based primarily on economic principles. However, this example clearly shows that the plan of standardization in education should be applied only with the greatest caution. The Bologna process is here another warning example.

Principle 4: We do not learn for school, but for life

One of the most important principles of 21st century school, which is also one of the oldest, is that the school should never be an end in itself, but must have a connection with the real environment of all participants. Socially relevant learning occurs through reflection of school activities in the context of the real world. Biology is not the content of a biology textbook, but one area of a biologist. The one teaching marine biology thus has to primarily train students to think as biologists, so that biology would become understandable. Does it happen in the best with the *game based learning, problem based learning, anchored instruction or equivalent methods*, depends on the individual needs of all participants in the learning process. However, it is important that a tangible reflexive relationship with reality is established in the school.

Participatory media systems are socio-politically difficult to control because they are not tied to geographic boundaries, and all known technological limitations can be overcome by the young with the more or less effort. Each social prohibition leads only to a group of young people migrating into media underground and thus has almost no influence on the actual access.

Conclusion

The keyword "web 2.0" includes a series of developments that have affected the web in recent years. From the perspective of the sociology of knowledge it is of special significance that knowledge is commonly created, expanded, processed, organized, evaluated, expanded into different types of knowledge, implying the decentralized, heterarchical and public processes in which active users constantly create, enhance, organize, and disseminate information, scientific and cultural assets. They question an established notion of knowledge as a commodity and property, as well as models of the organization, operations and distribution based on this non-market and oppose it by the non-market, non-property model of creation and distribution of knowledge.

Schools are now required to follow all technological and cultural trends and integrate them into their work. The school can not and must not ignore the media environment of students, such as the recently introduced ban of social network Facebook. Participatory media and related core

competencies are the central part of the children's and youth culture; they are therefore necessary way of schools dealing with the important issue.

Theoretical and methodological results of participatory culture are a starting point that should be implemented in the new issues and deepening issues with the necessary reflection of theoretical connections between the question *What for* and *Why* in the participation and constructivist epistemology. Finally, we believe that certain questions, which this paper only touches can very well be explained in a deeper and more thoroughly manner.

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How Knowledge can be Managed in Projects

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Abstract

Project management is now a necessity rather than a luxury, and permeates all aspects of business. The importance of managing knowledge in projects for competitive advantage has received a phenomenal amount of attention in recent years. PMO (project management office) serves as a centre of stored knowledge and enhances knowledge management in projects. When there is no PMO established, project managers take over this role. In this paper is presented the correlation between importance which organisation attach to project managers and success of the projects.

Keywords: project management, project knowledge management, project management office.

Introduction

Nowadays, word “project” is extensively used and project management becomes a universal discipline which can be used in almost all areas of business and industry. Although extensive academic research has explored project success (Davis, 2013; Lavagnon, 2009; Judgev & Müller, 2005) much less research has investigated importance of project managers.

First intention of this study was to identify presence of project management offices (PMOs) in Serbia and their relationship with project success criteria. However, PMOs in Serbia are not present enough to be able to conduct a valid statistical analysis. Only few companies in Serbia have recognised the usefulness of PMO and established them. Therefore, the presented study investigated how much importance companies give to project managers, assuming that companies which highly value professional project managers will sooner rather than latter realise the importance and value of PMOs and establish them as well, and by doing that facilitate knowledge management in their projects, since when there is no PMO project manager becomes an “entity” for managing knowledge in the projects. Criteria of project success in this research were whether the project was completed on time, remained in planned budget, met all requirements specified by the user, as well as by estimating the overall success of the project. The study was conducted among people actively involved in project management in Serbia and covered 407 participants. The unit of study was individual participant itself.

The rest of the paper is structured as follows: first, the extent literature on project, project management, knowledge management in projects, project management offices as well as on project management in Serbia is reviewed. This is followed by a description of the research methods, selection of success criteria and presentation of sample on which the research was conducted. Next, the findings are discussed and summarised. Finally, implications of the study as well as its limitations and directions for future research are offered.

Literature review

This chapter provides a theoretical basis and the literature review. The research literature has gone in four directions. Literature dealing with projects and project management was researched, then literature concerning knowledge management in projects and then the literature on PMO as

knowledge management entity on projects. Finally, an overview of the situation in the field of project management in Serbia was given.

Projects and project management

In everyday economic and social life the term “project“ is widely used. The project is a temporary endeavour undertaken to produce a unique product, service or result, and project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements (PMBOK Guide, 2009).

Project management is an universal discipline which can be used in almost all areas of business and industry. It is very efficient and effective, and proved to be a good management tool that is globally available and applicable to all kinds of industries. Today more and more companies organise their business through projects, and whether companies will be competitive or even able to provide their livelihood, depends not only on whether they undertake right projects, but whether these projects are managed in the best possible way. Project management is now a necessity rather than a luxury, and permeates all aspects of business. As companies begin to realise all good aspects that project management has on profitability, the focus is shift on achieving professionalism in project management. The way to achieve this was through the establishment of project management offices.

The field of project management continues to grow, and there is no evidence to suggest that it will reduce or become less complex (Lientz & Rea, 2002; Krahn, 2005). Various business organisations have a growing need for the management of projects, since companies are nowadays using projects in their daily work to achieve their goals. Management literature, both the popular and scientific, has been paying attention to knowledge and knowledge management for a number of years. Although organisations and their managers realise that knowledge is important it is not always easy to find a starting point for managing knowledge in an organisation.

Knowledge management in projects

Knowledge management can be looked at as the systematic process of creating, acquiring, disseminating, leveraging and using knowledge to gain a competitive advantage or to achieve an organisational objective (Nicolas, 2004). Knowledge itself usually is embedded in repositories, documents, routines, operational processes, practise and norma (Lin, Tseng & Yeh, 2005). Since knowledge is treated as a competitive resource, it is driving organisations to implement various knowledge management initiatives to identify, share and exploit knowledge assets (Chua & Lam, 2005). Knowledge management strategy is the process of generating, codifying and transferring explicit and tacit knowledge within an organisation. It requires getting the right information to the right people, in the right place and at the right time. The knowledge strategy defines the needs, methods and actions to achieve the objectives (Aronsons, Halawi & McCarthy, 2006).

The importance of managing knowledge for competitive advantage has received a phenomenal amount of attention in recent years (Nonaka & Takeuchi, 1995). Together with that, attention has been directed towards the opportunities and limitations of managing knowledge in project environments (DeFillippi, 2001; Gann & Salter, 2000; Prencipe & Tell, 2001; Winch, 1998; Bresnena et al., 2003). Two types of challenges in knowledge sharing arise often in project environments. Firstly, how to prevent the “reinvention of the wheel” and share knowledge accumulated in one project with others? Project teams are temporary and therefore a lot of

learning may be lost when they disband. This arises the second challenge: how to enhance the communication of peers working in dispersed projects, as relationships in project organisations are maintained cross-functionally. This may increase knowledge sharing yet at the same time isolate people from peers. When it comes to knowledge management in projects, particular problem is the fact that some of the knowledge may be lost because they are located within the various areas of knowledge, and they need integration to be able to continue to grow.

Brookes and Leseure (2004) report a strong correlation between good project management practises and evidence that good project teams use good practises for management knowledge. Likewise, companies that had problems with knowledge reuse across projects also had problems implementing good project management practises. Current research into project management offices (PMOs) has stressed the PMOs' potential to act as knowledge brokers between projects, and between project and top management (Pensel & Wiewiora, 2013).

Project Management Office

Project Management Office (PMO) is an organisational unit that is established to help project managers, project teams as well as different levels of management in carrying out the principles of project management. PMO coordinates and manages all projects in the company and it is engaged in the collection of best practises for project management, selection of methodologies for project management and selection of tools and techniques used in project management. Beginnings of PMO is set in the second half of the twentieth century, when the defence industry had to coordinate large, complex contracts, which contained a lot of projects for a large customer (Kerzner, 2006). Systematic study of the PMO begin to receive attention in the literature related to project management only in the last decade (Dai & Wells, 2004; Hobbs & Aubry, 2007).

The primary objective of the PMO is to ensure compliance with policies, standards and methodologies for project management. Over time, the PMOs are becoming a source of guidance, documentation and metrics related to the practise of conducting projects in the organisation. The office is involved in tasks related to projects, and monitor project activities from start to finish. PMO is able to report to the top-management of the project activities, problems and requirements, and can be a strategic tool for making decisions that are in line with business objectives (Aubry, Hobbs & Thuillier, 2008).

As it was noted in previous paragraphs, PMO serves as a centre of stored knowledge and enhances knowledge management in projects. When there is no PMO established, project manager serves as knowledge managing entity on projects (Dietrich, Arto & Kujala, 2010). The project manager must develop a project environment in which knowledge is created, shared and utilised to produce the results desired by the client organisation. For these reasons, effective knowledge management within a project context should contribute to the attainment of value from projects.

Project management in Serbia

Development of project managers' profession as well as development of complete area of project management, in many ways, are provided by the leading international organisation for project management, such as Project Management Institute (PMI), International Project Management Association (IPMA), the American Academy of Project Management (AAPM) and others. These organisations, for many years, hold meetings, conduct training and professional development in

order to transfer experience and knowledge and improve the field of project management in Serbia.

In Serbia, the most widespread are PMI and IPMA, through its national sections. They provide opportunities for training and certification of project managers in the country. Unfortunately, this possibility managers in Serbia do not use in sufficient number since the number of certified professionals in the neighbouring countries is much higher than in Serbia (Bredillet, Yatim & Ruiz, 2010). Companies operating abroad (or foreign-owned) are generally adopting a project management methodology of that foreign company. Still, there is no pressure to create a new standard for the use of project managers, or to adopt an existing one as at a national level.

Project management implementation and adoption in Serbia and similar environments must not be seen in simplistic, linear, and rational terms only. In an environment of irrationality, political turbulence, and strong cultural traditions, it is not possible to ignore emergence, radical unpredictability, micro-dynamics, and self-organising properties of humans in relation to their endeavour to make sense of their collective reality and move toward a more promising future (Cicmil et al., 2009).

Methodology

The target group of this study were people in Serbia active in project management. Given the level of economic transition in which Serbia is and the size of its' population, Serbia is a good example of the transition country from Central and Eastern Europe (Hadžić, 2002; Dethier et al, 2004; Kancs, 2007; Kecmanović, 2012).

A survey was designed to capture the "real world" experiences of people in Serbia who are actively involved in the project management, and the goal of this study was to identify how much importance companies give to project managers and how is that related to project success. The questionnaire was posted on the Internet. When selecting a sample, the so-called snowball sampling was used. An initial group of project managers and project team members was identified and a link to a questionnaire was forwarded to them. They were also asked to pass the link on to their colleagues. It is therefore not possible to determine how many people received the link to the questionnaire, and consequently no response rate can be determined either.

Questionnaire was based on literature study and it was pre-tested in a pilot survey on 21 respondent active in project management. The research lasted through 2012, and data on 407 people active in project management in Serbia were collected. Only fully completed questionnaires were processed. Respondents who dropped out at some point and did not complete the questionnaire were not taken into account, and total number of them were 52.

Respondents come from companies which differ in ownership structure. The state-owned companies (public companies) include public and local government, and all those companies that operate with funds of the state and whose establishment and termination is decided by the state or authorised government body (41%). A private company is one which operates with the funds that are privately owned, and the establishment and termination of such a company is decided by founder and owner. In the sample are represented both companies in domestic (25.1%) and in foreign private ownership (24.3%) (Table 1). In the presented sample, respondents were from more than 30 companies distributed across 11 industry types, however, not all industries were present enough to be able to perform statistically significant analysis, so those industries were

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grouped together in the “other“ category (Table 1). Respondents also come from companies that vary in size (Table 1). In this way, wide variety of projects in which the respondents participate was achieved.

Table 1: Data on companies

	Category	Frequency	Percent
ownership of the companies	public (state-owned) companies	167	41.0%
	private (domestic-owned) companies	102	25.1%
	private (foreign-owned) companies	99	24.3%
	NGOs	39	9.6%
industry type	IT	89	21.9%
	oil, gas and petrochemical industry	71	17.4%
	education, scientific research	63	15.5%
	finance, insurance, banking	45	11.1%
	art, culture, media	42	10.3%
	food industry	38	9.3%
	other	32	7.9%
	health and pharmacy	27	6.6%
number of employees (size of the company)	1-50	100	24.6%
	51-200	91	22.4%
	201-1000	102	25.1%
	more than 1000	114	28.0%
Total		407	100.0%

By gender, respondents were evenly represented (Table 2). When it comes to the hierarchical representation of respondents in the company, the smallest number is of the highest-ranking employees - top management (11.5%), followed by respondents who occupy middle management positions (29%), while more than a half of respondents are direct perpetrators of work (59.5%), which corresponds to the hierarchical structure of the most companies (Table 2). Most of the respondents were project team members (48.4%), but there is a sufficient number of project managers (34.9%) (Table 2).

Table 2. Data on the respondents

	Category	Frequency	Percent
gender	female	188	46.2%
	male	219	53.8%
position in the company	top management	47	11.5%
	middle management	118	29.0%
	staff	242	59.5%
role in the project team	member of a project team	197	48.4%

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	project manager	142	34.9%
	manager who works with a project team	68	16.7%
Total		407	100.0%

The success of the project is not easily either defined or measured, and so far researchers were unable to reach consensus neither on the definition nor on the terms of measuring the success of the project (Cooke-Davies, 2002; Lavagnon, 2009). The most prevalent solution to the problem how to measure the success of the project is a simple formula that is unambiguous and can be easily applied, and that is the "iron triangle: time, cost and quality" (Dvir, Raz, & Shenhar, 2003). Research conducted in 2002 (White & Fortune, 2002) showed that three the highest ranking criteria by which to measure the success of the project were exactly those forming "iron triangle" - quality ("meet the demands of our clients" 970 points), time ("finish on time and on schedule" 850 points) and budget ("stay within the budget" 766 points). The following ranking criterion, after these three, has only 188 points. A study was conducted (de Bakker, Boonstra & Wortmann, 2010) which determined method of defining and measuring the success of projects in research, and the results show that in about two-thirds of surveyed papers success of projects was defined and measured exactly by satisfying these three criteria.

These three criteria are considered central when it comes to the success of the project, although some studies define some new criteria, such as customer satisfaction (Ling et al, 2009), business success (Sausser et al, 2009), profit (Ling et al, 2009) or meeting organisational goals (Thomas & Fernandez, 2008). However, the „iron triangle“ remains the basis for all subsequently derived measures of project success (Kutsch & Hall, 2005, Dey et al, 2007, de Bakker, Boonstra & Wortmann, 2010) and for now, the dominant opinion is that the success of the project should be measured by traditional measures - time, cost and quality (Lavagnon, 2009).

Having all that in mind, this research measured the success of the projects by four success criteria: number of projects completed on time, stayed within budget, met all requirements and specifications, as well as by estimating the overall success of projects in the company. Scale on which the success of projects was measured was in the range 1-10.

Results

In order to measure importance of project managers in companies, respondents were asked to select one of the offered answers, which range from not having project managers in the company to attaching high importance to the role of project manager in the company.

Table 3: The importance and role of project manager for the development and survival of the company

	Frequency	Percent
my company do not have professional project managers	134	32.9 %
high, the company could not survive without them	90	22.1 %
moderate, it is good that they are there, but they are not crucial to the survival of the company	137	33.7 %
it makes no difference whether they are there or not	31	7.6 %
do not know	15	3.7 %
Total	407	100.0 %

Almost a third of respondents claim that their companies do not have professional project managers, while more than 20% of respondents recognised the importance of project managers in companies. However, most respondents believe that project managers are not critical to the survival of their companies, but it is a good thing to have them there. The analysis is continued in the direction of linking the significance attached to the professional project manager with the success indicators of the projects.

To determine the relationship between importance companies give to project managers and project success criteria, a series of analyses of variance was conducted (Table 4). To further determine the difference between the individual categories, further post-hoc analysis was conducted using LSD test (presented in the table as "Significant differences"). Analysis of variance was used to check whether the average value of the dependent variable (success criteria of the project) distinguish among different categories of responses to specific question (importance companies give to project managers). Categories among which the significant differences are noted are stated in the table, in the row "Significant differences", while N represents sample size, M average, SD standard deviation, F analyses of variance and p probability generated by a significance test (Table 4).

The results show that for the first success criterion (“number of projects completed on time“) significant differences are observed between second category " high, the company could not survive without them " and all other categories, as well as between third („moderate, it is good that they are there, but they are not crucial to the survival of the company“) and fourth („it makes no difference whether they are there or not“) category. Furthermore, average success rate of the projects (M) is the highest for the second category which indicates that the most successful projects, in terms of completing on time, are those conducted in companies which believe that project managers are very important (Table 4).

For the second, third and fourth success criterion („number of projects remained within budget“, „number of projects that fully meets the requirements and specifications“ and „the assessment of overall success of projects“) results show the same thing – significant differences are observed among the second and all other categories and average success rate of the projects is the highest for the second category (Table 4).

This means that the success of the projects differs significantly in all four categories that company can have (from not having project managers at all to considering them very important). It can be concluded that the attitude towards project managers is very important, since the assess of the effectiveness of projects differs significantly in all given categories. Average success rate of projects (M) for all four success criteria is the highest when company consider project managers important (Table 4).

Table 4: Correlation between importance companies give to project managers and project success criteria

success criteria	importance of professional project managers	N	M	SD	F	p
Number of projects completed on time	(1) my company do not have professional project managers	134	5.022	2.800	12.943	.000
	(2) high, the company could not survive without them	90	7.078	2.640		
	(3) moderate, it is good that they are there, but they are not crucial to the survival of the company	137	5.423	2.905		

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	(4) it makes no difference whether they are there or not	31	4.097	3.350		
<i>Significant differences: 1-2, 2-3, 2-4, 3-4</i>						
Number of projects remained within budget	(1) my company do not have professional project managers	134	4.672	3.058	18.118	.000
	(2) high, the company could not survive without them	90	7.600	2.672		
	(3) moderate, it is good that they are there, but they are not crucial to the survival of the company	137	5.810	3.069		
	(4) it makes no difference whether they are there or not	31	5.000	3.044		
<i>Significant differences: 1-2, 1-3, 2-3, 2-4</i>						
Number of projects that fully meets the requirements and specifications	(1) my company do not have professional project managers	134	4.396	3.302	14.723	.000
	(2) high, the company could not survive without them	90	7.133	2.934		
	(3) moderate, it is good that they are there, but they are not crucial to the survival of the company	137	5.219	3.427		
	(4) it makes no difference whether they are there or not	31	3.871	3.500		
<i>Significant differences: 1-2, 1-3, 2-3, 2-4, 3-4</i>						
The assessment of overall success of projects (including implementation)	(1) my company do not have professional project managers	134	5.239	1.807	34.404	.000
	(2) high, the company could not survive without them	90	7.444	1.849		
	(3) moderate, it is good that they are there, but they are not crucial to the survival of the company	137	6.737	1.491		
	(4) it makes no difference whether they are there or not	31	5.742	1.861		
<i>Significant differences: 1-2, 1-3, 2-3, 2-4, 3-4</i>						

The results of this study show that in Serbian most companies attach moderate significance to the existence of project managers, while almost a third of respondents claim that their companies do not have professional project managers. Results also show that the success of the project, in all four measured criteria, is higher in the case where the company highly value its project managers.

Discussion and Conclusion

The level of knowledge that companies have in terms of project management, relationship with that knowledge and way how knowledge is managed in projects have a significant impact on the results of the project. In this paper developments in the fields of project management and knowledge management were presented, and origin and significance of PMO was explained. Since Serbia is still in the early stages of project management development, PMOs are not introduced in many companies, so there is no statistical significance in researching them. Instead, importance which organisations attach to the project managers and correlation of that importance with project success was researched. The higher the importance of project manager is in the organisation, the higher is his freedom and decision-making ability in managing projects, so project managers serves as knowledge managing entity, instead of a PMO. It could be claimed

that if an organisation consider project manager as highly important figure, he, in a way, serves as a PMO forerunner and therefore is “in charge” for managing knowledge in projects.

A PMO is a formal layer of control between top management and project management (Kerzner, 2003; Liu & Yetton, 2007). Although many organisations do not have explicit PMO, the PMO functions are often incorporated within the parent organisation in the role of project managers (Dietrich et al., 2010). From a knowledge perspective, the PMO can be regarded as an organisational unit facilitating coordination of knowledge and act as a bridge over organisational and knowledge boundaries.

The project manager has a major role in project management and its importance in the organisation is undeniable (Anantatmula, 2010; Nixon, Harrington & Parker, 2012). When it comes to the correlation between the importance that companies provide for project managers and project success, the results show that respondents who believe that the importance of professional project manager is high have more successful projects in all four success criteria. Furthermore, this research shows that the average mark of the success of projects is the largest for those projects whose executives believe that the importance of professional project managers is very high. Other studies also showed that companies that have problems in knowledge management in projects also had problems with good project management practises (Brookes & Leseure, 2004).

Results presented in this paper demonstrate that the greater significance of the project managers is (therefore, greater significance and of knowledge management), the more successful projects are. Effective project management involves the establishment of PMOs as knowledge-managing entities in projects. However, while that does not happen, project managers serves as knowledge-managing entities in order to increase the success of projects.

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Critical Success Factors in South African Business Intelligence Projects in the Insurance Industry

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Abstract

Critical Success Factors (CSFs) are those factors which need to be addressed effectively in order to improve a new project's chances of success. This research looks at which CSFs were deemed the most important in three BI projects within a tier 1 South African insurance organization. A Delphi technique was used to achieve consensus among the 26 respondents. The most important CSFs categories were found to be 'Committed Management Support & Champion', 'Business Vision', 'User Involvement' and 'Data Quality'. The results also correlate partially with those uncovered in a European study.

Keywords: Business Intelligence, Critical Success Factors (CSFs), Delphi technique, South Africa, BI in Financial Services (Insurance) Industry, Case Study.

Introduction

Success achieved in BI implementations has varied across organizations and industries. Whilst each organization provides a specific context, a group of more generic factors critical to the success of BI projects has been identified. These factors, referred to as Critical Success Factors (CSFs), cover a wide spectrum of influences such as top management support, market dynamics, data quality of the source systems and BI system utilization. Some of the recent studies that investigated the outcomes of organizational BI projects by using the CSF approach are: Yeoh et al (2007); Hawking & Sellitto (2010); Yeoh & Koronios (2010); Olbrich et al (2012); Presthus et al (2012).

This research aimed to ascertain which CSFs are seen as the most critical in the South African financial services context and how these findings relate to those from the overseas studies. Since there appears to be very little research on CSFs in BI implementations in emerging countries, this paper should provide additional insight to both BI practitioners and academics.

Literature review

BI's main purpose is to "identify information needs and process the data and information gathered into useful and valuable managerial knowledge and intelligence" (Pirttimäki, 2007, p.4). The proper use of BI can have a material benefit on an organization's bottom line (Ranjan, 2008). This was substantiated by research that has shown the importance of BI for IT executives (Luftman & Ben-Zvi, 2010).

However, BI benefits are not always realised (O'Brien & Kok, 2006). Hawkins (2010) found that the main objective of BI use, a higher quality of decisions, was often not achieved. Whilst BI has often been seen as a technology solution, the reality is that there are a multitude of internal and external factors that influence the outcome of a BI investment. These include the quality of the data sources, the investment funding, the type of industry the organization competes in, the level of support from senior management to the skills of the technical resources (Olbrich et al, 2012). Depending on the industry and type of organization, some factors will have a greater influence on the BI solution than others. The challenge for organizations is to identify the factors that have

the greatest influence on their BI system. An important criterion when selecting the factors is that the organization must have some degree of effect on the factors during the timeframe of the project. The effect can be partial in that guidelines of how the target for a factor is expected to be met will be set whereas full control precisely defines the expectations of what the target for the factor is (Olbrich et al, 2012). Through focussing on these factors, the organization will be able to provide the platform for increasing the potential success of the IT solutions.

Over the last 5 years, there have been a number of empirical studies covering CSFs in BI (Yeoh et al, 2007; Hawking & Sellitto, 2010; Yeoh & Koronios, 2010; Olbrich et al, 2012; Presthus et al, 2012). Across these studies, committed top management support, source system data quality and user involvement consistently rated as the most important CSFs.

By contrast, there has been much less empirical BI research in South Africa, and none of these studies used the CSF approach explicitly. O'Brien and Kok (2006) conducted an early empirical study into the financial and other benefits of BI use in the large private telecommunications organisations using a combination of quantitative and qualitative methods. They found that even these large businesses in this sector did not fully understand BI and its benefits or, where they did, did not use BI to its full potential. A more recent empirical study was done by Pellissier & Kruger (2011) in the long-term insurance industry, but they focused only on a sub-set of BI, namely the use of strategic intelligence. Their research also found a lack of awareness and under-utilisation of the intelligence capabilities. The importance of a value driven framework for BI in the South African financial services industry was identified in an empirical case study research project (Smith & Crossland, 2008). This project identified that aligning BI strategy with organisational strategy and explicitly measuring business benefits using metrics, are key to realizing the value of BI. There have been a number of documented successful BI projects in the South African public sector, namely in the South African Revenue Service, the City of Cape Town, and the Western Cape Education Department (Hartley & Seymour, 2011; Lutu & Meyer, 2008). A study by Bijker (2010) noted the importance to taking an incremental approach to BI to deliver sustained value to the organization.

Research methodology

The objective of this research is to determine the key CSFs identified by both technical ("IT") and business experts working in a South African insurance company across different BI projects. To provide a baseline for the latter, the Olbrich (2012) study from Europe has been chosen. It uses a comprehensive list of factors over three rounds of a Delphi study and covers three dimensions of interest: importance, variability and controllability.

In line with prior CSF research, a Delphi approach was used. The Delphi technique uses a panel of experts to achieve a degree of consensus by means of successive questionnaires. The iterative process allows participants to change their view in the light of the aggregated results of previous survey rounds. While a degree of consensus is often the core objective, it is also interesting to note and interrogate minority views (Linstone & Turoff, 2011). Interviews were also conducted.

Key stakeholders in three different business units of a major South African insurance organization were approached to participate in the research. The three business units were selected with the aim of having a variety of BI projects: a very large strategic project, a small strategic project and a medium sized operational project. For the first round 31 participants were contacted, of which 26 responded. Of these 26, 20 responded in the second round. Since

sufficient convergence was achieved after the second round, no third round was necessary. In both rounds, there was a perfectly even split between IT and business domain experts. In the second round, 11 responses were from business unit 1, 6 from business unit 2 and only 3 from unit 3.

The initial list of CSF factors was based on the Olbrich et al (2012) list of 25 factors. Five factors were dropped as they were not relevant for a single organisation study, four CSFs were adapted and four were added. This resulted in a final list of 23 CSFs for the first round. For the second round, the CSF “user involvement”, was added due to participant input (see below). Also, we requested that all CSFs be rated *twice*: once for the respondent’s business unit’s specific BI project and once for the participant’s perception of BI projects in general.

Description of the three Business Intelligence projects

Business unit one: strategic predictive analytics dashboard

The first business unit had a BI solution consisting of a predictive analytics dashboard, aimed at increasing the unit’s profitability and growth. The system was implemented in a phased approach over a four-year period. The backend source systems range from mainframe to ERP (enterprise resource planning) systems. The enterprise data warehouse is populated with the backend system data using an ETL process which includes limited data transformation. Data processing using data cubes and other techniques is done to analyse data. Predictive analytics software is also used as part of the data analysis. The data is provided through a dashboard to the users using QlikView enabling the user to drill down in the specific data required. Although initially planned to have 200 users, the positive experience sees currently over 670 active users on the system. Apart from driving the business unit’s expansion and new market opportunities, the system now ensures that all users have a single version of the data and also resulted in user productivity increases.

Business unit two: an operational KPI reporting system

Business unit two implemented an operational BI system in response to an efficiency drive in their back office processing department. A consultant recommended a variety of KPI’s to be measured. The back office system was extended to capture additional information required and a data warehouse was set up. An ETL program was created to extract the information to the data warehouse for OLAP processing. The new reporting system provides a variety of Excel reports directly supporting the workflow of the back office agents. Some of the reports are quite complex and use cross tabbing functionality. The system was deemed a success as a number of vacancies needed no longer to be filled and has required minimal maintenance.

Business unit three: a drill-down reporting system

The third business unit implemented a BI solution to improve the reporting which was previously done using Excel. Due to the large number of transactions, reporting was being done only on large transactions and mainly at the branches. However, there were differences in opinion between the branches as to what needed to be reported. The data was loaded from five backend systems using an ETL process into their multidimensional database management system Essbase. During this process, data transformation occurred. Analysis of the data was done and a number of reports were initially produced. From the reports, a number of oversights in the manual reporting were identified. Further reports were requested significantly increasing the coverage and granularity of the reporting. As the business unit is small, no business analyst was involved

in the project. This resulted in issues between what business expected and what IT thought they wanted. The project also had data quality issues that were only picked up in production. Notwithstanding these shortcomings, executive management saw the value in the solution and have embarked on further BI projects.

Data Analysis and Findings

CSFs identified by the participants

In both Delphi rounds, participants rated each of the CSFs provided using a detailed descriptive importance rating. Few participants changed their ratings in the second round so it can be presumed that a sufficient degree of consensus was reached after only two rounds. The ratings of the second round for the general (i.e. not project specific) CSFs are shown in figure 1. Several criteria can be used to rank the csfs given their importance scores. Figure 1 shows the CSF rankings using the “very important” scores as the primary sorting key and, within that, “decidedly important” as a secondary criterion.

This order aligns quite well ($r = 0.965$) with a weighted average score based on the traditional “equidistant” Likert weights except that, in the latter case, business unit strategy and technical capability are ranked markedly higher. In both cases, the top three CSFs (with equal average) are data quality, it influence on business strategy and the business case for the bi project. Other critical CSFs appear to be: having a business champion, user involvement, technical capability, top management support and IT influence on the business unit strategy. These factors and their relative importance align well with the European study (see below: Hypothesis 2).

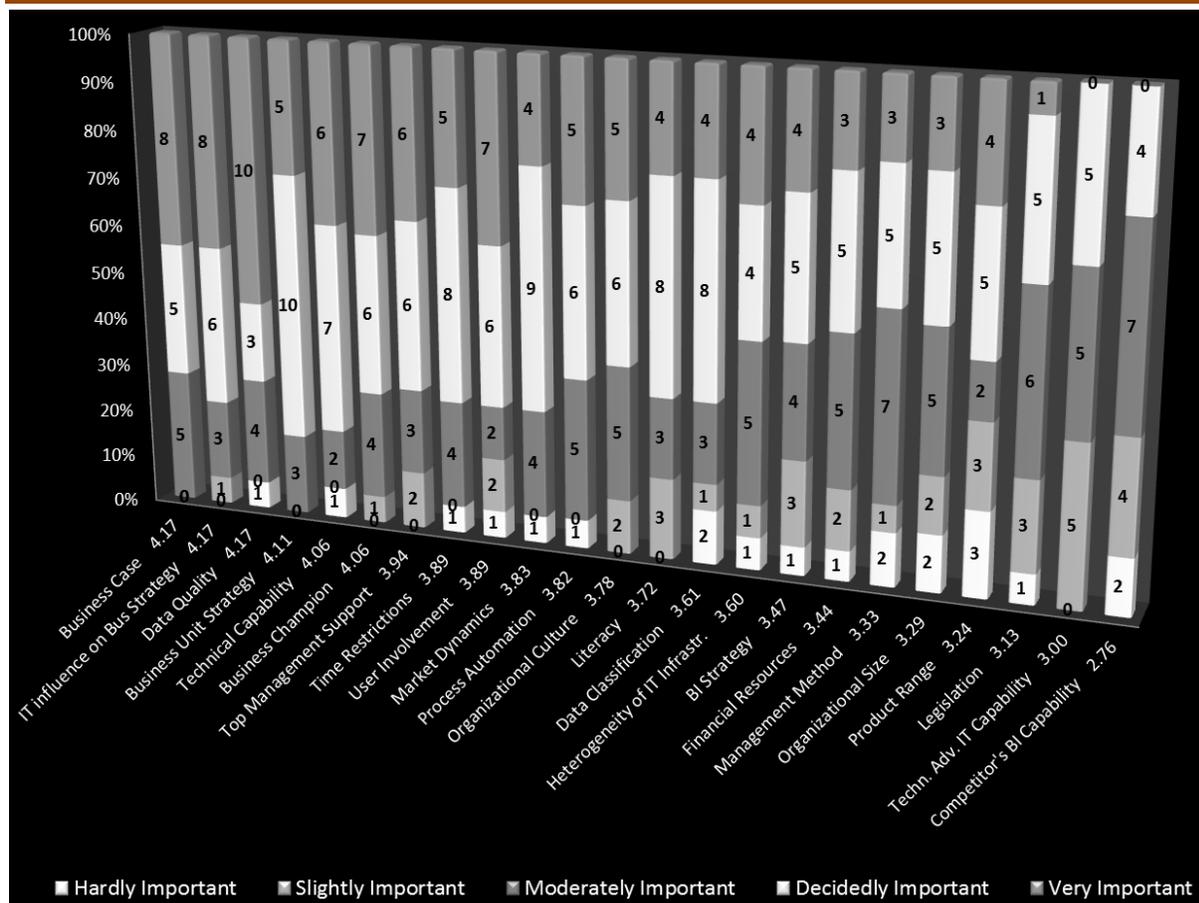


Figure 1: Importance ratings for each CSF (final round) by average and detailed breakdown.

Comparison with a recent European study (Olbrich 2012)

A comparison was done on the CSF importance rankings between our findings and those of the most recent European study, namely Olbrich et al (2012). The comparisons were based on the sixteen CSFs that were common across both studies for round one and the nineteen CSFs that were common across both studies for the final round.

The statistical tests showed a good correlation between the two studies with a rank-correlation coefficient of 0.577 (statistically significant at p=0.010). However, while the South African study comprised both IT and business participants, the European study was only comprised of IT participants who occupied the roles of senior managers and project managers. Thus we refined the analysis to distinguish between the South African IT and business participants. Not surprisingly, the ratings of the IT participants showed a much stronger correlation (0.579) with the p-value of 0.0099 being highly significant. The ratings of the business participants, on the other hand, showed only a weak, statistically non-significant correlation (0.354, p=0.118) between the datasets. This illustrates clearly how research outcomes can be influenced by the criteria used to select the sample. Table 1 summarizes the findings and comparison with the European study.

Table 1: Summary of comparison with Olbrich et al (2012)

Hypotheses	Hypothesis supported?	Final round	
		Correlation coeff	p-Value
H ₀ : SA participants will rate CSFs similar to the participants of the European study	Supported	0.5766	0.0103
H ₀ : SA <u>IT</u> participants will rate CSFs similar to the participants of the European study	Supported	0.5792	0.0099
H ₀ : SA <u>business</u> participants will rate CSFs similar to the participants of the European study	Not supported	0.3540	0.1178

Variability and controllability of CSFs

In the second round, participants were also asked to rate the variability and controllability of the top ten rated factors from the South African BI in general context from round 1. The decision to include these dimensions was to add a more holistic and rounded narrative to the CSF. An example is top management support. The mean response indicated that the participants in this study found that the variability ranged between ‘consistent for the majority of the duration of the project’ to being ‘fairly consistent; variation starts to be noticed as hurdles are encountered on the project’. For controllability the finding was in a similar range between ‘BI management secures top management support on an ad-hoc basis and ‘Secures support on a regular basis’. This highlighted that some executives gave support when they had a ‘need for specific information that they deem to be strategic’ whilst others saw the overall importance of BI in their organizations.

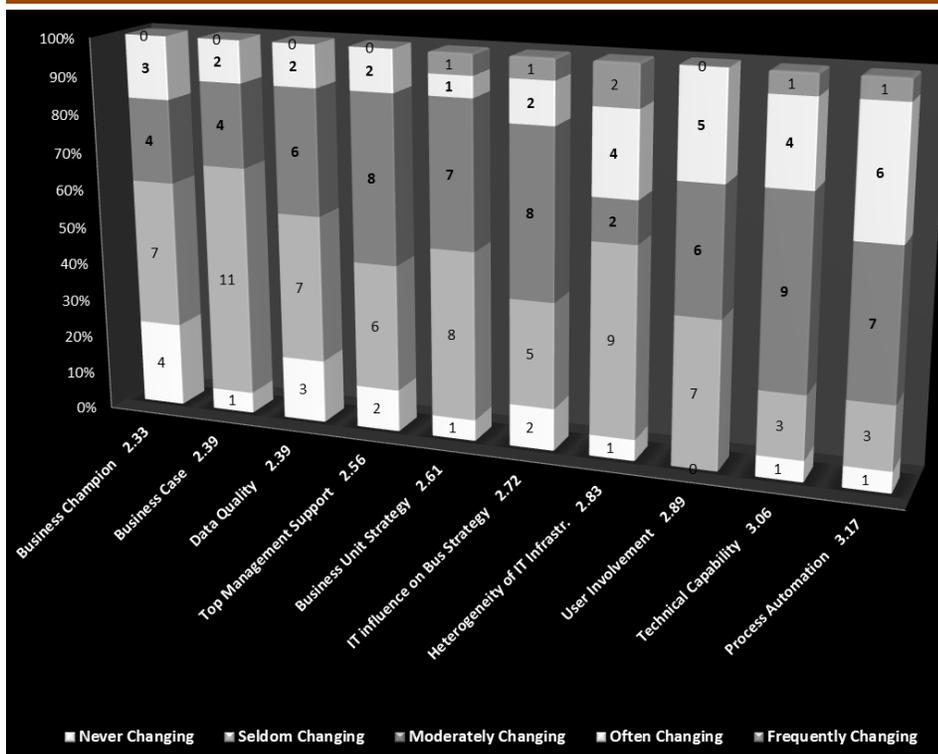


Figure 2. Perceived variability of top CSFs

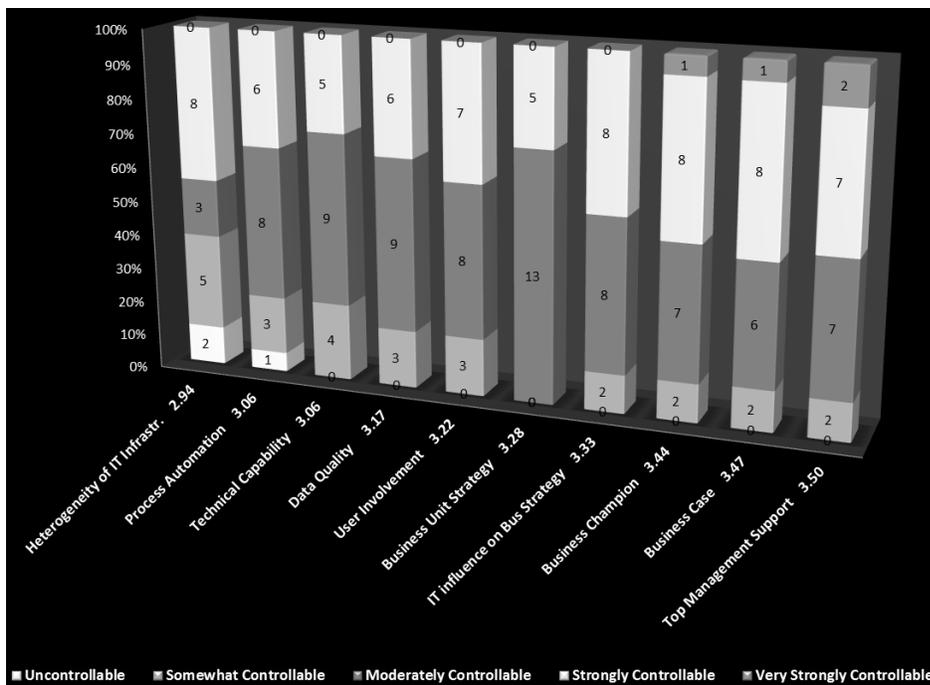


Figure 3. Perceived controllability of top CSFs

There were only seven factors for both dimensions that were in both studies. As the European study used ranking for rounds two and three and this study used ratings, the comparison was

done with the European round one. For neither of the two dimensions could a statistically significant correlation be established; the respective correlation coefficients were 0.3055 for variability and 0.1868 for controllability.

When examining the absolute values, they appear to indicate that the South African participants perceive that there is less variability in their environments and that they have more control over the factors. This could be because there is bias in the sample as ten of the participants in round one come from business unit one whose BI implementation has been very successful. Since the European study was conducted across different industries, we believe that the European ratings for the variability and controllability dimensions are potentially a truer reflection of the reality being experienced in organizations in general.

Conclusion

BI can provide an organisation's decision makers with accurate, relevant and up to date information on which to base their decisions. However, given their complexity, BI solutions are usually quite challenging to implement. Best practices and research on increasing BI success can reduce the risk associated with BI implementations. CSFs provide BI practitioners with insights into which factors should be effectively addressed within the constraints of their project in order to improve their chances of success.

A number of reference studies provided insights into the CSFs that were key to enabling a successful BI project implementation (Olbrich et al, 2012; Yeoh et al, 2007). However, no South African BI research addressed CSFs in the BI domain. This represented an opportunity to add to the body of existing knowledge and provide findings that are relevant to the South African context.

The research followed a mixed method approach of a survey and interviews. The survey followed the Delphi method approach with the participants primarily required to rate the CSFs for importance based on a Likert scale. The most important CSFs were also rated for variability and controllability. Interestingly, none of the projects had explicitly identified upfront the CSFs together with their relevant metrics needed for their projects to succeed. Encouragingly, some participants noted in the interviews that, now that they had been exposed to the list of CSFs, they would use it as a reference for future projects.

The most important CSFs identified belonged to the categories of 'committed management support & champion', 'business vision', 'user involvement' and 'data quality'. The highest rated CSFs for the importance dimension for the BI in general context were 'data quality', 'business case' and 'influence of IT on business unit strategy' whilst the highest rated in the project context were 'data quality', 'top management support' and 'business champion'.

A moderate correlation was achieved between the overall rating of this study for the BI in general context with the European study. There were a few significant differences in the ratings given by the IT and the business experts.

Future research could investigate whether the top CSFs are also identified in non-financial industries or other emerging countries, to see whether these findings are generalizable.

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Knowledge Management Necessary for Occupations

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Abstract

Rapid developments of techniques and technologies have driven the needs for the application of new knowledge in workplaces. It would be optimal if this new knowledge should be brought through formal education system, but there are two obstacles to the achievement of such goal.

1. Majority of educational institutions do not have the human and material resources required to apply the results of the rapid development of technology to a teaching process;

2. Education for the emerging occupations requires a long period for preparation and implementation of curricula.

These are the main reasons why educational institutions can't meet the demands of the contemporary economy. This paper presents a quantitative analysis, indicating a discrepancy in the number of educational profiles in Serbia and the number of occupations. The research shows that there is a significant delay and lagging of the educational system behind the rapid technological progress. Non-formal education, wherein the Internet takes an increasingly important role, is foreseen as promising solution to this problem.

Keywords : Education profile, Occupation, Technological progress

Introduction

Apart from primarily upbringing and education, the educational system has a number of other highly significant functions that are not in the system's title. These are:

1. The selective function, with the school making selection and allocation in the hierarchy of society;
2. The verification function in which the school with issued documents guarantees certain individual's performance;
3. The function of socialization, where the school is placed as a link between an individual and society, with its particularistic and universalistic norms;
4. The manifest function of school, where the school presents a primary transferor of culture;
5. The ideological function, where the school is one of the pillars of the establishment of the system of social stratification;
6. The latent functions of schools that represent the entire range of covert influence and activities that take place under the auspices of the school system. These are: development of communication skills, the formation of different structures, and even employment postponement which is especially important in countries where the unemployment rate is very high.

From the aspect of work and employment the educational function of the educational system is the crucial one. It is desirable that a worker entering into concrete workplace has all the necessary knowledge and skills for performing all duties and tasks that he/she will encounter during the working life. Such idealized education can't be established due to the rapid changes in modern technologies resulting in appearance of new knowledge and skills which the workers will need in their working life; in 40 years of their professional career, employees are expected to

perform jobs and tasks that could not be even foreseen at the time when her/his schooling took place. One attempt to solve this problem today is to apply lifelong education concept, which requires employees to educate themselves throughout their working life.

A very special problem in gaining education is the education for the initial occupation. By schooling completion an individual should gain knowledge that is up to date, sufficient for inclusion in the work, and enables the acceptance of a new knowledge resulting from the technological progress. In order to fulfill these requirements the educational system should have the appropriate personnel and equipment, which is very difficult to achieve due to the inertia of the system, and to some extent due to the limited financial resources. The inertia of the system occurs due to objective factors, such as long time necessary to form new personnel or to train the existing one for acceptance of new technologies. There is also a reason that is not objective, but the psychological one - resistance to changes in general.

There is also certain inertia in working organizations, but it is lower, so that work organizations are the initiator and driving force of development of rapid changes. They are forced to changes by the market which is constantly searching for lower prices and higher quality of goods and services.

In this research the relation is established clarifying the relationship of speed at which educational demands of working organizations are changing and to what extent the educational system manage to follow these demands.

The aim of the research

The aim of this research is to analyze occupations appearing in working organizations in Serbia and to investigate ability of the Serbian education system to meet demands of the labor market. The research will be based on two variables:

1. Occupations appearing in working organizations .
2. Educational profiles in educational system aimed at training professionals for work .

Theoretical Basis

The speed of development of working organizations and the degree of changes in their operation can be traced through the occupations' development.

The term occupation means: a set of organizational - technology associated and related jobs and tasks that appear as the basis of this work for a longer period of time, and which require specific knowledge and skills. (Nomenklatura zanimanja, 1990)

The speed of development of the educational system can be traced through the development of educational profiles.

The term educational profile means: set of knowledge defined by the curriculum the students acquire in the formal education system. (Strategija stručnog obrazovanja u Republici Srbiji, 2006.)

It would be ideal if the educational profiles all fully matched the occupations, so that the staff employed has all the knowledge needed to perform tasks in her/his workplace. In the time of the

rapid development of techniques and technologies it is impossible because a long period of time is needed for the personnel education, so the practice of the school system educating the personnel not fitting the needs of the labor market is increasingly evident.

As a particular problem the question of the educational profile broadness arises; that is whether a student should gain the narrowly-professional knowledge at a very high level or the extensive but sufficiently mastery knowledge in diverse areas. This aspect of education is indirectly involved in this study through the analysis of the number of educational profiles.

Research

In this research a survey of the number of educational profiles and occupations in the period from 1955 to the present is made. On the basis of these data the image of development of occupations and educational profiles has been created, which enabled their comparison.

The development of occupations and educational profiles is processed on the basis of data from:

1. The nomenclature of occupations in Serbia from the period from 1955 to the present.
2. The curricula of secondary and higher education schools in Serbia by the observed periods.
3. Occupations lists from the USA - ([The 2010 Standard Occupational Classification System, 2010](#)) and Germany – Klassifikation der Berufe 2010 (KldB) which are used to create prediction of today's number of occupations in Serbia since no complete occupation list in Serbia exists. The last nomenclature of occupations in Serbia was made and published back in year 1990.

Based on these sources, and taking into account that Serbia is included in the European integration process as well as that educational profiles should not be reduced to the needs of the devastated economy of the country, the estimation is made of the current number of occupations in Serbia. If we consider the predicted number of occupations in 2012, we could notice that it was significantly reduced compared to 1990, as many companies stopped working and many occupations were extinguished. The technological progress and new occupations have only partially penetrated into Serbia, so the increase of the number of occupations is not at the European and world level. Nevertheless, it does not relieve the school system of the obligation to prepare the personnel for whom the need will arise as the situation stabilizes in Serbia, and work-related activities will be dictated by technological development.

The number of educational profiles existing today should be reduced, which is already recognized and announced by the Ministry of Education, given that there are many educational profiles that are outdated, and consequently not enrolled by any participants. For years not a single miller is educated in Serbia. **We do not have shutters nor parquet makers, upholsters and brewers.**

All these occupations still exist in the schools, competitions are regularly announced for them, but for decades nobody applies for them. In all secondary schools even 74 out of the total of 307 educational profiles are not active, i.e. exist only on paper.

Taking into account all relevant information, the estimation of the number of current educational profiles and occupations in Serbia in 2012 is made.

Table 1. Number of occupations and educational profiles in Serbia in the period from 1956 to 2012

year	1956	1971	1981	1990	2012
number of occupations	492	950	2700	3500	3100
number of educational profiles	210	350	490	650	870

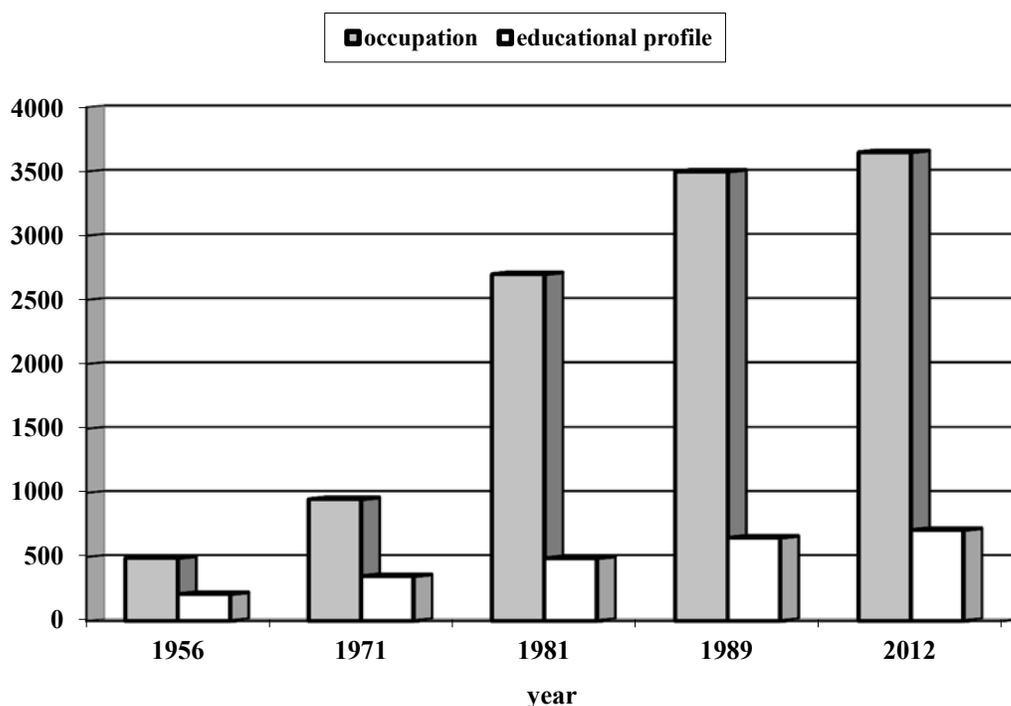


Fig. 1. The increase of the number of occupations and educational profiles in Serbia in the period from 1956 to 2012

Discussion

The diagram (Fig. 1.) shows the level of educational profiles lag compared to the number of occupations. This is quantitative data indicating that formal education can not follow the requirements of the development of society. A qualitative analysis, which was not performed in this research, could indicate an even worse situation, because there are additional problems related to the implementation of the curriculum and the level of the knowledge gained by the students. Due to the lack of funding, modern equipment, appropriately qualified teaching staff

and organizational problems in the educational system of Serbia, the knowledge that students gain is low and does not match one declared in the curricula. Secondly, for the occupations the names of which have not been changed the required knowledge and skills are changed, which is not reflected in educational profiles. This makes the gap between the needs of occupations and what educational profiles offer even greater.

The importance of the formation of labor force with modern educational profiles and knowledge is particularly acute because, due to the global crisis, there is an increasing problem with rising unemployment rate. The situation from the labor market in Europe and the world is presented in the following diagram, originating from the international organization ILO. (The International Labor Organization, 2012)

These are average values, but it is well known that in some countries the percentage is much higher and the number of countries affected by high unemployment is increasing daily. In our country, where the unemployment rate is nearly 30%, this problem is even more pronounced.



Fig.2 The workers' unemployment with a projection to the year 2017 according to data from the International Labor Organization (ILO)

It points to the seriousness of solving the problem of professional education, given that one of the causes of poor performance of working organizations is also the insufficient preparedness of the employees for effective and efficient operation.

Conclusion

There is an insurmountable difference in the number of occupations and educational profiles of the formal educational system.

The difference in what is required in the workplace and what the schools are providing is increasing.

The solution to this situation is to encourage more rapid changes in the formal education and development of non-formal education, with particular attention to be paid to the possibilities provided by the Internet.

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Optimizing Reading Operations for RavenDB

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Abstract

RavenDB NoSQL database is in use in The Higher Education Technical School of Professional Studies, Novi Sad for several months now and we are using it for managing unstructured data and for manipulating all kind of files. The information system we designed is service oriented and adding RavenDB on the database side of the system beside existing Microsoft SQL Server made hybrid architecture of this data layer. By design, RavenDB has reading optimization techniques that are based on client's awareness of database server locations. These are very important for good overall throughput of the system. However, in service-oriented architecture clients are not directly connected to database servers, but rather through service layer. This paper shows that there are ways to optimize reading operations for RavenDB within service-oriented architecture.

Keywords: Unstructured data types, NoSQL, RavenDB, Service-oriented architecture, Document management, Information systems

Introduction

Development of a tailored information system (IS) for The Higher Education Technical School of Professional Studies in Novi Sad included, at first, mostly management of structured data. Service oriented architecture (SOA) enabled separation of the database, service and various client layers. Microsoft SQL Server was engaged on the database side of the system and the development team established service layer using .NET technologies. The client layer was heterogeneous, meaning that there were several client layers deployed. At first, plugin-based interface was developed and later HTML 5, JavaScript and jQuery were deployed.

Widening of already defined business requests occurred and new demands appeared, such as storing large multimedia documents, emails, graphics and other types of documents. Most important subsystems where these new requests appeared were learning management subsystem and digital library subsystem, which would take care about academic research, student thesis, ongoing projects etc. Handling great number of potentially big files was a great task and RavenDB was in charge of handling these (Stonebraker et al., 2007). RavenDB has reading optimization techniques that rely on client awareness of database servers. Integrated RavenDB algorithm is in charge of conducting those techniques and those are responsible for distributing sequential reads from one client towards different RavenDB servers. However, reading optimization techniques were restricted by SOA because service layer separates client and database layer.

The proposed solution is a custom, load-aware technique for routing and distributing reading operations across RavenDB servers completely managed within service layer. The first problem was the separation of lightweight and demanding reading operations. The second problem was the achievement of uniform distribution of reading activities over the farm of RavenDB servers. Positioning RavenDB behind already existing service layer that was serving as the connection layer between client and database layers can help solve this problem. This implied changing the

way clients were connecting to RavenDB from direct connections towards connections through service layer, which enabled better overall load balancing performances. Another benefit was that now client layers were oblivious of the system change and benefited immediately after applying the solution. Database layers, both relational database management system (RDBMS) and NoSQL did not suffer any changes so the alteration of the system was swift and easy. Furthermore, the solution is customizable and adaptable for future changes and demands, very much because it enables future growth of data through vertical scaling (Hellerstein, Stonebraker & Hamilton, 2007 ; Kossmann, Kraska & Loesing, 2010).

Problem Description

The initial problem

During use of IS new requests appeared and they were about handling large amount of heterogeneous documents. There was a request about explicit file handling in secure manner from within IS. File system was unacceptable since everyone with access privileges would have access to sensitive files. Storing documents on the file system would separate file content from file metadata, which is undesirable because deleting, altering or damaging file content would make data inconsistent. Because of these reasons, requests were addressed through existing RDBMS. When amount of files was big enough, several issues became noticeable: insufficient disk space on the database server, inefficient file handling on RDBMS and scalability problems from the hardware resources point of view. Efficient handling of many kinds of documents including student thesis, student projects, student seminars and academic research material was one of the most important requests. In addition, there were plans for dedicating some exclusive space for students and professors on database servers for personal use, providing services similar to SkyDrive or dropbox. For these functionalities, handling files in efficient and scalable manner was essential.

NoSQL solution

Since the main target of investigation was dealing with unstructured data, NoSQL solutions were promising solutions. Requests were clear: the platform had to be highly scalable, partition tolerant, distributive by nature, simple to maintain and full text search had to be available. Many NoSQL platforms satisfy majority of these request and the decision to use RavenDB was based mainly on two parameters. The first reason was the ability of full text search - RavenDB includes Lucene technologies as integrated solution for full text search (Kovacevic et al., 2011). Using Lucene as proven technology for full text search was very important because specific fuzzy logic is incorporated in this platform (Prasad & Patel, 2005; Milosavljević, Boberić & Surla, 2010). The second reason was support for ACID (Atomicity, Consistency, Isolation, Durability) operations which is not common among NoSQL databases, because most NoSQL databases are not ACID but CAP (Consistency, Availability, Partition Tolerance) (Fekete, Goldrei & Asenjo, 2009 ; Wada et al., 2011; Stonebraker, 2010). ACID enables NoSQL databases to handle unstructured data with care preserving integrity of data. RavenDB offers ACID capability as optional, so avoiding ACID in operations where appropriate as a mean for increasing throughput performances was still an option.

Reading performances

Apart from connections through .NET library, RavenDB offers client access through cross-platform acceptable http post/get solution. One implementation scenario was based on direct communication between client interfaces and RavenDB. Since there were several replicas of the same data, it was possible to use replicated servers for reading purposes in order to improve reading operations. Detailed analysis revealed that there could be a potential bottleneck in the system. This is because default use of RavenDB servers implies writing and reading exclusively on the main server and replication servers were used only for backup purposes. This can be altered in order to use replication servers for reading purposes and it can be done in two ways: by working in eventual consistency regime of work or in guaranteed consistency regime. The second is more reliable, but slower and since the responsiveness of the system was important, the first regime of work was selected. While working in this way RavenDB maintains a list of servers for reading operations and every client request is guided towards the next server in the list in order to achieve load balancing. The problem that arose was the situation in which different users synchronized reading attempts and thus targeted same servers, unaware of each other. This generated situations in which several users requested reading operations at the same time from the same servers. It was partly caused by predictable user interface in which users were taking very similar steps in doing everyday tasks, which led to a situation where every user that logs into the system makes first several steps in the exact way, targeting always the same servers. When several users do this at the same time, a reading peak happens on the same servers because reading operations were targeted to the same servers making the load unbalanced. As shown on Fig.1., the T1 moment in time is the moment where several clients are contacting the first RavenDB server (server for writing and reading purposes), T2 is the moment where several clients are contacting the second RavenDB server and T3 and T4 are moments where clients are contacting third and fourth RavenDB server, respectively. This figure illustrates how bottlenecks can occur in a system with predictable user interface and similar everyday activities. The situation is worse if the system is designed to expect timely synchronized everyday activities.

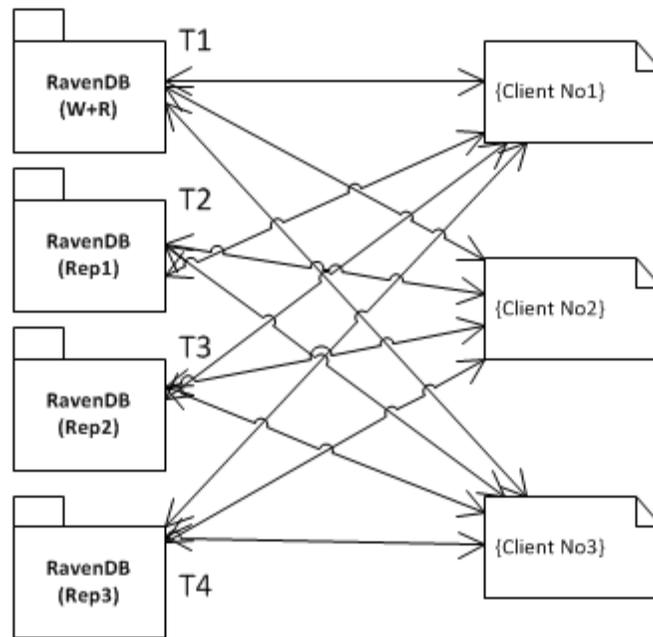


Fig. 1. Unbalanced reading operations on several RavenDB servers

SOA Integration

The initial solution for using NoSQL RavenDB database implied changes in significant amount of client code that had to be harmonized considering that unstructured data was not on RDBMS anymore, but on NoSQL and that reaching for that data was not done through service layer but rather through directly generated connections to NoSQL servers, as shown on Fig.2. This solution was appropriate for dealing with scalability and partition tolerance issues, since it was easy to add new RavenDB servers and the system could survive several simultaneous server crash situations, depending on RavenDB configuration (Abadi, 2012). Although these properties were very important, the amount of client code that had to be changed was substantial.

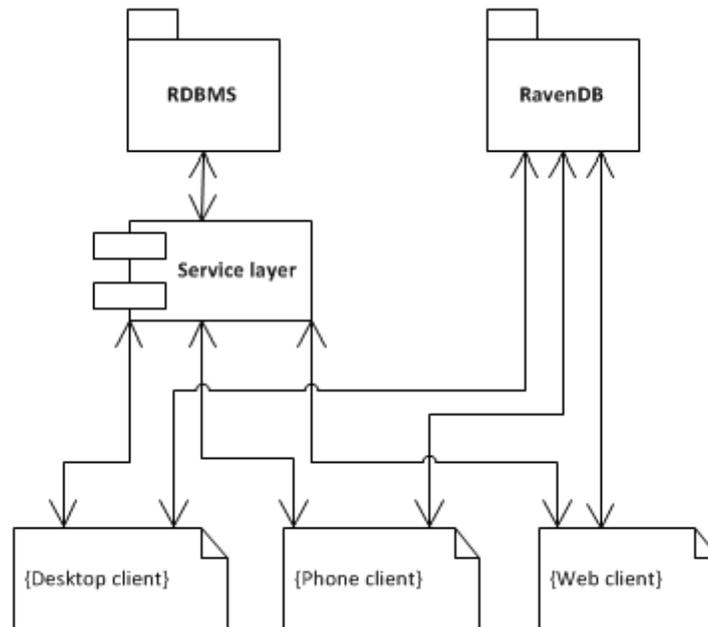


Fig. 2. Direct client connections to RavenDB database

Balancing reading operations was done through SOA integration. Balancing reading operations on NoSQL servers was difficult because it was impossible to predict the client behavior. The idea was to integrate NoSQL into SOA so data gathering would be unique, through service layer, regardless of the data type, structured or unstructured, as shown on Fig.3. This would eliminate the need for changes in the client interface and the only layer that had to be changed was the service layer. After adaptation of the service layer code, client interface continued working oblivious of the data whereabouts. Second benefit was completely automatic - load balancing for reading operations happened automatically as NoSQL was now integrated into SOA. Load balancing occurred since reading operations from several clients were going towards NoSQL through service layer that was the real client for NoSQL requests. This is when NoSQL started optimizing server list on the service layer and server load was balanced. Every reading operation was going through the service layer and every new request ended up on a different NoSQL server, regardless of the client that initiated this request. This led to a load balancing in reading operations on RavenDB servers.

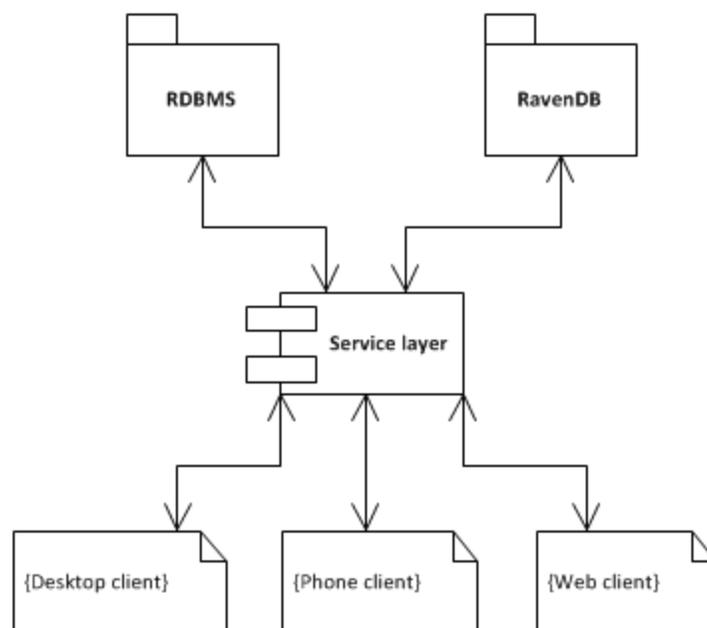


Fig. 3. Integration of RavenDB in existing SOA

Discussion and Conclusions

Analysis of the accepted solution

The proposed solution had yet to be tested and initial tests showed that reading operations are acceptably balanced between RavenDB servers. RavenDB logs exposed fair reading distribution and justified suggested RavenDB integration into SOA. Not only that reading operations were equally distributed over RavenDB servers, but also asynchronous nature of the service layer enabled good reading results because multiple requests executed on several servers at the same time, which potentiate more efficient use of database layer in SOA. Overall experience during a couple of months of test phase of the system revealed increased responsiveness of the system.

Aside reading optimization gain, accepted solution enabled simplification in architecture design. The adoption of this new future was easy, since RDBMS holds only structured data and NoSQL deals with unstructured data and SOA made this change effortless for clients. Adding new servers into a server farm was simple because server nodes need not be the same and it is possible to use almost any hardware architecture for this task (Baker et al., 2011).

Implications for research

It would be important to examine how well different NoSQL databases would perform in the proposed architecture. Although this project did not include explicit measurement of performance gain, this also might be interesting for future investigation. Comparative results would be very important in generating recommendations and best practices for different usage scenarios.

Automatic or semi-automatic fraud detection system could be another field for research because RavenDB through integrated Lucene features enables use of full text search and fuzzy logic

appliance. This would enable development of a system that could become sensitive on the existence of two or more documents that are similar by certain rules, defined by particular fuzzy logic applied in the system. Accepted solution made this possible from the data-handling point of view.

Implications for practice

Implications for practitioners are numerous, ranging from designing simple IS that includes handling unstructured data to very complex SOA based IS. NoSQL databases offer new quality in database design area enabling efficient management of unstructured data that is becoming more and more interesting in modern companies. Several important implications can be outlined:

- Proposed solution offers efficient handling of unstructured data using NoSQL databases. It is important that client layer need not change.
- Horizontal scaling possibilities enable handling great amount of documents using appropriate NoSQL solution.
- Server termination is acceptable thanks to the partition tolerance. Systems where this is needed could apply proposed solution.
- Disaster recovery can be managed using database solution presented in this paper, even when large amount of data is in stake.
- Distributive nature of the system, partition tolerance and scaling capabilities of the accepted system enables use of hardware that can be very different.

Limitations

The study shows acceptable adoption of NoSQL technology inside particular SOA and any insight is limited to this context. When applied in different surroundings, the model could require adaptation.

Notes

- 1 Apache Lucene, available at: <http://lucene.apache.org> (accessed 01 February 2013).
- 2 RavenDB, available at: <http://ravendb.net> (accessed 01 February 2013).
- 3 The projects using Apache Lucene, available at: <http://wiki.apache.org/jakarta-lucene/PoweredBy> (accessed 01 February 2013).
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Photography as an Element of Tourist Propaganda in the Digital Era

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Abstract

In historical context, tourism and photography have been developing almost parallelly, continually interlacing over the time. Photography is a powerful means of tourist propaganda and one of the most stimulating motives for travelling. The aim of this paper is to investigate the effect of tourist photography to formation the desire for travelling, as well as to analyse the conditions necessary for the creation of quality documentary photography in the service of tourist propaganda means of the 21st century.

Keywords: tourism, photography, tourists, motivation, propaganda

Introduction

Tourism and photography as new world phenomena appeared at historical scene almost parallelly. Photography was officially born by the publishing of daguerreotype in 1839, and the beginning of tourism is considered to be the first tourist trip organized by Thomas Cook in Great Britain in June 5, 1851 (Wels, 2006, p 126). Taking advantage of a favourable socio-politic climate of a prosperous historical period, it could be said that the first tourist agency practically appeared in the right moment for the mankind. At the moment the working class came into possession of sufficient assets and some spare time, there was already present transportation infrastructure and basic prerequisites for the development of tourism were enabled. Cook's tourist agency is considered to be the first tourist agency of the kind in the world. It has managed to maintain successful business until the present days under the name Thomas Cook Travel Group, as one of the greatest and most influential tour operators in the world.

By inventing of the first cameras for personal use and later a complete, at that time particularly advanced technology for making amateur photographs, Kodak company marked the second half of 20th century by a new phenomenon that would change forever human understanding of the world. The possibility to stop a moment in time and transfer visual picture of one space into another immediately aroused the interest of world public, and activities such as public informing, the applied science and tourism have undergone a real revolution.

Tourism and Photography

The first Kodak addressing to tourists and travellers were of purely documentary character, however soon afterwards in the second part of 20th century it appeared in the service of commercials promoting family holidays (Wells, 2006, p.192-193). Donald Horne claims that photography is essentially a part of tourist experience which offers the joy of possession. By making photographs of famous places and subsequently arranging them into albums, we create

the feeling that we somehow possess those places (Horne, 1984). “Photographic camera and tourism are two of the uniquely modern ways of defining reality” (Wells, 2006).

Private photographs from journeys and postcards can be considered as keepers of memories and emotions, being at the same time also the keepers of the identity of a space. Photographs document historical development of tourist places and landscapes of nature, therefore represent historical archival records of exceptional importance. As a printed medium and more popular means of communication, photography soon also became a powerful weapon of tourist propaganda. One of the first to launch the type of tourist postcard with photographs of landscapes and cities was Swiss François Borich. The postcards with Swiss landscapes brought him a fortune (Đurić, 2012, p. 365). Until 1910 the average annual sale of postcards was eight hundred sixty million pieces (Pryce, 1994, p.143). Deltiology as a field of collecting dealing with collecting of postcards from various regions and historical periods is occupying the third place as for popularity in the world, after numismatology and philately (www.emotionscards.com).

Having in mind the specificity of tourist products that they can be neither tasted nor consumed at the place of tourists’ stay, their visualization can represent one psychological connection between the purchaser and the purchased (Cooper, 2008, p.15). Tourist photograph in that sense can be considered as an ideal module for achieving effects of visualization, even materialization of destination to some extent, or some selected detail of that destination, therefore it is not unusual that it became a powerful weapon of tourist propaganda through its rich history.

Photography has always been of crucial importance for the development of tourism, in both propaganda and the matter of emotional correlation of tourists with the places they visited. If it had never been invented, nowadays tourist courses, as well as ways of communication, would have been developing completely differently. Global tourist processes would practically be enabled in the form that is currently familiar to us (Cooper, 2003, p.13). Therefore, it represents the only medium by which help tourist industry can offer its consumers something “palpable”, something that could represent a material form of its otherwise impalpable product.

Comprehension of photographic image as an empiric proof and the photography as a witness that offers a descriptive and rational testimony are essentially based upon the attitude of reality as being external in relationship to the individual. If that reality is somewhere present and accessible to objective recording, then the photography can be considered to be an objective reference, therefore arousing the desire for new shooting or looking at pictures of certain places or events (Sontag, 2002). During its history, photography has always taken the advantage of complex relationship with other textual or visual informative media (Bode, Wombell, 1991, p.4-5).

Suzan Sontag defined photography as a “trace” transferred directly from reality. She considers it to be a document or report or proof of activity, like tourism. When we are not sure of our reaction to some unknown circumstances, the photography can reduce travelers experience to the search of the photogenic for example (Sontag, 2002).

For Sontag, the fact that photography exists, proves about the truth of the way somebody, something or somewhere looked like. Max Kozloff confronted conceptual model that Sontag presented, criticizing her attitude that photography “annulates” reality, pleading the attitude about photography as a “witness” with all the dangers of being misunderstood, representing partial information or false testimony that the term “witness” might implicate (Kozloff, 1987,

p.237). He concludes that “the high status of photographs is not achieved only by their obvious “objectivity”, but also our belief that in them we “locked” the impressions that are constantly fleeing from us” (Kozloff, 1979, p.101). That also means that both emotions and personal interests are positively important components in the process of analysng of one photographic image. Photography technologically improved over time, so beside technical aspects, its esthetic components also developed parallelly. Obvious technological difference between technological processes based upon the use of the camera on one hand and digital computer processes on the other, has also become a basis for the formation of different intellectual and creative concepts in practice, production and everything that represents looking or using the pictures (Wells, 2006, p.139).

Although in the 19th century Serbia was a Turkish vassal for a long time and waged numerous wars, in the field of photography it rather paced with Europe. That situation was maintained over a long time. However, due to many years of isolation, bad social, economical and political situation at the end of 20th and the beginning of 21st century, there was present negligence in culture and art.

As a consequence of general unenviable situation of present economy of Serbia, neither tourism nor catering are in much better position in relation to other branches of economy. Gross investments that small entrepreneurs in Serbia face with when starting business of their own do not leave them always possibilities to provide sufficient assets for every segment of their business plan realization, which frequently results in forced cuts of activities like professional advertising. Low quality or insufficiently expert propaganda promotional material in the tourism in Serbia is unfortunately not rare to be found. The owners of private residential properties and small tourist agencies that support their advertising activities by themselves very frequently, especially at the beginning of their work, try to do many of the activities by themselves in order to save money wherever possible.

The use of amateur photographic equipment and its handling by inexperienced persons leads to bad business results in the majority of cases. Residential properties with significant funds invested are inadequately presented with low quality propaganda material and do not achieve results that their quality really deserves.

For the needs of this research we analysed great number of promotional brochures, catalogues and web presentations of Serbian tourist agencies, and paid special attention to the design and quality of photographic material. There are noted great differences in quality and esthetic value of photographs of residential properties. The biggest oversights are noted in the photographs of small residential properties privately owned. The reasons for that lie in either unprofessionally handled photographic equipment or low quality of the used photographic equipment.

The aim of the Investigation

Due to significant differences in the quality of photographs which are an integral part of promotional brochures of tourist agencies in Serbia, the aim of this research is the analysis of the influence their quality on the impression they make to potential tourist service consumers. In our research there participated 40 adult persons occupying posts related to travel arrangements being sold in tourist agencies in Novi Sad. These persons are in everyday direct contacts with clients and posses multi-year working experience, especially in promotion and selling of arrangements for summer holidays in tourist centers of Khalkidhiki peninsula, Greece, which is vey popular

among Serbian tourists. What is of special importance for this research is the fact that all its participants are perfectly informed on prices of the destination, as well as have rich experience in categorisation of residential properties in the region. On the basis of their professional experience, we investigated and evaluated the level of influence of different qualities of the same residential properties photographs on possible different perception of clients about their real quality and value.

The Methodology of the Research

As a basis of the research, we selected 40 persons of the same or similar socio-cultural profile, education and profession. All the examinees are employed in tourist agencies of the same city which sell residential properties in Greece. The experiment was conducted in two phases. The first phase was collecting information about examinees' attitudes with regard to the quality of the selected residential property in Greek Riviera, and the other part of the experiment was the analysis of collected information and their statistical processing.

The Results of the Research

For the needs of this research we prepared two identical tourist offers for apartments in Greece in printed form. The offers were with identical textual content and design, with logo of the same tourist agency where only the photographs were different. In the photographs we showed the same space of an apartment which was shot with two types of photographic equipment taken from different angles and under different lighting conditions (see Figures 1,2,3,4,5,6,7,8). In the first case we used amateur compact digital camera with reduced possibilities, while the other picture was taken by professional camera from a different angle, respecting all the technical and esthetic parameters of professional photography. The first picture was taken by the person that is not a professional photographer, while the other picture was taken by an experienced professional.

Textual part of the offers included a detailed description of the residential property with all the necessary information being the integral part of a tourist catalogue. We described the object's location, distance from the beach, total capacity, floor and all the amenities. The offer did not include price and categorisation of the residential property; it was up to the examinees to enter the data by themselves, according to their own evaluation. They had to award the number of stars to the presented object and define the price they would be ready pay for the stay in it.

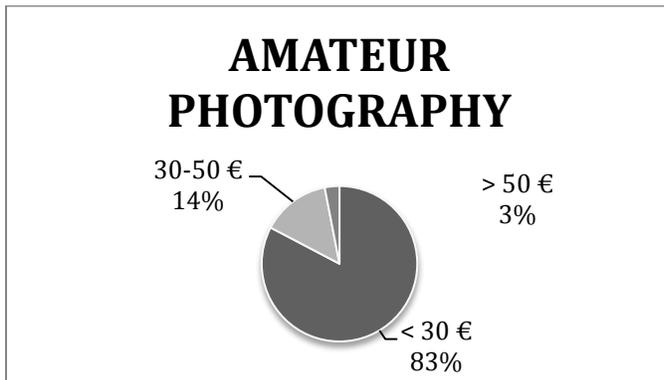
The examinees were divided into two groups of 20 persons. The members of the first group were given the offers containing amateur photographs, and the other group members offers containing professional photographs. The examinees were asked to enter the number of stars ranging from 1 to 5 in the defined space according to their own evaluation on the basis of information given in the text and presented by photographs. In order to make this research most successful, the examinees were not previously been given information on the aim of the research. They were expected to give their most honest and objective opinion.

After the end of the first part of the research we analysed the obtained results of both experimental groups. The results showed that residential property presented by the offer containing professional photographs evaluated by the other group of examinees was evaluated to be of a higher category, i.e. was awarded more stars (the majority of the examinees awarded the

object 4*, and then 3*) in relation to the offer evaluated by the other group (the majority of the examinees awarded the object 2*).

The part of the experiment related to the evaluation of prices of residential property presented the following results:

The object presented by the photographs 1, 3, 5 and 7 was evaluated by the examinees as an object deserving 2*, for which the client would be willing to pay maximal price of 30 € per night for two persons (83% of the examinees). Only 14% of the examinees hold the opinion that clients should pay 50€ for the object, and only 3% think that they would pay even more.



Graph 1. The evaluation of price of residential property presented by an amateur photograph (relates to photographs 1, 3, 5 and 7)



Graph 2. The evaluation of price of residential property presented by a professional photograph (relates to photographs 2, 4, 6 and 8)

According to the opinion of tourist agents, the offer presented by professional photographs could bring the seller, in this case the agency, greater income because the clients would be ready to pay more for the product presented in such a way. According to the statements of 78 % of the examinees, clients would be ready to pay 30-50 € per night, 16% of the examinees think that the

price of the object presented in such a way could be higher than 50 € per night, and only 6% of them think that the price should be lower than 30 €.

Parallel Analysis of Different Photographs of the Same Tourist Object



Fig.1 The external appearance of the object, entrance



Fig.2 The external appearance of the object, entrance from the yard

Photograph No. 1 is taken with back lighting, disregarding photographic rules of architecture shooting. "Back lighting is the worst kind for architectural photography because it creates very uniform, dark surfaces." (Williams, 2012, <http://www.photographymad.com>). The whole object in Photograph No. 1 is in its own shade, by which all the parameters of a balanced esthetic whole are disturbed. The light enters the lens, thus distorting the effect of realistic colours. Colour is often an important architectural element of a building/structure and can add a lot to the photo. (Holtkötter, 2012, www.fotoblur.com). The frame is also extremely bad, the building is squeezed into a format, so the viewer cannot get the impression of its positioning in space. The presentation of the yard is omitted, as well as the facilities near the very building. On the entrance glass we can note the reflection of a person taking the photograph of the building who in this case represents a redundant element of the photograph.

In Photograph No. 2 all technical and esthetic principles are fulfilled which is proved by the positive reaction of the examinees. It is also a proof of how much weather conditions can influence the quality of the photography, as well as the selection of shooting angle and adequate photographic equipment (we used 35 mm wide-angle lens). Lighting also represents a decisive factor of architecture photograph quality. Side-front lighting usually produces the best architecture photos. It provides plenty of illumination and also casts long, interesting shadows across the face of the building, making its surface details stand out and giving the building a more three-dimensional look. A fence can be an important image element. It helps that the fence is not brightly lit and is a bit out of focus. The viewer's eye will therefore naturally be drawn to the main subject of the photo (Greenspun, 2007, <http://photo.net>).



Fig.3 Hotel reception, amateur photography



Fig.4 Hotel reception, professional photography

In Photograph No. 3 the impression of the space size is lost and the details which are a desirable factor in the presentation of an interior are omitted. Due to a bad positioning of the photographer and an inadequate lens selection, the space size seems to be restricted and much smaller. Wide angle lens cameras (35mm-24mm) enable photographers the projection of almost entire space, as seen in In Photograph No.4.



Fig.5 Hotel room, amateur photography



Fig.6 Hotel room, professional photography

In Photograph No. 5 we can note one of the most frequently made mistake when we speak of amateur photographs – bad lighting, narrow shooting angle and inadequate positioning of the photographer. Although neither all the technical requirements and esthetic parameters of photography are fulfilled, nor much effort invested in arranging the interior which can be concluded from the fact that no linen is on the beds that would associate the viewer to cleanliness and comfort, the pictures like this still appear in promotional brochures of tourist agencies. Their aim is to inform and attract the viewer, practically a potential guest of the presented facility.

Photograph No. 6 shows the same hotel room. It is was found in promotional material of another tourist agency. The same space is far more quality presented, inducing in viewer the desired psychological-emotional effect. It also makes the impression of a higher material value which is very important, since we speak of propaganda material which purpose is encouraging sales.



Fig.7 Bathroom 1.



Fig.8 Bathroom 2.

In Photograph No. 7 there is shown a bathroom with the open toilet and untidy arranged toilet paper which makes bad impression on the viewer. A detail can often dictate a complete visual impression of the entire photographic image. Shooting angle suggests very limited space, and some of the essential elements are presented only partially. Photograph No. 8 gives a more effectual, although not perfect presentation of a hotel bathroom. Better effect there is achieved by adequate selection of lens and right setting of camera parameters, selection of adequate shooting angle and a more balanced space arranging.

If the photograph leads the viewer to draw wrong conclusion, Sontag claims that it is due to the fact the photographer did not find adequate means of transferring what he wanted about particular set of circumstances (Sontag, 2002). Noting details is a consequence of subconscious interests of the viewer, therefore ever relatively insignificant detail can become a key point of his focus (Barthes, 1997).

Discussion

When we speak of market moves of the companies dealing with tourism, the most common ethic dilemmas that occur are related to presentation and advertising of tourist products and services. An example of that is computerized and improved photographs of hotels and beaches in catalogues and the Internet sites (Miskovic, 2012). Analyzing the results of this research connected to the correlation of photograph quality and prices, we come to the moment when the ethics is being questioned. There are numerous attempts of the manipulation of hoteliers by publishing the photographs of the nicest and biggest rooms in their presentations and brochures, although the hotel actually have several different categories of facilities with different prices. This way of advertising in Serbia represents regular practice, although it could not be held over long time, at least when speaking of online marketing. With regard to the fact that the Internet browsers and portals have sections with photographs taken right at the places by guests, they can

be easily compared with those uploaded by the hotel management. The differences are often drastic, therefore now the chances that tourists go to the destination full of great expectations and return disappointed are becoming far fewer. On the other hand, low quality photographs can decrease the interest of potential tourists and create in them a sense of less value and attractiveness of the observed facility than it is actually in reality. Therefore, it is necessary to emphasize the essential importance of the quality of propaganda tourist material, no matter whether we speak of text, design, print or pictures. Credibility of information, both textual and visual, represents the only prerequisite to evade subsequent complaints of guests, law suits, bad recommendations and bad reputation.

Conclusion

In the new information era, there are far fewer possibilities to be easily misled when we speak of price and quality. A lot of things can be easily checked in advance, and possible disappointments can be immediately shared with the rest of the world. This fact is a nightmare for hoteliers, but also a spark of hope for maintaining a more quality value system, based on the principle "value for money". The number of stars the hotel officially has on the Internet portals can be compared to the number of stars awarded by more objective reviewers.

Beside being informative, the photographs positively have also the aim to create positive emotions and the desire to chose a particular tourist offer and visit particular tourist destination. By hiring professional photographers and designers it is possible to make the most quality propaganda material for any of the facilities. The owners of the facilities and mediators in their commercialization must take into account the economic aspect of investments, but should never neglect the importance of professional and quality propaganda activities and adequate market approach in accordance with the quality of the services provided.

As it has been established by this research, the way certain product or service is presented to a potential purchaser defines the success of further business. Photographs as the only possible "palpable" form of establishing connection between goods or service and its future consumer reach the height of their manipulative performances in tourism. As long as the processes of presentation unfold within ethically accepted activities, they will positively be successful and recover invested funds.

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Possibilities of Vojvodinian Public Media Broadcasting Service in Times of Personalized Televisions

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Abstract

The paper discusses the current trends in the so-called personalized televisions, by using the examples of Apple TV and Google TV, which are parallelly and with an oscillating success developing an integrated model of communicating with every single user, by merging movies, TV shows, music and Internet into one system and one offer, thereby enabling the full availability of diverse content on TV sets, tablet computers and smart phones. The question raised in the text is whether the Radio Television of Vojvodina can adapt to the current moment and bring itself closer to new audience and reposition its place in the media scene of Serbia, by developing Android applications as tools.

Keywords: Apple TV, Google TV, Radio-Television of Vojvodina, smart television set, applications, internet, personalized televisions

Introduction

Let me start with a reminder to the Article 10 of model of Law on broadcasting as a service to the public, jointly published by the Bureau for Development of Telecommunications of International Telecommunications Union and UNESCO saying: „The fundamental difference between the public service broadcasters and commercial broadcasters is that the public service is a non-profit organization in the service of the public, not the shareholders, and it uses money for making program, and not program for making money.“

This provision should, of course, be *conditio sine qua non* of a Broadcasting institution of Vojvodina, burdened with numerous problems, out of which almost all stem from the recent tragic history of this country. Upon the entry into force of the Law on Broadcasting in the year 2006 and the transformation of Radio and TV Novi Sad into RTV-Radio-Television of Vojvodina, necessary prerequisites were made for the new, independent public service to fulfill its primary role of reporting on Vojvodina and for Vojvodina.

Unfortunately, nearly a seven-year effort to accomplish it has not given the expected results yet, although a noticeable progress has been made since its beginning. If at the time of adoption of this important law there wasn't a clear demarcation line between the public broadcaster and its commercial competitors, the line is clear today. If at that time the growing commercialization of television content in Serbia had resulted in primitivization of the program of this broadcaster in an attempt to resist the private broadcasters, nowadays the situation has radically changed and thus, reasons from that time have lost their relevance.

Finally, if a widely accepted protoclause of all local issues, embodied in an older brother (RTS) has become independent and granted RTV to assume the role of a regional broadcaster without any interference in its operations and the program concept, why is then RTV Vojvodina today barely visible on the television rating map?

Most reasons which could partially justify the existing state are generally known to the public, some of them being: lack of own premises, dramatic decline in TV subscription as the basic source of funding, obsolete transmission technique, dysfunctional organization and a superfluous number of employees. Other, but not less important reasons are a consequence of insufficiently

careful perception of the new reality in the world of electronic media and the new global reality, largely created by the social networks and the habits that they produce.

In order to properly understand the possibilities of the Public media service of Vojvodina, it is necessary to gain insight into the current moment formed by the world of digital media, changes in them and echoes that they produce in our (still dominantly) analogue reality, often with a long delay. The second decade of the new millennium has brought with it numerous inquiries about the direction in which the media should move and how the oversaturated, weary and predictable television of today should look in the future.

Study of trends that will have mass domination in the world until 2030 titled „Future TV“, organized by the American IT company „Cisco“ has resulted in interesting, but not unexpected predictions. If a bright future for television is desired, it will have to provide the viewers solely with what they want, when they want it and at a place that is most convenient for them – at home, in transport, on screen or on a smart phone. This is a common standing of leading experts from the world of media and high technology. Judging from the experts' forecasts, future technologies will become increasingly more personal, video materials will have to be customized, personalized, that is, to be created specifically for each particular user, and obligatorily connected with the social networks. Experts' expectations are moving in the direction of interactivity and complete individualization of the video content, where the television of the future will also broadcast the taste, smell and touch (for instance, the smell of bread in a culinary show) and the viewer will be able to look at the screen from the perspective of the favorite hero from a TV show he likes, or to receive only the advertisements the viewer is interested in. The conclusion that is imposed is that the television will survive if it adjusts to the global network, interests and mobility of the audience, as well as to their need to do more things at the same time.

An indication of such future was announced in the summer of 2006 by Steve Jobs at a press conference in San Francisco, while he was presenting a Front Row program, which had marked the beginning of Apple Television. The first official Apple media receiver had a hard disk with 40 GB capacity and two months later a four times stronger version appeared. The company that brought revolution into the computer and telecommunications industry thereby began a new era of image, sound and viewers' needs integration into a single, much more convenient offer.

September of 2010 brought with it a second generation of Apple TV devices that could broadcast rented content from iTunes player (and media archive), computers and devices with iOS operating systems. Third generation, equipped with new user interface and HDTV features was introduced in March of 2012.

In this way, Apple TV users got a chance to enjoy their favorite songs, TV series or movies on a big screen of their television sets, ignoring the program schedule of cable distributors and planning their own fun when it suits them – if, of course, they were prepared to pay for it. Still, the attempt to erase the boundary between the television with a live broadcast of its program and video on demand system (delayed viewing based on the viewer's choice) failed; Apple TV has not become the dominant habit of this company's users. It was a dead end.

Twelve months from the last modification of the system which many have trusted, reflections of officials, but also experts' assumptions, go in two directions. The first one is transforming the existing system into a video game console and this idea is based on the great popularity of iOS operating system as a gaming platform. The second one is transforming this interface into a powerful Smart TV set, by using possibilities of Apple TV set-top box and the software that it

employs.

The last issue of the official Apple Macworld magazine – the UK edition (March 2013) discreetly announces the possibility of launching of new product in the fall of this year and also addresses a dilemma: Should Apple company start producing Smart television sets, or should they try to improve Apple TV? There is no doubt that there is a demand for smart television sets, but the market has not yet been conquered. The question is whether Apple can change the television industry as it has changed the music industry with the iPod and will somebody do it before them.

By analyzing the experience of Apple, as well as of Microsoft MSN Television from the middle of 1990s, Google company launched an ambitious new project in late 2010. First in partnership with companies Sony, Logitech, Intel and Vizio, and since last year in partnership with South Korea's LG Electronics as well, the leader of web searches decided to win a new medium with its Google TV. The starting point was the statistical data according to which an average American spends five hours a day of their leisure time watching TV, ten times more than in front of the monitor of their computer. On the other hand, Internet users in search of video content choose this communication channel precisely due to their unwillingness to accept strictly defined broadcasting scheme of pre-determined program, with no possibility of later viewing. Both models of behavior enabled the Google television engineering team to develop technology that will have television and Internet as a common denominator. After all, introduction of the Internet to personal computers in the year 1994 and enabling mobile phone users to access the net in 2007 was a revolution that television deserves and that is bound to happen.

The revolution has come in the form of integration of Android operating system and Google Chrome web browser, supported by Flash 10.1 player, according to the experts from the Google team. In this way, a Google TV user can browse the Internet on the big screen, watch his/her favorite programs, movies and television series, view photos, read press, listen to music or even chat with his/her friends on social networks, by using Smart TV into which this system was integrated, or by connecting a set-top box to his/her television set.

Everything is adjusted to the viewer, an Internet addict: wireless keyboard, the possibility of voice command by using a mobile phone running an installed Android operating system, as well as the possibility to record the preferred content and watch it later. Owners of Android and Apple smart phones can use their devices as a remote control for Google TV, while choosing from the rich television offer of HBO, CNBS, Netflix, Amazon and numerous other TV programs.

A popular video-exchange website, Youtube, enabled a special „Leanback“ (lean back and enjoy) option, which gives the user a possibility to select a group of video clips or shows he/she would like to watch, then click on the option Leanback and enjoy it from his/her comfortable armchair, while Youtube is playing the chosen content for him/her.

The voice command option offers diverse possibilities created to delight and entertain the users; it is sufficient to say the name of a TV station and the name of your favorite TV series and the browser will take you directly to the live broadcast of the requested content. If you would like to be reminded how to make a certain dish or how to stitch a button, Youtube will play for you a video that explains it. However, one of the most attractive options and the most powerful weapon of this platform are applications and the possibility for improving the system by introducing numerous new applications, which is also announced by the Google team; improved applications for higher quality semantic search and personalized recommendations of content from all sources (based on the data from searches made by the user) are expected. The best example of immense

importance and power of applications are mobile phones. The comparison is intentional, as both the software and the hardware of Google TV powerfully reflect modern mobile platforms. But in spite of all seducing possibilities that Google TV has offered to its users, it has not managed to fully shape a model of future integration of higher models of communication, and more importantly, to convince the customers.

It turned out that the idea of integrated industries on which users would like to watch everything, everywhere and at all times is slightly overblown. There are only 24 hours in a day and most users have very narrow interests and not too much time for improving them. As in all other areas, there is a small number of users who consume excessive amount of content and they are thrilled with the offer that looks like a buffet. But most users are also satisfied with a la carte choice of their taste. Google TV service looked too complicated to most users and it seemed like it would not be their choice. But then a second chance arose...

Not only the idea of rescuing Google TV, but primarily the need to integrate hardware and software has led the company to invest 12.5 billion dollars into purchasing Motorola Mobility. According to the IT experts' standpoint, Google has increased its competitiveness and strengthened the patent portfolio with this acquisition, thus providing Android a better protection from the threats from Microsoft, Apple and other companies.

In this way, Google has achieved a complete control over design and production of smart phones and the operating system that runs them; Apple has demonstrated with its iPhone and iOS how successful the control over the entire system can be.

With this move, Google has angered a number of its partners that use Android for their smart phones. Although the company has announced that this operating system would remain an open platform, and that the cooperation with all the previous partners would continue, while Motorola would be operated as a separate company, it is a fact that they have become rivals of all their previous partners overnight. Their partners, and most of all HTC and Samsung, are concerned that in future all the novelties regarding the software that they use as well will first be presented on Motorola phones, and that this company, which is part of Google, will be favored.

And how does this acquisition reflect onto the attempt to conquer the video market?

Google TV is a service that uses Android and Chrome web browser to enable users to surf TV channels and flip through the Internet pages on their televisions. Android platform is renowned for its openness to programmers who develop applications, but the market was simply not big enough, so there were no additional programs that were supposed to be the main carriers of this „revolution of interactive television“.

In the end, it turned out that Google TV is a set of good ideas united under a „pierced umbrella“, so the project proved to be, harshly put, a failure.

Now the situation is changing considerably, since Motorola has been very successful in selling set-top box devices, used by many television providers in the United States. Combined with Google software, the TV project of this company has got a second chance and open doors to many American homes.

Precisely that fact has given new impetus to the company that started the European conquest, too. From July of 2012 Google TV is available in the United Kingdom, and two months afterwards the company also entered France, Germany and the Netherlands, as well as Canada, Australia, Brazil and Mexico.

At first, the program offer consisted mostly of American TV stations; first European media networks that entered Google interface were Spanish TV3 from Catalonia and France 24. Today,

most of European quality TV content can be viewed through Eurochannel program application. Despite high expectations, sales forecasts are not overly optimistic. According to the analyses of DisplaySearch agency, sales of STB devices for viewing streaming content over the Internet across the EU will not exceed three million a year, and in case of Blu-ray devices they will not exceed 10 million a year in the next three years. It is expected that only sales of Smart TV, television with built-in Internet access will be increased from the current 20 million per year in the EU countries to 50 million by 2015.

It is unclear whether or when Google TV will be available in Serbia, but even without its presence, the situation on the smart video market will not be dull at all.

At this year's European Regional Forum, Samsung company has introduced its new Smart TV devices, attempting to reflect the idea of TV offer personalization. They are integrated with first-rate software and in a very attractive package.

New 2013 Smart Hub television set offers screens for easy navigation that analyze the viewers' habits and offer personalized suggestions in real time; it brings highest quality video-on-demand (ordered) content from different subscriber channels to one place, it enables access to personal content (photos, music, video clips) from different connected devices at one place, as well as watching popular video content on social channels and a facilitated access to downloaded Samsung applications, as well as their editing.

The new Samsung technology, S-Recommendation with Voice Interaction“, besides very easy content search, allows users to receive personalized offers formed on the basis of previous views they've made or on the basis of general viewership ratings.

It seems that the new Samsung technology integrates everything that its predecessors in this field had tried to achieve: contents of many providers, programs of televisions that have a live broadcast of programs, top quality VOD (video-on-demand) offer, most diverse applications and social and media content from connected devices (computers, gaming consoles etc.).

This year has just begun. It is hard to predict what else we may expect in the market of smart TVs. Whatever it is, it should have an impact on the media situation in our country.

The new reality in the world of state of the art electronic video technology sheds new light on some old viewpoints and it completely relativizes the most important supporting points on which the public broadcasters formed their program concepts decades ago.

The formulation of the first director of BBC, John Reith, from 1932, which is still used today, and according to which the public service broadcasting should educate, inform and entertain, now seems as a kind of *contradictio in adjecto*; don't Google TV, Apple TV and an abounding offer of smart TV sets, telephones and tablet PCs perform those functions much better and in a much more attractive way than the public broadcasters?

How can the Radio Television of Vojvodina not only survive, but also overcome its own possibilities and dramatically improve its position on the Serbian media scene, in such an environment, in a colorful reality of unimagined and unforeseeable possibilities?

If we recall the basic tasks set before the public service of Vojvodina, we will see that they are:

1. Cultivation, preservation, development and promotion of cultural, economic, religious and other social values of multiethnic Vojvodina
2. Development of democratic social relations in Serbia; fostering, strengthening and communicating national, religious and gender equality, human rights and European values

3. Informing the entire Vojvodinian audience in the languages of most numerous Vojvodinian nations on the issues, problems and phenomena that are strongly connected to their daily lives
4. Informing about the most important events in Serbia, Europe and the world; informing the whole Serbian and the international environment about Vojvodina
5. Production and broadcasting of informative, cultural, documentary, educational, religious and entertainment content
6. Establishment and development of cooperation with similar institutions in the Autonomous Province, Republic and the region
7. Building of Vojvodinian media network
8. Provision of professional staff and their training and education for its own needs
9. Development and conquer of new technologies
10. Implementation of ethical rules and craft rules of production and broadcasting of television and radio programs

Can it be expected that the Broadcasting institution of Vojvodina, the biggest and the most important local media house, will manage to successfully carry out all the set out tasks and to do it in a way that is sufficiently attractive for the public?

The outside view from the comfortable armchair of the viewers – subscribers, who are always asking for more, for more interesting and for better content, is at best reflected in indifference, but often also in a resistance towards legal obligations to pay for the programs, which are, as it is frequently heard, not in accordance with the needs of modern times.

Television and radio programs, though meticulously prepared, are not among the favorite ones; their content is not retold, there is no need to re-broadcast them or to share them on social networks or on the sites that are specialized for it.

There is no awareness of the real difficulties in which TV shows of public media service of Vojvodina are created: about the lack of appropriate television studio space, tenant's status or the chronic lack of funds.

Unfortunately, neither the representatives of corresponding ministries of the Republic of Serbia, nor the public at large, nor the experts have recognized the significance of this media house for lifting the criteria on which, together with many other necessary and well thought out actions, raising awareness of the local audience rests.

We have also seen that the new upcoming time of sophisticated video technologies, overloaded with diverse, unexpected and completely dedicated to personalized offers will have a comparative advantage in every sense, regardless of the fact that they have been made somewhere far away. In the globalization era, neither supply nor demand bears a national mark. They rely on a basic human aspiration for enjoyment that is inversely proportional to the invested effort, but directly proportionate to the invested money.

Is it possible, considering everything that has been stated, to increase the level of program offer, in whose production exceptionally much effort of all kinds has been put in? Is it possible to do it in such a way that the generations that expect everything now find it attractive, appealing and interesting?

From the moment the Public media service of Vojvodina was formed, the attempts to fully adapt the program to the needs of viewers and to personalize it (if we define this term somewhat wider than referred to in this text so far) have not stopped. The intention of the editorial teams was, as

it is today as well, to bring the problems of the common people to the screen, to indicate their wishes, to be with them in every moment, in all places and at all times.

It is a known fact that the viewers choose the television stations which manage to keep pace with their needs or desires and offer an acceptable format for their entertainment; but, perhaps first and foremost, viewers select the television station that addresses their problems, raises the questions to the government that the viewers would pose, the television station which records and broadcasts to the wider audience the viewers themselves, their neighbors, streets or landscapes that they recognize and that they are defined by.

The attempts to tailor editorial policy to the needs of small communities, from, colloquially speaking, Apatin to Alibunar, have ended in failure on several occasions. Ambitious projects of forming local and regional branch offices of Radio Television of Vojvodina that would in the first phase be opened in eight out of 45 municipalities in the Province have not been implemented yet. Voice of local communities is not heard to a sufficient extent; their appeals are being not answered, success of their businessmen, artists and athletes is not commended. Vojvodinian public service cannot fulfill this task alone. The state fails to recognize the necessity of dealing with the individual. What will happen if and when Google TV, or any other serious media player, recognizes the need of a local little guy to appeal to the great big world? Could that even happen?

In fear of a positive answer to this or similar questions, it is necessary to have quality solutions that enable Radio Television of Vojvodina to stay in the race for each viewer. The solutions should commend it as a relevant informative, entertaining and educational media house, more corresponding to the local consumer than the uniform, stereotyped global media magnates. If we try to find one dominating word in the abundance of key words from the section of the text dealing with personalized television attempts, that word would be APPLICATION. We have seen that the most attractive offer of the prestigious Google TV offer, but also of the newly formed Samsung smart TV attraction, is actually a personally tailored program, when interface frames and hardware formats are put aside.

What do the application refer to, what are they used for, how are they helpful, why are they attractive?

A variety of them, such as Advise me, which should help us decide when we do not know what to do today, or Al Pacino sounds, which remind us of 36 popular phrases from his movies, are used as a pastime or for entertainment.

The other ones, such as 32red Casino, aBubblePop or aiMinesweeper, take us into the world of popular games played to kill the time while waiting in lines or while traveling on public transportation, or we use aMetro application, masterfully leading us through the timetable of metro trains, buses, trams or trolleys worldwide.

Some applications, such as aCurrency Lite, help us calculate the exchange rates of different currencies. Other ones, such as Algebra Tutor, teach us mathematics.

Some applications are entertainment-oriented, others are education-oriented; some make everyday life easier, some help us improve our knowledge.

What is common to all applications is that they have become an indispensable part of daily activities of Smart phone owners with Android programs, but also of those people who use personalized television sets, or set-top boxes with the same possibilities.

Applications are numerous, they are formed according to the needs of the users who create them, exchange them, discuss them, improve them. Since Android is an open platform, there is no

doubt that its attractiveness and accessibility will gain importance, more and more in the field of televisions that are oriented to the individual, especially in the field of smart phones.

Can the Radio Television of Vojvodina, in light of the aforementioned details, impose itself as a competitive and unavoidable fact first on the media map of the Province, and then of Serbia? If it happens that in future the first button of remote control we press is the one with the caption Google TV, can we expect the second button to have the logo of RTV? If the applications are the pride of a big company, which direction should the thinking about re-positioning of Vojvodinian public media service take? What kind of software are we talking about?

Let us disregard the most important topics: space, money, technology, digitalization, superfluity of staff and all the issues that will, sooner or later, have to be addressed by the state. Is it possible to come closer to viewers, who are users of smart phones and Internet addicts, by using low-cost solutions? Is there a realistic chance of success in that field?

Would RTV appeal to the youth if it offered them a mobile phone application guiding them through the evening events in the cities of Vojvodina? How successful would the software for installation into the Android phones be, if it informed the users about the time and place of electricity, water and heating cuts? Would offering an application leading the users through the gastronomic offer of cities, food delivery, taxi service, theater or movie schedule be worthwhile? Would the mobile phone or tablet computer users become more attached to particular programs of RTV if they received announcements of new TV shows, summaries of content, making-of footage?

What would happen to the ratings of news programs if the users of news applications would receive the latest news first, directly and before anyone else? Would they then perceive the Radio Television of Vojvodina as their own television station, as a media house that takes care of them?

How to take advantage of the comparative Vojvodian advantage of co-existence of many nations, how to articulate it through an application? Could it be done in a form of a multilingual dictionary, a daily calendar of historical figures, recipes of local specialties?

Is this really the only realistic option of television that, nevertheless, depends on others when it comes to the most important issues of its survival?

Even if the RTV is, unfortunately, not in a position to influence the most important issues of its survival and if it is still left at the mercy of local politicians, creativity is, fortunately, left up to the television personnel. There lies the greatest opportunity for the Vojvodinian media service. Can the future of its development be formatted through a system of attractive applications that would converse with new generations, in a situation in which it is not possible to do it through a network of branch offices from every village in the province? Or are these processes completely separate and not at all related?

With the strong support of the Internet, the television of today is changing and blending into personalized experience. It is moving slowly away from the main television screen, in spite of numerous attempts to remain there enthroned, improved and upgraded.

Viewers increasingly switch to other formats: iPad, tablet computers and even smart phones to a more significant extent. Internet-oriented television offers (such as Google TV, Apple TV, but also the competitors not mentioned so far, such as Roku, Ubuntu TV), as well as Smart TVs with a powerful dual role of television offer and market support bring additional confusion into the increasingly demanding consumers, who always end up at gain.

There are content materials everywhere. They need to be organized and properly directed. The

only losers can be old traditional television companies who do not find their place in an all-encompassing interface offer. For the industry built on advertising, change of viewers' habits poses at the same time a threat and an opportunity.

Estimations indicate that people watch a 30-minute series on their tablets, with the help of applications in 22 minutes, or that they watch it a 60-minute series in 38 minutes. That number of minutes must inevitably lead to changes in advertising. Sooner or later, customized applications that will be used to charge for the time the users spend in front of alternative screens must appear. Relevance becomes a condition sine qua non of modern times for advertisers on all platforms, especially taking into consideration that 70 billion of advertising dollars are at stake every year. Therefore, there is no lack of motivation.

Still, television is not dead and it will, in all likelihood, retain supremacy in the years to come. It does not show signs of giving up in any segment of signal broadcasting: neither cable-wise nor satellite-wise. However, the future of television has to go into the direction of personalizing content that will enable delivery of specific program to a specific user at a specific time and on a specific device. In future it will not only matter what the user would like to watch, but also whether he would like to watch it directly or delayed, in its original form or in the short form, leaned back or on his/her iPad. The complexity such choices entail will require an incredibly sophisticated and intelligent system that will be able to formulate personal files and to materialize them into a picture for a satisfied customer.

Future will, with no doubt, bring a handful of attempts of media services and companies to attract and retain customers by using personalized approaches and attractive social, gaming or video content. From this point of view, which will soon be considered a digital prehistory, it seems that the only ones who will succeed will be the people who will create needs for the viewers that the viewers themselves did not know existed. Companies that know how to “read the minds” of their customers will gain their trust and dominate in the prestigious race for the future of television. Time will show whether the Radio Television of Vojvodina will find its opportunity in this process and whether it will manage to establish the viewers' requirements by listening to the needs of the audience.

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Multiple Discourses: Framing the Magical Words of Knowledge Management

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Abstract

The paper presents the argument that when we use the words “knowledge,” “tacit knowledge,” and “explicit knowledge”, we are usually speaking or writing from within a frame of reference, or ontology which shapes the sense of these terms. This paper begins to uncover these ontologies and also presents three short taxonomies of the ontological frames.

Keywords: knowledge management, knowledge, tacit knowledge, ontological frames, perspectives

Introduction

Once upon a time, Benjamin Lee Whorf suggested that we, using the language or languages we know, cannot help but talk and write about our experiences in, by the way our language(s) describes and analyzes the stuff of our experience for us. Our vocabularies are grounded in either our psychological system, or our social system, or our cultural system. We live-in or dwell in these systems. These systems are the metaframes conditioning what we experience in and how we experience the world, our worlds, and the objects of these worlds. We also live-in the language which mediates, which we use to describe, analyze, and interpret, our world. We cannot help but experience our world and its objects as we do because we live in a language with the words that name and describe these things. Our language maps our world and its objects. While we should not mistake our language, a map-making tool, for our reality, it is the only map we have of our reality.

The magical words referred to by the essay’s title are “knowledge,” “tacit knowledge,” and “explicit knowledge.” Their magic works differently depending on which ontological frame controls the vocabulary and the situation.

Paper’s problematic

In this paper, the argument is that this selective vocabulary and use can be grounded in three different ontological frames, at least. These ontological frames determine and represent (reflect) how the words ought to be construed in the knowledge management literature. These frames are the psychological, or the cognitivist frame, the social frame, and the cultural frame. Basically, these frames ontologically locate the reality of the sources of knowledge, and the ways of knowing and representing knowledge, according to the KM literature. Consequently, what a researcher designates as a unit of knowledge, a known or knowing, and the kind of knowledge mapping done in an organization, can be different in three different ways. The purpose of the paper is to clarify conceptualizations of the frames and their grounding in the KM literature.

Psychological frame

Discussion of the psychological frame

Knowledge is the result of a person’s set of “mental mode[s]” being used to understand affairs in the world (Norman, 1983, pp. 7, 12; Schoemaker & Russo, 2001, p. 134; Rahe, 2009, p. 05).

Knowledge consists of a set of ideas which expresses a view guiding action in situational affairs. What one knows are the theories in place used to describe and analyze things (Argyris & Schön, 1996, p. 117; Argyris, 1999, p. 60). “Mental models are what people really have in their heads and what guides their use of things” (Norman, 1983, p. 13). Mental models are “map[s]” of our world (Johannessen, Olaisen & Olsen, 2002, p. 1116) constitutive of an ontological perspective (Gruber, 1993, p. 199; Fonseca, 2007, p. 786). Knowledge is an outcome of the interactive processing of situated information by conceptual structures (Greiner, Böhmman & Krcmar, 2007, pp. 4-5; Despes & Chanuvel, 1999, p. 110). Knowledge or understanding result from mental forms of meaning applied in situations (Evermann & Wand, 2001. P. 16; Nelson & Middleton, 2003, p. 105; Jennex, 2007, p. 3).

The conceptual models in use, or Argyris’ (1999) and Argyris and Schön’s (1978) “theories-in-use” are the creators of culture or the sense making affairs of experience; one experiences what one experiences because of the set of conceptual models in place making sense of activities and events. The experiential meaning of things are dependent upon the psychological system of ideas forming the affairs of experience into objects of perception and cognition. The ideas form the basis for communicating. The ideas inform the vocabulary used to describe and analyze things. The conceptual models are symbolically realized in things; things are objects of experience; the knowns of the knower. Culture consists of the meanings derived from the idea-systems or conceptual models individual bring to every situation. Culture is a set of definitions of situations encountered. Knowledge is a result of conceptual models engaged in the world and interpreting affairs in the world. An extreme form is the description and use of neural nets or the brain as the ultimate interpretive basis of things in the world. Language or vocabulary is a way of understanding (or knowing) this. An epistemological analysis of knowing as a process, and the knowns as a result of the process, is based on the description and analysis of cognitive and emotional schemas.

Taxonomy of the psychological frame

Cognitive schemas or mental models.

Individual or personal experience as ground.

Problem of representation or codification.

Knowledge, as either tacit or explicit, results from applying cognitive schemas.

Vocabulary maps mental models to personal meanings.

Social frame

Discussion of social frame

A practice is a habitual and usual way of doing and saying within an organizational situation. A practice in its details is a way of living-in a situation and accomplishing an intended goal. A practice is an entirety consisting of detailed actions or procedures aimed at achieving a purpose (Brown & Duguid, 2000, p. 97). A practice realizes in an environment a norm or rule to be followed, and perhaps, used to explain the actions performed (Tsoukas, 1996, p. 16).

For example, it may be a team’s regular action, or practice, to use an agenda to organize and control discussion. Another regular act of another group is to propose an actionable idea and vote on it; a practice is a social rule that fixes and focuses an activity within a shared frame (Brown &

Duguid, 2000, pp. 107-108). A practice is another name for those habitual activities which are based in a communal sense of action (Brown & Duguid, 2000, pp. 126-129). Learning and knowing how to proceed in situations are consequences of the relational processes involved in the social environment (Brown & Duguid, 2000, pp. 137-138). Organizations are “networks of practice” (Brown & Duguid, 2000, pp. 141, 142-143, 161-163; Stein, 2007, pp. 143-144). Personal knowledge of procedures are regularities based in the habits of doing work within a social environment (White & Sutton, 2002, p. 320). As Tsoukas (1996) writes: “Individual knowledge is possible precisely because of the social practices within which individuals engage [with others in situations]...” (p. 14). The social environment as a generator of knowledge is constituted in the “com-presence” of others jointly engaged in common activities, or other affairs evidencing relationships (Ortega y Gasset, 1957, pp. 5, 92). This is very much like Polanyi (1962) calls “conviviality” (p. 203).

Habitual communal affairs (department meetings, academic conferences) and regular social relationships (departments, professional organizations) reflect the “semantics” embodied in the social environment (Hjørland & Albrechtsen, 1995, pp. 06, 408). Organizational environments (meetings) consisting of webs of meanings, situations, and vocabularies (language) are locations of “...shared beliefs (and values)...” (Iyer, Shankaranarayanan & Wyner, 2006, p. 2; Cantelli, 2007, p. 5; Van den Sten, 2010, p. 618).

Knowledge is a consequence of participatory interaction (Cantelli, 2007, p3). Knowledge results from the interpretive discursive frames construed within a social environment (Weinberger, 2011, pp. 89-90). Social roles and statuses are represented in the interactive relationships and are reflective of the knowledge used in situations (Hjørland & Albrechtsen, 1995, p. 408). Individuals interacting in any situation are constitutive of a field or context which bounds knowledge as a social reality (Nonaka, 1994, pp. 17, 23-25; Johannessen, Olaise & Olsen, 2002, p. 1100).

The roles and statuses of individuals in interactions, which create situations, are basic to, of definitions of situations. Associative actions are practices within a group’s view of things. These practices are habits of acting with, toward things in situations. Views of things, and the world in which they are, are dependent upon relationships as defined by roles and statuses of the actors. Roles and statuses create views, or theories-in-use, about experiential affairs; views frame the affairs making them into sensible, of meaningful, objects. What is known and knowable depends upon the view, which depends upon the associative “circle” of individuals. The individual views the world from this circle of relationships. Knowledge is a result of social, collective, relationships defining the objects of knowledge. Knowledge is present in interactions or the habits of doing things conjointly, or practices. A circle of associates is a community of practice. An epistemological analysis of knowing as social process and knowledge as a social result is a description and analysis of the social schemas present in the definitions of situations.

Taxonomy of the social frame

Networks of actors: roles and statuses.

Organizational schemas.

Situations of action.

Practices, as embodying knowledge.

Community of practice.

Knowledge, as either tacit or explicit, results from applying communal schemas.

Vocabulary maps practices to social meanings or schemas.

Cultural frame

Discussion of the cultural frame

We know because we live-in fields of meanings, semantic structures or webs shared by the group which affords understanding and interpretations of affairs (Lakoff, 2000, pp. 13, 19, 49). Knowledge is a “cultural product” (Hjørland & Albrechtsen, 1995, p. 409). What we know as factual are known because they are aspects of a web of meanings (Tuomi, 1999-2000, p. 105). Organizational knowledge is a result of an organization’s set of meanings framing what people do (Lai & Lee, 2007, pp. 307-09). At any given place and time, we are always living-in (Byvavat’, a Slovak verb meaning “continuously dwelling-in”) a web of meanings (Gueldenberg & Helting, 2007, p. 110). We dwell in meaning (Polanyi & Prosch, 1975, p. 66). These webs of meanings are interpretive frames of understanding (knowing) which constitute the backdrop of our actions (Russo & Schoemaker, 2002, pp. 29, 35).

Individuals become persons, associates form a community, things experienced become objects of experience because they (individuals, associates, things) exist as knowable affairs, as knowns, encapsulated in a particular web of meanings, or a meaning-system. There are multiples of meaning-systems. Groups-belonged-to are meaning-systems. Knowledge is a result of an emerging level of understanding which is an entirety of details undergone, or experienced; what is known is wrapped in a quilt of meaning. Things are known and knowable as objects because of the informing nature of meanings. Language or vocabularies make common encapsulating meanings; language makes experience reflective of objects in, of the world. An epistemological analysis of knowing and the knowns of experience is a description and analysis of the webs of meanings informative of experience, or of the interpretive frames of experience.

Taxonomy of the cultural frame

Webs of meanings or meaning-systems.

Organizational webs or networks of meanings.

Meanings encapsulate situations, actors and actions.

Community of meaning or common senses.

Knowledge, as either tacit or explicit, results from applying common senses.

Vocabulary (language) maps experienced objects (practices) to the common meanings.

Conclusion

The essay maps three major paradigms, or frames, as determinates of the senses of the terms, “knowledge,” “tacit knowledge,” and “explicit knowledge” in KM discourse. These underlying

paradigms shape or form the ontological space of the use of the vocabulary descriptive and analytical of the subject matter of knowledge management.

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The Analysis of Properties of Bricks from Old Serbian Monasteries Based on the Theory of Pattern Recognition

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Abstract

Pattern recognition is a process that involves mathematical methods for decision making on whether a certain pattern belongs to a particular class. In the case of bricks in old Serbian monasteries, it is interesting to classify them by location and time of their origin on the basis of their chemical and rational composition to determine the impact on their sintered properties. This paper presents results of chemical properties of the bricks from Serbian monasteries, which cover the period from the 10th to the 15th century, as well as sintered properties related to brick porosity. By using the pattern recognition method based on the pattern distribution in two-dimensional space, classes of samples were formed related to particular sintered properties and locations.

Keywords: theory of pattern recognition, bricks from monasteries, chemical composition, sintered properties

Introduction

Today, the man is faced with a multitude of information that is increasingly easy to obtain thanks to the development of information technologies, which enables him to acquire broad knowledge. Also, the vast amount of readily available data can lead to a situation where a person is completely overwhelmed and the essence escapes him/her. It happens very often that, when searching for some information on the Web, we encounter a huge variety of interesting content, more or less connected with our search. This raises and deepens our interest, which can lead to good-quality results, but sometimes only to a superficial introduction to many elements without exploring their substance.

How to moderate ourselves and keep us on the right track - to identify the right content and fully understand its meaning? How to determine what information is relevant to our interests and use it in the right way?

In mathematics, there is a discipline of pattern recognition, which does precisely this, i.e. tries to edit the mass of data by classifying them on the basis of selected features that are essential for the research, eliminating the less relevant ones.

This discipline can be applied in various fields for it is multidisciplinary, and this is exactly what is required today in many investigations. More than ever there is a need for updating knowledge and direction. People are more versatile and more aware of the need to work in teams, often uniting several disciplines to conduct the research using the knowledge from various fields.

In this paper we have conducted research in the field of materials science using the classification method of pattern recognition. The processed data relate to the properties of bricks from Serbian monasteries originating from different periods of time.

When processing data, the 19 monasteries are presented only with the properties of their bricks. Their time of construction and location are not taken into account. The classification of the monasteries in the paper is based on the given data and the pattern recognition procedure. The assumption is that by a good choice of significant features objects can be classified in a qualitative way. The resulting classification groups the monasteries into classes that show considerable association regarding the construction period, as well as geographical and geological origin of raw materials. This connection demonstrates the validity of the pattern recognition method used herein, because the results confirm the assumed hypothesis that the right choice of a small number of significant features preserves the specificity of the observed objects. This makes it possible for the n-dimensional space, in which we observe objects that are to be grouped through the recognition of their connection, to be projected into 2- or 3-dimensional space in which it is far easier to perform the classification, without disrupting their class association.

The following section describes the process of brick making used in the construction of the monasteries. Then, a method of classification is presented and applied to the data defining the composition and condition of bricks. The bricks of each monastery are characterized by numerous properties, whereas the reduction in the number of properties to those that are relevant to a particular investigation provides more useful classification of samples. The analysis shows interesting and significant results in terms of grouping the monasteries by the year of construction or location.

Serbian monasteries

The first orders of monks who lived in monasteries were established at the very beginnings of the Christianity, significantly after the edict of Milan at the year 313, when freedom proclaimed to this religion. The first founder of the Serbian monk movement is Rastko Nemanjić, the younger son of the ruler Stefan Nemanja, who went to the Holy Mountain (Sveta Gora) where he became a monk and took new name Sava. In common speech there is a saying that the monasteries of Hilandar, built by Sava and his father on the Holy Mountain and the monastery of Studenica that is a legacy of Stefan Nemanja, are parents of all monasteries across the Serbia and the places where the Serbs live.

Nowadays at the territory of Serbia exist 212 monasteries, of which 54 are proclaimed to be a monuments of the culture. Sopoćani (Figure 1), (with the monastery of Đurđevi stupovi and the church of St. Peter and Paul), monastery of Studenica (Figure 2), medieval monuments at Kosovo (monasteries of Dečani and Gračanica, the Patriarchy of Peć and the church of Bogorodica Ljeviška) are enlisted to the register of the world's legacy of the UNESCO.



Figure 1 Monastery of Sopoćani

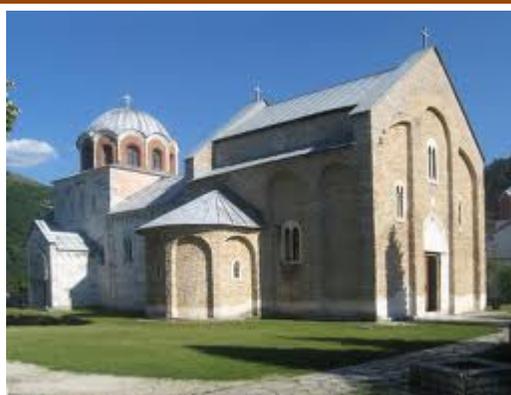


Figure 2 Monastery of Studenica

Monasteries were usually built in hardly approachable locations which was a guarantee for the isolation of the community of monks. Usually the surrounding cliffs and woods were the only defense from intruders, and the treasures of monasteries were an interesting pray to the Turkish raiders, so a significant number of these churches were burned down and destroyed in these raids.

The monasteries architecture followed the changes of styles in the Byzantine legacy until the present days. The iconography developing at the time was the best in Europe, while the monastery treasures were the artistic and spiritual capital.

The Serbian monasteries today are still significant spiritual places; however, they are primarily segments of Serbian legacy, national identity and history.

Besides the architecture and the iconography, their own place in the history of the monasteries have the bricks of which this monasteries were built. The bricks were made of clay found near the building sites and by the thermal process transformed into a sintered condition which conserved their shape, chemical and mineral content. In Figure 3 is a map of locations of 19 monasteries were was conducted the survey by Serbian Academy of Science and Arts (SANU) on examination of chemical, mineral-biological and sinterated properties of the bricks (Ristic, Cirkovic & Korac, 1979).

Physical and chemical changes during brick production

Raw minerals used in ceramic products are usually complex mixtures of clay minerals, with other mineral matter such as quartz, feldspars, carbonates, gypsum, iron oxides and sometimes organic matter. Refractory products are also made from a wide range of non-clay minerals, together with the specialized additives and binders (which may include some clays). When clay-based ceramic products are fired in a kiln, any residual moisture is driven off at temperatures between 100 and 200°C. If organic matter and iron pyrites are present, the oxidation takes place at temperatures between 300 and 500°C. Water combined within the structure of clay minerals (“crystal water”) is usually released at temperatures between 500 and 600°C, whilst carbonates

such as calcite and dolomite dissociate with the release of carbon dioxide in the temperature range 750 to 950°C (Zivanovic, 1985).

The most important changes relating to the development of ceramic properties involve the breakdown of the lattice structure of the original clay minerals, followed by the formation of new crystalline compounds and glassy phases. The temperature at which vitrification (glass formation) takes place, varies according to the mineralogy of the clay. Vitrification usually commences at about 900°C and is completed at about 150°C (for many brick clays) or about 1100°C in the case of more refractory fireclays (Zivanovic, 1985), (Ranogajac & all, 1998).

There are several materials that are referred to as clay. The properties of clays differ in: plasticity, the malleability of the body; porosity, the degree to which the fired pottery will absorb water; and shrinkage, the degree of reduction in size of a body as water is removed. The various clays also differ in the way in which they respond to different degrees of heat when fired in the kiln. A clay object can be decorated before or after baking. Prior to some shaping processes, clay must be prepared. Each of these different clays is composed of different types and amounts of minerals that determine the resulting pottery. There are wide regional variations in the properties of raw materials used for the production of pottery, and this can lead to wares that are unique in character after a locality. It is common for clays and other materials to be mixed to produce clay items suited to specific purposes. The two essential components of clay are silica and alumina which combine to form aluminium silicate, also known as kaolinite. Other mineral compounds in the clay may act as fluxes to lower the melting point of the silica during baking (Ranogajac & all, 1998), (Marstijepovic, 2011).

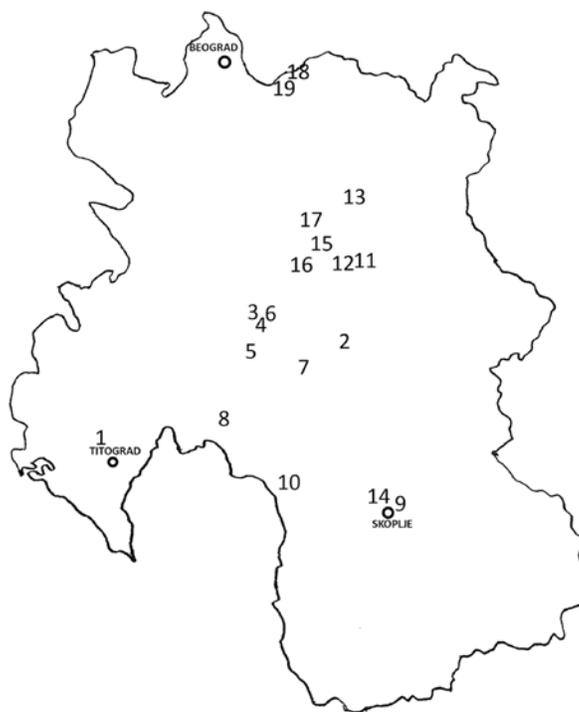


Figure 3 Geographical placement of the monasteries were bricks were taken (Central Serbia, Montenegro and Macedonia)

Clays and clay minerals have been widely used as the main raw materials in the fabrication of rough ceramic products especially bricks for construction due to many specific properties both before and after baking.

The study of mineral phases present in the raw material is rather difficult, because industrial clays have a very complex mineralogical composition. During the baking process a series of transformations occurs, which will influence the final properties of the ceramic products. Besides, plasticity, chemistry, color, mechanical strength after baking, water absorption capacity etc., are the important clay properties that are of interest to the ceramics industry. The knowledge of these characteristics leads to optimization of the use of new clay deposits in local or regional ceramic industries. During the ceramic process, once the crystalline structures of minerals exceed their stability limits, they are partially decomposed while others are being simultaneously formed. Low-pressure mineral transformations at high temperature are mainly influenced by the chemical and mineralogical compositions of the original clay, its grain-size distribution, the maximum heating temperature, heating rate, duration of baking and kiln atmosphere.

Table 1 : List of monasteries were bricks were examined

No	Object	Location	Time period
M-01	Church of Bradina-Martinići	(Podgorica)	(X-XI century)
M-02	Church of St. Nicolas	(Kuršumlija)	(1168-1172)
M-03	Monastery of Studenica	(Raška)	(1183-1196)
M-04	Monastery of Studenica	(Radoslavljeva priprata)	(1223-1234)
M-05	Monastery of Sopoćani	(Nevi Pazar)	(1265)
M-06	Monastery of Gradac	(Kravna)	(1270)
M-07	Monastery of Banjska	(Kosovska Mitrovica)	(1313-1316)
M-08	Patriarchy of Peć	(Peć)	(1333)
M-09	Marko's monastery	(Skoplje)	(1346)
M-10	Monastery St. Arhandjela	(Prizren)	(1348-1352)
M-11	Church Lazarica	(Kruševac)	(1375-1385)
M-12	Lazar's palace	(Kruševac)	(1375-1385)
M-13	Monastery of Ravanica	(Čuprija)	(1381)
M-14	Monastery St. Andrew	(Skoplje)	(1389)
M-15	Monastery of Ljubostinja	(Trstenik)	(end of XIV century)
M-16	Monastery of Veluče	(Trstenik)	(end of XIV century)
M-17	Monastery of Kalenić	(Jagodina)	(1427-1413)
M-18	Cemetery church in Smederevo	(Smederevo)	(beginning of XV century)
M-19	Smederevo fortress	(Smederevo)	(1439)

Table 2 : Chemical and mineral composition and sintered properties of analyzed bricks

No.	Chemical composition, %							Mineral composition, %				Sintered properties	
	CaO	MgO	Na ₂ O	K ₂ O	Al ₂ O ₃	F ₂ O ₃	SiO ₂	kaolinit	Microcl.	albit	quarz	pore size (μ)	T (°C)
M-01	0.784	0.175	0.025	0.016	0.359	0.085	1.125	47.70	5.20	7.74	8.39	1.68	920
M-02	0.334	0.462	0.125	0.079	0.650	0.238	3.420	31.76	12.13	18.14	21.55	10.06	720
M-03	0.326	0.406	0.150	0.117	0.998	0.294	5.884	33.82	11.76	14.17	30.31	6.70	800
M-04	0.286	0.394	0.142	0.177	1.469	0.464	9.819	34.06	11.34	8.59	38.57	7.70	760
M-05	0.437	0.343	0.093	0.127	0.847	0.262	4.347	36.30	15.90	10.94	23.82	0.99	800
M-06	0.496	0.313	0.088	0.103	0.856	0.224	3.992	40.99	13.84	11.01	21.67	3.56	800
M-07	0.682	0.211	0.046	0.661	0.351	0.090	1.900	28.62	15.50	11.04	20.99	3.08	800
M-08	0.250	0.414	0.126	0.210	1.252	0.343	9.534	28.93	14.33	8.13	41.76	1.80	820
M-09	0.430	0.308	0.109	0.153	1.083	0.144	9.317	28.21	11.43	7.61	48.75	2.81	920
M-10	0.260	0.359	0.266	0.115	1.708	0.564	13.171	38.34	5.45	11.87	33.88	2.29	750
M-11	0.394	0.391	0.115	0.010	0.826	0.216	5.981	29.62	10.47	11.35	39.09	3.77	800
M-12	0.392	0.428	0.102	0.078	0.877	0.221	5.770	34.31	8.28	10.28	37.69	2.82	800
M-13	0.491	0.182	0.247	0.079	0.621	0.123	3.920	20.47	11.26	34.59	22.11	1.69	910
M-14	0.258	0.467	0.083	0.192	1.080	0.417	4.924	39.04	20.07	8.18	18.50	2.70	750
M-15	0.222	0.450	0.153	0.124	1.115	0.310	9.460	27.52	8.81	10.26	46.78	2.31	800
M-16	0.238	0.305	0.270	0.188	1.155	0.335	8.246	27.28	15.85	21.46	27.22	2.81	900
M-17	0.093	0.555	0.177	0.175	1.290	0.353	8.246	32.76	13.23	12.62	34.57	2.52	880
M-18	0.616	0.287	0.048	0.049	0.347	0.097	2.546	25.02	10.58	9.91	34.05	2.46	900
M-19	0.566	0.291	0.074	0.079	0.533	0.125	3.503	28.82	13.03	11.47	32.14	0.93	790

Pattern recognition

The pattern recognition is a scientific discipline which consists of mathematical methods for decision-making regarding object classification with a minimal number of wrong decisions. Since the pattern provides the description of a certain object and expresses a number of its properties, the pattern is represented by means of an object vector - an ordered array of the values of the related properties.

The classification of samples is conducted by dividing the measurement space into k decision areas. If the classes are specified (by a certain characteristic or by a representative) for every sample, the decision is made based on the class determination. If the classes are not specified, they are formed based on the representation along with the sample classification.

The selection of the type of characteristics used to describe an object depends on the problem that is being analyzed. A proper choice guarantees successful classification. Often, the number of selected characteristics is large and thus the resulting vector is also high-dimensional, which complicates the classification. In that case, the number of characteristics is reduced to the minimum, but the initial sample representation has to be maintained.

In mathematics, the sample materials with numerous properties are also analyzed and by using the suitable classification methods of pattern recognition and the mutual influences of these properties in particular processes of material processing can be noted (Acketa, 1986).

The materials considered in this paper were subjected to the sintering process. The materials were the bricks from the medieval Serbian monasteries. The first step is the reduction of the dimensions of the vector data after which, based on their representation in the space of the lower dimension, the classification is conducted. In this way the significance of certain characteristics is shown as well as the influence of the individual parameters.

Bayesian decision theory

The most appropriate approach to the pattern recognition is the statistical one, as in mathematical statistics the parameter X is determined based on the sample with n characteristics.

In the pattern recognition theory, the device that divides the measurement space into the decision areas is called the classifier. It can be presented by using the discrete functions: $g_1(x), \dots, g_c(x)$, where each function corresponds to one class. The decision is made for the class in which: $g_i(x) > g_j(x), j < i$. The areas are divided by decision hyperplanes $g_i(x) = g_j(x)$

Particularly significant is Bayes classifier that makes a decision based on the maximum value of the conditional class probability.

$$P(w_i / X) = \frac{p(X / w_i)P(w_i)}{p(X)}, \quad p(X) = \sum_{i=1}^c p(X / w_i)P(w_i)$$

It is easily shown that it is the optimum in terms of the minimum probability of error

$$P(err) = P(X \in R_2 / w_1)P(w_1) + P(X \in R_1 / w_2)P(w_2) = \int p(X / w_1)P(w_1)dx + \int p(X / w_2)P(w_2)dx$$

Bayes classifier is more frequently used to measure the efficiency of other types of classification, since its application is more difficult as $P(w_i)$ and $p(X, w_i)$ are unknown.

Here, a functional norm of the decisions is used as a relation between the given samples and the new input vector.

The k -th nearest-neighbor rule estimates the a posteriori probability function as follows:

$$P(w_i / X) = \frac{p_n(X / w_i)}{\sum_{j=1}^c p_n(X / w_j)} = \frac{k_i}{k}$$

Therefore, if the majority of k nearest neighbors of the input vector X belong to the class i , the input vector will also belong to the class i . If $k=1$, the classification of the nearest neighbor is assigned to the X class which the nearest vector belongs to, so it leads to the same decision provided by Bayes classifier (Fukunaga, 1990), (Theodoridis, & Koutroumbas, 2009).

Dimension reduction of the vector sample

The dimension reduction of the vector sample can be conducted if the classes are given and on condition that subsequent classification does not alter the class placement of the samples. If the classes are not given, the first step is the reduction and the second one is the classification. This is the so-called monodistribution.

Transformation of the n -dimensional space into a space of a lower dimension is often best performed using a nonlinear function. Since it is difficult to determine the optimal transformation, the discrete Karhunen-Loeve expansion is utilized.

n -dimensional vector is represented as a linear combination of the orthonormal basis vectors.

$$X = \sum_{i=1}^n y_i F_i$$

By choosing $m < n$ vector y components, and by replacing the rest with the constants, the following error is made:

$$\Delta X(m) = \sum_{i=m+1}^n (y_i - b_i) F_i$$

The optimal choice of m characteristic values (eigenvalues) with the respect to the minimum of the expected square error will be:

$$E \{ \|\Delta X(m)\|^2 \} = \sum_{i=m+1}^n E \{ (y_i - b_i)^2 \}$$

From the minimum condition we further obtain: $b_i = E \{ y_i \} = F_i^T E \{ X \}$

$$\text{The error is: } E \{ \|\Delta X(m)\|^2 \} = \sum_{i=m+1}^n F_i^T \sum_X F_i$$

\sum_X – covariance matrix of X

The optimal choice for the orthonormal vectors F_i are the characteristic vectors (eigenvectors) of the matrix \sum_X .

The minimum of the mean square error is $E \{ \|\Delta X(m)\|^2 \} = \sum \lambda_i$

To minimize the error, the vectors y_i with the smallest characteristic values are neglected. The choice of vectors y_1, \dots, y_m is thus performed on the basis of the largest characteristic values $\lambda_1, \dots, \lambda_m$.

The effect of the selected values is best understood in terms of the percentage expressed by the mapping fidelity coefficient:

$$r = \frac{\sum_{i=1}^m \lambda_i}{\sum_{i=1}^n \lambda_i} * 100\%$$

The procedure is as follows: The vector sample components are denoted with x_{ij} , where j is an index of a sample within a sample set, and i is the sample dimension index.

$$\sum_x = \frac{1}{s} \sum_{j=1}^s (x_{ij} - M_i)(x_{ij} - M_i)^T \qquad M_i = \frac{1}{s} \sum_{j=1}^s x_{ij}$$

M_i is the mean value i -th characteristic of every sample where $\lambda_k, F_k, Y_k = F_k^T X, \dots$ are found/determined (Acketa, 1986).

Data analysis

The analysis is conducted by using the data gathered from the composition and structure of the Serbian medieval monastery bricks. The product is obtained by sintering multi-component silicate materials.

The sintering process of the ceramic materials should be observed along with the change analysis in the microstructure and the influence on the characteristics of the sintered materials. In the technology process of the brick production, the sintering is conducted at the temperatures from 900 to 1050°C depending on the composition of the initial material and the features of the finished product. The sintering process causes chemical changes (reactions in the solid state, the formation of the new stages) and physical changes (the shape of pores, solidity).

Through the process of heating, finely dispersed particles merge, increasing the density and the solidity of materials. The pores shrink, the canals close and change into isolated spheres.

The analyzed brick samples from 19 monasteries are characterized by 13 properties – 7 about chemical content, 4 about mineral content, the average value of pores, and the baking temperature, as shown in Table 2.

This procedure is conducted by computer software written in C#.

Eigenvalues of covariance matrix 13*13 are 55321, 2290, 869, 289, 148, 76, 24, and all others are less than 1.

By choosing only the 2 highest values for the transformation, the mapping to the two-dimensional space is performed with the fidelity coefficient of 97.6

Applying linear transformation, with two characteristic vectors F1, F2 as coefficients, result is a new set of 19 two-dimensional vectors. On the basis of the distribution of samples, mapped in the transformed two-dimensional space (Figure 4), the samples can be classified as follows:

Class1: M4, M10, M14

Class2: M1, M3, M5, M7, M8, M9, M11, M12, M15, M19

Class3: M6, M13, M16, M17, M18

Monastery M2 do not belong any of above classes

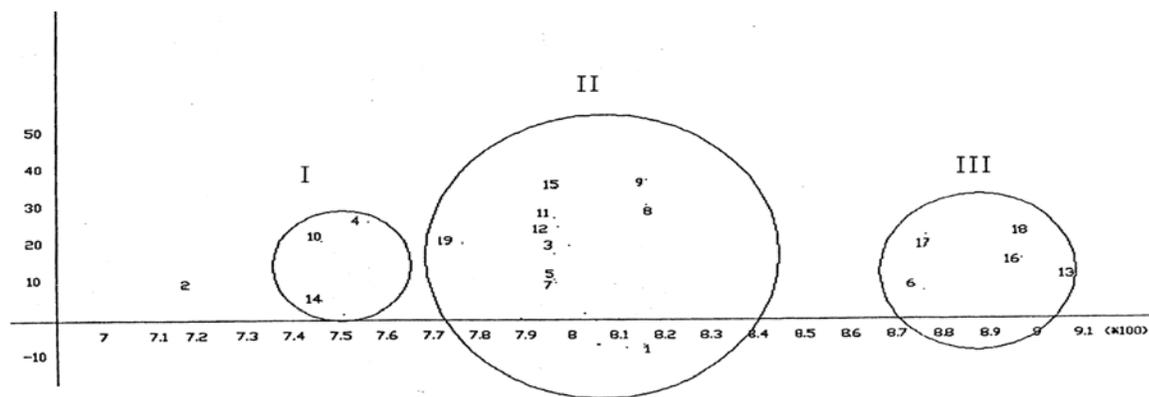


Figure 4: Distribution of samples without normalization

This classification has the underpinning on the temperature of baking and this is a basic parameter of separation.

Monasteries where the brick baking temperature is between 760 and 780⁰C belong to the first class, monasteries with the brick baking temperature between 780 and 820⁰C to the second, and with the brick baking temperature between 820 and 910⁰C to the third class.

The property 13 carries much higher values than other 12 properties, and its impact is obvious. Hence it is useful to perform a normalization of property values beforehand and then to carry out reduction down to 2 vectors. The mapping to the two-dimensional space is performed with the fidelity coefficient of 91.7%, and now we have the next classification:

Class1: M5, M6, M7, M13, M14, M18, M19

Class2: M11, M12, M16

Class3: M8, M9, M15, M17

Monasteries M1, M2, M3, M4, M10 do not belong to any of the above classes.

This classification is partially correlated to the geographical area in which the monasteries are situated (Figure 2), mostly because of the similarities of the raw material of which the bricks are made.

If this classification is depicted on the 3-component state diagram quartz-volastonit-anortit (Figure 5), then the elements of Class1 cluster in the area A, while the Classes 2 and 3 in the area B. The position of the brick samples on this 3-component state diagram indicates that the conditions of brick production were similar for samples within each area of diagram.

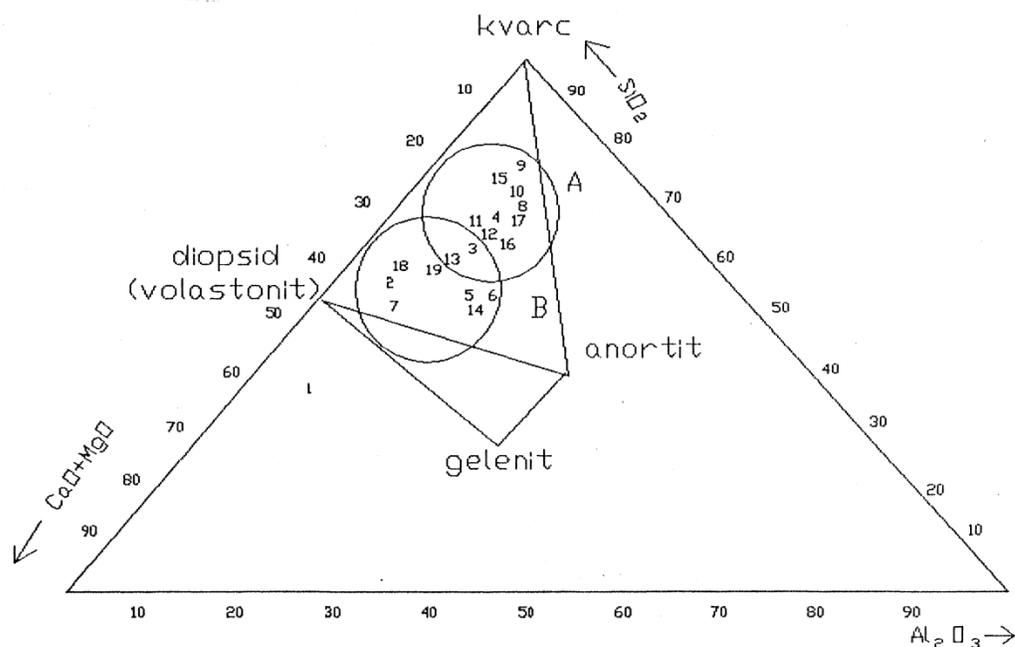


Figure 5: 3-component diagram

Conclusion

The paper shows the possibility of using the method of dimensional reduction for a monodistributed sample, i.e. without advance knowledge of possible suitable classes. The advantage of the method is in reducing a large number of data to a near-optimal reduced set which enables easy classification without disturbing interrelation of data.

When applied in the field of material science, the method has enabled fast and efficient classification of majority of samples. The important parameters have been preserved while others have been discarded, thus enabling a single sample to be a faithful representative of its whole class.

This feature of the pattern recognition theory enables it to be utilized in various multidisciplinary analyses of a large quantity of different data, which helps the user to extract the wanted features, enabling the user to acquire the knowledge as he/she wishes to research.

Pattern recognition is used in computer technology for graphics and audio data, but also in many other areas.

The obtained results show the applicability of the theory of pattern recognition in archaeological studies and the possibility of determining the authenticity of bricks based on their belonging to a location and time period.

Thus, the combination of knowledge in mathematics and materials science can provide valuable information for sciences such as archeology, history and art, which the present analysis confirms. This means that in the future, even with lesser known elements it is possible to start research

with more confidence, using the experience we gained when results can be checked, as in the presented example.

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Web 2.0 applications and Knowledge Management

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Abstract

This paper discusses the use of Web 2.0 applications as tools for knowledge management for organisations. The exponential growth of this technology changes the way knowledge is shared but has yet to fully align itself with traditional knowledge management processes. In order for such an alignment to take place it is essential to grasp the full potential of developing Web 2.0 applications for knowledge management. There is a desire to develop effective knowledge sharing and a culture of collaboration amongst staff, however, it is only with the use of Web 2.0 applications can this be achieved. The impact of Web 2.0 on the way we communicate has created new possibilities for sharing knowledge, therefore, embracing this concept can greatly benefit existing knowledge management processes. The power of Web 2.0, and social media, can have a tremendously positive effect on interactions between organisations and the public. By using a common model, this study aims to display to what extent Web 2.0 can be applied. It also includes examples of successfully implemented Web 2.0 applications. By providing a look into how these applications improved knowledge management in organisations, this paper gives a clearer idea of how to implement new ideas.

Keywords: Web 2.0 applications, knowledge management, social media, e-government

Introduction

Web 2.0 is a second phase of architecture of application development for the world wide web. These applications are commonly in the form of websites that rely heavily on user input. They tend to feature input options such as photo upload, blogging, video sharing and various other. The concept of Web 2.0 is centred around the need to make the web a more dynamic and interactive experience. This kind of evolution ensures a shift from a one-way interaction to an environment where user input is not only vital, but a force that drives the medium forward. The web has come a long way in terms of accessibility as well. Today, there is no longer a need for a comprehensive knowledge in web mark up and programing languages in order to manipulate the content of websites. What was once a daunting task for even the most highly skilled administrators has been reduced to a task equivalent of working within a simple text processor. This is due to the fact that the web has been adapted to suit the needs of the users, and continues to evolve even further in that respect. Making the web a more user-friendly experience paved the way for the rise of concepts like social media, blogging, and others. They were conceived with the goal of enabling users to interact with each other. Social media gave people opportunity to voice their opinions, exchange ideas and even serves as a channel for distributing their creative work. Because of this focus on user experience, development of Web 2.0 applications relies on the ability to create new ways of user interaction.

There is a growing interest from organisations to make use of Web 2.0 applications within their working practices. The existing model of online communities within these organisations lacks various features that can be added by applying newly developed Web 2.0 applications. Such a step requires not only a technological shift, but a cultural one as well. Most organisations such as enterprises and government agencies have strong rules and boundaries. There is usually a clear definition of a person's association to the organisation. Members of Web 2.0 communities often operate under different, less strict conditions. This is most notable in the example of an

individual having multiple and interchangeable roles as well as varying levels of interest. Another characteristic of Web 2.0 communities is the greater freedom of expression, and rules constituted from a consensus reached within the community. This type of structure is not commonly found within an enterprise environment and therefore necessitates fundamental changes within the organisation. In order to successfully implement Web 2.0 communities, organisations must adapt to these new methods. By aligning Web 2.0 with their traditional knowledge management processes, organisations can understand the effects of incorporating its activities. In Section 2, this paper describes the four knowledge management processes most commonly carried out by organisations. Section 3 describes Web 2.0 in greater detail and highlights the activities carried out by end users. This paper describes various activities users carry out within Web 2.0 applications in terms of knowledge management and draws a parallel with traditional knowledge management processes. With the main goal of demonstrating an example of a relation between traditional knowledge management and Web 2.0 applications, Section 4 provides a look into ways in which the two correlate. Section 5 provides a set of recommendations on what to consider when implementing Web 2.0 and social software tools. Finally, Section 6 showcases notable examples of successful implementation of Web 2.0 applications in regards to knowledge management. These examples are mostly found within government organisations.

Traditional Knowledge Management

Early on in the Knowledge Management movement, it was defined as “The process of capturing, distributing and effectively using knowledge” (Davenport, 1994). Knowledge management is a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise’s information assets. These assets may include databases, documents, policies, procedures, and previously un-captured expertise and experience in individual workers. (Gartner Group, Duhon, 1998). In order to understand the concept of Knowledge Management, it is important to distinguish knowledge and information. While data comes in the form of raw signals, it becomes information only when there is some meaning attributed to it. This information by itself does not mean anything to the organisation yet, and it is only when knowledge gives it a purpose can it achieve a specific goal. As an example of this distinction one can consider the meteorological conditions. Data would be the fact that it is raining. Information embodies the understanding of relationship of some sort, possibility and effect and would come in the form of: “The temperature dropped 15 degrees and then it started raining.” Knowledge represents a pattern that connects and generally provides a high level of predictability as to what it described or what will happen next and would come in the form of: “If the humidity is very high and the temperature drops substantially the atmosphere is often unlikely to be able to hold the moisture so it rains.” Knowledge Management is considered as a process of “leveraging the collective knowledge in an organisation” in order to support the organisation in carrying out its activities.

The origin of Knowledge Management arose within the consulting community. It was from there that the principles of Knowledge Management were rapidly spread by the consulting organisations to other disciplines. These consulting organisations realised that there is potential in using the internet as intranet in order to link together their own geographically dislocated and knowledge-based organisations. They understood that the expertise they gained, in how to share and manage information and knowledge, could be considered as a product which could be sold to

other organisations. The name for this new product was Knowledge Management. Its initial stage was driven primarily by IT, information technology. The second stage of Knowledge Management emerged when it became apparent that simply deploying new technology was not enough to enable information and knowledge sharing. It became clear that Knowledge Management implementation would involve changes in the corporate culture, in many cases significant changes. The third stage developed from the awareness of the implementation of content, and in particular the awareness of the importance of the retrievability of content, and therefore of the importance of the arrangement, description and structure of that content (Koenig, 2012).

Web 2.0

Tim O'Reilly lists his seven principles of Web 2.0 in which he demonstrates the use of these new applications. In his first principle, O'Reilly and John Battelle outlined their definition of the "Web as a Platform", where software applications are built upon the Web as opposed to upon the desktop. The second principle describes embracing the power of harnessing collective intelligence. Online encyclopaedia, Wikipedia, demonstrates this by being more up to date than encyclopaedia Britannica by focusing on the community that consists of millions of users. This is not just user-generated content. It is a cognitive community exhibiting intelligent behaviour.

As a third principle, O'Reilly refers to data as the next "Intel inside", a term that implies that data is the sole source component in systems whose software infrastructure is largely open source or otherwise commodified. End of the software release cycle, O'Reilly's fourth principle, implies a number of fundamental changes in the business model. Firstly, operations must become a core competency, which stresses the importance of a shift from software as artefact to software as service that the software will cease to perform unless it is maintained on a daily basis. Scripting languages such as Perl, Python, PHP and Ruby have been adopted by application developers building dynamic systems that require constant change. Secondly, users must be treated as co-developers, in a reflection of open source development practices. The open source dictum, "release early and release often" in face has morphed into a state of "perpetual beta", in which a product is developed in the open with new features slipstreamed in on a monthly, weekly or even daily basis. This allows companies to test whether their users will adopt the products before releasing it officially.

As his fifth principle, O'Reilly lists lightweight programming models which refer to support of lightweight programming models, focus on syndication rather than coordination and designing for remixability or, in other words, to enable users to use various resources like source codes. An example of this is Google's ability to, due to simplicity, gain popularity with its Maps service by taking a much more flexible approach compared to GIS vendors such as MapQuest and Microsoft MapPoint. One other feature of Web 2.0 that deserves mention is the fact that it is no longer limited to the PC platform. In his sixth principle of Web 2.0, O'Reilly showcases how software above the level of a single device provides a key insight into how to design applications and services for the new platform. Apple's iTunes is the best example of this principle in practice. This application reaches from the handheld device to a massive web back-end, with the PC acting as a local cache and control station. There have been many previous attempts to bring web content to portable devices, but the iPod/iTunes combination is one of the first such applications designed from the ground up to span multiple devices.

Finally, O'Reilly's seventh principle of Web 2.0 lists rich user experiences, which is arguably one of the most important principles. Several years ago, Macromedia coined the term "Rich Internet Applications" to highlight the capabilities of Flash to deliver not just multimedia content but also GUI-style application experiences. However, the potential of the web to deliver full scale applications did not hit the mainstream until Google introduced Gmail, quickly followed by Google Maps, web based applications with rich user interfaces and PC-equivalent interactivity. The collection of technologies used by Google was christened AJAX. In summary of these principles, the core competencies of Web 2.0 are considered to be: focus on services instead of packaged software, control over unique data sources that get richer as more users use them, trusting users as co-developers, harnessing collective intelligence, leveraging the long tail through customer self-service, software above the level of a single device, lightweight user interfaces, developing models and business models. The use of Web 2.0 in Knowledge Management allows users to share what they have learned, innovate to be more creative, inventive and imaginative, reuse what others have already done, collaborate to take advantage of what others already know and learn by doing from others and from existing information (Frydenberg, 2008).

As previously stated, the essential part of Web 2.0 is user contributed content and knowledge creation. Without user input this technology would not be as relevant as it is. One of the first Web 2.0 applications that made user input more accessible were the ones that allowed users to post and share articles. A prime example of user generated content comes in the form of blogs. A blog is a website where entries are made in a journal style and displayed in a reverse chronological order. This type of websites enables users to easily write, typically using a WYSIWYG based editor, and connect with others thus creating good conditions for a discussion and an exchange of ideas. The recipients can randomly access the information or subscribe to it and share it amongst their contacts using other tools such as social media. More recently, the growing popularity of Twitter ushered in a new term, microblogging. It refers to posting content within a strict character limit which, in the case of the aforementioned website, is limited to 140 characters and is distinct from blogging due to its higher rate of frequency. This kind of exchange, with respect to traditional knowledge management, refers to knowledge transfer which deals with making pieces of knowledge of a person or organisation explicit and providing it to other persons and organisations.

A process in which a group of users that collaboratively create knowledge, whether it is an open community on the internet or closed such as a specific division of a company, is referred to as collaborative knowledge creation. It mainly deals with the creation of new knowledge. Because users are allowed to collaboratively create articles, wikis can be considered as a Web 2.0 application for collaborative knowledge creation. A wiki is a website which allows users to add, modify, or delete its content using a simplified mark up language or a rich-text-editor. The best example for this kind of Web 2.0 application is the online encyclopaedia, Wikipedia.

Individuals that solve problems by exploiting the wisdom and experiences of others is referred to as collaborative knowledge exchange. In order to solve a given problem, they first have to provide a description of it to a group of users. Feedback is provided in the form of hints or suggestions that can lead up to concrete solutions and further discussion. All feedback is visible to the users of the community. This kind of exchange comes in the form of forums in Web 2.0, and in relation to knowledge management, focuses on knowledge transfer and knowledge

application. Users providing potential solutions transfer the knowledge, and knowledge application happens when the user who stated the problem applies the suggested solution.

Meta-knowledge are descriptions of pieces of knowledge. Users possess the knowledge they contribute and sharing comes in combination with creation and sharing of meta-knowledge. Different categories of articles such as definitions and guidelines in wikis can be considered meta-knowledge. Websites like Flickr and YouTube are examples of Web 2.0 applications that facilitate knowledge and meta-knowledge sharing. In contrast to collaborative knowledge exchange, application of knowledge is not in the primary interest of knowledge sharing systems. Instead, the purpose is to make the knowledge available and provide long term storage and accessibility.

A social networking service is an online service, platform, or website that focuses on facilitating the building of social networks or social relations among people who, for example, share interests, activities, backgrounds, or real-life connections. In social networking users provide some personal information such as interests and share it with the community. The users can have multiple contacts which can be friends, colleagues or university peers. The most popular social network, Facebook, concentrates solely on the end users. Social networking, in terms of traditional processes of knowledge management, can be used to store and retrieve knowledge but they can also support creation of knowledge. Social networks are considered to be one of the most powerful Web 2.0 applications, and their popularity is constantly increasing.

Mashups are web applications, that use and combine data, presentation or functionality from two or more sources to create new services. In terms of knowledge management, mashups allow combinations of different open infrastructures and merging different resources to create a new service and to provide better insights into the knowledge. The goal of combining existing resources is knowledge transfer and knowledge application. Transfer of knowledge means that by accumulating the knowledge and presenting through different visualisations, it can be perceived and acquired.

Web 2.0 and Knowledge Management Process Alignment

There are four common processes in knowledge management. These processes are knowledge creation, knowledge storage and retrieval, knowledge transfer and knowledge application. The concept of Web 2.0 is very young and has gained much attention in the last years. Some of its essential aspects, as described in the previous chapter, are user contributed content, collaborative annotation, sharing, openness, and mashups. “In particular the openness and active involvement of users allowing them to be not only consumers but also producers of content brings in a new and very interesting quality of internet-based applications for knowledge management” (Schwagereit, Scherp, 2008).

The six processes identified for Web 2.0 applications correlate to the four core processes of traditional knowledge management. The matrix in Table 1, as presented in “Web 2.0 and Traditional Knowledge Management Processes” (Schwagereit, Scherp, Ireson, 2008), shows that the majority of Web 2.0 support for traditional knowledge management lies on knowledge transfer. The four traditional knowledge processes are displayed on the x-axis, while the six Web 2.0 processes are displayed on the y-axis.

Knowledge Syndication		Blogs, Podcasts, News Feeds		
Collaborative Knowledge Creation	Wikis	Wikis	Wikis	
Collaborative Knowledge Exchange		Discussion Forums		Discussion Forums
Knowledge and Meta-Knowledge Sharing		Content Sharing and Tagging	Content Sharing and Tagging	
Social Networking	Social Networking Applications	Social Networking Applications	Social Networking Applications	
Knowledge Orchestration	Mashup applications	Mashup Applications		Mashup Applications
Web 2.0 Knowledge Management	Knowledge Creation	Knowledge Transfer	Knowledge Storage / Retrieval	Knowledge Application

Table 1: Traditional knowledge management processes aligned with Web 2.0 processes

The majority of Web 2.0 support lies on knowledge transfer. While knowledge creation is additionally supported by knowledge orchestration, knowledge storage and retrieval can be improved by knowledge and meta-knowledge sharing. In contrast, knowledge application has Web 2.0 support only in collaborative knowledge exchange and knowledge orchestration. The processes of knowledge creation and knowledge storage and retrieval are supported by less Web 2.0 methods. Both can be facilitated by Wikis and Social Networking Applications. Even though not all of the four processes of traditional knowledge management are equally supported by Web 2.0 applications, knowledge management can benefit from Web 2.0, judging by the general amount of support. Web 2.0 applications and methods provide means to manage knowledge especially with high participation of end users. These methods allow the integration of different kinds of knowledge.

Recommendations for Implementing Web 2.0

The first step in successful Web 2.0 implementation is to assemble a task force that has a task to provide guidance and a baseline set of recommendations for handling Web 2.0 and social software. These task forces, which would implement this guidance and create specific policy for Web 2.0 and social software, should be created by individual agencies within the organisations. Apart from addressing interactions with Web 2.0 and social software tools, this effort should also address the internet application of such tools to support information repositories, information sharing, social networks, and knowledge transfer within the organisation. Solutions that encourage and reward the appropriate use of internal and external Web 2.0 and social software tools should be developed whenever possible. Measures of collaboration and participation are a

positive indicator during performance evaluation and therefore should also be developed. In practical terms, a task force that handles Web 2.0 and social software is faced with tasks such as profile management on various social networks such as Facebook, Twitter, etc.

Employee orientation and training should include appropriate use of internal and external tools. It is important that the task force considers integrating these factors when establishing its recommendations. The application of these tools transcends traditional information technology or public affairs roles. The necessary requirement for moving forward with Web 2.0 is to maintain an active presence on the web and social networks. This is an important component of outreach to the general public. Staff should be encouraged to explore these tools themselves when appropriate. The best way to maintain an effective presence is to encourage and support participation among staff. This means that, for example, interaction such as addressing user inquiries via social media in a reasonable amount of time reinforces the feeling of an active online presence.

Organisations should avoid the errors of banning or blocking certain Web 2.0 and social software tools, as well as treating improper use of such tools in the workplace as a technical problem rather than a staff problem. The major consequence of banning tools is the disconnection from the public and real-world flows of information. This leads to problems such as not being able to receive, share or discuss critical information. Web 2.0 and social software can be used inappropriately, but it is essential that this problem is dealt with as any other staff issue. It is important to note that staff within an organisation are the most effective communicators. Even a fully staffed public relations unit working around the clock cannot discover or reach all realms where relevant discussion may be occurring. Therefore staff should be provided with guidance for how to participate appropriately in forums, ensuring that good-faith steps are taken to ensure accuracy of information. One of the most common issues when it comes to forums are various types of spam messages. Instead of restricting use of forums, staff should be made aware of how to avoid posting content that could be interpreted as spam, as well as how to detect and react to it.

For organisations, especially governmental, it is important to understand and address security and legal implications in order to successfully interact with Web 2.0 and social software tools. Existing security training and policy should include programs for education and awareness. Policy should apply both to the appropriate use of internal tools and to the recommended use of and interaction with external tools, such as blogs and social networking websites, both in and out of the workplace. Caution is advised when participating in social media, especially for sensitive positions. A good example of this is use of Web 2.0 applications for military staff. Even though it is beneficial it also presents new security risks. Another example is the financial sector where the flow of sensitive information should have multiple security layers. Users should be educated about the dangers with focus on awareness of how to use the tools without negatively impacting security. In other words, users should have a clear image of what kind of information they can reveal during their exchange with the public. This is often outlined in the set of rules that are specific to an organisation.

It is also important to be aware of identity verification mechanisms. Individuals have masqueraded as staff representing various organisations in a way that is intended to confuse and is not considered a protected activity. When brought to the attention of the service provider,

these activities can be shut down. There should be various levels of user profiles with the service provider being at the highest level. That way, if a user profile of the lower level is compromised, only a portion of the data can be exported, while being denied access to other critical components. Organisations, however, should not solely rely on this kind of security measure alone. Implementing features such as a periodical password reset or a connection monitor reduces the risk of identity theft.

Arguably the most difficult component of the effort to successfully integrate Web 2.0 and social software tool into organisations is a willingness to adapt existing processes to accommodate these new tools. Many organisations are reluctant to do so out of fear that these adaptations might disrupt their current and proven methods by which processes are run. However, it is important to realise that much can be gained if staff have the opportunity to experiment with Web 2.0 and social software tools. Participants can develop an experienced understanding of how existing business processes might be adapted to benefit the new tools. Instead of using tools such as wikis and blogs as a supplement to existing processes, these tools can actually enhance, and in some cases replace, existing processes. Management should have a clearly stated policy of support for these efforts and a process to integrate these tools into existing systems. Traditional hierarchical organisational structure is often at odds with the “network” characteristics of Web 2.0 and social software, which transcend horizontal and vertical organisational boundaries. However, this is also one of the greatest benefits of such tools, allowing knowledge to travel much more quickly throughout the organisation. Knowledge centres will be naturally built, and the speed and effectiveness of information storage, search and transfer is enhanced throughout the organisation with proper management. Not only do these long term benefits outweigh any risks, but not acting is considered a far greater risk. Organisations should research how various tools might be of use to them. The adoption and effective use of Web 2.0 and social software tools requires a clear and defined commitment and support from upper level management, and support at all levels (Schroeder, 2009).

Examples of Successful Web 2.0 Application Implementation

Some organisations have already successfully integrated Web 2.0 applications with their knowledge management processes. As stated above, such an endeavour requires adaptation, and even core changes in some instances, of existing processes. It is obvious that these can be daunting tasks, but the long term benefits can certainly justify the efforts. These are just a small sample of the success with Web 2.0 and social software. It is important to note that one of the challenges these organisations had to overcome was the problem with federal (USA) use of commodity Web 2.0 tools which was that the terms of service were often incompatible with government legal and other requirements. The General Services Administration worked with several popular Web 2.0 applications, such as Flickr, YouTube, Vimeo and blip.tv, in order to make it possible for federal agencies to use these tools for official business while still meeting legal obligations.

Interlink

The Office of the Director of National Intelligence (DNI) Intelligence Community Enterprise Solutions operates a suite of Web 2.0 and social software tools, including wikis, blogs, instant messaging, social bookmarking, YouTube-like video and media sharing, and more. These tools are available for use with unclassified and classified information by the entire intelligence, diplomatic, law enforcement, and national security establishment. Unclassified versions of the

tools allow collaboration with state and local agencies and the academic community. Interaction via YouTube, and more recently, Ustream is handled in the form of posting various relevant videos which are later shared on social media websites such as Facebook and Twitter where the public has the opportunity to share their opinions through the comment section.

Air Force

The United States Air Force has embraced the idea that “every airman is a communicator”, and actively provides guidance to its personnel on how and when to interact in discussions that relate to the Air Force. They have even created a flowchart providing guidance on how to engage in discussions about the Air Force in a professional manner online. Successful implementation, of Web 2.0 tools, such as this means that every member of this organisation is made to be a positive part of public relations. The prime examples are their official Facebook and recruitment office Facebook pages where every post represents an opportunity for an exchange with the public. Each administrator approaches an inquiry or a comment with great care and aims to provide quality feedback. They include a personal signature, as well as the name of the organisation, in every comment.

TSA Blog

The Transportation Security Administration’s Evolution of Security Blog is an interactive mechanism that facilitates an on-going dialogue on innovations in security, technology and the travel checkpoint screening process. Controversial topics are covered well with senior TSA leadership often engaging in dialogue based on comments from the public. The comments are moderated for abuse, but free discussion is welcomed and encouraged. All blog posts can be shared via social media. Due to the high frequency of use of social media, sharing content and including links to the aforementioned blog posts, is a key activity in drawing interest of a wider audience. As the number of readers increases, the opportunity for a discussion is more likely.

Conclusion

Web 2.0 applications are increasingly being used in a number of different ways and organisations are beginning to show an interest in in this technology with respect to knowledge management processes. The first step in successfully integrating Web 2.0 into knowledge management processes is understanding how it will affect those processes. It is important that an organisation is willing to change and adapt its processes to accommodate new tools as this would provide proof that there is a tendency towards flexibility. The world wide web is an environment of constant and rapid change in the form of technology as well as user behaviour. Understanding this, and using it to an advantage, is one of the crucial factors when attempting to harness the power of Web 2.0.

The alignment of Web 2.0 with traditional knowledge management processes, depicted in Section 2 of this paper, shows that while a correlation exists, there is room for improvement. This improvement cannot be made exclusively by Web 2.0 application developers, but has to come from experience gathered by organisations that use Web 2.0 that are aligned with traditional knowledge management processes. Over the years, the world wide web has come a long way from conveying a one way information flow. Blogs, wikis, social networks and other tools have been proven to perform exceptionally well at some knowledge management tasks by facilitating online communities where users can exchange data, information and knowledge instantly. Organisations that look to improve upon their existing practices should consider making use of these tools. The examples of successful Web 2.0 application implementation lists

a few notable cases in which this technology has been incorporated and improved certain processes. Taking note of these examples, and considering the presented recommendations can help in forming a clearer view on how Web 2.0 applications, with respect to knowledge management, can benefit organisations.

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Knowledge Management Process

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Abstract

At the beginning of the twenty-first century, knowledge management has become a specific area of management through knowledge, skills and abilities, and wisdom in business production systems. Knowledge management has its roots in a wide variety of disciplines such as philosophy, business management, anthropology, information sciences and psychology. This paper discusses the process of knowledge management as a very complex process that consists of numerous, interconnected and conditioned activity.

Keywords: knowledge management, process management, data and information.

Introduction

Knowledge management is often equated with information systems or human resources management. It is a relatively young discipline that has its roots in several disciplines. We can say that knowledge management has interdisciplinary links that provide the best advancement in the field of knowledge management. There are several definitions of knowledge management and some of the definitions can be specified as:

- Knowledge management is the integration of management information systems, organizational change management and human resource management practice
- Under the management of knowledge we mean: "any process or practice of creating, acquiring, sharing and using knowledge, wherever it is located, in order to improve learning and performance in organizations"
- Knowledge management is: "Improving the way in which firms face a highly turbulent environments through which to launch their knowledge base (or bolster their knowledge assets) in order to provide continuous innovation."
- It can be defined knowledge management as "an effective learning process associated with the exploration, exploitation and sharing of human knowledge (explicit and hidden) using appropriate technology and cultural environment in order to improve performance and intellectual capital of an organization."

Data, Information, Knowledge

We conclude that the information is very important for effective and efficient management. Dispose of high-quality and useful information and allows successful operation of each manager and not only in decision making, but also in the performance of all other management activities

(planning, organizing, directing and controlling). When it comes to knowledge, it is necessary to take into account the information and data as this one without the other does not work. Information is present knowledge about the phenomena and the problems to be addressed. It is well known that knowledge is the most important resource of any organization and that means that if effectively and efficiently manage the knowledge we can only expect that we as managers do effectively and efficiently, and to successfully operate our organization. It is important to know about the data, information and knowledge as follows:

Data represent models (verbal or non-verbal, quantitative or qualitative, concrete or abstract) that show a certain phenomenon. In acquiring knowledge about the characteristics of the phenomenon, it is necessary to use more data, and use multiple sources of data collection. The data should have a certain quality characteristics.

The main features of the data [1].

- Representativeness - the data must be such as to provide information that fairly reflects certain phenomena;
- Accuracy - data should contain all the information in sufficient detail showing the characteristics of a given phenomenon;
- Understandability - data should be in the form make understand users,
- Actuality - data must have the performance to allow acquisition of information that is useful for the timely resolution of a particular problem.
- All information is aware of a certain phenomenon, process or problem. The knowledge obtained in this way we process information. This interpretation of the data is often called interpretation. Way of interpreting the data can depend on the quality of information about a particular phenomenon.
- Under the knowledge we mean information that is gnoseological preconditions for taking actions that lead to achieving the goals. Knowledge is the real Drucker, an essential resource, a resource that compiles and runs other resources and land, human resources and capital.
- Consider knowledge as a phenomenon, and occurs in two main modalities as well:
 - Explicit and
 - Tacit knowledge.

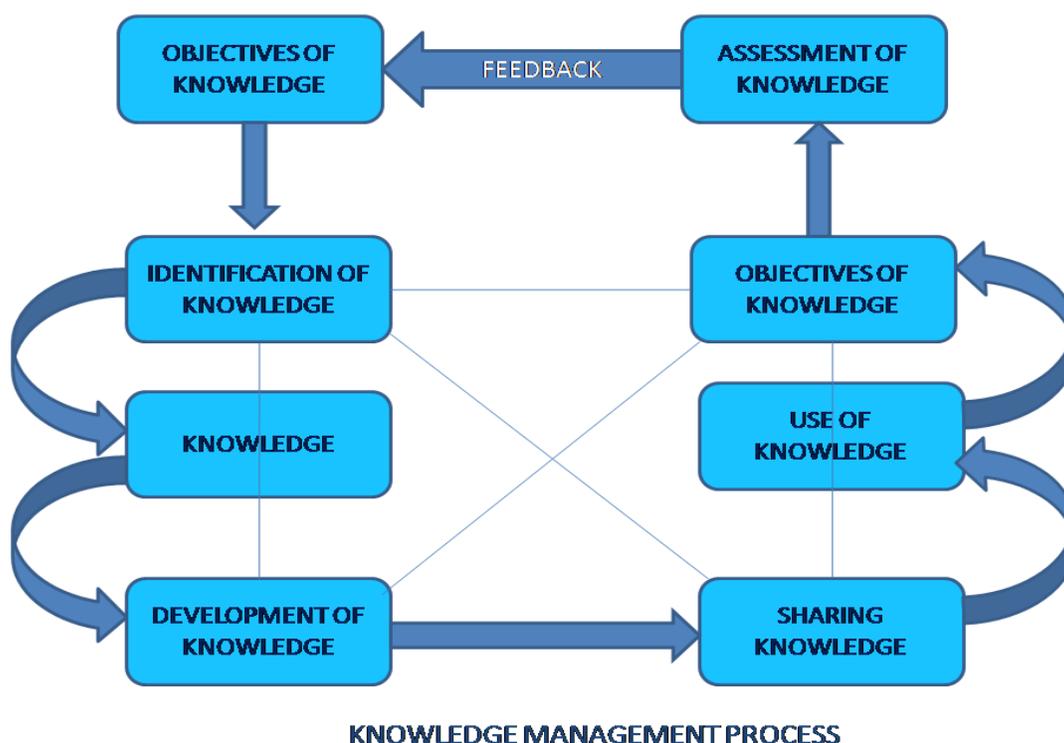
Explicit knowledge is knowledge that is clearly structured and has a recognizable form and content. [2].

Tacit knowledge is knowledge that is knowledge of the informal type. This is about knowledge possessed by individuals, groups, or organizations. Learning organizations must try, as much of the knowledge is the same document in a suitable form and stored in the relevant databases, because it can efficiently transform the way knowledge is a resource available to all who are insiders. Particular attention should be paid to creating organizational assumptions of simple and rapid "access" knowledge.

Knowledge, Management processes

The process of knowledge management is a set of activities that are carried out in order to create gnoseological assumptions to timely and effectively implement the objectives of individuals, groups and organizations. Here is a very complex process that consists of numerous, interconnected and conditioned activity. [3].

Probst, Pauli and Bintteli made by the process of knowledge management model that comprehensively and accurately indicate the steps and activities that make the process of knowledge management [3].



Picture 1: The process of knowledge management [3]

Under the knowledge management process should involve carrying out a number of activities which the most prominent are the generation, storage, distribution and application of knowledge (use).

The success of knowledge management depends on appropriate responses to the following questions:

- "What to do" and respond to what action should be taken.
- "How to do" in order to be a successful knowledge management process involves using a variety of methods, techniques and procedures. It is necessary to take into account a variety

of activities (steps) of the process of knowledge management and require relevant methods, techniques and procedures, and their conduct must be part of any successful performance of the relevant work activities, the overall process of knowledge management to individuals and groups, and the organization as a whole.

- "How" this is a multidimensional issue that has several aspects as follows: [3].
 - The identification, acquisition, development, distribution, use and storage of knowledge to the realization of the goals of individuals, groups and organizations as a whole
 - Using methods, techniques and practices of knowledge management that allow for the best results - as each phase or activity, as well as in the whole process and knowledge management
 - Establishing an environment (infrastructure, corporate culture, and motivations) that allow effective implementation of knowledge management processes - each individually and all together.

Knowledge Management process

Knowledge management is a process that should take place continuously in all parts of the organization. An important task of the manager and the total management to manage knowledge and skills, but also creates an environment for creating and acquiring new knowledge and skills, their distribution and use, and innovation of knowledge and skills. This process can be represented by six basic phases that are essential for any organization, as follows:

- Knowledge creation
- Learning
- Scheduling
- Transfer
- Exploitation, and
- Storage of knowledge.

Knowledge creation is to create knowledge in a certain environment as well as create an environment for the continuation of knowledge. These two things should be considered as a whole, because they alternately turn. The first is a management emphasis on knowledge creation, and the second time in creating a favorable atmosphere and environment in which knowledge is to be created. It is well known that the Japanese knowledge means wisdom that is required and necessary in order to provide an optimistic perspective for the future. They are not burdened by way of acquiring knowledge. Any knowledge on them has value, whether it is created through the education system, or through work or life experience. The Japanese emphasize in particular the importance of lifetime employment. They point out that Japanese firms are much better now constantly engaged in the introduction of innovations. The Japanese also advocate for change fundamental classical philosophy and the introduction of philosophy based on knowledge and intellectual capital.

Knowledge creation must be understood as a process.

This is natural, because creation is not an act that happens once, and then stops, but it is a living

process that has its own life and follows the man as a participant in this process.

Creating knowledge has its elements or models that have their own characteristics and peculiarities, namely:

- The movement of knowledge through socialization skills
- Navigating through outsourcing
- Knowledge and acquire new skills varies by location and learning as well as space and the techniques used to acquire new knowledge and skills. Given the historical context, the acquisition of knowledge and skills, and learning can be:
 - Self study,
 - Learning from animals,
 - Learning from the other people,
 - Group base learning,
 - Learning from traditional and the past,
 - Learning in specialized educational institution, and
 - Learning from successfully and mistakes.

Types of knowledge and skills in the organization are the responsibility of management. In addition on the commitment is to create a favorable atmosphere for learning and memory, and storage of knowledge, imposed by the need to deploy it properly at all levels and functional areas of the organization. It is significant to note that the existing organization is adequately dispersed in the organization. One of the major tasks is to put the management of every man in the right place. If anyone knows who put in the wrong place, the organization does not allow individuals to use their knowledge and skills, as non-motivation effect on the success of the employee or employees.

Knowledge transfer is a subsystem of knowledge management.

Upon transfer of knowledge, consider the following:

- The decision to transfer knowledge, which means they are a source of knowledge.
- It can be a base of knowledge, innovation documentation, lessons, books, experts, articles, data warehouses, and the like.
- Resources and tools for the flow of knowledge, that is, whether it is a local area network, wireless transmission, encrypted or plain text, and the like.
To who does knowledge transfer, an apprentice, the user, another computer, a team, any individual certify, manager, customer, etc...

Transfer of knowledge facilitates knowledge sharing. The transfer of knowledge increases the flow of knowledge in particular over the Internet. New technologies in communication networks and can ensure that the knowledge that is transmitted and asks is always available.

Exploiting the knowledge and exercise certain effects that are set by the strategic and top management have scope to those activities. Only the exploitation of knowledge, and the exercise of certain economic effects, valorizes efforts, time and energy that went into the earlier stages of the management process. Management needs to have the right strategy, operational art and tactics in using knowledge and skills.

The strategy of exploiting the knowledge is necessary to leave the classic holistic and systemic way to accept the exploitation of knowledge. It is necessary to introduce new methods which will be incorporated self-organization and learning more dimensionally and subtle control in transfer and utilization of knowledge. This approach can act as a driver of change in the market by introducing creative ideas and processes in the vertical and hierarchical structure, which still dominate the modern business. This principle is called holistic systems approach. Knowledge management is an integrated, systematic approach to identifying, managing, sharing and utilization of all corporate assets, including databases, documents, policies and procedures as well as the previous fuzzy expertise and experience of individual workers.

Storage of knowledge has a retention phenomenon that is related to learning and memory. We have a basic need for constant concurrence of all the new and latest knowledge. This is one of our most important spiritual, and existential needs, as this new knowledge and provide a better life dignified. Over opinions provide insight and continuous detection of connections and relationships between things and phenomena and their causal relationship. Opinion of education is the ability of new connections, or the ability to acquire new types of behavior [4].

A man remembers and creates a unique reservoir of knowledge that is used in the conscious creation. Reservoir, a storehouse of knowledge, of a man is his brain. Memory is the psychological function that consists of three phases:

- remembering (creating memo)
- Memory in the narrow sense (storage memo in the brain), and
- Memories (recognizing memo, re-encounter with the reproductions remembered information content without re-observation information).

Conclusion

The process of knowledge management is a set of activities that are carried out in order to creategnoseological assumptions in order to promptly and effectively implement the goals of individuals, groups and organizations.

Sub processes of knowledge management should involve carrying out a number of activities whose basis: knowledge creation, learning, scheduling, transfer, utilization and storage of knowledge.

Knowledge management is a system that has its subsystems and implementation phase. In this process we create knowledge, learn, or remember, assign and transfer of knowledge and its utilization.

They know the process of managing the deal and give answers to the questions "what to do", "how to do" and "how" and thus can only be successful knowledge management process contribute to the functioning of the organization is effective and efficient.

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Teaching Business Intelligence in an Undergraduate Liberal Arts Institution

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Abstract

Liberal arts model of education is well known and highly spread in USA, but not in Europe. Advantages and disadvantages of liberal arts education in offering professional majors are presented to explain the way of adopting ACM/IEEE Information Systems curriculum recommendations and positioning of BI course. Offering professional majors in liberal arts institutions is always a challenge. This is especially true for courses required a mixture of prerequisite knowledge on at least intermediate level with extensive real live experience. Sharing experience of offering a course related to Business Intelligence to a students' body with diverse background and expectations is the objectives of this paper. In conclusion, one approach to resolve the problems is presented to provoke discussion and sharing opinions.

Keywords: Business Intelligence, Data Mining, Data Warehousing, Liberal Arts, Undergraduate

Introduction

Advancement of computer and communication technologies resulted in growing understanding about the role played by information as a valuable resource for the success of the business. To satisfy the variety of needs, the field of Information Systems also moved toward a variety of directions in its recent development. Among them, in the area of Business, we can name CRM, ERP, Knowledge management and, of course, Business Intelligence as the next step in evolution of the Decision Support Systems. The last area, established to serve business analytics, now goes well beyond pure Business context. Techniques and applications developed to serve business activities are using fruitfully in many other areas. Currently, courses introducing students to the field of Business Intelligence, are inevitable component of every curriculum model pretending to provide up to date education in the field of Information Systems (see the ACM/IEEE IS 2010 curriculum recommendations).

In principle there are three different approaches in teaching Business Intelligence related subjects, based on background and objectives of the audience:

- Theoretical - emphasizing the mathematical and analytical aspects of techniques used within Business Intelligence application;
- Technological - addressing design of applications in a way to manage large and heterogeneous data sets, algorithms for efficient management of data, loading and refreshing data cubes, software and hardware solutions for distributed data processing, etc.;
- Business - addressing the necessary business conditions to implement Business Intelligence application in a feasible way. This may include:
 - launching conditions - how to re-design and adjust business processes in a way to allow implementation of Business Intelligence applications;
 - organizational issues - how to organize usage of inferences, achieved via Business Intelligence data analysis in a beneficial for the business success way;
 - informational issues - how to interpret results of different analytical techniques applied for given data sets.

The paper shares the experience accumulated in offering one introductory course in the field of Business Intelligence.

It is organized in the following manner: First section introduces the liberal arts educational model. This model is well known and highly spread in the USA, but it is not popular in Europe. Next section discusses the challenges of offering professional training within a liberal arts framework of education. The third section presented the major of Information Systems as offered by the American University in Bulgaria. The last section addressed our approach of offering Business Intelligence course, the challenges and possible solutions. The experience in offering Business Intelligence related training within a liberal arts curriculum is summarized in conclusion.

What is a “Liberal Arts Education”?

According to Webster’s Encyclopedic Unabridged Dictionary (1989), liberal arts is defined as “a course of instruction at a college granting an academic degree, comprising the arts, natural sciences, social sciences, and humanities”. The stress is on a broader education, allowing students to develop a wide understanding of human activities and values. Students benefit from the liberty in choosing rationally their areas of interests and to select their own road map to achieve their objectives and to fulfill their personal mission. Modern trend in the word is "personalization" via offering individually customized products and if we look on education from this point of view, the liberal arts model corresponds in the best way to this trend.

The emphasis on a broader education contradicts the amount of content, accumulated in scientific and technological areas nowadays. The knowledge, which have to be communicated to students and the skills needed to guarantee success on the job market grows exponentially. As a result, in a narrow professional, especially technical area, competition with more narrow trained graduates of traditional European universities is quite difficult. Students, trained in liberal arts institutions, are more flexible in choosing and following their career paths; possess better communication skills and had developed problem solving and decision making attitude. In long run these "soft" skills contribute to the students' success.

How Liberal Arts Paradigm is implemented in the American University in Bulgaria?

The American University in Bulgaria (AUBG) was established in 1991 to introduce a USA liberal arts educational model to South-Eastern Europe when the region was just starting its transition towards democracy. The region have traditions in a narrow, professional education with no experience in offering the liberal arts type of training and the liberal arts paradigm was the naturally selected option for AUBG. The major characteristics of this model can be summarized by the following three principles:

- Broader education: all students are introduced to a variety of disciplines from mathematics to fine arts, as a General education component, which covers more than one third of the required credits;
- Freedom of choice: students have to develop their own road map for acquiring knowledge and meeting requirements and they have also the freedom to change their initial ideas;

- Community life: building citizenship responsibilities within the immediate and larger community, which emphasizes humanistic and social subjects.

To graduate a student has to gain 120 credits in four years, distributed approximately in the following way: 9 to 15 credits from courses oriented to enhance further training within university; 39 credits from General Education courses from eight categories; 36 to 39 credits from courses in the Major; and 36 to 27 credits from Free Electives. This framework also allows students to make double majors.

Professional Programs within Liberal Arts curriculum framework

The design of a professional program in the framework of liberal arts is constrained by the limited and actually small number of courses a student is offered to achieve his/her degree, but it also benefits from the courses offered by other disciplines (see Bonev et al., (2007) and Christozov at al. (2011)). Professional areas, such as Computer Science or Business Administration, which require a significant amount of knowledge to transfer to and utilized by students, combined with necessary skills to be trained, are subject of particular difficulties in designing a program in a way to meet job market standards. For a small institution like AUBG, which offers only a bachelor's degree, there exist additional difficulties coming from the need to prepare students for graduate study, not only for a professional career. A good balance between theory and practice is essential, but with the limited portion of overall curriculum dedicated to professional majors neither of those two sides of training are satisfied in full.

The liberty of selecting own road map by deciding when to take courses encourages students to try courses from different disciplines before making the decision about the professional field they will follow and also to make double major. Cooperation and bridges between majors are highly desired, but any overlap of recognized courses for the degree content is reduced to a reasonable minimum. A given program is not offered in isolation. It has to contribute to other programs and to benefit from other programs as well. The Computer Science major, as initially proposed and further developed, was the only technologically-oriented major in AUBG. The gap between Computer Science and other majors makes it almost impossible for students, who are not majoring in Computer Science, and who do not obtained or possess the needed programming expertise, to take courses from the program or to migrate to the program in later stages. With the growing role of technology in all facets of human life, the need for more significant contribution of technology training to other disciplines became obvious and resulted in launching firstly a minor program in Information Systems (IS) and recently the IS major.

Information Systems Major as a bridge between Computer Science and the rest of the AUBG curriculum

The IS major is designed to train professionals competent to solve problems in the huge and growing area of computer-based information systems and services. The curriculum model adopts the curriculum recommendations of ACM/IEEE. The major provides a broad understanding of the role played by the computer and communication technology in every area of human activity. It trains students to analyze problems and to provide solutions, using up-to-date information technologies (see Christozov at al. 2009).

It is expected that students with a primary interest in Computer Science, Business Administration, Economics, and Journalism and Mass Communication will benefit from this

program as a second major, or from some of the courses offered, which complement their main stream of education. The IT area is much richer than simple software development. The job market faces a shortage of IT-trained personnel, capable of solving business problems by using IT. A great variety of problems needs a broader training in different aspects of IT and IS. Offering such training needs to be institutionalized and to lead to a degree recognizing such expertise.

In a contemporary IS curriculum, the field of Business Intelligence is an unavoidable, but teaching such a course under the framework described above is a challenging task.

Business Intelligence as a Cross-discipline between IT, Business, Computer Science and Mathematics

Needs to include a course training Analytical skills in the IS curriculum

Business Analytics is a fast growing field, not only in academia, but as a practical instrument allowing companies to understand better the circumstances related to the business they are involved and to plan in a rational and realistic way how to adjust to the dynamically changing environment. There are several factors influencing the need of applying computerized tools to analyze business data:

- Development and use of Information technologies in the last few decades allows establishing a so called "digital firm" as typical way of company's organization, which includes processing almost all managerial activities via digital media. This results in accumulating huge data sets in searchable repositories, describing every aspect and every facet of company's activities. Analyzing such amount of data is not possible without using specially designed computer applications.
- Globalization of economy increased the amount of external data, needed to be considered for adjusting to the needs of markets. To access these data again is needed computer technologies and extracting the useful information also requires special applications.
- Dynamics in the markets challenges managers by reducing the allowed time between identifying a problem and making decision to address it.
- Finally, the accumulated data provides important opportunity to understand better and comprehensively the circumstances, processes, causes and effects and to behave in a rational and feasible way.

The Figure 1 shows the three major driving forces in expanding the area of Business Intelligence. To great extent they represent the three categories of audiences and the three major ways of teaching BI.

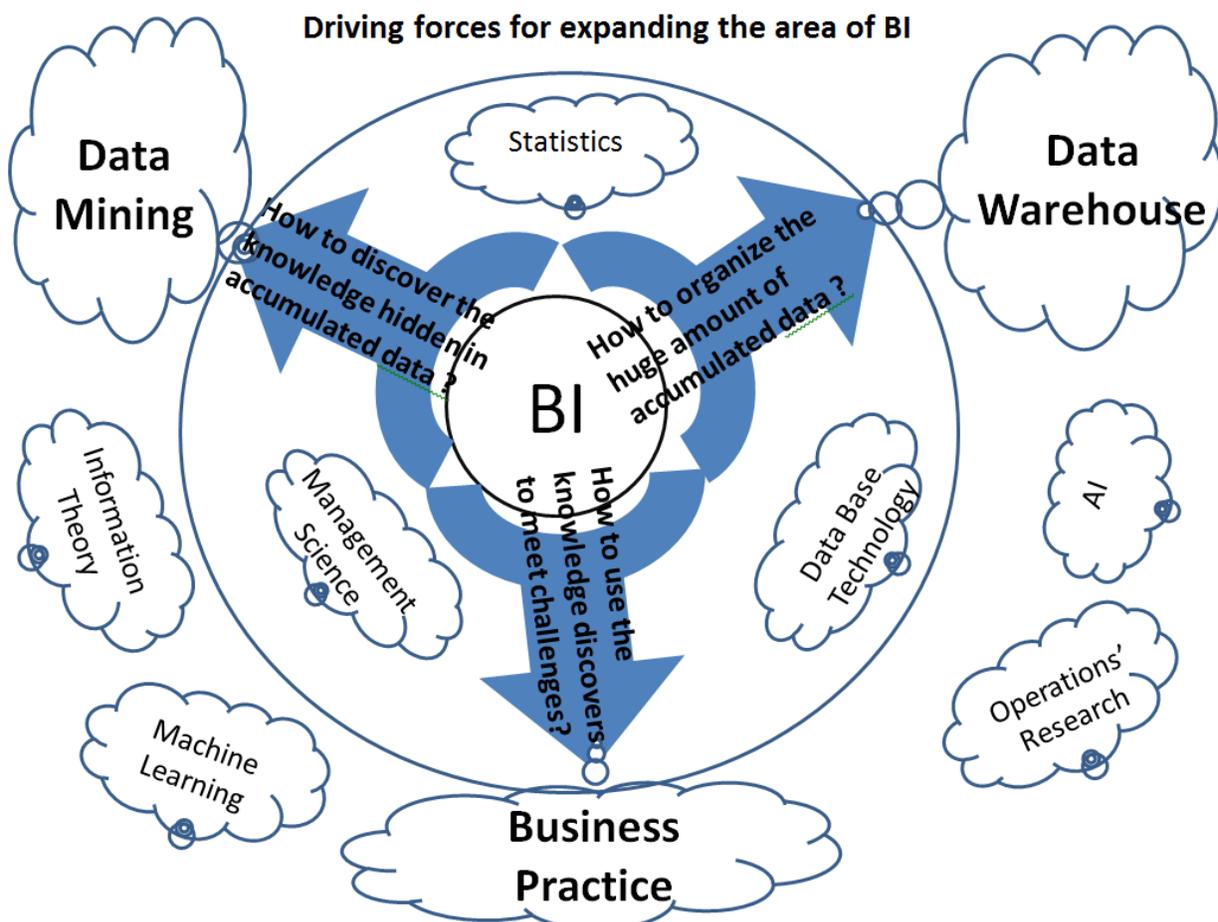


Figure 1. Driving forces of BI development

Course content

The course tries to cover all those areas. It is clearly divided into three sections - business rationality and practice, data warehousing and OLAP and data mining algorithms. Additionally, a fourth part is dedicated to BI technologies (see the attached syllabus).

The challenges in designing and teaching BI course

The skills in using business analytics tools are among the required for a successful career nowadays. From other side, offering a business analytics course within curriculum of undergraduate liberal arts institutions is a challenge. To acquire the needed knowledge and skills, prerequisites include several areas as mathematics, statistics, different business fields and also skills in using variety of computer applications. The following two groups of problems influenced the design of this course at AUBG:

- Diverse and complex academic background needed to grasp the basic BI concepts and to master skills in implementing and applying BI techniques. Students must be familiar on mathematics well beyond calculus one and introduction to statistics; on business administration at least with intermediate accounting, organizational behavior and management science (or operations' research); finally on computer science a

database course only is not sufficient to understand the complexity of information technologies needed to solve BI problems.

- Lack of real life experience. Students studying on bachelor level usually possess very little experience on management and related problems of real economy. The most critical deficit is the lack of real working experience. Examples and cases allowing to illustrate how to use a tool and how a company can benefit by using such tool require deeper and first-hand understanding of the way a company operate and how it is managed.

Our solutions

The balance between what is possible with what is needed drives the way the course "Data warehousing and data mining" is designed and offered:

- The problem with the limited academic background is resolved by reducing mathematical rigorous of presented methods and models. The course emphasizes development of intuition regarding complexity and performance of algorithms and development of skills of applying different techniques by setting hypothesis and selecting appropriate computerized instruments to analyze data.
- This approach transfers the emphasize from theoretical toward practical aspects of Business Intelligence, which is heavily affected by the lack of working experience. Development complex enough practical case, familiar to students, to illustrate analytical techniques and different approaches in resolving the problems, was identified as the task with the highest priority.

Course registration issues is the most natural candidate to serve for illustration of business analytics. Challenges in course offering allows to present numerous ideas under circumstances familiar for students:

- Data: there are different data sources, relevant to the problem:
 - Data from registrar's database provides information regarding courses passed by students, or allows to identify who is eligible to register to given course on the upper level. Also, information regarding the registered majors provides additional details.
 - Data from students' admission - this data includes original, when entered to the university, preferences of students. This information is especially useful for defining courses to offer for freshmen - students who had no record in registrar's database.
- Models:
 - The majors' road map is predefined sequence of passing courses recommended to students. These maps are abstract addressing the "ideal" way to obtain the credits a student needs to graduate in selected major.
 - Individual student's road map - this is a dynamic model, adjusted by every student every semester. These models are subject of data analysis and classification.
- Techniques:
 - Classification is a natural technique which may apply to identify and predict demand for courses;

- Association rules is another useful technique. Passed courses are considered as "consumer basket". This allows to identify rules like "Student who passed course X register next semester course Y".
- Also, several approaches of using cluster analysis may apply.
- Finally, in course offering only aggregated data is needed.

It was proved that this case allows students to grasp the complexity, to understand the need and to recognize the feasibility of applying analytical techniques in solving nontrivial problems. This motivates students and allows to master the use of BI tools.

But developing skills to analyze data needs to work with real life data sets. Naturally, registration data is not available for mining by students without hiding all information that may allow identification of individuals.

Conclusion

Teaching emerging professional topics within a curriculum, designed for broader rather deeper education, is always a challenging job. With increasing the dynamics in computers' related fields those challenges requires innovative and adaptive solution. The paper shares one approach used to address problems in offering Business Intelligence course as a component of the curriculum model in Information Systems major.

The growing interest on behalf of the business for hiring graduates trained in different aspects of business analytics imposed the need of splitting the course as it was offered so far into three courses within the three majors:

- in Computer Science major - a course with tentative title "Data mining" addressing mostly theoretical and algorithmic aspects of analytics;
- in Information Systems major - a course with tentative title "Data warehousing and OLAP" emphasizing the role of BI application in building the company's IS infrastructure;
- in Business major - a course with a title "Business Intelligence" to address problems in implementing BI tools and how a company may benefit of using different analytical techniques and instruments.

There are still numerous of open questions, as:

- whether this approach is feasible;
- what is the reasonable level of content overlapping;
- where to find datasets and other cases to help understanding; etc.

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Appendix.

Spring 2013

INF 480 “Data Warehouses and Data Mining”

SYLLABUS

Textbook:

J. Han, M. Kamber, J. Pei *Data Mining: Concepts and Techniques*, 3 ed., Morgan Kaufmann, 2011

Additional readings:

J. Han, M. Kamber, *Data Mining: Concepts and Techniques*, 2 ed., Morgan Kaufmann, 2006

Chakrabarti et al, *Data Mining: know it all*, Morgan Kaufmann, 2009

More references:

E. Turban, R. Sharda, D. Delen, *Decision Support and Business Intelligence*, Pearson, 2011

H. Du, *Data Mining techniques and Applications*, Cengage, 2010

P. Tan, M. Steinbach, V. Kumar, *Introduction to Data Mining*, Addison-Wesley, 2006

M. Dunham *Data Mining: Introductory and Advanced Topics*, Prentice Hall, 2003.

A. Sinha *Data Warehousing*, Sams Technical Publishing, 2001

Description The term Data-mining is used to mark a class of computer applications designed to integrated effective information retrieval from heterogeneous data sources with analytical tools, data evaluation, and inference. Data-mining and knowledge discovery use a wide range of

algorithms and techniques, drawn from areas as databases, artificial intelligence, machine learning, neural networks, statistics, pattern recognition, knowledge based systems, knowledge acquisition, information retrieval, data visualization, etc. The course gives a broad overview of the area of data mining, its basic concepts and techniques from database perspective.

Outline:

- Data Warehouses;
- OLAP (on-line analytical processing) technology;
- Data Pre-processing
- Concepts Description: characterization and comparison
- Association rules in large database
- Classification and prediction
- Cluster Analysis

Students' Learning Objectives

Understanding the usefulness of data mining.

Compare, contrast, and select techniques for mining association and/or sequential patterns.

Understand, apply, and use techniques of data clustering.

Apply data clearing and other preprocessing techniques.

Develop practical skills in approaching data research problem.

Grading:

Presentation on R&D topic	20 %
Presentation on BI technology	20 %
Practical assignments (2)	8%
Tests (4)	52%

R&D topic: Every student will be assigned a topic from one of the categories: Business aspects of analytical application, Implementation of Data Warehouse; Algorithms for Data Mining. During the second week every student will be assigned to one of those categories, but students will be given the opportunity to exchange. Students from given category will receive a particular topic and have to prepare: presentation, readings, resources, references and a set of questions. The test corresponding to given category of topics will include problems from students papers which will contribute with approximately 30% of the grade of the test.

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BI technology: Every student has to choose and to present in front of the class a BI technology. The fourth test will include problems (at least 30%) from topics presented by students. For more details see the attached file.

- (3) Practical assignments: Every student will receive two assignments to apply certain algorithm/technique to given data set.

Tentative Schedule

Week	Lecture	Topic	Tests
1	01/14/13	Introduction to the course: syllabus, schedule, assignments Business Intelligence = Data Warehousing + Data Mining	
	01/16/13	Chapter 1. Introduction. Business analytics: business aspects of OLAP	
2	01/21/13	Chapter 2. Getting to know your data.	
	01/23/13	No class meeting. Instead individual meeting regarding research topics and practical assignments.	
3	01/28/13	Decision Support	
	01/30/13	Business aspects of business analytics	
4	02/04/13	Discussion, case study	
	02/06/13	Presentations	
5	02/11/13	Test	Test 1
	02/13/13	Chapter 3. Data Preprocessing	
6	02/18/13	Chapter 4. Data warehousing & OLAP	
	02/20/13	Chapter 5. Data cube technology	
7	02/25/13	Discussion, case study	
	02/27/13	Presentations	
Break			
8	03/11/13	Test	Test 2
	03/13/13	Chapter 6. Mining frequent patterns: association rules	
9	03/18/13	Chapter 7. Classification	
	03/20/13	Chapter 10. Cluster analysis	
10	03/25/13	Chapter 12. Outlier detection	
	03/27/13	Mining complex data types	
11	04/01/13	Discussion, case study	

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	04/03/13	Presentations	
12	04/08/13	Test	Test 3
	04/10/13	Presentations :BI technology, cases	
13	04/15/13	Presentations :BI technology, cases	
	04/17/13	Presentations :BI technology, cases	
14	04/22/13	Presentations :BI technology, cases	
	04/24/13	Test	Test 4

Information Systems for Small Business

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Abstract

In modern business conditions timely and reliable information is a prerequisite for successful business, and their availability is the measures of business efficiency. Managers need information in order to make effective decisions, to control the organization's activities and to coordinate organizational activities.

There are three basic groups of information systems: transaction processing systems - operating systems to perform business processes, decision support systems - information and analytic systems for business management systems, systems for communication, collaboration and individual work - office systems.

In office operations of small businesses is possible to notice the application of business concepts that aim to improve and increase the efficiency of everyday processes. These are D-office, M-office, V-office, E-office.

Keywords: information system, D-office, M-office, V-office, E-office.

Importance of Information for Small Business

In modern business conditions timely and reliable information is a prerequisite for successful business, and their availability is a measure of business efficiency. However, all the available information does not constitute simultaneous and useful information. Moreover, some information may be unusable, harmful or counterproductive. For successful business management is needed: basic information about productivity, information about competencies, and information on the deployment of scarce resources. (Drucker, 2005, p. 91).

Use of information includes: reducing uncertainty, enhancing decisions, better planning and scheduling ability of organizational activities.

To determine the value of the information is not easy. It is difficult to identify and quantify all the costs, especially indirect costs attributable to the cost of creating information. It is even harder to quantify the benefits of obtaining additional information. One can say that the value of information is the difference between the benefits derived from its use (usually in the form of improving the decision) and the cost of creating information.

In the corporate governance there are requirements for the constant flow of information. Information influences business decisions. Managers at all levels make decisions based on available information. It is very important to judge that the information is correct. Even for the most experienced managers is not easy to judge what data is needed to solve a particular problem.

Levels of decision making are: strategic, tactical and operational. (Srića & Muller, 2001, p. 5):

1. Information at the operational level is related to daily activities, procedures or details of some activities. Information is analytical, i.e. the lowest level of aggregation.

2. At the tactical level, managers need information about the trends of some process or activity within the extended period. Information is in the form of summary and periodic reports.

3. At the strategic level, managers need long and unstructured information qualitative characteristics that are mostly found in the environment. For example, to make decisions about production of a new product, only information on the demand characteristics, needs and wants of target markets, habits, behavior, aspirations and needs of the consumer, competitor information, etc.

Information adds value; it brings something new, even surprising. The information that relates to something that is already known has no added value. Knowledge also has value, and its accumulation increases with time, wisdom and human capability. For example, an understanding of information technology helps managers in developing business strategies and the complementarities of their knowledge.

Managers use information as a resource, asset or commodity (Srića & Spremić, 2000, p. 6):

1. Information as a resource. Such as money, materials or machinery, information can serve as a resource and as an input in the production of output value. Information is an indispensable resource in services or partners.

2. Information as an asset. Information can serve as assets owned by a person or organization which contributes to the output value. In this sense, information is similar to the equipment, facilities, goodwill or other traditional forms of property.

3. Information as a commodity. Organizations buy and sell information, thus they become a commodity, such as a car, clothing or cosmetics. The modern economy is becoming more service typed. Many organizations make less and less difference between products and services and information products are added by creating new value.

Information Systems for Management of Small Business

The information system includes information flows in the company. Its basic function is to have the information available to all levels of management and environment of the business. (Žugaj & Šehanović & Cingula, 1999, p. 472)

Information system as a system that collects, stores, processes and delivers information, acts depending on the nature of information and how this information is processed. There are three basic groups of information systems (Čerić & Varga, 2004, p. 22): transaction processing systems - operating systems to perform business processes, decision support systems - information and analytical systems for business management systems, systems for communication, collaboration and individual work - office systems.

Transaction Processing System

Transaction Processing System or Transaction IS is a system that provides support for the ongoing conduct of a particular business process. It is a computerized system that performs and records the daily routine transactions. They greatly improved the quality and efficiency of implementing business processes.

Some systems for transaction processing especially improved manufacturing processes. They are systems for material resources planning, production systems using computers and more popular nowadays systems for customer relationship management.

General functions of the system are:

- a) Keeping records – includes generating records of every business transaction in the database
- b) Issuance of documents - generate various documents required in the business, which is necessary for the effective operation of the business process
- c) Reporting - is used to monitor and control business processes.

Transaction processing system is an essential part of any information system. The construction of the IS building begins with its transactional segment as a whole or parts. Many larger systems for transaction processing are built on mainframe computers, which are handled by a group of IT professionals in the information center. On those hosts are central databases. Transactions are done working remotely via the terminals or personal computers that are connected to a communication network to the mainframe.

Most companies did not significantly improve its information system from transaction processing stages. Lately tangible progress towards systems for decision support.

Enterprise Resource Planning system

Enterprise Resource Planning systems, ERPs are systems that combine multiple systems to process transactions. Thus making connections between all business functions (e.g., purchasing, production, marketing, human resources), rather than their mutual isolation and lack of coordination. It is an information system that connects and automates all business activities, from product design, planning, procurement, production and inventory, finance, accounting and human resources management to distribution, sales and forecasting future demand.

These are more modular application software packages that enable businesses to connect and coordinate all functional activities and operations, from initial design to sales of products / services to customers. It is a system that allows full integration of information systems. It is important to note that systems for enterprise resource planning, as opposed to the transaction processing system that process vertically connected processes or individual business areas, integrate horizontally, therefore, connect and coordinate the processes of different business areas.

Based on information provided by the system for enterprise resource planning, as well as indicators of sales, expenses, inventory, employee performance or data on departures from the company, managers make better decisions. Since the systems integrate information on all operations, employees at all levels can see how decisions and actions in a certain part affect other areas of the company, which also contributes to the quality of decision making.

Above shows that the application of quality systems for enterprise resource planning reduces costs, shorten cycle times, increase productivity, and improve relationships with customers and suppliers. In the world there are hundreds of systems for enterprise resource planning, among which are known SAP, Oracle, JD Edwards, PeopleSoft, Sage and Navision. (Bahtijarević-Šiber & Pološki Vokić & Sikavica, 2008, p. 325)

Internet and office applications

Internet is a communications network that consists of IT equipment (servers, workstations, home PCs and laptops) that is interconnected to electrical devices, lighting or wireless communication. (ECDL manual, 2005, p. 5) allows easy transfer and sharing of information, communication and collaboration.

The most important Internet services are electronic mail (e-mail), discussion groups, mailing lists, remote file transfer, remote computers management, and teaching and learning through the Internet. (Čerić & Varga, 2004, p. 289-234).

The Internet is an important tool for the promotion of small businesses for several reasons: it is the future of commerce, aim precisely, it offers modest advertising and the ability to measure its effectiveness, offers interactivity, is easily accessible so it is not so expensive in the promotion. (Travers, 2003, p. 194)

Three levels are based on Internet technology:

- a) Intranet - a computer network within the company
- b) Extranet - a computer network between businesses and parts of its environment
- c) Internet - the so called network of networks, global computer network that connects individuals and computers around the world and allows enterprises to exchange and gather information and do business electronically.

Office applications refer to programs for word processing, electronic mail, graphics, desktop publishing, database management, maintenance, teleconferencing, computer-aided design (CAD), spreadsheet tabs, etc.

They allow to easily collect, organize, manage and send information, better coordination and control of activities and better decision making.

Management Reporting System

Management Reporting System is used in the conduct of affairs, especially middle management. The system provides users partially aggregated and categorized information obtained from transactional part of the information system. Name of management information system is sometimes used as a synonym for the information system.

The purpose of this system is to show managers to review business processes and events to draw attention to the trends of individual activities. Therefore it is called Information Reporting System). The system is rarely used as a standalone system, because it is closely related to the transaction processing system, since it draws the necessary data to perform. The system mostly contains predefined reports that can be related on a regular schedule. May contain reports on unexpected situations or statements that are made as required by managers.

Decision Support Systems

Decision Support Systems (DSS) are established information systems that assist in making better decisions about unstructured decision-making problems by challenging users to interact with data and models. They are intended for people with managerial decision-making and are maximally oriented towards the user. (Žugaj & Šehanović, 1999, p. 486). They are based on systems for enterprise resource planning (ERP systems), and are connected with them. They use optimization methods (for example, the method of linear programming, transportation problem), multiple criteria decision making, simulation modeling, methods for project management, etc.

Decision support systems serve the processing of existing information that is obtained from various internal and external sources to create information needed for decision making. It is about systems that strive with their information to assist managers in solving poorly structured or unstructured problems. Systems can be replaced by a programmed system for decision-making (Programmed Decision System), which can be integrated into the system for processing transactions. Its role is to replace the man in a routine or a structured decision-making.

Systems can be complex, which store data in a data warehouse and are equipped with software tools for complex data processing such as analytical data processing and knowledge discovery. Under these processing can use different methods of processing (e.g., methods of business process modeling, analytical processing based on statistics, expert systems, neural networks, and methods of genetic algorithms and statistical methods, knowledge discovery, etc.) and technical spreadsheets, report generators, query language, graphics programs, data visualization, etc.

Executive Information System

A special type of decision support system is Executive Information System - EIS. Executive managers are in positions at or near the top of the organizational hierarchy. Decisions are made by a wide spectrum, based more on intuition than on their own expertise. The consequences are largely unstructured decisions, a high degree of uncertainty, related to informal sources of information. Data often have to have a wide range without unnecessary detail.

System that would satisfy all the requirements of executive managers is very complicated to make, so there are not many good examples. In recent years, is less and less used because it replaces the term Data Warehousing.

Expert systems

Expert systems are computer applications, which have embedded knowledge of experts in a certain area due to which these systems can make decisions within the scope of these experts. (Panian, 2005, p. 203) They are a type of intelligent systems or computer systems that use knowledge to solve a problem that can learn, adapt to or understand the language. (Čerić & Varga, 2004, p. 181)

They are based on the technology of artificial intelligence as an area that deals with building computer systems which make judgments like people. Their particularly useful feature is that they learn behavior "watching." For example, following a manager that sorts your e-mails, the same can "learn" to sort instead.

Expert systems are the highest stage of development of the information system as incorporating expert knowledge. Storage, use and creation of new knowledge are fundamental business resource. The computer is trusted when making raw information on an accounting or ongoing activities. However, lack of trust occurs when the computer forecasts or proposes decision.

Future expert systems have the ability to explain the process of reasoning, knowledge can be transferred to the user. Users can check the process of reasoning which significantly increases the reliability and credibility of expert systems. Systems for decision support can be found in virtually every area of the company.

There is software that helps in making decisions related to the mutual expansion, mergers and acquisitions, to determine the location and capacity, new product development, pricing, and software for jobs creation and launch of a new promotional campaign and administration of securities.

Office Information Systems

Office Information Systems are a separate part of the information system that includes various applications of information technology in office operations. They are used as systems for communication, collaboration and individual work.

Office is a place where managerial or administrative activities by managers, professionals, secretaries or office staff are performed. This is works that by its kind belong to at least one of the following groups of tasks:

- a) Decision making - the basic work of experts, requires the greatest knowledge in a particular area of the company (managers, professionals)
- b) Manipulation of data - gathering, processing and preparation of the data in a form that can be, for example, presented at the meeting, the job can be done manually or by computer
- c) Communication - a large part of the time as possible to spend on communication with customers, employees or business partners
- d) Handling documents - preparation, copying and deployment of large documents are part of the job of office staff
- e) Archiving - besides the classical archiving, jobs that involve tracking records of business activities can be added.

The introduction of information technology in offices has significantly improved the work and brought in new business. Two concepts that are associated with the introduction of information technology are Office Automation and Departmental Computing.

Office operation system, as part of an information system, is most difficult to describe because it weaves together a number of differences:

- a) Document processing involves a variety of document processing tasks from entries to the archiving.
- b) Communications are the second largest business in the offices. There are several available technologies

c) The teleconference will be in the future, more developed. In our country is still currently underdeveloped because of the relatively demanding technology that is not always available (for example, high-bandwidth telecommunications lines)

d) Auxiliary systems do not belong to any of the above, for example systems to support the work of the group, various programs for organizing personal work, presentation programs, etc.

Systems for office operations can be relatively easy to apply. The success of the application depends primarily on clearly defined objectives of office operations and careful planning. It is expected that system for office business in the future totally integrate all these technologies into one harmonious whole.

Concepts to Increase the Effectiveness of Small Company

D-office

The concept of digital office increases efficiency and reduces the use of data, increasing the mobility of workers, etc. Positive values of D-office (for example, digital production, processing, transmission and storage of business information) should be used.

Small businesses need to adapt to new business trends. The most significant business trends that are important in developed economies, which will mark a strong digital economy, contain three key elements:

- a) Efficiency - efficiency trends affecting the relationship between users and their environment
- b) Effectiveness - efficiency trends affecting the internal structure and operational activities of a small company
- c) Integration - the integration trends lead consolidation and buying options in one place (one-stop-shop), and consistency of information in all areas.

Some of these trends result in the formation of small businesses, because the long-term goal is making it possible to meet more effectively the needs of the user. Attention is focused on the management of internal efforts dedicated to performing everyday operations as efficiently as possible.

Small businesses must recognize the reality of the necessary electronic business orientation and the opportunities it provides, and to adapt their business processes and overall business model. Those who fail to do so will soon disappear from the market in market dynamics that dictates the digital economy.

E-business and the digital economy are imposing new rules and the world in which the only source of differentiation is the way small businesses manage information. The proper balance between the physical and the digital economy will form probably the biggest challenge for small businesses in the 21st century.

M-office

The concept of the mobile office is used to increase the efficiency of operations, in a way that allows you to connect to the central business application. All collected data are entered in the main application or in a central database.

Globalization requires flexibility, mobility, speed and connectivity. IT offers a desk anywhere, most importantly, exactly where the process occurs. Engineers who are on opposite sides of the world are working to develop a product using CAD and CAM connection (Computer Aided Design and Computer Aided Manufacturing) can achieve a very effective collaboration groups. Often are created virtual groups of experts who are reformed and waiting for a new task after the job was done. (Srića & Spremić, 2000, p. 49).

Connection and communication are fundamental imperatives that technology should provide to modern enterprise. The latest trend is wireless communication. Wireless Application Protocol is a communication protocol for wireless Internet devices, which among other things provides access to the Internet via a mobile phone or any other portable device. Wireless communications will launch new changes and allow small businesses a new opportunity to improve the business (mobile business).

V-office

The concept of virtual office developed on the idea that a person should not be in the office, but do the job. Such an approach avoids the empty business cycles and unemployment and reduces fixed costs.

The concept of virtual office can be traced through the operation of the virtual organization that is part of a small business or operating independently. Virtual organization is a modular structure that is associated with information technology. Information technology connects the individual modules and allows them the division of labor resources. The ability of small businesses to reorganize virtual structure contributes to the flexibility the company has to have in order to maintain competitiveness and exploit opportunities.

The fundamental characteristics of virtual companies are: (Srića & Spremić, 2000, p. 49):

- a) **There are no limits.** The level of communication and inter-organizational synergies among competitors, partners, suppliers and customers goes beyond boundaries of the company.
- b) **The application of information technology.** Information technology erases geographic and temporal limits of business and electronic commerce between companies ("business-to-business") becomes the standard.
- c) **Excellence.** Partners are positioned inside the virtual structure. Best suppliers and manufacturers are required, which have a sufficient level of excellence that can contribute to a common goal.
- d) **Informal access.** Partnerships do not have to be long-term, permanent; they are more informal and non-binding type. Partners come together for the common interest of the market, and are discharged after the job is done.

e) **Trust.** A high level of independence in a virtual partner contributes to the flexibility of the structure, but can affect its stability. Connection between partners in the virtual structure is based on a synergic effect and mutual trust.

Virtual organizations can eliminate some steps in business processes, reduce the need for temporary hiring and training the new people and produce better coordination, flexibility and increased speed of business. It also reduces capital requirements and the need for additional resources, provides quick access to markets and avoids costly delays and accelerating the process of research and development.

Virtual organization helps small business to remove internal organizational walls, and a key focus is placed on the acceleration of business processes to improve the core competencies and increase customer satisfaction. It can be viewed as a form of cooperation that enhances competitiveness. There is no defined span of existence; it can be very short or very long, a few months to a few dozen years, as appropriate.

For the realization of virtual organization within small companies (with the possible dynamic bonding with other individuals and companies), it is necessary to create certain conditions. First of all, a clear and well established organizational structure on which it is possible to build new concepts, such as the virtual organization. In order to apply the concept of virtual organizations, on the existing organizational structure, better flow of information is necessary (horizontal and vertical).

Virtual organization is an opportunity for all those who want to take advantage of the development of modern information and communication systems, understand the trends of modern business and want them completely customized, with an organizational structure that is flexible to the fullest extent, and that can be quickly and dynamically adapted to market demands. It is a powerful tool to adjust to the new demands of the Internet economy and e-business.

E-office

Extremely rapid spread of the Internet and its use imposes new rules to businesses and challenges. Change becomes the natural state of affairs.

Trading through the Internet allows small businesses the following benefits: increase customer loyalty, acquire new customers, increase profitability, reduce time-to-market of new products/services, reaching customers on cost-effective way with target offers, significantly reducing the cost per transaction, dramatically reduce customer service costs and the time required for its delivery, while increasing customer satisfaction, achieving savings on sold products/services through electronic commerce.

Electronic commerce opens up great opportunities. Prizes for participation in electronic market are multiple and affect all of its stakeholders. For example, sellers can gain more customers, get more information about them, prepare programs and better serve on them.

Creates an electronic market place for the emergence of intermediaries that create new value by collecting, organizing, analyzing and forwarding information to customers, processing orders, providing logistics services, integrated information systems of users or sellers, and providing

advisory services. The development of electronic markets is inevitable. Determined through the creation of value through savings on cheaper transactions, and by increasing the power of the user because the transparency and comparability that e-commerce offers.

Electronic commerce characterizes selling and buying online. Electronic business, in which e-commerce is an important aspect, includes all applications that support small enterprise business through the Internet and organizational readiness for this type of business. (Srića & Muller, 2001, p. 166). E-commerce not only includes transactions of electronic commerce, but the redefinition of old business models with modern information technology that supports electronic commerce, thus maximizing the value for users.

The business process of e-commerce consists of the following stages: **promotion or initiative** (using the three sales channels: the first is a telephone sale, groups and communication with the market, the second is personalized mail directly to another person; the third way is communication with the users by salesmen. Since the sale is the most expensive, so it is left for the end.), **business operations** (agreement with potential users and the presentation of search engines and other services directly or via telephone), **the conclusion of a job** (delivering all the required information, pictures and documents related to the presentation to user on site and signing a contract), **the delivery of goods** (delivery of the goods must be according to the agreed timetable, otherwise they may lose the right to collect).

Web business communication includes the following:

- a) Web place is a web address.
- b) Search. Web pages are optimized so they can be found across all major search engines. Most are optimized for Google.
- c) Publicity. Small businesses are advertised on various portals, pay Google or another search engine for page ranking, using all Search Engine Optimization and Search Engine Marketing knowledge for the purpose of positioning in the rankings in Internet advertising.
- d) It is desirable to put the page in Croatian, English and German.

Business communications that are used are: Web Business Communications, chat, e-mail and social networks (Twitter, Facebook, LinkedIn, etc.).

E-business is a complex combination of business processes, enterprise applications and organizational structure necessary for the creation of a highly successful business model. (Srića & Muller, 2001, p. 166). Without a foundation built a business model that provides e-business, e-commerce can not be successful.

In order to exploit the potential of e-business and its opportunities for the creation of competitive advantage in the market, it is necessary to eliminate the obstacles to the development of e-business. For example: business process inefficiencies, lack of application integration, fragmentation and inadequate distribution and lack of accurate information.

Conclusion

Managers have the information needed in order to make effective decisions, to control the activities of the organization and for coordination of organizational activities.

Information is not needed only by managers, but also people who perform various business functions (production, marketing, finance, accounting, human resource management, etc.). Managers cannot plan, organize, manage human resources, manage or control without information. In order to have efficiency, information is needed at the right time, right place and in the right quantity.

Information system as a system that collects, stores, processes and delivers information, acts depending on the nature of information and how this information is processed. There are three basic groups of information systems, transaction processing systems - operating systems to perform business processes, decision support systems - information and analytical systems for business management systems, systems for communication, collaboration and individual work - office systems.

If we view office management from the point of a small company, it tends to develop good relationships with potential and current customers who have come in contact with workers at the office. However, good customer relations do not arise spontaneously, but require the use of appropriate methods and business processes that will establish a small business control, and by which they will be able to manage these relationships. In the modern office management of small businesses it is possible to apply business concepts that aim to improve and increase the efficiency of everyday processes. These are D-office, M-office, V-office, E-office.

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