Contents

Nanotechnologies

Informācijas sistēmu menedžmenta augstskola

ISMA ANNO 1994

ISMA University

Information Technologies, Management and Society

The 14th International Scientific Conference
Information Technologies and Management
2016 April 14 - 15

ISMA University,
Riga, Latvia

Ventspils University College,
Ventspils, Latvia

Poltava National Technical Yurii Kondratuyk University,
Poltava, Ukraine

Institute of Information and Computational Technologies,
Almaty, Kazakhstan

Kazakh-British Technical University,
Almaty, Kazakhstan

Suleyman Demirel University,
Almaty, Kazakhstan

Riga, 2016

Supporting Organizations	ISMA Computer Technology Institute, Latvia ISMA Business Institute, Latvia
ISSN 1691-2489	***Information Technologies, Management and Society*** The 14th International Scientific Conference ***Information Technologies and Management 2016*** April 14 - 15, 2016. Theses. Editors Yu.N. Shunin and V.I. Gopeyenko **ISMA University, Riga, 2016**

Modelling and simulation of electric response of nanocarbon nanocomposites and nanoporous polymer based structures for nanosensor devices

Yu Shunin[1, 6], L Alfonta[3], D Fink[2], A Kiv[3], A Mansharipova[4], R Muhamediyev[4], Yu Zhukovskii[1], T Lobanova-Shunina[5], N Burlutskaya[6], V Gopeyenko[6], S Bellucci[7]

[1]*Institute of Solid State Physics, University of Latvia, Kengaraga Str. 8, LV-1063 Riga, Latvia*

[2]*Departamento de Fisica, Universidad Autónoma Metropolitana-Iztapalapa, PO Box 55-534, 09340 México, D.F., México*

[3]*Ben-Gurion University, PO Box 653, Beer-Sheva 84105, Israel*

[4]*Almaty University, Kazakhstan*

[5]*Riga Technical University, Faculty of Mechanical Engineering, Transport and Aeronautics, Latvia*

[6]*ISMA University, 1 Lomonosova Str., Bld 6, LV-1019, Riga, Latvia*

[7]*INFN-Laboratori Nazionali di Frascati, Via Enrico Fermi 40, I-00044, Frascati-Rome, Italy*

**Corresponding author's e-mail: yu_shunin@inbox.lv, shunin@isma.lv*

Abstract

The main objective of the current study is to demonstrate the implementation of advanced simulation models providing a proper description of electric responses in nanosensoring systems. Firstly, we consider physical nanosensors (pressure and temperature) based on functionalized CNT- and GNR-nanostructures. The model of nanocomposite materials based on carbon nanocluster suspension (CNTs and GNRs) in dielectric polymer environments (e.g., epoxy resins) is regarded as a disordered system of fragments of nanocarbon inclusions with different morphologies (chirality and geometry) in relation to a high electrical conductivity in a continuous dielectric environment. The electrical conductivity of a nanocomposite material depends on the concentration of nanocarbon inclusions (in fact, carbon macromolecules). Various nanocomposite morphologies are considered and computer simulation results are discussed. Secondly, we pay attention to development of bionanosensors based on polymer nanoporous structures (nanotracks) with various enzymes, which provide corresponding biocatalytic reactions and give reliably controlled ion currents. In particular, we describe a concept for a glucose biosensor based on the enzyme glucose oxidase covalently linked to nanopores of etched nuclear track membranes. This device can be used to detect physiologically relevant glucose concentrations. The sensitive catalytic sensor can be made re-usable due to the production of diffusible products fromt he oxidative biomolecular recognition event.

Keywords: carbon-based nanocomposites, epoxy resins, pressure and temperature nanosensors, hopping conductivity, track electronics, bionanosensors

1 Introduction

Nanosensor systems are essential functional parts of any modern devices of information processing for information systems, engineering interfaces, health etc. We can talk about nanosensor systems for various aspects of ecological monitoring and security. The fundamental electron devices are FET-transistors, which are able to provide high sensitivity to various external influences of different nature. Usual schemes of nanosensoring systems are based on nano-FET-types devices, namely:

a) the unperturbed field-effect transistors based on CNT- or GNR- based FETs are mainly composed of the corresponding semiconducting carbon materials suspended over two electrodes;
b) physical nanosensors: a conducting threshold can be altered when the tube or graphene ribbon is bent;
c) chemical nanosensors: the same threshold can be altered when the amount of free charges on the tube of graphene ribbon surface is increased or decreased by the presence of donor or acceptor molecules of specific gases or composites;
d) biological nanosensors: monitoring of biomolecular processes such as antibody/antigen interactions, DNA interactions, enzymatic interactions or cellular communication processes, etc. [1, 2].

The other way of nanosensoring is the using of polymer

nanoporous structures. In particular, ion tracks are suitable in biosensing applications because they have true nanometric dimensions. Ion tracks can confine chemical reactions in well-defined, pre-determined locations ensuring that their reaction products are highly enriched locally. If membranes containing such etched tracks are put in the path of ion currents flowing through a vessel, all the ions are subsequently forced to pass through the nanopores, electrically sensing any confined chemical reaction occurring there via changes in the pore's electrical resistance.

2 Nanocarbon nanocomposites based pressure and temperature nanosensors

We develop a set of prospective models of nanocarbon-based nanomaterials and nanodevices based on the various interconnects and interfaces. In particular, nanoporous and nanocomposite systems are considered as complicated ensembles of basic nanocarbon interconnected elements (e.g., CNTs or GNRs with possible defects and dangling boundary bonds) within the effective media type environment. Interconnects are essentially local quantum objects and are evaluated in the framework of the developed cluster approach based on the multiple scattering theory formalism as well as effective medium approximation [3].

In cases when nanocarbon clusters are embedded in high resistance media (instead of vacuum) we come to nanocomposite material. The utilization of polymeric composite materials (e.g., epoxy resins) supplemented with various morphological nanocarbon groups of carbon nanotube-type (CNTs) and graphene nanoribbons (GNRs) allows us to create effective pressure and temperature sensors. Application of such nanocomposites as coatings can provide continuous monitoring of the mechanical strains in piping systems (for example, in aircraft or automotive applications), when the critical pressure values can indicate malfunctions of the engine.

The interest in the CNTs and GNRs based polymer nano-composites as prospective pressure and temperature nano-sensor materials is based on the observed electric percolation phenomena via the nanocarbon inclusions concentration. In particular, the electrical conductivity of a nanocomposite increases with the increasing CNT loading till a critical filler concentration, where a dramatic increase in conductivity is observed. This critical filler concentration is called electrical percolation threshold concentration. At percolation threshold concentration, a filler forms a three-dimensional conductive network within the matrix, hence electron can tunnel from one filler to another and in doing so, it overcomes the high resistance offered by insulating polymer matrix.

Consider the model of composite material with carbon nanocluster inclusions of CNTs- and GNRs- types. The host material – is a flexible dielectric medium of epoxy resin-type with high resistance. However, low concentration of nanocarbon inclusions cannot change the mechanical properties of the host material. At the same time, high electrical conductivity of CNTs- and GNRs incorporated in the host material can significantly affect the total conductivity of the nanocomposite material. According to our model, the mechanism of these changes is related to the effects of percolation through the hopping conductivity.The hopping mechanism is regulated by the hopping of electron between 'nanocarbon macromolecules' (see also Figure 1):

$$\sigma_{IC} = \sigma_0 \cdot \exp\left(-\frac{4}{3}\left(\frac{4\alpha r_{IC}}{a}\right)^{3/4}\left(\frac{W_0}{kT}\right)^{1/4}\right),$$

where r_{IC} is the length of the tunnel 'jump' of the electron equal to the distance between 'nanocarbon' clusters, σ_0 - normalization constant, which means the conductivity of monolithic dielectric medium.

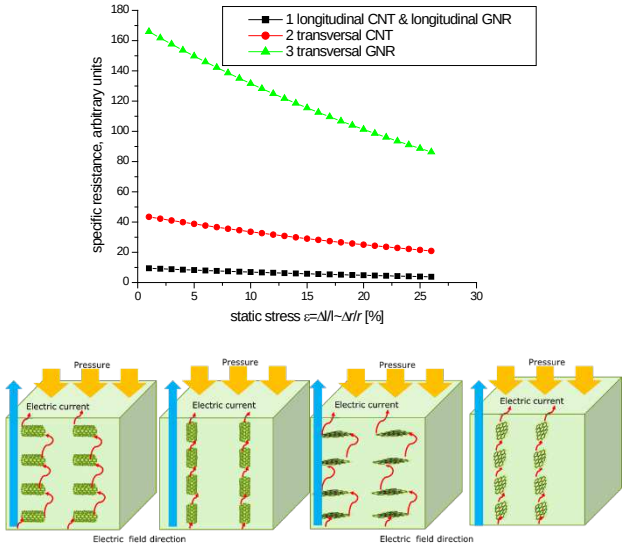


FIGURE 1 Specific resistance of CNTs and GNRs based nanocomposite (epoxy resin) via static stress. Below – variants of morphological orientations of nanocarbon inclusions.

The availability of temperature factor in the hopping conductivity formula allows to create a model of temperature nanosensors using similar electric responses.

3 Polymer nanoporous structures based bionanosensors

Since the sixties of the past century it is known that energetic (with tens of MeV or more) heavy (with atomic masses being usually larger than that of Ar) ion irradiation ("swift heavy ions", SHI) introduces very narrow (~ some nm) but long (typically 10-100 μm) parallel trails of damage in irradiated polymer foils, the so-called latent ion tracks. The damage shows up primarily by the formation of radiochemical reaction products. Whereas the smaller ones readily escape from the irradiated zone thus leaving behind them nanoscopic voids, the larger ones tend to aggregate towards carbonaceous clusters. Thus, emerging structural disorder along the tracks modifies their electronic behaviour (see Figure 2). In particular, a complicated biochemical kinetics of basic reaction of glucose detection depends on track qualities (e.g from track creation mechanism, foil material properties), enzyme (GOx) distribution on the track surface, geometry of etched track etc. All these factors are subjects of the nearest special research. Moreover, the detailed kinetics of reaction is the object of 3D-modelling for design of optimal geometry of nanosensor active space. This allows to create optimized

nanosensors with the increased efficiency.

The newly created intrinsic free volume enables electrolytes to penetrate into the polymer, thus forming parallel liquid nanowires. In case that the tracks penetrate through all the foil the conducting connections emerge between the foil front and back sides. The ion track technology is, in particular, directed towards biosensing applications. In this case the ion tracks are functionalized directly by attaching organic or bioactive compounds (such as enzymes) to their walls.

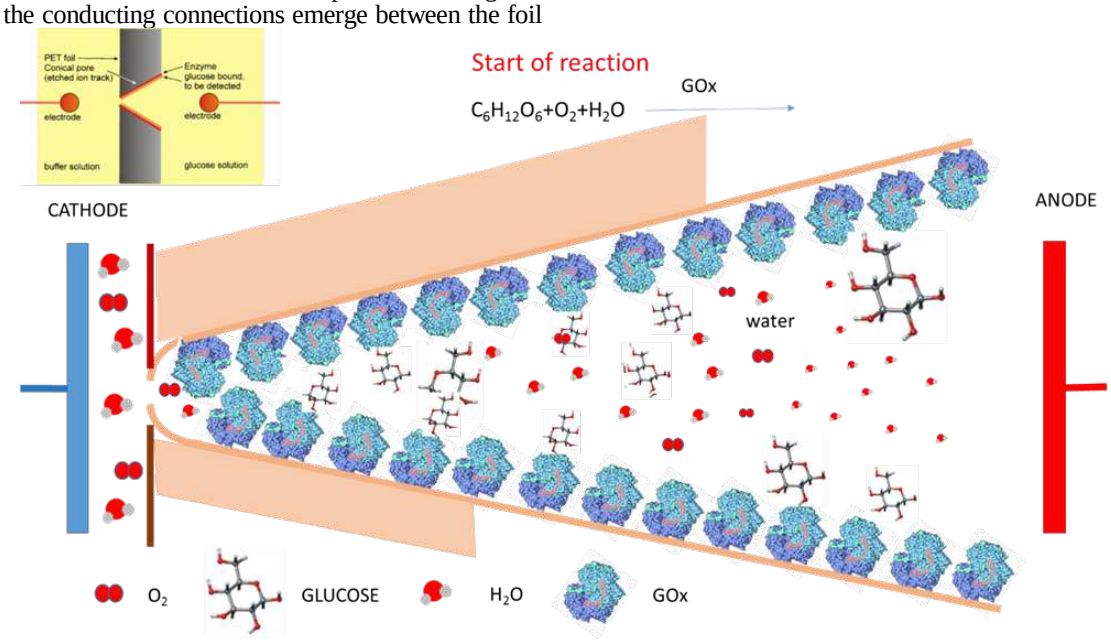


FIGURE 2 General scheme describing the detection scheme and modified polymer. Principle arrangement of experimental setup to study voltage-current dependences in ion track-containing foils embedded in electrolytes. The typical reaction for glucose indication:

$$\mathbf{C_6H_{12}O_6 + O_2 \xrightarrow{GOx} C_6H_{12}O_7 + H_2O_2}$$

$$\mathbf{H_2O_2 \xrightarrow{catalaza} \frac{1}{2}O_2 + H_2O}$$

$$\mathbf{Anode:\ H_2O \rightarrow \frac{1}{2}O_2 + 2H^+ + 2e^-}$$

$$\mathbf{Cathode:\ 2H^+ + 2e^- \rightarrow H_2}$$

$$\mathbf{Ultimate\ \ reaction:\ C_6H_{12}O_6 + H_2O \rightarrow C_6H_{12}O_7 + H_2}$$

Description of the sensing reaction of glucose with the enzyme GOx looks as follows:

a) the overall net reaction is:

Glucose ($C_6H_{12}O_6$) + O_2 (due to enzyme-induced oxidation) → gluconic acid ($C_6H_{12}O_7$) + O;

b) This remaining O attaches to some H_2O to form peroxide H_2O_2;

c) the product: gluconic acid dissociates around pH=7: $C_6H_{12}O_7 \rightarrow C_6H_{12}O_7^- + H^+$; thus the liquid's conductivity changes (essentially if the product is enriched in the track's confinement); this is what is measured by the sensor.

The recent advances in this field allow monitoring and tracking biomolecules in areas such as environment, food quality and health. The presently developed ion track-based nanosensors provide high sensitivity, reliable calibration (Figure 3), low power and low cost [4, 5].

The creation of new biosensors and their further improvement requires a careful study of the mechanisms of electrolytes passage through the tracks.

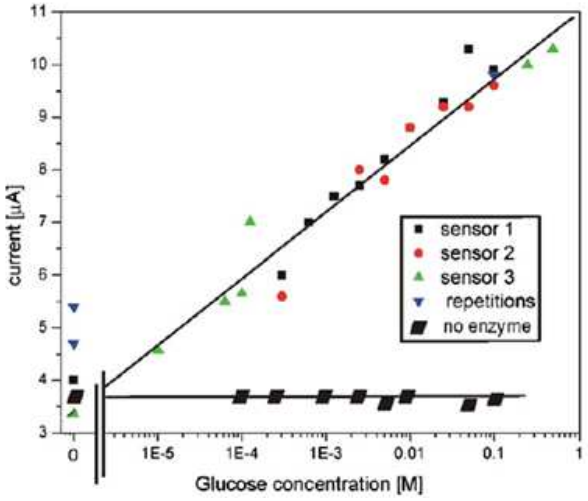


FIGURE 3 Performance comparison of three identically produced track-based glucose detectors against a calibration curve *I* (+5 V) vs. glucose concentration Current response to a pure buffer solution (i.e., glucose concentration = 0) is added on the left side. The standing triangles show for sensor the accuracy within which a measuring cycle can be repeated

4 Conclusions

- A nanocomposite pressure and temperature nanosensor prototypes has been simulated. The hopping conductivity mechanism gives the adequate description of possible nanosensor qualities. An important problem of manufacturing sensors based on CNTs and GRNs is nanocarbon inclusions orientation, which determines the electrical properties of the future sensor.
- Our work showed that iontrack-based glucose sensors can be easily created. Furthermore, they show good sensitivity, they cover the range of medical applications, and they can be reused at least 10 times. This study also shows that track-based biosensors with other enzymes can be similarly developed.
- Both nanosensoring schemes use the simple electrical responces outputs for device calibrations of parameters to be measured.

Acknowledgments

This research has been partially supported by Belarus-Latvia Bilateral Project *'Correlation of electromagnetic, mechanical and heat properties of aerogels and polymer composites with nanocarbon inclusions'* (2014-2015), Latvian BoxNet company, Latvian grant IMIS2, NASA-OTM grant and grant 0168/GF4 from the Ministry of Education and Science of the Republic of Kazakhstan.

References

[1] Shunin Yu N, Zhukovskii Yu.F, Gopejenko V I, Burlutskaya N Yu, Bellucci S 2012 Simulation of Fundamental Properties of CNT- and GNR-Metal Interconnects for Development of New nanoSensor Systems *In: Nanodevices and Nanomaterials for Ecological Security Series: Nato Science for Peace Series B - Physics and Biophysics* Eds Yu Shunin and A Kiv Springer Verlag 237-262

[2] Shunin Yu N, Gopeyenko V I, Burlutskaya N, Lobanova-Shunina T, Bellucci S 2013 Electromagnetic properties of CNTs and GNRs based nanostructures for nanosensor systems 2013 *Proc. Internat. Conf. „Physics, Chemistry and Application of Nanostructures-Nanomeeting-2013, Minsk, Belarus* Eds. V E Borisenko, S V Gaponenko, V S Gurin and C H Kam New-Jersey, London, Singapore:World Scientific 250-253

[3] Shunin Y, Bellucci S, Zhukovskii Y, Lobanova-Shunina T, Burlutskaya N, Gopeyenko V 2015 Modelling and simulation of CNTs- and GNRs-based nanocomposites for nanosensor devices 2015 *Computer Modelling & New Technologies* **19**(5) 14-20

[4] Fink D, Klinkovich I, Bukelman O, Marks R S, Kiv A, Fuks D, Fahrner W R, Alfonta L 2009 Glucose determination using a re-usable enzyme-modified ion track membrane sensor *Biosensors and Bioelectronics* **24** 2702–2706

[5] Fink D, Kiv A, Shunin Y, Mykytenko N, Lobanova-Shunina T, Mansharipova A, Koycheva T, Muhamediev R, Gopeyenko V, Burlutskaya N, Zhukovskii Y, Bellucci S 2015 The nature of oscillations of ion currents in the ion track electronics *Computer Modelling & New Technologies* **19**(6) 7-13

Convergence of Nano-Bio-Info-Cogno-Socio-Humano Sciences and Technologies for societal benefit and justice

T Lobanova-Shunina[1], Yu Shunin[2, 3]

[1]Riga Technical University, Faculty of Mechanical Engineering, Transport and Aeronautics, Latvia

[2]Institute of Solid State Physics, University of Latvia, Kengaraga Str. 8, LV-1063 Riga, Latvia

**Corresponding author's e*-mail: busus@inbox.lv

Abstract

The processes of globalization, diversity, migration and the growing interdependence among nations and people around the world are bringing to the agenda important issues of the day related to citizenship and social justice from different perspectives and causing a very intense debate on such topics as equality, cultural identity, language, diversity, global interdependency, migration, inclusion, human rights, constructing communities, citizenship, social justice, ability to adapt and integrate, which become a very complex problem to tackle. In fact, this situation has led to a number of important questions related to the principles of interdependence in nature and society as a holistic system demanding solutions for key societal challenges, which is only possible on the basis of the convergence of multiple knowledge and technology. Convergence is as essential to our future knowledge society as engines were to the industrial revolution. This convergence of technosciences, humanosciences and technologies allows society to answer questions and resolve problems that isolated domains cannot. This convergence will help to create a counterbalance between technosciences and humanosciences on the basis of which it is only possible to find solutions to complex scientific, social, political, moral, ethical, business and other problems as well as to create new competencies, new advanced technologies and new knowledge on this basis. As a result, all these issues should become part of the current educational policy, focusing on the need to develop a multidisciplinary approach to establish and promote new and innovative interconnections between citizenship education and and knowledgeable representation of social justice in the era of global interdependence.

Keywords: integrated sciences, Nano-Bio-Info-Cogno-Socio-Humano Sciences, social benefits, social responsibility

1 Introduction

Citizenship education must be transformed in the 21st century due to the higher level of knowledge reached by the world societies, accelerating progress in foundational emerging technologies and creating new industries and jobs at their frontiers and interfaces, developing information exchange and interaction, improving lifelong wellness and human potential, and advancing a cognitive society. Knowledgeable citizens in a diverse democratic society should be reflective, moral, responsible and active citizens showing enough knowledge, skills, and commitment needed to change the world to make it more humane, just and democratic, hence, they should develop multicultural literacy and 'Global Citizenship Competence' in an interconnected global world [3 - 5].

The world's greatest problems do not result from people's inability to read and to write. They result from people's inability to understand different cultures, races, religions, and nations – from the inability to get along and to work together to solve the world's intractable problems such as global change of the climate, energy deficiency, continually increasing population density, epidemic diseases, poverty, racism, sexism, and war. When we teach students how to critique the injustice in the world, we should help them to formulate possibilities for action to change the world to make it more democratic and just. Critique without hope may leave students disillusioned and without support. Support is provided by identifying the ways for successful co-existence of diverse cultures in a society with secured sustainable quality of life for all.

2 Convergence of Nano-Bio-Info-Cogno-Socio-Humano Sciences and Technologies

The ideas of a knowledge society and knowledge economy are interlinked with the idea of science, technology and engineering which are recognized to penetrate nearly every aspect of modern life and hold the key to solving many most vital current and future challenges of the world. The notion of the future knowledge society, which is linked with innovation, pervades science, mathematics, technology and appears over and over again, whether we look at an ancient civilization, the human body, or a comet.

The concept of a knowledge society and information society are closely conflated, but not identical. The concept of a knowledge society comprises characteristics, which relate not only to the development of information and communication technologies but also to the development of any other technologies.

The perspective of a new technological revolution and the formation of a knowledge society are associated with the convergent development of nano-bio-info-cogno-socio-humano sciences and technologies – ultimately resulting in NBICSH Society (Figure 1).

The values and ethical imperatives of modern science and technologies including information, self-organisation, integrity, security, ecology, and the formation of new priorities take place under the influence of a new – synergetic - methodology, the implementation of high technologies and social transformations under conditions of globalisation.

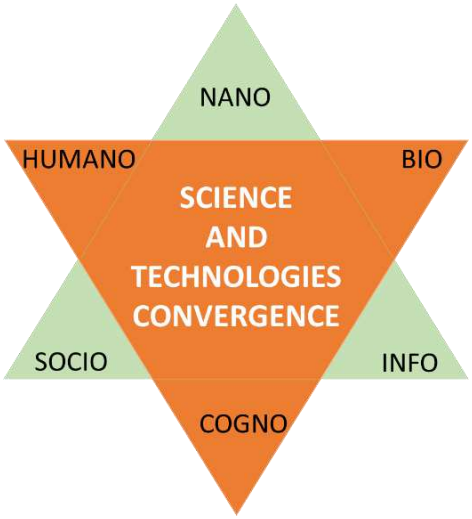


FIGURE 1 The systemic approach to Knowledge and Technologies Convergence

Information in the modern world is one of the most powerful mechanisms, able to control public consciousness and construct various models of social behaviour. Universal commercialization of consciousness significantly limits the possibility of informatization in reinforcing mental values, among which environmental culture occupies the most important position. In humanitarian sciences there is a demand for a wider use of information technologies as a methodological foundation for the perception, comprehension and transformation of the socio-cultural and socio-natural space [1, 2].

The concept of the role of higher education in the creation of new cultural synergies to change human understanding of the world and social practice is the problem of developing an innovation culture and 'Global Citizenship Competence'

3 Conclusions

Higher education should help students to develop thoughtful and knowledgeable identifications with their cultural communities, nation-states, and the global community. It also should enable them to acquire a clear understanding, attitudes, and skills needed to act to make the nation and the world more democratic and just.

Cultural, ethnic, racial, language, and religious diversity exists in most countries in the world. One of the challenges to diverse democratic nation-states is to provide opportunities for different groups to maintain aspects of their community cultures while building a nation in which these groups are structurally included and to which they feel allegiance. A delicate balance of unity and diversity should be an essential goal of citizenship education and of teaching and learning in democratic societies.

References

[1] Lobanova-Shunina T, Shunin Yu 2015 Technology impact on developing virtual identity Identity in Times of Crisis, Globalization and Diversity: Practice and Research Trends Conference Programme and Book of Abstract 2015 CiCea / Jean Monnet CiCe Network Conference "Identity in times of Crisis, Globalization and Diversity" Corinth – Greece 3rd – 5th of September 2015 London:CiCe 43-44 http://www.cicea.eu/pdfs/2015_CiCea_Book_of_Abstracts_8-28.pdf

[2] Lobanova-Shunina T & Shunin Y 2012 Nanoeducation for developing responsible scientific citizenship and creating a sustainable intellectual global community in P. Cunningham & N. Fretwell (eds.) Creating Communities: Local, National and Global London:CiCe 316-326

[3] Lobanova-Shunina T, Shunin Y 2014 Innovation management in higher education: Nanosciences and technologies for scientific citizenship In: P Cunningham & N Fretwell (eds) Innovative Practice and Research Trends in Identity, Citizenship and Education London:CiCe 56 – 66

[4] Lobanova-Shunina T, Shunin Yu (2014) Nanothinking and nanoeducation: nanoscientific literacy for responsible consumerism Computer Modelling & New Technologies **18**(1) 13-24 http://www.cmnt.lv/upload-files/ns_60art02_LOBANOVA-SHUNINA-SHUNIN%20CMNT1801-54+.pdf

[5] Lobanova-Shunina T, Shunin Y 2013 Nanotechnologies: challenges and controversy on the way to scientific citizenship, new emerging identities and intellectual consumption in P Cunningham (ed) Identities and Citizenship Education: Controversy, crisis and challenges London: CiCe 182–193

Theoretical modelling of nanodevices in the frameworks of embedded molecular cluster model

E K Shidlovskaya

Institute of Aeronautics, Riga Technical University, Kalku iela 1, Riga LV-1658, Latvia

Department of Natural Sciences and Computer Technologies, ISMA University, Lomonosova iela 1, k-6, Riga LV-1019, Latvia

**Corresponding author's e*-mail: shidlovska@inbox.lv

Abstract

Applicability of cluster embedding method with non-orthogonal wave functions for theoretical study of processes in nanodevices is studied. We demonstrate that our cluster embedding method is compatible with quantum transport theory based on time-dependent DFT. We conclude that quantum transport theory methods may be applied if we use one-electron approaches both with orthogonal and non-orthogonal wave functions. Possibilities to generalise quantum transport theory methods on the many-electron case and theoretical modelling of nanodevices beyond approaches based on one-electron approximation are discussed.

Keywords: embedded molecular cluster model, non-orthogonal wave functions, quantum transport theory, current in nanodevices

1 Introduction

When we theoretically describe nanodevice we have to treat the whole quantum system as two subsystems: small finite fragment of the system containing nanodevice (cluster) and the rest of the system containing electrodes. Problem "cluster in the field of the rest of system" is successfully solved in the frameworks of embedded molecular cluster (EMC) model with orthogonal wave functions. We have modified EMC model treating cluster embedding problem in the frameworks of one-electron approximation with non-orthogonal wave functions. We have proposed new cluster embedding scheme based on our approach [1].

Our present aim is application of our cluster embedding method for quantum-chemical modelling of processes in nanosystems and calculation of electrical properties of nanodevices.

2 Overview

One of the approaches for theoretical description of nanodevices is quantum transport theory developed by Gross with co-workers [2]. We study possibility to combine our approach with approach of Gross et al [2] based on time-dependent DFT (TDDFT). We demonstrate [3] that our cluster embedding method is compatible with DFT Kohn-Sham method. We conclude that our embedding scheme may be combined with TDDFT if electron transitions are described correctly: occupied and vacant cluster states are localized in the cluster region in the same manner. To get occupied and vacant states of the same localization degree, we use modified form [4] of our initial cluster embedding equations [1]. We demonstrate that our cluster embedding method is compatible with electric current calculation method based on TDDFT [2] and propose approach for calculation of electric parameters of nanodevices.

3 Conclusions

Quantum transport theory methods for electric current calculation may be applied if we use one-electron approaches. In this case we can easily construct one-electron density and get continuity equation for electric current. To treat processes in nanodevices, we should overcome limitations of one-electron approaches using configuration interaction (CI) or perturbation theory (PT) methods. Our cluster embedding scheme is compatible with PT or CI methods. One-electron density may be constructed for these methods, too. But possibility to get continuity equation and expression for electric current in general form requires further investigation.

References

[1] Shidlovskaya E K 2002 Improved embedded molecular cluster model Int J Quantum Chem **89** 349-370
[2] Kurth S, Stefanucci G, Almbladh C-O, Rubio A, Gross E K U 2005 Time-dependent quantum transport: A practical scheme using density functional theory Phys Rev B doi: 10.1103/PhysRevB.72.035308
[3] Shidlovskaya E K 2012 in ed Y N Shunin and A E Kiv Nanodevices and Nanomaterials for Ecological Security NATO Science for Peace and Security Series B: Physics and Biophysics Springer pp. 191-202
[4] Shidlovskaya E K 2006 Problem of cluster embedding in crystalline lattice Computer Modelling and New Technologies **10**(4) 17-28

Ab initio modelling of Y-O complexes in α-Fe matrix

M Sokolov*, Yu Mastrikov, A Gopejenko, Yu F Zhukovskii, E A Kotomin

Institute of Solid State Physics, University of Latvia, Kengaraga Str. 8, LV-1063 Riga, Latvia

**Corresponding author's e-*mail: makcsokolov@gmail.com

Abstract

ODS (Oxide-Dispersion-Strengthened) steels with Y_2O_3 are promising materials for structural applications in future nuclear fusion reactors. The great amount of experimental research has been made so far. However, many details of the Y_2O_3 nanoparticles' behaviour at the very atomistic level still remain unclear. For better understanding of the mechanics and kinetics of the ODS particle formation process, we have performed theoretical modelling. We have applied the Density Functional Theory (DFT) method, as implemented in the computer code VASP. The initial step has been chosen to simulate the Y-O complexes in the α-Fe matrix. Various configurations of yttrium and oxygen solute atoms, combined with vacancies have been investigated. Acquired from these calculations data will be used as an input for the further kinetic Monte Carlo simulations.

Keywords: ODS, DFT, VASP

1 Introduction

The study of ODS (Oxide-Dispersion-Strengthened) steels is important because of their ability to withstand high neutron radiation at relatively high temperatures (650°C) [1] which makes them suitable material for building the first wall of future nuclear reactors.

In this paper we present the initial step of theoretical modelling of the behavior of ODS nanoparticles in α-Fe (or bcc-Fe) matrix. The study of α-Fe is of a particular interest, since this phase of iron corresponds to the operation conditions. We perform ab-initio calculations for different configurations of yttrium and oxygen solute atoms, combined with vacancies.

2 Computational details

All calculations in this study have been performed using the computer code VASP (Vienna Ab-initio Simulation Package) [2] which implements plane wave basis set and DFT (Density Functional Theory) method.

The generalized gradient approximation (GGA) ultra-soft (US) projector augmented wave (PAW) Perdew-Burke-Ernzerhof (PBE) pseudopotentials (PP), provided by VASP developers, were used for each element.

The supercell with the size of 4×4×4 elementary cells has been used. According to convergence test, both the k-mesh size 4×4×4 and plane wave energy cutoff 450 eV are sufficient to achieve the goal of this study.

3 Simple Defects

By simple defects we mean single point-like defects of yttrium and oxygen as well as some their combinations with vacancies.The calculated vacancy formation energy is 2.16 eV, which qualitatively corresponds to results of other theoretical and experimental studies [3].

In the Table 1, the energies for different configurations are provided, relatively to the minimal energy of the investigated configurations.

Despite the non-negative energy of the vacancy formation energy, V_{Fe}-Y-V_{Fe} configuration still has a lower energy, which means that we need vacancies in the matrix in order to attract yttrium atoms inside the system.

The system with oxygen in the substitutional position also has the lowest energy, however, as it is shown in the section 5, oxygen in octahedral position 1NN away from the vacancy possesses a significantly lower energy.

TABLE 1 Energies of the configurations with simple defects, energy is given relatively to the minimal energy in the column

System with Y	Energy, eV	System with O	Energy, eV
V_{Fe}-Y-V_{Fe}	0.00	O_{Fe}	0,00
Y_{Fe}	1.35	O_{oct}	0,58
Y_{tet}	9.76	O_{tet}	1,00
Y_{oct}	16.41	Fe-O-Fe	3,01

4 Energy Barriers between Simple Defects

It is also important to calculate the energy barriers, between simple defects by estimating the minimal energy path (MEP) with nudged elastic band (NEB) method with climbing.

The calculated heights of barriers for vacancy migration in the [111] and [100] directions have been found to be 0.7 eV and 2.6 eV, respectively.

Since the difference between O_{oct} and O_{tet} is fairly small, we have calculated the barrier between them. It has appeared that O_{tet} is almost a saddle point itself for the transition O_{oct}-O_{oct} with the height 0.42 eV.

Also, the height of the barrier for a jump of yttrium atom from one vacancy to another in the direction [100] is appeared to be fairly low: 0.44 eV.

5 Complex Defects

As complex defects, we consider different combinations of the simple defects. We have calculated the interaction energies in the following systems: V_{Fe}-O_{oct}, $V_{Fe}YV_{Fe}$-O_{oct}, and $V_{Fe}YV_{Fe}$-2O_{oct}.

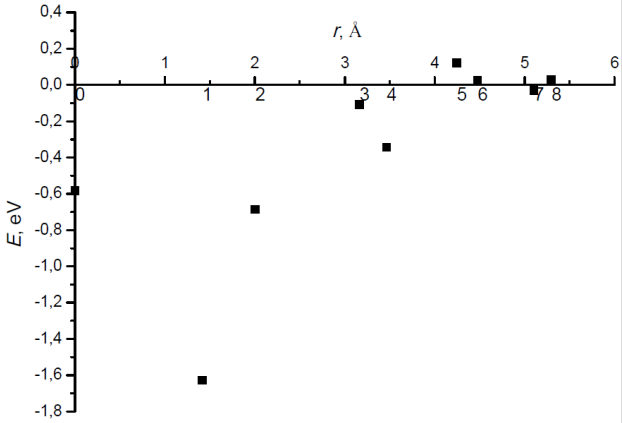


FIGURE 1 Interaction energy between O_{oct} and V_{Fe}. r is the distance between vacancy and oxygen. Numbers under horizontal axis signify the distance between regular and octahedral site in NN.

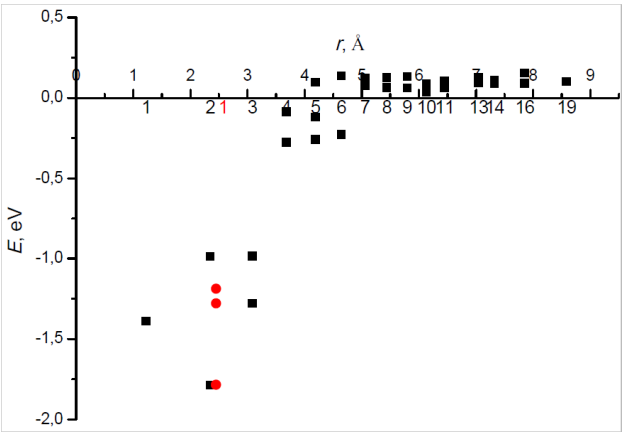


FIGURE 2 Interaction energy between V_{Fe}-Y-V_{Fe} complex and O_{oct} (black squares) and O_{Fe} (red squares). r is the distance between yttrium and oxygen. Three red dots correspond to the same configuration with different symmetry, e.g. number of equal coordinates for oxygen (from top to bottom: all three coordinates are equal, only two coordinates are equal, none coordinates are equal). Numbers under horizontal axis signify the distance between interstitial (Y) and octahedral site in NN

Results for V_{Fe}-O_{oct} configurations are presented in a Figure 1. As already mentioned in the section 4, oxygen in octahedral position 1NN away from the vacancy has a significantly lower energy than oxygen in substitutional position (the difference is approximately 1 eV). This signifies that we should put oxygen in octahedral position in more complex configurations.

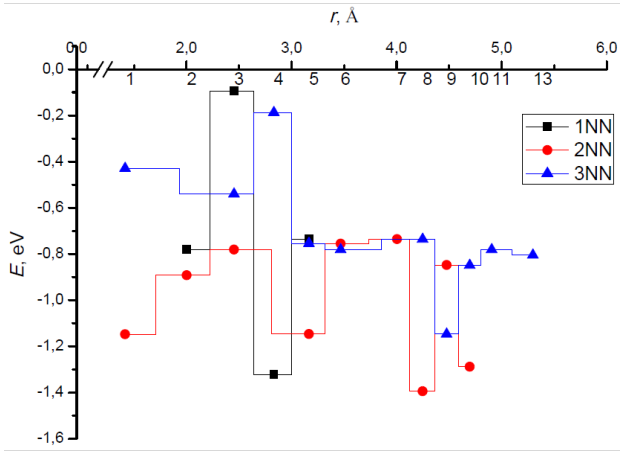


FIGURE 3 Interaction energy between V_{Fe}-Y-V_{Fe} complex and $2O_{oct}$. r is the distance between two oxygens. Each curve corresponds to different distance between the second oxygen and yttrium. Numbers under horizontal axis signify the distance between oxygens in NN.

The results for $V_{Fe}YV_{Fe}$-O_{oct} are shown in a Figure 2. The most stable configuration is found and also it is shown that $V_{Fe}YV_{Fe}$-O_{Fe} (1NN) is a metastable configuration and relaxes to the most stable if the symmetry of the system is broken.

The different configurations $V_{Fe}YV_{Fe}$-$2O_{oct}$ have been created by adding a second O_{oct} to the most stable $V_{Fe}YV_{Fe}$-O_{oct} configuration. The results are displayed in the Figure 3. We still can notice that if oxygen is 2NN away from yttrium substitute, the configurations tend to be more stable.

6 Conclusions

Various configurations of yttrium and oxygen solute atoms, combined with vacancies, have been thoroughly investigated.

To continue the research, we need to calculate the barriers between more complex configurations before we proceed with the kinetic Monte Carlo simulations.

Acknowledgments

All the calculations have been performed using the “Helios” supercluster (Japan).

References

[1] Lindau R, Möslang A, Rieth M, Klimenkov M, et al. 2005 Fusion Eng. Design **75-79,** 989-96
[2] Kresse G, Hafner J 2007 VASP the Guide, University of Vienna http://www.cms.mpi.univie.ac.at/vasp
[3] Söderlind P, Yang L H, Moriarty J A, Wills J M 2000 Phys. Rev. B, **61,** 2579-86

Suitability of doped [0001]-oriented ZnO nanowires of different sizes for photocatalytic applications: DFT-LCAO simulations

Yu F Zhukovskii[1*], O Lisovski[1], S Piskunov[1], R A Evarestov[2]

[1]Institute of Solid State Physics, University of Latvia, Kengaraga Str. 8, LV-1063 Riga, Latvia

[2]Department of Quantum Chemistry, St. Petersburg State University, Petrodvorets (Saint Petersburg), Russian Federation

**Corresponding author's e*-mail: quantzh@latnet.lv

Abstract

Zinc oxide is considered as a promising material for solar water splitting. While experimental studies on ZnO photocatalysts have already become abundant, computer simulations of ZnO-based materials are rather scarce. We are contributing to filling this gap by performing a series of DFT simulations on ZnO nanowires of different diameters, mono-doped with various elements, both metals (Co, Ag, Cd) and non-metals (C, N). We also consider nanowires with O vacancies. We analyse changes in the electronic structure induced in every defect introduction scenario and conclude that carbon-doped ZnO nanowires have the highest potential.

Keywords: Density Functional Theory, zinc oxide nanowires, material doping, band gap engineering, water splitting

1 Introduction

Intensive studies in the field of photocatalysis sre performed for decades, with a particular application of solar light-driven water splitting [1]. As hydrogen is an attractive alternative to conventional fuels thanks to its high energy density and environmental friendliness [2], a numer of materials are tested in a role of a photocatalyst [3]. One of the most widespread materials in this field is TiO_2, which possesses a set of promising properties: low price, good chemical stability, non-toxicity, long lifetime of charge carriers and advantageous position of the conduction band edges [4]. Another material, which attracts enhanced attention as a suitable photocatalyst, is ZnO [5]. The advantage of ZnO over TiO_2 is its higher electron mobility, while the major drawback is vulnerability to photocorrosion. However, this problem was already solved experimentally with a number of discussed stabilization routes, thus, ZnO might be a better photocatalyst. Since its band gap is still too wide, the most challenging task is a tuning of the ZnO electronic structure to enhance photocatalytic efficiency [5],. One of the common ways of addressing this issue is fabrication of nanoscale materials and band-gap engineering via control of material composition. Experimental studies on these properties of ZnO already become abundant while theoretical simulations are rather scarce [5]. To fill this gap we conduct a series of DFT simulations on ZnO nanowires mono-doped with metals (Co, Ag) and non-metals (C, N) as well as containing oxygen vacancies.

2 Computational details

We consider [0001]-oriented hexagonal ZnO NWs of wurtzite structure. Five NWs of different diameters (from 1.63 nm to 3.60 nm) are studied. At first, we investigate whether the dopants favour inner or outer sites, since photocatalytic process is mostly influenced by the outer defects. Then we perform further modelling to make a broader study on how electronic structure of the NWs alters along with NW diameter and defect concentration. We focus on ~3% and ~6% defect concentrations.

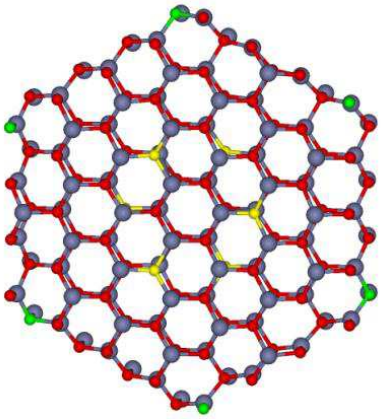


FIGURE 1 Example of defect positioning at 3% conc. in a ZnO NW unit cell with 2.29 nm diameter, front view. Outer (green) and inner (yellow) site alternatives are highlighted

An example of non-metal defect distribution is shown in Figure 1. Unless specified separately, non-metal elements serve as oxygen substitutes, while metal atoms as zinc substitutes. Situation with metal defect positioning is similar. Note that defect site choice varies with NW size.

We perform ab initio calculations on a number of ZnO NWs using the DFT-LCAO method and the PBE0 Hamiltonian as implemented in the CRYSTAL14 code [6]. The used basis sets for atoms and dopants are chosen as:

- 8s-64111sp-41d for Zn atoms;
- 842111s-6311p-411d-1f for Co atoms;
- 3111s-221p-41d for Ag atoms;
- 6s-311sp-11d for C atoms;
- 8s-411sp for O atoms;
- 6s−31p−1d for N atoms.

3 Results

Calculations on the defect formation energy show that Co atoms exhibit affinity towards the outer sites. However, for some of the smaller structures both at 3% and 6% defect concentration occupied states were induced above the SHE level which is detrimental for the photocatalytic process. For the other, larger models the improvement is not sufficient to achieve high efficiencies.

Silver is the most promising metal dopant. Although the position of the highest occupied induced level (HOIL) is slightly unfavourable at ~6% defect concentration, it descends along with NW diameter growth and also along with Ag content decrease. Unfortunately, the lowest unoccupied level (LUIL) is adjacent to the HOIL, which might promote charge recombination.

Nitrogen in general favours outer sites. For smaller structures with ~6% N content the highest occupied level is located above the energy level of hydroxyl group reduction (-1.23 eV), which is a major drawback. For the larger structures the HOIL is below that level, but the energy gap is too large to ensure efficient photocatalysis. The situation is more optimistic for N doping at ~3% concentration. Here, the energy gap width is around 2 eV for larger NWs. Although the HOIL is slightly above the -1.23 eV level, it descends along with NW diameter growth, which allows us to make an optimistic prediction since results for larger NWs are more relevant to real-life structures.

Oxygen vacancies also prefer the outer sites. For O-deficient NWs, the energy gap contracts to around 2.75 eV along with the NW diameter growth both for the ~3% and 6% defect concentration cases. It is worthy to note that the HOIL position is further from the -1.23 eV level for the NW with ~3% defect content.

Finally, carbon doped nanostructures show the most promising results. A clear trend of preferring outer oxygen sites is observed. For the models doped at ~6% defect concentration, the energy gap diminishes along with NW diameter growth and equals around 2.2 eV for the largest model. Still, the HOIL being equal to -1.34 eV is approaching the -1.23 eV level. At the same time, when lowering C content to ~3%, the energy gaps for the two largest models are larger and roughly equal to 2.4 eV. However, the benefit of the lower carbon concentration is the lower position of the HOIL, i.e., at a safer distance from the -1.23 eV level. The results are consistent and do not exhibit any large oscillations when NW size is varied.

Due to the limited volume of the abstract, we show only the most noteworthy results for defects (Table 1).

TABLE 1 Properties of some nanostructures under consideration

Defect	**Co**	**Ag**	**N**	**$O_{vac.}$**	**C**
concentration	**~3%**	**~3%**	**~6%**	**~6%**	**~3%**
NW diameter, nm	**2.93**	**2.93**	**3.60**	**3.60**	**3.60**
LUIL, eV	1.10	1.07	1.04	1.43	0.69
HOIL, eV	-1.73	-1.72	-1.77	-1.32	-1.76
$\Delta\varepsilon_{gap}$, eV	2.82	2.79	2.81	2.75	2.45

Since carbon doping shows the best perspective, we have performed additional modelling of the C-doped NWs with a larger supercell, i.e., width of increased distance between carbon atoms along the NW axis. Leaving the same defect positioning as for 2.29 nm wide NW with 6% carbon content and adding one and two additional defect - free unit cells to the total structure, we obtained NW models with ~3% and ~2% carbon concentration. For all three such a structures under consideration, the band energy gap $\Delta\varepsilon_{gap}$ is broadened to approximately 2.5 eV, and both the HOIL and the lowest unoccupied induced level are slightly lowered with respect to initial structure. The data on the C-doped ZnO NWs with supercells are summarized in Table 2.

TABLE 2 Properties of C-doped ZnO NWs, analysis of effects produced by increasing distance between dopants along the NW axis

Unit cells added	**0 (initial structure)**	**1**	**1 (different sites)**	**2**
Concentration	**~6%**	**~3%**	**~3%**	**~2%**
LUIL, eV	0.78	0.73	0.73	0.69
HOIL, eV	-1.59	-1.78	-1.83	-1.83
$\Delta\varepsilon_{gap}$, eV	2.37	2.51	2.56	2.52

4 Conclusions

We have studied a number of defects as candidates for enhancement of ZnO NW photocatalytic properties: Co, Ag, C and N dopants as well as oxygen vacancies. The most prominent favourable effect on the electronic structure of ZnO nanowire has been shown for C-doping, while Ag, N and O vacancies might also lead to some improvement while Co dopants are rather ineffective for ZnO NWs. At the first instance, a deeper and more detailed study is needed in order to understand the prospects of carbon doping for ZnO nanowires.

References

[1] Pan H 2016 Renew. Sustain. Energy Rev. **57** 584–601
[2] Catlow C R A, Guo Z X, Miskufova M, Shevlin S A, Smith A G H, Sokol A A, Walsh A, Wilson D J, Woodley S M 2010 Philos. Trans. A. Math. Phys. Eng. Sci. **368** 3379–456
[3] Chen S, Thind S S, Chen A 2016 Electrochem. Commun. **63** 10–7
[4] Kumar S G, Devi L G 2011 J. Phys. Chem. A **115** 13211–41
[5] Pan J, Wang S, Chen Q, Hu J, Wang J 2014 ChemPhysChem **15** 1611–8
[6] Dovesi R, Saunders V R, Roetti C, Orlando R, Zicovich-Wilson C M, Pascale F, Civalleri B, Doll K, Harrison N M, Bush I J, D'Arco Ph, Llunell M, Causá M, Noël Y 2014 CRYSTAL14, User*'s Manual* University of Torino

First principle calculations of PZT varying Zr and Ti concentrations

A Gopejenko*, Yu F Zhukovskii, S Piskunov, E A Kotomin

Institute of Solid State Physics, University of Latvia, Riga, Latvia

Corresponding author's e-mail: agopejen@inbox.lv

Abstract

Ab initio calculations of lead zirconate titanate ($PbZr_xTi_{1-x}O_3$) or PZT have been performed using the CRYSTAL14 computer code within the framework of the density functional theory. This study continues the researches of lead titanate (PT) and lead zirconate (PZ) performed earlier [1,2]. The calculations have been performed by varying the concentration of Zr and Ti for the values of x = 0; 0.25; 0.5; 0.75; 1. The results received within the project for ISSP UL PhD students are in a good qualitative agreement with those reported in the references. This not only proves that the chosen approach towards the calculations allows us to reproduce the results obtaimed earlier but also that the older versions of the CRYSTAL code used in 2004 and 2007 are plausible.

Keywords: ODS steels, density functional theory, CRYSTAL computer code

1 Introduction

PZT is a piezoelectric ceramic material that is widely used due to its broad spectrum of applications due to the unique piezoelectric properties. In particular, PZT materials are used as ultrasonic transducers, ceramic capacitors, sensors, actuators, MEMS – microelectromechanical systems, storage devices, electro-optical modulators, in space programs dues to its radiation resistance, etc. However, as the piezoelectric properties of PZT are not fully understood the interest in studying the material is high.

2 General

PZT is a solid solution of PZ and PT, which leads to the interest in analysing the effects of Zr and Ti concentration variation on the structural and electronic properties of the material. The model of the $PbZr_{0.5}Ti_{0.5}O_3$ is shown in Figure.

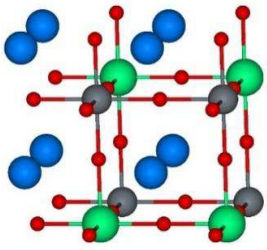


FIGURE 1 Model of $PbZr_{(0.5)}Ti_{(0.5)}O_3$ (Pm3m space group)

During the calculations hybrid B3PW DFT method has been used within the CRYSTAL14 computer code [3]. Gaussian-type functions are centered on atomic nuclei as the basis sets (BS) for an expansion of the crystalline orbitals. During the calculations the same BSs have been used as in the previous calculations [1,2]: O-8-411(1d)G, Pb – 211(1d)G, while the BS for Zr - 311(31d)G and Ti – 411(311d)G. The inner core electrons of Pb, Zr, and Ti atoms were described by Hay–Wadt effective core pseudopotentials taking into account the relativistic effect.

3 Conclusions

The calculated lattice constants and density of states (DOS) for the values of x equal to 0 and 1 are in a very good agreement with the results previously reported [1, 2]. Moreover, for $PbZr_{0.5}Ti_{0.5}O_3$, we have obtained $a_o = c_o = 4.04$ Å, in a qualitative agreement with $a_o = 4.12$ Å reported in Ref. [4]. The analysis of the Zr an Ti concentrations has showed that the lattice constant increases with the increase of x values. The band gap also increases with the growth of x. For $PbZr_{0.5}Ti_{0.5}O_3$, $\Delta\varepsilon_{gap} = 3.6$ eV, in a good agreement with 3.5 eV from Ref. [4].

Acknowledgement

Financial support provided by Scientific Research Project for Students and Young Researchers Nr. SJZ2015/11 realized at the Institute of Solid State Physics, University of Latvia is greatly acknowledged.

References

[1] Piskunov S, Heifets E, Eglitis R I, Borstel G 2004 Comput. Mater. Sci. **29** 165–78
[2] Piskunov S, Gopeyenko A, Kotomin E A, Zhukovskii Yu F, Ellis D E 2007 Comput. Mater. Sci. **41** 195–201
[3] Dovesi R, Saunders V R, Roetti C, Orlando R, Zicovich-Wilson C M, Pascale F, Civalleri B, Doll K, Harrison N M, Bush I J, D'Arco Ph, Llunel M, Causà M, Noël Y 2014 CRYSTAL14. User's Manual Organization University of Torino, Torino http://www.crystal.unito.it/
[4] Bujakiewicz-Koronska R 2013 Comput. Mater. Sci. **77** 399–402

Ab initio calculations of charged point defects in corundum

A Platonenko*, Yu F Zhukovskii, S Piskunov, E A Kotomin

Institute of Solid State Physics, University of Latvia, Riga, Latvia

Corresponding author's e-mail: alexander.platonenko@gmail.com

Abstract

Calculations on neutral and charged oxygen interstitials in corundum using different supercell sizes have been performed. Formation energies, charge distribution and defect-defect interactions have been estimated. Neutral and single charged O_i form "dumbbell" pairs with oxygen atoms in regular positions. Diffusion energy and migration paths have been calculated for both types of defects.

Keywords: corundum, LCAO, density functional theory, point defects

1 Introduction

Corundum (α-Al_2O_3) is important radiation-resistant material with potential applications for components of diagnostics, breeder blanket and in future fusion reactors as coating to avoid the light gases permeation, as well as corrosion produced by lithium-based alloys [1]. Radiation-induced changes in structural and optical properties of radiation-exposed α-Al_2O_3 crystalline materials are mainly associated with oxygen vacancies V_O and complementary Frenkel pairs of defects (O_i+V_O) [2].

Despite the technological importance of corundum crystalline structures, point defects have not been well theoretically studied so far. This can be explained by the following: (a) the complicated atomic structure of α-Al_2O_3 as well as (b) the semi-covalent and semi-ionic chemical bonding as was experimentally observed using X-scattering method [3].

2 General

In this study, we have performed large-scale ab initio DFT-LCAO calculations, on the electronic structure of α-Al_2O_3 with oxygen interstitials, applying B3PW exchange-correlation functional as well as Al – DURAND-21G* and O – 8-411d11G basis sets for aluminium and oxygen, respectively, as implemented in CRYSTAL14 code [4]. Both 2×2×1 and 3×3×1 corundum supercells containing 120 and 270 atoms, respectively, have been used for our calculations. For charged O_i, one or two electrons have been added to p-orbital. Formation energies and charge distribution for both defect-containing supercells have been compared to evaluate defect-defect interaction in periodic model.

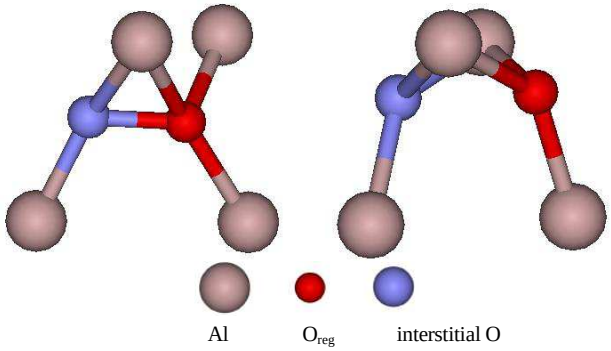


FIGURE 1 Configurations of neutral (left) and -1 e charged dumbbell Oi-Oreg pairs occupying regular oxygen position in corundum lattice

3 Conclusions

It has been shown (Fig. 1) that the single-charged interstitial O^- ion forms a dumbbell with a regular oxygen ion shifted from one of the nearest lattice sites (which distance is 1.87 Å and bond population 1.73 e) preserving C_2 site symmetry. In turn, the double-charged oxygen interstitial ion tends to occupy a regular lattice site, but not preserving site symmetry. In all the cases, oxygen interstitials form the bonds with regular Al ions in corundum lattice rather than occupy centers of octahedron consisting of six nearest O_{reg} ions as one could intuitively expect. The calculated migration energies of neutral and single charged oxygen interstitials are compared with available experimental data.

References

[1] Mota F, Ortiz C J, Vila R, Casal N, Garcia A 2013 J. Nucl. Mater. **442** 5699
[2] Jacobs P W M, Kotomin E A 1994 J. Amer .Ceram. Soc. **77** 2505-8
[3] Lewis J, Schwarzenbach D, Flack H D 1982 Acta Crystallogr. A **38** 733-9
[4] Dovesi R, Orlando R, Erba A, Zicovich-Wilson C M, Civalleri B, Casassa S, Maschio L, Ferrabone M, De La Pierre M, D'Arco P, Noel Y, Causa M, Rerat M, Kirtman B 2014 Int. J. Quantum Chem. **114** 1287

New approach in molecular dynamics modelling of radiation stimulated processes

A Kiv[1], N Mykytenko[2], D Fuks[1], I Dahan[3], L Meshi[1]

[1]*Department of Materials Engineering, Ben-Gurion University of the Negev, Israel*

[2]*Hewlett -Packard, Yehud, Israel*

[3]*Nuclear Research Center-Negev, POB 9001, Israel*

Abstract

The approach based on the classical molecular dynamics (MD) is developed that allows to probe the energy spectrum of particles in radiation induced processes. To simulate the effect of particles collisions in the selected interval of the energy spectrum the "shock function" is introduced to the standard scheme of MD. This function describes the forces acting on the lattice atoms by the incident particles in the selected energy interval. The approach is illustrated by mod-eling the ion bombardment of triatomic model crystal with significantly different atomic masses of constituents. It can be useful in particular for a prediction of clusters type defects formed in polyatomic crystals.

We developed the MD software that allows studying radiation induced processes in the selected range of energy spectrum of incident particles. Mechanisms of formation of radiation defects essentially depend on the type of incident particles and their energy. As a rule at the long-term unchanging irradiation conditions a stationary energy distribution of incident particles is set. In each interval of energy spectrum of these particles the specific mechanisms of defect formation are realized. The final radiation effect is determined by a superposition of radiation effects caused by incident particles in all intervals of their energy spectrum. Therefore, to decrypt the mechanisms of formation of radiation defects it is important to clarify the mechanisms of radiation-stimulated processes in different intervals of the energy spectrum of incident particles.

To simulate the effect of atomic collisions in the selected interval of the energy spectrum the "shock function" is introduced. This function determines the forces (FSH) acting on the lattice atoms as described earlier in [9]. The pulses that are transferred to lattice atoms during irradiation are characterized by special random function. This function shows which atom in the irradiated sample is knocked, what energy value is chosen from the selected energy interval, and what the direction of hit is.

It should be noted that due to the superposition of radiation effects caused by incident particles from different intervals of the energy spectrum, the result of the action of particles from selected energy range can be partly or fully hidden. Therefore, to estimate the role of different mechanisms in the radiation induced destruction of material it is necessary using the proposed approach to carry out the suggested simulations in different intervals of the energy spectrum and take into account the contribution of each energy interval to the final radiation effect.

The developed approach is especially useful when the compound under irradiation consists of atoms with significantly different masses. The properties of track devices depend on the shape of tracks and the electronic structure of the internal track surfaces. The necessary properties of tracks can be obtained using the proposed approach.

Reference

[1] Mykytenko N, Fink D, Kiv A 2015 *Journal Comp. Sci.* **6** 34-9

Automated method of the correlation selection of perovskites

N O Mykytenko[1], A E Kiv[2], D Fuks[2]

[1]*Hewlett -Packard, Yehud, Israel*

[2]*Department of Materials Engineering, Ben-Gurion University of the Negev, Israel*

Abstract

An approach that automates the selection of ABO_3 perovskite compounds, which have the necessary properties, is developed. Compounds with high ionic conductivity (σ) are considered. First, procedure for determining the correlation dependencies "property - the composition of the compound" was performed.

When using the descriptor [1] the method of correlation selection method was applied. According to this method the samples worsening correlation are eliminated from a common set of compounds. Analysis of the composition and the structure features of eliminated compounds allows determining the technological ways for obtaining materials with desired parameters. Correlation selection procedure requires long time calculations in order to find "worst" points as a result of complete inspection of correlation series. Therefore, we have developed a computer program that implements the algorithm for linear regression analysis that automates the process of materials correlation selection.

Thus, the program automatically performs correlation selection procedure for perovskites realizing step by step the following actions:

1. The linear approximation of the full set of correlation points based on regression analysis.
2. Calculation of the correlation coefficient.
3. Search of the "worst" point in the full series of correlation points and removal this point:
   3.1. For each remote point the repeated regression analysis is performed and new correlation coefficients are calculated for a set of remaining points.
   3.2. Based on a set of calculated correlation coefficients the "worst" point in the correlation series is found.
4. The "worst" point sequentially removed as long as the correlation coefficient reaches the desired value.

The developed method of correlation selection of perovskite compounds in its automated version can be applied for optimization physical and service characteristics of other materials.

Reference

[1] Mykytenko N, Kiv A, Fuks D 2016 Correlation Selection of Perovskites with Optimal Parameters *Adv. Mater. Lett.* **7**(4) 10-5

Nanotechnologies, ecological security and economic problems

A Kiv[1, 2], T Koycheva[2], I Donchev[2]

[1]*Ben-Gurion University of the Negev, Department of Materials Engineering, 84105 Beer-Sheva, Israel*

[2]*South Ukrainian National Pedagogical University, Department of Physical and Mathematical Modelling 65 020 Odessa Ukraine*

Abstract

Information exchange and data processing systems, databases, etc., require modern very-large-scale-integration (VLSI) operating at high frequencies and allowing low power consumption. The corresponding products follow the general scaling trend: “Moore’s law". Semiconductor industry developing electronic systems for environmental, security and ecological security applications faces a new development concept: "More-than-Moore". In this case, designers less struggle for more advanced technology nodes, but intend to provide added values by incorporating new functionalities integrated in the CMOS platforms.

“More than Moore” approaches became a part of the modern technology. This concept supposes a variety of applications, in particular connections with different fields of human activity, including control of environmental and ecological conditions, civilian and military intelligence. Actually, it gives an opportunity to step up from discrete sensors measuring speed, acceleration, pressure, flow, distance, field, temperature, humidity, concentration of contaminants, etc. by electronic means to sensor systems with increasing functionality: analogue, digital, or mixed signal.

Robust integration of novel approaches into the existing CMOS platform is complicated. It is requested that the integrated features would not deteriorate the basic CMOS process or make the total process flow too complex. In particular it is requested that: (i) changes of the core CMOS devices fabricated on the same wafer would be minimized; (ii) the introduced new functionality would not lead to unreasonable increase of the chip area. Strict low cost policy is applied for most applications (typically, only 1-2 additional masks to the core CMOS process).

Micro-fabrication methods make it possible to build very small and low power sensors. One example of microfabricated sensors that could be integrated into a Smart Sensor System is a sensor based on a microhotplate. Microfabricated hotplates offer a lower power platform for high temperature metal oxide conducto-metric sensors. Femtomolar isothermal desorption has been carried out with heating rates up to 10^6 C/s and minimal power consumption due to the small thermal mass of the microhotplates. An ultra-low power bridge built with polysilicon surface micromachining. Such sensor responds to ambient gas changes in nanoseconds having a measured transient response time - constant of 12 ms in Helium. With constant voltage operation, the temperature of the bridge, and hence electrical resistance, is a function of the thermal conductivity of the surrounding gas ambient. The micro-fabricated sensor elements have extremely low power consumption, approximately 4 mW continuous and, <4 mW when operated on a duty cycle to read every millisecond. In principle, this would allow the operation of this sensor for months to years using a single small battery.

Many sensors will require multichip solutions, however, in order to 10^7 achieve optimal sensing and processing. While approaches may vary for other 10^8 sensor types, sensor elements that provide data with minimal power consumption 10^9 can enable long-lived Smart Sensor Systems (SSS). All these technologies have different peculiarities.

From one side we observe a significant progress in service characteristics of sensor systems. We obtain sensors with unique parameters. However, from other side we must overcome a significant complication of technological circles and negative consequences of human-nanoparticles interaction in the conditions of production. Therefore, economical analysis for development of these technological directions is important.

Preliminary estimations showed that at this stage the consequences of human-nanoparticles interaction in the process of nanosensors production lead to serious economic problems.

On the simultaneous etching of two neighboring swift heavy ion irradiated polymer foils

D Fink[1], A Kiv[2], S Cruz[1], G Munoz[3]

[1]*Physics Department, Universidad Autónoma Metropolitana - Iztapalapa, Apartado Postal 55534, 09340, México, D.F., México*

[2]*Department of Materials Engineering, Ben Gurion University of the Negev, Israel*

[3]*Biotechnology Department, Universidad Autónoma Metropolitana-Iztapalapa and Cuajimalpa, Apartado Postal 55534, 09340, México, D.F., México*

Abstract

We found during our research that two polymer foils, irradiated under the same conditions, and thereafter facing each other in the same vessel while simultaneously being exposed to the same etchant solution, always behave different under the etchant attack, in spite of equal etching conditions. We showed that by making use of a well-known chemical recipe, this problem can be overcome. The equations derived here can be applied to the mentioned problem.

Let us introduce the following notations:
m_a (t) is the polymer mass removed by etching at the time t in the foil *a*.
m_b (t) is the polymer mass removed by etching at the time t in the foil *b*.
c_a is the local concentration of etchant at the time t at the foil *a*.
c_b is the local concentration of etchant at the time t at the foil *b*.
t is the total etching time, with t = 0 corresponding to the onset of etching.

With proceeding etching time, some difference will emerge between the amounts of removed polymeric material m_a and m_b in both foils due to statistical slightly different track numbers and track shapes, and similarly some difference will emerge between the concentrations c_a and c_b of the etchant in front of the polymer foils a and b, due to statistical slightly different etchant consumptions. To arrive at a consistent description, we have to consider on the one hand the dependence of the speed of removal of the irradiated polymer regions dm_i/dt, and on the other hand the dependence of the speed of etchant loss dc_i/dt, on both the amount of already removed material m_i and the remaining etchant concentration c_i, for both foils i = a and b. This leads to the kinetic equations (1-4):

$$\frac{dm_a}{dt} = \alpha_a c_a - \beta_a m_a , \tag{1}$$

$$\frac{dm_b}{dt} = \alpha_b c_b - \beta_b m_b , \tag{2}$$

$$\frac{dc_a}{dt} = \alpha_a{}' c_a - \beta_a{}' m_a , \tag{3}$$

$$\frac{dc_b}{dt} = \alpha_b{}' c_b - \beta_b{}' m_b , \tag{4}$$

where the rate coefficients α, α', β and β' are thought to be constant. Subtraction of Eq. (2) from Eq., (1) and of Eq. (4) from Eq. (3) yields:

$$\frac{d\left(m_a - m_b\right)}{dt} = \alpha\left(C_a - C_b\right) + \beta\left(m_b - m_a\right), \tag{5}$$

$$\frac{d\left(C_a - C_b\right)}{dt} = \alpha'\left(C_a - C_b\right) + \beta'\left(m_b - m_a\right). \tag{6}$$

Let us assume for simplicity that the rate coefficients are the same for both foils: $\alpha_a = \alpha_b = \alpha$, $\beta_a = \beta_b = \beta$, $\alpha_a{}' = \alpha_b{}' = \alpha'$ and $\beta_a{}' = \beta_b{}' = \beta'$ and let us simplify the concentration and mass differences: $|c_a - c_b| = c$, $|m_a - m_b| = m$. Then Eqs. (5) and (6) give:

$$\frac{dm}{dt} = \alpha c - \beta m , \tag{7}$$

$$\frac{dc}{dt} = \alpha' c - \beta' m . \tag{8}$$

This set of equations can be reduced to equations of second order for *m* and *c*, respectively:

$$\frac{d^2 m}{dt^2} = \left(\alpha'\beta - \alpha\beta'\right)m + \left(\beta - \alpha'\right)\frac{dm}{dt}, \tag{9}$$

$$\frac{d^2 c}{dt^2} = \left(\alpha'\beta - \alpha\beta'\right)c + \left(\beta - \alpha'\right)\frac{dc}{dt}, \tag{10}$$

which can be simplified to:

$$\frac{d^2m}{dt^2} = A\frac{dm}{dt} + Bm, \tag{11}$$

$$\frac{d^2c}{dt^2} = A'\frac{dc}{dt} + B'c \tag{12}$$

by introducing the coefficients A and B in (9) and A´, B´ in (10). Due to the identity of the rate coefficient terms in both Eqs. (9) and (10), A = A´ and B = B´. Eqs. (11) and (12) have simple solutions:

$$m \sim e^{\gamma t}, \tag{13}$$

$$c \sim e^{\gamma' t} \tag{14}$$

with the same exponent γ.

It depends on the sign of the exponent γ whether the etching speeds of both foils a and b converge or diverge. Whereas for γ < 0 eventual differences in etching speed would smooth out, γ > 0 would signify that both foils will be etched at increasingly different rates. This latter case was found to occur in our experiments.

By inserting Eq. (13) into Eq. (11) (or Eq. (14) into Eq. (12)), one obtains:

$$\gamma = \frac{A \pm \sqrt{A^2 + 4B}}{2} \tag{15}$$

or:

$$\gamma = \frac{(\alpha' - \beta) \pm \sqrt{(\alpha' + \beta^2) - 4\alpha\beta}}{2}. \tag{16}$$

A basic precondition in order to arrive at realistic non-fluctuating solutions is that the radicand $A^2 + 4B$ must be positive or at least zero, hence that: $A^2 \geq -4B$ or $(\alpha` + \beta)^2 \geq 4\alpha\beta`$.

From the criterion for convergence of etching speeds: γ<0 one can derive the condition: $\frac{\alpha'}{\alpha} > \frac{\beta'}{\beta}$, whereas the experimentally found case: γ>0 implies that $\frac{\alpha'}{\alpha} < \frac{\beta'}{\beta}$ should hold. This latter condition means that in this case the ratio of the correlation of {etchant concentration change to the actual etchant concentration} to the correlation of {speed of polymer mass loss to etchant concentration} is smaller than the ratio of the correlation of {etchant concentration change to dissolved polymer mass} to the correlation of {speed of polymer mass loss to dissolved polymer mass}.

In other words, the technologically preferred case of identical track etching speeds in both foils can be achieved only if track etching would be performed in a highly inefficient way, i.e. by using a huge amount of etchant to remove only very small amounts of polymeric matter. For contrast, when striving for efficient track etching (i.e. by removing much polymeric material with only little etchant consumption – as it usually done), one inevitably arrives at the technologically undesired result of strongly diverging etchant speeds for the two foils.

The competition of two neighboring foils for sufficient etchant solution can also be interpreted as some type of (here: undesired) communication between these foils via the mediating common electrolyte. This effect resembles somewhat the earlier observations of multiple track etching in a single polymer foil, where some tracks are etched much more pronouncedly and rapidly at the expense of others in their neighborhood, Eq. (6).

Ab initio study of phase transformations in Mg-based alloys

L Kutsenko

Naval Fleet Technical College, Odessa Maritime Academy, Ukraine

Corresponding author's e-mail: larisa.kutsenko@gmail.com

Abstract

Plasma Immersion Ion Implantation (PIII) is one of the new experimental and technological methods that allow modifying Mg-based alloys and obtaining materials with novel characteristics. The calculations were based on the density functional theory. According to the suggested concept, a *two-stage model* of the ion-induced phase transition is proposed. In the model the adiabatic approximation is used that means that the penetration of the implanted ions into the host lattice leads to "immediate" excitation of its electronic subsystem, while the changes in atomic configurations occur later.

At the first stage, the implanted system is in a condition that can be defined as the intermediate state (IS) that corresponds to the strongly non-equilibrium state of the parent phase. The rearrangement of the atoms occurs at the second stage of the transition due to the changes in the electronic states. Such atomic rearrangement corresponds to formation of a new phase.

The approach described above was used for a study of PIII-induced phase transformations in two cases: (a) A Mg matrix implanted with the ions of Ag and (b) A Mg-Al system implanted with the ions of Ag. In both cases, our results have shown that dependence of calculated electronic characteristics of the implanted material as a function of the dose of implanted ions can be used for prediction of conditions favoring the formation of new structure.

A parameter ΔE was introduced that shows how far the initial non-equilibrium state is from the quasi-relaxed state of the system. We have shown that a good correlation between the value ΔE calculated for different concentrations of implanted ions and the conditions of formation of the phases linked to ion implantation exists.

In the case of PIII of Ag ions into the $Mg_{17}Al_{12}$ compound it was found the mechanism of the transformation of $Mg_{17}Al_{12}$ into a new phase with a composition of $Mg_{54}Al_{28}Ag_{18}$. Formation of the new phase in the form of nanoparticles is explained using the concept of thermal spikes.

A qualitative explanation of the formation of second phase particles within the implanted matrix can be given as follows: a liquid nano-size droplet of Mg-Ag melt forms as a result of excitation of the spike; the droplet quickly cools and at the end of the spike lifetime it may be considered as a metastable super-cooled liquid within which 20–100 atomic oscillations have occurred. These oscillations are sufficient to displace atoms towards their new positions in a new intermetallic structure, which is formed during solidification.

The described model of the formation of finely dispersed intermetallic particles may explain the results of hardening of surface layers using PIII technology. Following this model we may assume that by controlling the energy of ions used in PIII treatment it will be possible to effectively vary the size of nano-particles, thus tailoring the mechanical properties of the implanted layers.

Nanotechnologies in the development of electronic components information systems

A Mrochko

ISMA University, 1 Lomonosova Str., Bld. 6, Riga, Latvia

Corresponding author's e-mail: aleksandrs.mrocko@isma.lv

Abstract

Several major subsystems can be identified in the Information system (IS) structure: sensors of information; of information exchange, processing and transformation of information, storage of information. The basic technical element of the above-mentioned subsystems is the electronic device. Since the emergence of the first electronic devices, the attention of researchers focused at the improvement of their application properties: reduction of sizes, increase of the performance rate and reduction of the consumption.

Keywords: electronics, electronic devices, microelectronics, nanotechnologies, nanotube radio.

1 General

From a technical point of view IS includes a set of devices providing the exchange of information:

- various sensors;
- data processing systems;
- storage systems;
- means of telecommunications.

All modern IS use electric signals to represent information. The electronic devices, which principle of action is based on the interaction of charged particles with electromagnetic fields, make the technical basis of information systems. The area of science and technology on the creation of electronic devices is called electronics, and it emerged in the early XX century.

Generally, there are two types of electronic components that we come across namely: *passive* (resistors, capacitors, inductors, etc.) and *active* (diodes, transistors, etc.) components. These components can be combined in different configurations by interconnecting them with conducting wires to build different useful electronic devices and circuits (rectifiers, amplifiers, oscillators, filtrs etc.) [1].

The first electronic device, a vacuum diode, was patented in 1904 by D.A.Fleming.

In 1946 the World's First Electronic Computer - ENIAC, weighing 27 tons, dimensions 2.6 m × 0.9 m × 26 m (taking up 63 m^2) was created. Its components included 17,468 vacuum tubes, 7,200 crystal diodes, 1,500 relays, 70,000 resistors, 10,000 capacitors and approximately 5,000,000 hand-soldered joints.

Invention and practical application of the first semiconductor device – transistor, which was demonstrated at Bell Telephone Laboratories in 1948, caused the intensive development of solid-state electronics, especially semiconductor one.

Formation of the new direction in electronics, which is known as microelectronics, is connected with the first integrated circuits (IC) on silicon in the late 1950s. The late 1960s were characterized by medium-scale integration technology and by kind of discrete-level electronics.

Due to the achievements in microelectronics, it has become possible to develop sophisticated electronic systems with a high degree of integration, high rate of data processing, low energy consumption. At present, the sizes of electronic components in CMOS integrated chips have already attained the 50-nm range and the density of one billion transistors per square centimeter has been reached [2]. An SRAM chip had a capacity of 52 megabits and packed 330 million transistors onto the surface of each chip. The fundamental building block of a microprocessor the field-effect transistor (FET) can switch on and off at gigahertz rates. SOI (silicon-on-insulator) topologies can increase the switching rate of transistors by up to 30%.

However, successful IC development beyond the 45-nm feature sizes meets certain difficulties because of exist physical limitation due to finite-size effects.

Need in smaller and faster electronic devices has given life in the recent years to the new branch of nanoelectronics. Researchers and developers are interested in nanoelectronic properties of materials for the purpose of communication, computation, storage or control.

In the recent years there have been developed electronic devices (single-electron device, resonant tunneling diodes and different spintronic devices) which are undergoing laboratory research. In the nearest future is expected rapid development of Carbon nanoelectronics and emergence of the key electronic components on the basis of carbon nanotubes [3].

The group of researchers from University of California at Berkeley in 2007 have constructed a fully functional radio receiver from a single carbon nanotube [4], which serves simultaneously as all essential components of a radio: antenna, tuneable band-pass filter, amplifier, and demodulator (Figure 1).

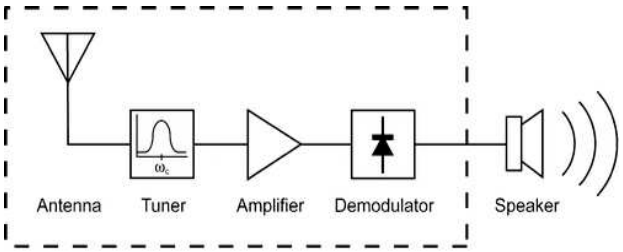


FIGURE 1 All in one nanotube radio

2 Conclusions

The emergence and rapid development of nanoelectronics provides new opportunities for reduction of sizes, increase of the performance rate, reduction of the consumption power of the electronic components and, and as a consequence, the improvement of some particular indicators of efficiency of Information Systems.

References

[1] Mrochko A 2012 Nanoelectronics and Efficiency of Information Systems of Management. Informatics in the Scientific Knowledge University publishing house VFU „Chernorizets Hrabar", Varna, Bulgarija 214-20
[2] Minoli D 2006 Nanotechnology applications to telecommunications and networking John Wiley & Sons, Inc. 487
[3] Borisenko V E 2009 Nanoelektronika M.: БИНОМ 223
[4] Jensen K, Weldon J, Garcia H, Zettl A 2007 Nanotube radio. Department of Physics Center of Integrated Nanomechanical Systems, University of California at Berkeley. August 21

3D modelling of the glucose detection nanoprocess

V Gopeyenko[1*], Yu Shunin[1], D Fink[2], A Kiv[3]

[1]*ISMA University, Latvia*

[2]*Department SF8, Lise Meitner Campus, Helmholtz Center for Materials and Energy, Berlin, Germany*

[3]*Department of Materials Engineering, Ben Gurion University of the Negev, Beer-Sheva, Israel*

[*]*Corresponding author's e-mail: viktors.gopejenko@isma.lv*

Abstract

3D visualisation of the physical processes in the problem of Glucose detection using a re-usable enzyme-modified ion track membrane sensor has been considered.

Keywords: Glucose oxidase, Glucose detection, Biosensor system, 3D visualisation

1 Introduction

Implementation of the visualisation and animation in 3D modelling allows cognizing physical processes effectively by considering their simplified models. Then it is possible to get closer to the realistic description of the physical phenomenon step by step by expanding the model taking into consideration more details.

2 General

The aim of this work is 3D visual modelling of the biotransducer that is used in Glucose detection mechanism Figure 1.

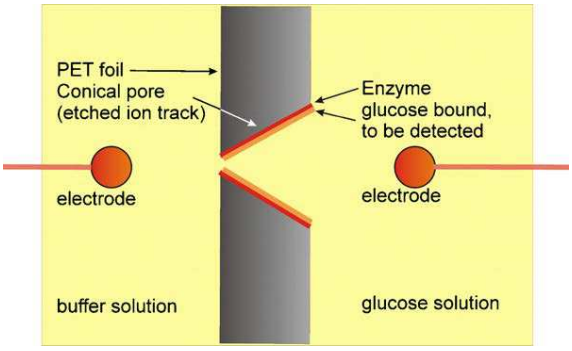


FIGURE 1 The biosensor for glucose detection [1]

The object of the modelling is the space of glucose detection reaction and its optimisation from the perspective of efficiency that defines the sensitivity of the biosensor. Fig. 2.

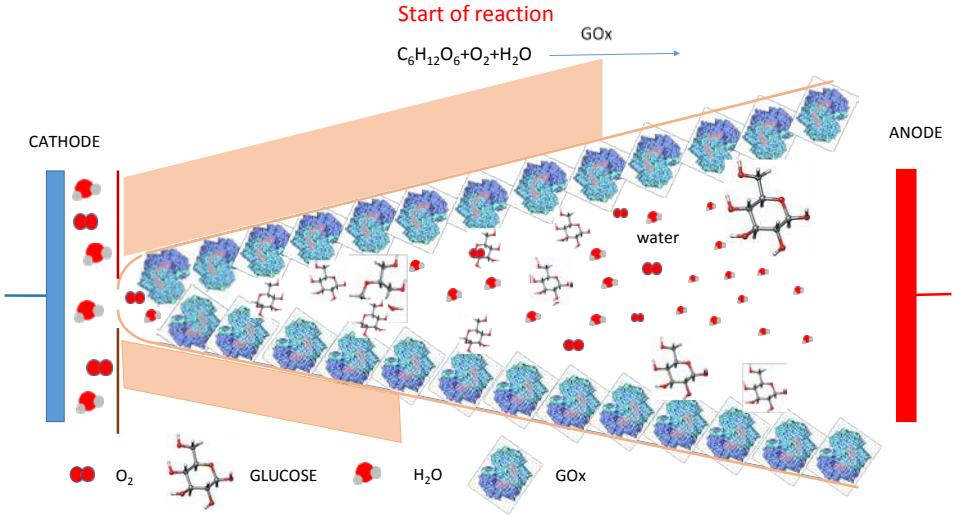


FIGURE 2 Model of active area of the glucose indication reaction within biosensor space

4 Conclusions

It is proposed to use Accelrys, Blender, cellPack applications in order to solve the problem of the 3D visualisation of the glucose reaction with the oxygen in the biosensor, which is used for the measurements of the glucose level.

References

[1] Witzens J, Hochberg M 2011 Optical detection of target molecule induced aggregation of nanoparticles by means of high-Q resonators *Opt. Express* **19** 7034–61 Bibcode:2011OExpr. .19.7034W. doi:10.1364/oe.19.007034

[2] Shunin Yu, Fink D, Kiv A, Mansharipova A, Muhamediyev R, Zhukovskii Yu, Lobanova-Shunina T, Burlutskaya N, Gopeyenko V, Bellucci S 2016 Modelling and simulation of electric response of nanocarbon nanocomposites and nanoporous polymer based structures for nanosensor devices *ITM2016 Theses*

[3] Fink D, Kiv A, Shunin Y, Mykytenko N, Lobanova-Shunina T, Mansharipova A, Koycheva T, Muhamediev R, Gopeyenko V, Burlutskaya N, Zhukovskii Y, Bellucci S 2015 The nature of oscillations of ion currents in the ion track electronics *Computer Modelling & New Technologies* **19**(6) 7-13

Electrostatically deformation mechanism of hydrogen passivation of electrically active centers in CdTe and $Cd_{1-x}Zn_xTe$ semiconductors

V B Brytan, R M Peleschak, U P Kohut

Ivan Franko Drohobych State Pedagogical University, 82100, 24 I. Franko St., Drohobych, Ukraine

Abstract

Within the framework of electrostatic deformation model influence of electric centers hydrogen pasivaction degree in CdTe and $Cd_xZn_{1-x}Te$ on the images optical record of devices with on n-p-i-m nanostructures have been investigated. It is set that when the concentration of atomic hydrogen does not exceed the acceptors concentration there is strengthening of electric active centers passivation.

Keywords: Atomic hydrogen, energy of co-operation, electric centers

1 Introduction

The semiconductors of CdTe, ZnTe and $Cd_{1-x}Zn_xTe$ present considerable interest from the technological point of view, due to the use of them in nano- optoelectronic (material both fotorefractor and forcreation of electro-optical keyers, detectors γ-ray and x-ray), in particularly as working elements for optical recording environments on n-p-i-m nanostructures [1].

2 Problem statement

Growing defects in the crystals of CdTe ($Cd_{1-x}Zn_xTe$) result in violation of chemical connections symmetry and to forming in the restricted area of semiconductor of admixture power levels, and, as a result, to diminishing of recording detector charge, that to diminishing of information optical record resolving power.

One method of decline of imperfectness level in the standards of CdTe ($Cd_{1-x}Zn_xTe$) and strengthening of record effect of images on optically recording semiconductor nanostructures of *n-p-i-m*-type is the hydrogen pasivation. Such pasivaction was technologically carried out as a result of hydrogen implantation or annealing a crystal in the hydrogen atmosphere [2].

The present methods of pasivation (method of chemical reactions and electrostatione) are not engulfed by cases, when electric centers (EC) and atoms of hydrogen in a crystalline matrix create heterogeneous deformation of crystalline grate.

For the choice of optimum technological terms of pasivaction of electric centers in CdTe ($Cd_{1-x}Zn_xTe$) with atomic hydrogen it is necessary to know their mechanisms. Therefore in this work we carry on with research of pasivaction mechanisms of EC atomic hydrogen within the framework of electrostatically deformation models and their influence on images optical record quality.

3 Pasivation method

The single-crystals of cadmium telluride of p-type grown with the method of sublimation in the atmosphere of hydrogen [2] are examined with the concentrations of acceptors $N_A = \left(10^{16} \div 10^{18}\right) cm^{-3}$. Energy of electrostatic and elastic cooperation between an acceptor and atomic hydrogen is described within the terms of screened electrostatic $V_{\text{el-st}}\left(\vec{r}\right)$ and deformation $V_{def}\left(\vec{r}\right)$ potentials [3]:

$$V\left(\vec{r}\right) = V_{\text{el-st}}\left(\vec{r}\right) + V_{def}\left(\vec{r}\right). \quad (1)$$

$$V_{\text{el-st}}\left(\vec{r}\right) = -\frac{Ze^2 \exp\left[-r \Big/ \sqrt{\frac{k_b T \varepsilon \varepsilon_0}{e^2\left(N_A + N_H\right)}}\right]}{4\pi\varepsilon\varepsilon_0 r}.$$

$$V_{def}\left(\vec{r}\right) = -\frac{1}{24\pi} C_{44}\left(1 + 2\frac{C_{12}}{C_{11}}\right)\xi\Delta V_A \times \times \Delta V_H \frac{1}{r^3}\left(3 - 5\sum_{x=1}^{3} n_{\vec{r}x}^4\right),$$

$\vec{n}_{\vec{r}} = \frac{\vec{r}}{r}$, $\xi = \frac{C_{11} - C_{12} - 2C_{44}}{C_{44}}$ – parameter of resilient anisotropy cube to the crystal, e – charge of electron, T – temperature to the crystal, k_b – became Bolcman, $C_{ij}\ \left(i, j = 1-4\right)$ – resilient to steel, ε – relative inductivity of material CdTe, ΔV_A, ΔV_H – change of volume of

crystalline grate at presence of admixtures of acceptors and atomic hydrogen accordingly.

It is set that when anisotropy parameter $\xi < 0$ identical defects which are placed along an axis [100] attracted by the deformation field, and along an axis [110] or [111] – pushed off.

4 Conclusions

It is set as result of the conducted research, that there is strengthening of effect EC pasivaction at $N_H \le N_A$, and then an increase of images optical record resolving power is on the nanostructures devices of n-p-i-m-type and in the case of $N_H > N_A$ – to diminishing it.

In theory expression is got for the discriminability of optically-recording nanostructures on the basis of semiconductor standards CdTe, $Cd_{1-x}Zn_xTe$. It is offered on the basis of the use of sosoloid $Cd_{1-x}Zn_xTe$ $(0 \le x \le 1)$, as a working semiconductor element in n-p-i-m nanostructures, expansion of spectral range of record of optical information.

References

[1] Kasherininov P G, Tomasov A A 2008 The Rapid optical recordings environments on semiconductor nanostrukturakh for a record and processing of images *Physics and technician of semiconductors* **42**(11) 1391-9
[2] Brytan V B, Peleshchak R M, Tsiutsira D I, Korbutyak D V 2009 The Effect of Treatment in Hydrogen Atmosfere on Electrically Active Centers in $Cd_xZn_{1-x}Te$ Single Crystals *Physics and chemistry of solid* **10**(1) 41-4
[3] Krivoglaz M A 1983 *Diffraction of x-rays and neutrons in non-perfect crystals* Kyiv: Naukova. dumica 408 p

Modelling of calcein solution in aqua: *ab initio* study

T Burlėga[1], G Saulis[1], A Gruodis[2*]

[1]*Dept. of Biochemistry & Biotechnology, Vytautas Magnus University, Kaunas, Lithuania*

[2]*Dept. of General Physics & Spectroscopy, Vilnius university, Vilnius, Lithuania*

**Corresponding author's e-mail: alytis.gruodis@ff.vu.lt*

Abstract

Calcein as fluorescent material is well known for microscopic visualizing of cells. Possibility to use the calcein indicator in *invivo* cell experiments requires the specific knowledges concerning the molecular conformation activity. This work is devoted to estimate the electronic properties of two molecular forms of calcein (hydrophilic and hydrophobic) in aqua surrounding.

Ground state geometry optimization and following excited state simulation was provided using *Gaussian09*. Intramolecular charge transfer in calcein plane could be manipulated by controlled presence of ionized groups especially metal cations.

Keywords: quantum chemistry modelling; calcein

1 Introduction

Calcein (fluorexon) as derivative of well-known fluorescein represents a laser dye with high luminescence yield. Due to high molecular stability and solubility in aqua, calcein is popular in cell coloring actions. For example, calcein could play the role of indicator in estimation of lipid layer quality [1]. Presence of absorption band (495 nm) and luminescence band (515 nm) in visible region allows to use it as complexmetric indicator in Ca^{2+} titration [2]. Also denaturated cells cannot adsorb the calcein due to loss of active esterase. For this reason, only viable cells fluorescent.

This work is devoted to estimate the electronic properties of two molecular forms of calcein (hydrophilic and hydrophobic) in aqua surrounding – see Fig. 1 and 2. Intermolecular and intramolecular charge transfer was modelled according to quantum chemistry simulations.

2 Quantum chemistry simulations

Computations were performed on resources at the High Performance Computing Center „HPC Sauletekis" in Vilnius University Faculty of Physics. Ground state complex geometry optimisation was provided using *Gaussian09* package using B3LYP/6-31+G(d,p) method. Effects of aqueous solution were estimated by means of polarized continuum method PCM. Electronic excitation and following intermolecular charge transfer (CT) was calculated using TD method for singlets only.

3 Discussion

Molecular properties of calcein must be estimated in framework of molecular clustering. Presence and/or absence of intermolecular bonds "calcein-calcein" and intermolecular bonds "calcein-water" allows to use calcein as a switch in structure formation [3]. Absence of intermolecular charge transfer allows to keep detection limit at several micrograms per litter [4]. Hydrophobic form (Calcein AM) is known as a molecular conformer readily absorbed by cells [5]. Figure 3 represent the electronic charge redistribution for non-protonated calcein in aqua. Significant charge redistribution takes place in three-ring system only but several chains are included also in this process. Significance of carbonyl group containing chain increases when additional protons or additional metal cations are localized in near surrounding.

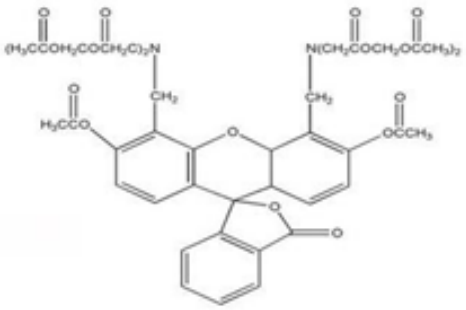


FIGURE 1 Hydrophobic calcein (Calcein AM)

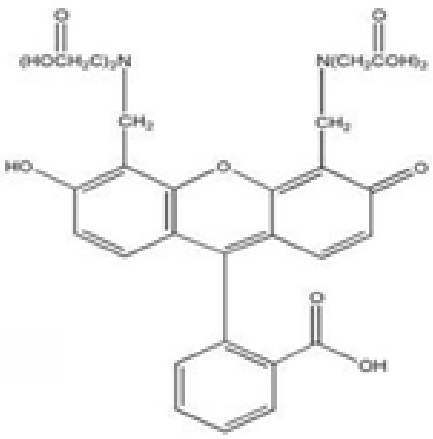


FIGURE 2 Hydrophilic calcein

4 Conclusion

Geometry of nonprotonated and protonated hydrophilic and hydrophobic molecular structures (calcein in aqua) was studied and presence of proton in long chain area was estimated as the significant of following charge transfer reaction.

Intramolecular charge transfer in calcein plane surface could be manipulated by controlled presence of ionized groups especially metal cations.

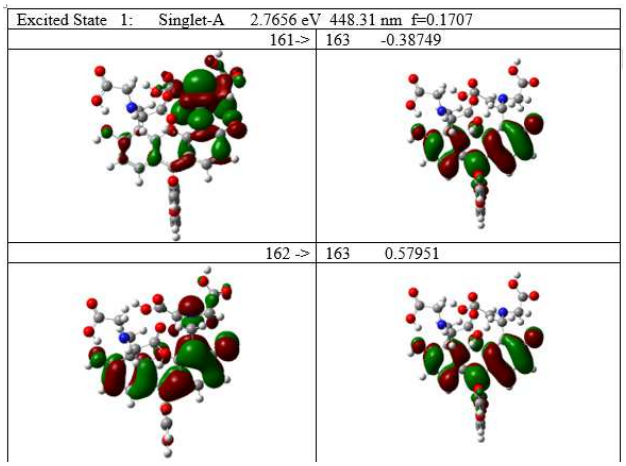


FIGURE 3 Calcein in aqua. Intramolecular charge transfer. Charge redistribution from ground to 1st excited state.

References

[1] Yung Shyeng Tsao, Leaf Huang 1985 Sendai virus induced leakage of liposomes containing gangliosides *Biochemistry* **24**(5) 1092-8
[2] Patel H, Tscheka C, Heerklotz H 2009 Characterizing vesicle leakage by fluorescence lifetime measurements *Soft Matter* **5**(15) 2849–51
[3] Kruglenko J Burlachenko S, Kravchenkoa A, Savchenko M, Slabkovska Yu, Shirshov 2014 Adsorption properties of thermally sputtered calcein film *Applied Surface Science* 378–82
[4] Fengshan Yua, Yanbin Dingc, Yongwei Gao, Shishi Zhengc, Fang Chena 2008 Fluorescence enhancement effect for the determination of DNA with calcein–cetyl trimethyl ammonium bromide system *Analytica chimica acta* 195–200
[5] Clémentine Linard, Yannick Gueguen, Jacques Moriceau, Claude Soyez, Bélinda Hui, Aurore Raoux, Jean Pierre Cuif, Jean-Claude Cochard, Marcel Le Pennec, Gilles Le Moullac 2011 Calcein staining of calcified structures in pearl oyster Pinctada margaritifera and the effect of food resource level on shell growth *Aquaculture* 149–55

Evolution of vitamin complex CK_3: *ab initio* study

M Pašakinskas[1*], G Saulis[1], A Gruodis[2]

[1]*Dept. of Biochemistry & Biotechnology, Vytautas Magnus University, Kaunas, Lithuania*

[2]*Dept. of General Physics & Spectroscopy, Vilnius university, Vilnius, Lithuania*

**Corresponding author's e-mail: pmantvydas@gmail.com*

Abstract

Ascorbate (vitamin C) and menadione (vitamin K_3) mixture is known as powerful antioxidant with strong expressed cytotoxic effects for malignant cancer cells. Therapeutic effects of some cell lines is obvious, but the mechanism of action (ending apoptosis but not necrosis) is still not clear. Three-step reaction of reagents C and K_3 yields significant amount of H_2O_2 (hydrogen peroxide). This work is devoted to complex evolution analysis, when *in vitro* complex represents the associate of C and K_3 in aqua surrounding (pH <7). Intermolecular charge transfer was modelled according to quantum chemistry simulations.

Keywords: vitamin C, vitamin K_3, intermolecular charge transfer

1 Introduction

Tumor diseases represent the serious danger for human existence. The significant progress has been made in tumor diagnosis, surgical and preventive treatment. Big progress has been made in applying the principles of a healthy diet, but there is still a lot of unresolved problems. There are many types of cancer for which an effective treatment is absent, such as carcinoma, melanoma and others.

From middle of XX century, ascorbate (vitamin C) and menadione (vitamin K_3) mixture is known as powerful antioxidant with strong expressed cytotoxic effects for malignant cancer cells. Although the therapeutic effects of some cell lines is obvious, but the mechanism of action (ending apoptosis but not necrosis) is still not clear. Three-step reaction of reagents C and K_3 yields significant amount of H_2O_2 (hydrogen peroxide). Hydrogen peroxide acts selectively on cancer cells, causing them to oxidative stress in which the cancer cells are killed.

This work is devoted to complex evolution analysis, when *in vitro* complex represents the associate of C and K_3 in aqua surrounding (pH <7). Intermolecular charge transfer was modelled according to quantum chemistry simulations.

2 Quantum chemistry simulations

Computations were performed on resources at the High Performance Computing Center „HPC Sauletekis " in Faculty of Physics, Vilnius University. Ground state complex geometry optimisation was provided using *Gaussian09* package using B3LYP/6-31++G(d,p) method. Effects of aqueous solution (surrounding properties) were estimated using SCRF=(solvent=Water) routine. Electronic excitation and following intermolecular charge transfer (CT) was calculated using TD method for singlets only. Figure 1 and 2 represent the electronic charge redistribution for protonated complex of vitamin C an K_3 in aqua. Intermolecular charge transfers for C to K_3 and for H to K_3 respectively are significant initiators for following ascorbyl formation.

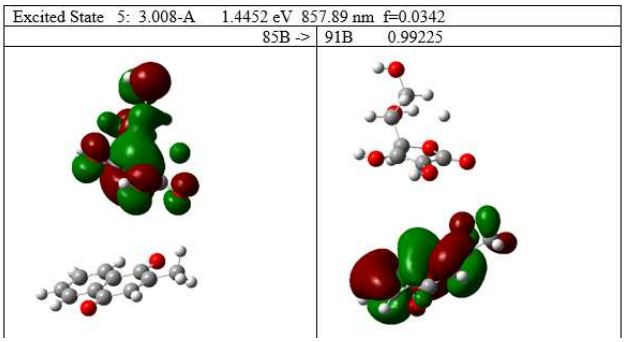


FIGURE 1 Protonated complex of vitamin C an K_3 in aqua. Intermolecular charge transfer from C to K_3

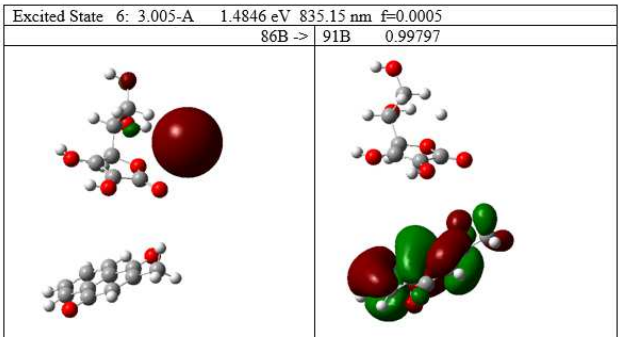


FIGURE 2 Protonated complex of vitamin C an K_3 in aqua. Intermolecular charge transfer from H^+ to K_3

Presented sandwich-type complexes differ from previous, described in Ref. [1] (the same complex without surrounding effect). Vitamin C is well known as a proton donor, and reaction profiles were studied by many researches [2-4]. Hydrophilic and/or hydrophobic character of surrounding must by accepted by analysing the proton-electron transfer mechanism and free radical formation. Otherwise, one-electron reduction of quinines by ascorbate [5] results formation of active forms of oxygen. Additional metal cations such as Na^+, K^+, Be^{2+}, Mg^{2+} are significant in CT formation according to Ref. [6].

3 Conclusion

Geometry of protonated structure was studied and presence of proton in vitamin C area was estimated as the significant of following charge transfer reaction. Localization of additional proton in K_3 area was estimated as negligible for CT.

Presence of proton in vitamin complex with aqua surrounding realizes the more energetically favorable situation for ascorbyl formation in comparison to non-protonated complex.

References

[1] Gruodis A, Galikova N, Šarka K, Saule R, Batiuškaitė D, Saulis G 2012 Mechanism of Intermolecular Electron Transfer in Bionanostructures *Nanodevices and Nanomaterials for Ecological Security. - NATO Science for Peace and Security Series. Series B: Physics and Biophysics. Ed. By Yuri N. Shunin and Arnold E. Kiv* ISBN 978-94-007-4121-8 (PB) – Springer: 2012 183-90

[2] Li P, Shen Z, Wang W, Ma Z, Bi S, Sun H, Bu Y 2010 The capture of H and OH radicals by vitamin C and implications for the new source for the formation of the anion free radical *Phys Chem Chem Phys* **12**(20) 5256-67

[3] Costanzo F 2007 Ab initio molecular dynamics study of ascorbic acid in aqueous solution *Molecular Physics, Taylor & Francis: STM, Behavioural Science and Public Health Titles* **105**(01) 17-23

[4] Reeshemah N A, Shukla M K, Demarcio Reed, Jerzy Leszczynski 2006 Ab Initio Study of the Structural Properties of Ascorbic Acid (Vitamin C) *International Journal of Quantum Chemistry* **106** 2934–43

[5] Roginsky V A, Barsukova T K, Stegmann H B 1999 Kinetics of redox interaction between substituted quinones and ascorbate under aerobic conditions *Chemico-Biological Interactions* **121** 177–97

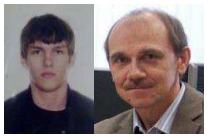
[6] Reeshemah N A, Shukla M K, Jerzy Leszczynski 2006 Ab initio insight on the interaction of ascorbate with Li^+, Na^+, K^+, Be^{2+}, Mg^{2+}, and Ca^{2+} metal cations *International Journal of Quantum Chemistry* **106**(11) 2366–7

Navigation system based on augmented reality for educational institution

V Lapatsky, V Gopejenko*

ISMA University, 1 Lomonosova Str., Bld. 6, Latvia

**Corresponding author's e*-mail: viktors.gopejenko@isma.lv



Abstract

Due to the rapid development of the electronic technologies the mobile devices become more powerful with and the speed of the wireless Internet increases each day. These two factors provide an ideal opportunity for the practical implementation of the new interesting technologies, one of which is augmented reality, commonly referred to as promising direction of the mobile devices development. Combining the extensive capabilities of mobile technologies and the Android operating system, it is possible to create new or to use existing software for navigation with augmented reality for Android

Key words: augmented reality, mobile devices, navigation

1 Introduction

Augmented Reality technology has a great potential in such areas as advertising, entertainment, navigation, etc. Mobile devices are now equipped with the cameras; this makes the mobile phone one of the most convenient platforms for the implementation of this technology. In addition, the majority of cell phones have additional built-in sensors such as accelerometers, magnetometers and GPS-receivers. Using these technologies and software, the mobile phone can be used as a navigator with augmented reality

In the case of mobile augmented reality, the users are looking at the direct image received from the video camera on their mobile device, and the real world is supplemented by the integrated 3D virtual objects (i.e. augmented reality as shown in Fig. 1.

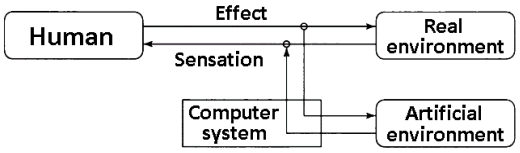


FIGURE 1 The scheme of the augmented reality environment

Markers are also an important element of the augmented reality; these are the points of the virtual world used to bind virtual objects to. Fig. 2 shows special marks that can be used as such makers [1].

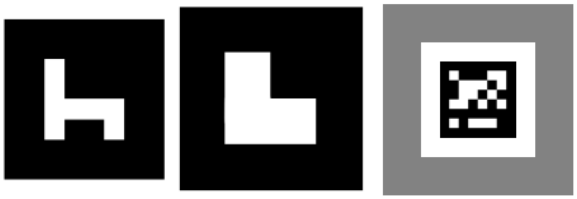


FIGURE 2 Marks (markers) of the augmented reality

The mark can contain any content from a very simple object such as a static model up to a complex presentation with animations and relations between virtual objects and additional text or sound information [1].

2 Overview

This work describes the possibilities of the navigation system with augmented reality for the mobile devices and its implementation as follows:

- An overview of the existing solutions
- The study of the requirements, methods, and algorithms of the given task
- The development of the software structure
- The development of the software prototype

3 Discussion

It is possible to create a navigation application for educational institution using the possibilities of the current mobile phone and augmented reality. Using the camera of the smartphone and markers installed in the certain points of the building this application should help the students to better orientate in the large educational institutions in order to find the necessary room or lecturer by providing the required information through the markers.

4 System design

The following modules are required for the functioning of the system under consideration:

1. Camera

A camera ensures that each image is recorded and transmitted to the tracker. The developer initialises the camera only in order to start or stop the recording. The

image is automatically converted to the device dependent format and specifies the desired image size.

2. Image converter

Format converter converts frames from the camera to a format compatible with the OpenGL ES rendering and for tracking. This conversion also includes the compression of the frame from the camera to a different resolution available in the converted frame stack.

3. Tracker

Tracker contains the algorithms of the computer vision in order to recognise and track the objects of the real world within the video camera. Different algorithms are used to recognise new targets, markers, and virtual button assessment basing on the images from the camera. The results are stored in the state of the object that stores a background visualisation video and that can be accessible from the code of the application. The tracker can load several sets of data simultaneously and activate them.

4. Background rendering

This visualisation module creates the image that is stored in the object. The performance of the video visualisation in the background mode is optimised for a given device.

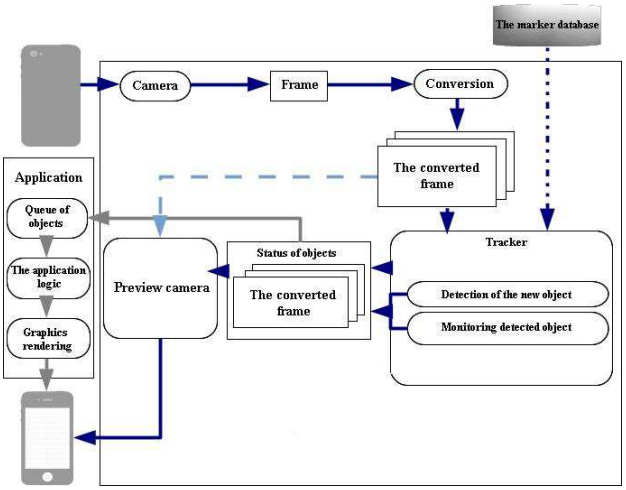
5. Application code

All modules mentioned above should be initialised in the code and three conditions should be met. The object is updated and rendering method is called for each processed frame.

It is necessary:

- To define the objects for the newly detected targets, makers, and updated conditions of these elements.
- To update the logic of the application with the new input data
- To render the layer of the augmented reality

The marker database in the device is created using the online processing of the given image highlighting special points and forming the special files that are used later to recognise the marker. It creates special XML configuration file and a binary file that contains the database for tracking. These files are added to the application installation package by the developer of the application and are used during the runtime.



5 Conclusion

The overview of the existing applications has showed the main trends in the augmented reality technologies development. These technologies are now being developed and can be used in the various fields.

The analysis of the applications has showed that currently they are mostly used either for entertainment or in very specific applications. The main focus of these applications is directed to the possibilities of their interactions with the environment and user. Taking this into account it is possible to conclude that the development of the navigation systems that interacts with virtual objects seems promising.

In order to develop a functioning system a quite powerful platform is required, which can be based on the mobile devices due to their wide prevalence and constantly growing capabilities, Android as well as iOS can be used as such platforms.

References

[1] Dopolnennaja real'nost' - novyj vzgljad na okruzhajushhij mir - http://www.kcc.ru/articles/dopolnennaya-realnost-novyy-vzglyad-na-okruzhayushchiy-mri/?sphrase_id=469

[2] How Augmented Reality Works - http://computer.howstuffworks.com/augmented-reality.htm

[3] Dopolnennaja real'nost' - https://geektimes.ru/hub/augmented_reality/

Navigation system based on the augmented reality on a cruise ship

V Jermakov, V Gopejenko*

ISMA University, 1 Lomonosova Str., Bld. 6, Latvia

**Corresponding author's e*-mail: viktors.gopejenko@isma.lv

Abstract

This work describes augmented reality and navigation systems, the examples of the existing systems (new models only), the urgency of the combining the augmented reality with the navigation systems.

Keywords: Augmented reality, navigation systems, virtual reality glasses

1 Introduction

For a long time, people need essential reference points in order to find their way home or to any other destination. People were determining the cardinal directions using the moss on the rocks and the trees, the sun, then the compasses were invented etc. Nowadays the smartphones come with the navigation systems. Every day, people are working on improving the navigation systems. People do not know of the limits as there is nothing ideal. The new ideas are generated as soon as it starts looking like there can be nothing better, people always want for something more.

The definition of augmented reality was first mentioned in 1960s [1], and the first person to create the virtual reality was Morton Heilig. Since then these technologies were developing slowly. However, in the recent years several different devices were announced, the most popular of them are Oculus Rift and HTC Vive. Microsoft has stated that Microsoft HoloLens announced in 2015 [2] is going to be better than Google Glass or Oculus Rift.

2 Discussion

Only a few companies are working on combining augmented reality with navigation systems. Right now it is possible to take a smartphone, open any application such as "maps" or "navigation" and continue towards the destination. Every day numerous traffic accidents happen that have different causes in the world. A person who uses the navigator while driving usually diverts the attention from the road in order to look for the directions. Of course there are voice overs that provide the directions, but unfortunately this is not effective in all of the cases. However, if a navigation system is created for Microsoft HoloLens it is going to be possible to drive to the destination without diverting the attention from the road, to drive without additional efforts along the "green" road in front of the car that was laid by the navigator. Similar devices are being developed by numerous large car manufacturers [3].

The usage of augmented reality can be very helpful on cruise liners [4], approximately of 8-10 story building size, accommodating several thousand people. It is not that easy to find a cabin there, not to mention to go anywhere without getting lost. The plans showing the current location are all over the ship, however, not all people can read this plan and understand where they need to go to get to their destination. Such applications for smartphones do not exist. In order to do this, it is necessary to create the navigation system with the augmented reality glasses. If these devices are combined it should not be difficult to find the way in the ship. This equipment should be user-friendly as children should also be capable of using it.

Augmented reality glasses with a built-in camera are required for this. The camera provides the real world image after the application is launched, the navigation system analyses the data and identifies the location by comparing the visual data from the camera with the preloaded plans of the ship. The plan is required as a reference point the same way as the map of the country or of the city. After the data processing the result is output to the screen of the augmented reality glasses. Augmented reality is going to draw the directions on the image received from the camera.

3 Conclusion

The technologies are being developed very fast. Augmented reality should significantly facilitate the life. People should not be afraid of something new but to make a step forward. It is possible that soon the new augmented reality glasses combined with the navigation system are going to be developed soon. This should help not only civil purposes but also to the military.

References

[1] Dopolnennaja real'nost' - http://futurosophy.com/technology/dopolnennaya-realnost
[2] Microsoft HoloLens - https://www.microsoft.com/microsoft-hololens/en-us/development-edition
[3] Razrabotki – http://motor.ru/articles/2015/11/13/augmentedreality/
[4] Kruiznye lajnery – http://ru.wikipedia.org/wiki/ Spisok_kruiznyh_sudov

3D modelling of the nanoprocesses

E Polikarpovs, V Gopejenko*

ISMA University, 1 Lomonosova Str., Bld. 6, Latvia

**Corresponding author's e*-mail: viktors.gopejenko@isma.lv

Abstract

The questions of the 3D visualisation of the physical processes have been considered in this work. The appropriate software has been chosen, computer modelling methods of the nanoprocesses have been proposed.

Keywords: Blender 3, Accelrys (DS ViewerPro), 3D modelling

1 Introduction

One of the main reasons for the usage of 3D models is a possibility of their application in the tasks of the visualisation and animation of physical processes. 3D modelling as a method of the scientific visualisation allows perceiving physical phenomena effectively. In comparison with the experiment computer modelling allows:

- getting dynamic illustrations of the physical experiments and phenomena, reproduce small details that often slip off during the observations of the real phenomena and experiments;
- visualising a simplified model of the natural phenomenon. It is possible to enable additional factors into consideration step by step making the model more complex and getting it closer to the real physical phenomenon;
- vary the time scale of the events;
- model the cases that it is hard or even impossible to reproduce in the physical experiments [1].

2 General

The process of the 3D project creation can be divided on several mandatory and subsequent stages:

1. Modelling – the creation of the objects that are going to be placed on the scene.
2. Texturing (usage of the materials) – defining the properties of the objects' surfaces in order to simulate different properties of real objects (colour, texture, transparency, brightness etc.).
3. Lighting – adding and placing the light sources in a way that is similar to how it is done in the theatre or in the shooting area.
4. Animation – the creation of the movement basing on the key frames.
5. Visualisation – the creation of the final image or animation.

3 Decision

3D modelling realisation method using Blender 3D and Accelrys (DS ViewerPro) visualisation software is considered.

Blender 3D is a software for the creation of the 3D computer graphics, animations and interactive applications. It is an open source application that is distributed free of charge and is supported by Blender Foundation www.blender.org.

Blender provides a wide range of tools for the creation of the 3D applications including modelling, animations, visualisation, post-processing of the videos, and creation of games.

Accelrys (DS ViewerPro) allows drawing and editing complex molecules, chemical reactions and biological sequences.

4 Conclusions

Software complex Blender+Accelrys (DS Viewer Pro) is proposed for usage in order to visualise Glucose oxidase implementation during the measurements of glucose levels.

References

[1] ISSN 0236-3933. Vestnik MGTU im. N.EH. Baumana. Ser. "Priborostroenie". 2012

Simulation of the generalized Wiener process

A Pashko*

Taras Shevchenko University of Kyiv, Glushkova Str. 4d, 03187 Kyiv, Ukraine

**Corresponding author's e*-mail: pashkoua@mail.ru

Abstract

This article analyzes the modeling methods of the generalized sub-Gaussian Wiener process. Modeling algorithms are based on the representation of generalized Wiener process in a series of random and stochastic integral. Number of components in the model is selected based on the accuracy of the simulation.

Keywords: simulation, generalized Wiener process, sub-Gaussian random model, accuracy and reliability of model

1 Introduction

Statistical models of Wiener Processes are used in many applications, such as the calculation of integrals for the Wiener process, the numerical solution of stochastic differential equations in problems of actuarial mathematics. In problems of statistical modeling to evaluate the accuracy of simulation, usually used the assessment points, assessment of weak convergence of distributions and assessment of accuracy and reliability in function spaces. As a model considered spectral representation of random processes in a random series and stochastic integrals.

2 Algorithms of statistical modeling

Let (T, B, μ) - be some measurable space.

Generalized Wiener process with parameter α, $\alpha \in (0,1)$ will be called a Gaussian random process $W_\alpha(t)$ with zero mean and correlation function

$$R_\alpha(t,s) = EW_\alpha(t)W_\alpha(s) = \frac{1}{2}\left(|t|^{2\alpha} + |s|^{2\alpha} - |t-s|^{2\alpha}\right).$$

Generalized Wiener process can be represented as a series [1]

$$W_\alpha(t) = \sum_{k=1}^{\infty}\left(a_k \sin(x_k t)\, X_k + b_k\left(1-\cos(y_k t)\right)Y_k\right), \qquad (1)$$

where

$\{X_k, Y_k\}$ - independent standard Gaussian random variables,

$\{x_k\}$ - real zero of Bessel functions $J_{-\alpha}(x)$,

$\{y_k\}$ - real zero of Bessel functions $J_{1-\alpha}(x)$,

$$a_k = \frac{\pi^\alpha\sqrt{2C}}{x_k^{\alpha+1}J_{1-\alpha}(x_k)},\ b_k = \frac{\pi^\alpha\sqrt{2C}}{y_k^{\alpha+1}J_{-\alpha}(y_k)},$$
$$C = \frac{\Gamma(2\alpha+1)\sin(\pi\alpha)}{\pi^{2\alpha+1}}.$$

The random process $W_\alpha(t), t \in [0,T]$ will be called strictly sub- Gaussian generalized Wiener process with Hurst index $\alpha \in (0,1)$ if $W_\alpha(t)$ such as $W_\alpha(0) = 0$, $EW_\alpha(t) = 0$ in the representation (1) the sequence $\{X_k, Y_k\}$ - independent sub centered strictly Gaussian random variables with $EX_k^2 = EY_k^2 = 1$.

The correlation function of this process will coincide with $R_\alpha(t,s) = \frac{1}{2}\left(|t|^{2\alpha} + |s|^{2\alpha} - |t-s|^{2\alpha}\right)$.

Let $\{X_k, Y_k\}$ - independent strictly sub-Gaussian random variables. Designate the approximate values a_k, b_k, x_k, y_k by $\breve{a}_k, \breve{b}_k, \breve{x}_k, \breve{y}_k$.

Let $|a_k - \breve{a}_k| \le h_k^a$, $|b_k - \breve{b}_k| \le h_k^b$, $|x_k - \breve{x}_k| \le h_k^x$, $|y_k - \breve{y}_k| \le h_k^y$. The process modeling as $\breve{S}_\alpha(t,M) = \sum_{k=1}^{M}\left(\breve{a}_k \sin(\breve{x}_k t)\, X_k + \breve{b}_k\left(1-\cos(\breve{y}_k t)\right)Y_k\right)$.

The modeling accuracy $\Delta(t)$ will be $\Delta(t) = W_\alpha(t) - \breve{S}_\alpha(t,M)$.

Wiener process with arbitrary index Hurst can be written as integrals

$$W_\alpha(t)=\frac{A}{\pi}\left(\int_0^\infty \frac{\cos(\lambda t)-1}{\lambda^{\frac{2\alpha+1}{2}}}d\xi(\lambda)-\int_0^\infty \frac{\sin(\lambda t)}{\lambda^{\frac{2\alpha+1}{2}}}d\eta(\lambda)\right), \quad (2)$$

where $\{\xi(\lambda),\eta(\lambda)\}$ - independent real standard Wiener processes, $E\xi(\lambda)=E\eta(\lambda)=0$ and $E(d\xi(\lambda))^2=E(d\eta(\lambda))^2=d\lambda$,

$$A^2=\left(\frac{2}{\pi}\int_0^\infty \frac{1-\cos(\lambda)}{\lambda^{2\alpha+1}}d\lambda\right)^{-1}.$$

The model is based on an algorithm.

Let $B_M: \ 0=\lambda_0\le\lambda_1...\le\lambda_M=\Lambda$ - a partition of the set $[0,\Lambda]$. The process simulation as

$$S_M(t,\Lambda)=\frac{A}{\sqrt{\pi}}\left(\sum_{i=1}^{M}\frac{\cos(\lambda_i t)-1}{\lambda_i^{\frac{2\alpha+1}{2}}}X_i-\sum_{i=1}^{M}\frac{\sin(\lambda_i t)}{\lambda_i^{\frac{2\alpha+1}{2}}}Y_i\right),$$

where $\{X_i,Y_i\}$ - independent sub-Gaussian random variables, $E\xi(\lambda)=E\eta(\lambda)=0$ and $E(d\xi(\lambda))^2=E(d\eta(\lambda))^2=d\lambda$.

The modeling accuracy $\Delta(t)$ will be $\Delta(t)=W_\alpha(t)-S_M(t,\Lambda)$.

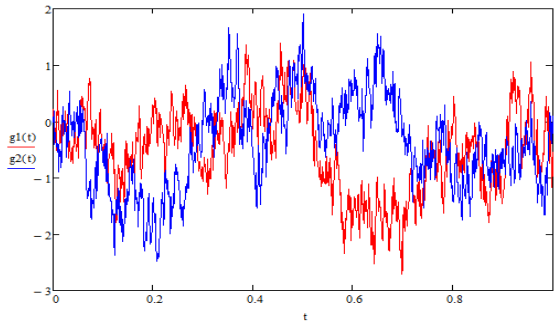


FIGURE 1 The implementation of the generalized Wiener process on model (1)

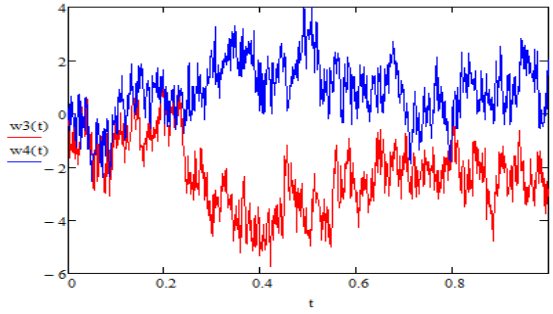


FIGURE 2 The implementation of the generalized Wiener process on model (2)

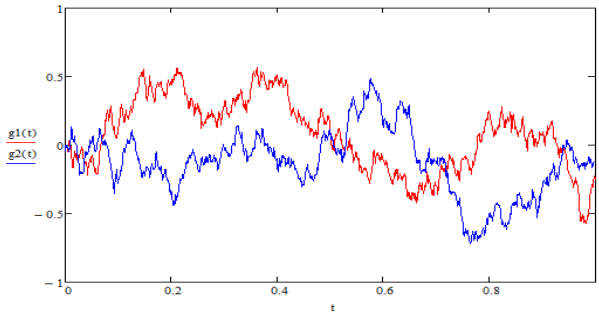


FIGURE 3 The implementation of the generalized Wiener process on model (1)

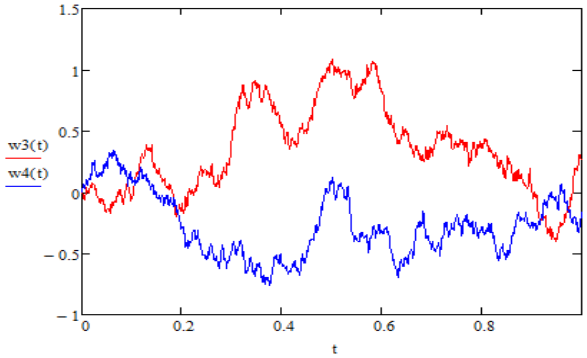


FIGURE 4 The implementation of the generalized Wiener process on model (2)

Figure 1 and Figure 2 shows the implementation of the generalized Wiener process for $\alpha=0.2$.

Figure 3 and Figure 4 shows the implementation of the generalized Wiener process for $\alpha=0.5$ (Standard Wiener process).

3 Conclusion

The behavior patterns received by model (1) and (2) the same. Therefore, any representation can be used for the simulation. Implementation of the model (1) requires the calculation of zeros of Bessel functions with the required accuracy. Model (2) more easy to implement, but it must be a compromise between the range and the number of terms in the model. Estimates for the accuracy and reliability of modeling Wiener process in various function spaces studied in [2-3].

References

[1] Dzhaparidze K, Zanten J 2010 A series expansion of fractional Brownian motion CWI. Probability, Networks and Algorithms R0216
[2] Pashko A 2014 Statistical simulation of the generalized Wiener process. Bulletin of Taras Shevchenko National University of Kyiv. Series Physics & Mathematics **2** 180-3
[3] Pashko A 2014 Simulations of standart Brownian motion. Computer modelling and new Technologies **18**(10) 516 – 21

Electronic tools for E-Justice in Bulgaria: E-Justice system in development

M Petrova

St Cyril and St Methodius University of Veliko Turnovo, Faculty of Mathematics and Informatics,
3 Arch. G. Kozarev Str., 5000 Veliko Turnovo, Bulgaria

*Corresponding author e-mail: mm_p@abv.bg

Abstract

E-governance is a policy priority for the Bulgarian government. It was listed as one of the ways to get out of the economic crisis, to reduce corruption, to reduce administration costs and increase its transparency. Judicial reform is unconditionally associated with one of the main elements of the concept of e-governance - the introduction of e-Justice. Allowing citizens to assert their their procedural rights in electronic form is a step forward in the development of the modern state apparatus and civil society. The practice of the Member States in the EU related to the e-justice includes the introduction of information and communication technologies in judicial proceedings in the administrative services of the courts and the provision of legal information and documents electronically.

Keywords: e-justice, e-government, Information system

1 Introduction

E-Justice is not a single act or a state of the judicial system - this is a process that involves a set of measures associated with the reorganization of the judicial system of using modern information technologies - legal, technical, organizational, financial and educational.

The European e-Justice must fulfill three basic functions in terms of access to information in the field of justice, electronic communication between the court and the parties concerned, and to simplify and promote the exchange of information between judicial authorities in the Member States. In view of this development and implementation of an information system of enforcement is crucial, not only the expected effect on the affected public relations internally, but also as a means of fulfilling the obligations imposed as a result of Bulgaria's membership in the EU.

According to the practice, the scope of e-justice includes:

- electronic access to court information and documents;
- electronic exchange of judicial information and electronic folders and documents;
- provision of administrative services by the courts electronically;
- conducting court proceedings electronically and electronic monitoring of convicted persons;
- international cooperation through information and communication technologies.

2 Exposition

On 7.04.2015, in the National Assembly was submitted a new bill amending the Law of the Judiciary and a new chapter was introduced - XVIII "a" on Verification statements and proceedings in electronic form and in art. 360 of the Act is assigned high priority level to the requirements for websites, electronic documents, electronic statements from the judicial authorities, electronic evidence, storage and access to electronic cases etc. [7].

1. Central web-based interface for publishing judicial acts

Central web-based interface for the publication of judicial decisions is available on the Internet at http://legalacts.justice.bg is integrated with the four systems for case management. Integration is built through the technology Windows Communication Foundation, for that purpose are created web services, through which the systems can transmit information to the portal.

2. Systems approved by the SJC

With decision from 2009, the Supreme Judicial Council approved the use of 5-information filing systems (Decision 27, Protocol 42 / 29.10.2009 from meeting of the SJC - http://www.vss.justice.bg/page/view/2395):

- Automated system for case management (ASCM);
- Judicial Administrative System (JAS) is used in ≈ 83% of the Bulgarian courts: 22 District courts (DC); 93 Regional courts (RC); 24 Administrative courts; 3 Military courts; 2 appeal courts; 1 Specialized criminal court.
- The system has a module for random distribution of cases, but 144 out of 146 courts do not use it.
- Court Case Management System (CCMS);
- Case Progress Management System (EMSG);
- Unified information system of the prosecution.

3. Programs for random distribution of cases

Currently the courts in the country work with three programs for random distribution of cases: 165 of them work with the program of the Supreme Judicial Council

"Law Choice", 2 with the program JAS CourtClerk of "Information Services" and 9 courts use the module of ASCM for random distribution of cases.

4. Electronic access to judicial information and administrative services through the website of the courts
5. E-Portal for remote electronic access to case files and documents for lawyers and involved parties

3 Results and challenges

1. Electronic tools used in the judicial system in Bulgaria

According to the European Commission report on the effectiveness of the judiciary in the period 2012-2014 the situation in Bulgaria is as follows (Scheme for evaluating judicial systems - 2012-2014 cycle of the European Commission for the Efficiency of Justice (CEPEJ):

Electronic tools used in the judicial system in Bulgaria:

Electronic database of the legislation	Financial information system
Electronic files	Electronic web forms
Electronic mails	Internet pages
Connection to Internet	Electronic registries
Systems for case filing	Court information management system

Used limited videoconferencing (videoconference is used limited - only on evidence in criminal proceedings)

Lack of options to:

- Tracking the progress of the case online
- E procedure for "small claims"
- E-procedure for recovery of claims
- Electronic submission of application
- Electronic communication with other agencies

2. Proposals to improve electronic access to e-justice

- National register of criminal records (electronic tool in the public interest to assist the exchange of information between institutions and at international level in criminal proceedings).
- Electronic submission and tracking of legal documents (complaints, warrants, etc.) - an online service for lawyers, judges and citizens (electronic tool useful for lawyers and citizens to exchange information between the institutions)
- Electronic archive, filing and availability of court cases (a tool for lawyers and citizens and the exchange of information between institutions)

Purpose of the tool is to improve archiving, filing and availability of court cases, thereby increasing the transparency and efficiency of the judiciary and provide guarantees on respect for rule of law and improve services to the public.

4 Conclusions

The problems with the application of information technologies in the judiciary and the work of the Bulgarian courts are expected to be solved: 1) by introducing unified and centralized software for management and distribution of cases in all courts (as is already provided in the new Draft of IDZSV of MJ); 2) by introducing a Unified central-based electronic portal for remote access to the court cases, administrative services and procedures (as is legally provided in the new Draft of ZIDZSV already being developed by the SJC; 3) by the implementation of e-justice and the relevant e-procedures and services from IDZSV of MJ [8].

Acknowledgment

The research is financed by Project „Developing a web portal of the electronic periodicals of University of Veliko Tarnovo "St. st. Cyril and Methodius", Bulgaria

References

[1] Access to Judicial report on "Access to Information Programme" with financial support of United States Agency for International Development USAID, Access to Information Programme Foundation, http://www.aip-bg.org [access 28.07.2015]
[2] Petrova M M, Dimitrov G G 2011 E-justice - the guarantee of an effective judicial system. Initiatives in Bulgaria REVISTA NAȚIONALĂ DE DREPT (Publicație periodică ştiințifico-practică), Universitatea de Stat din Moldova, Chisinau, Moldova, **10-11**(133-134) 169-73, ISSN 1811-0770
[3] Petrova M M, Nenkov N V 2015 Information models for assessing the maturity of the websites of the Judicial authorities in Bulgaria, Civitas, ISSN: 2217-4958, MMXV, N 9/ 2015, Fakultet za pravne i poslovne studije, Novi Sad, 139-54
[4] Markova T, Petrova M 2015 Information Systems for Automated Case Management in the Bulgarian Courts, Civitas, ISSN: 2217-4958, MMXV, N 9/ 2015, Fakultet za pravne i poslovne studije, Novi Sad, 125-39
[5] Nenkov N V, Petrova M 2015 Instruments and Criteria for Research and Analysis of the Internet Visibility of Bulgarian Judicial Institutions WEB-Space International Journal of Advanced Research in Artificial Intelligence (IJARAI) **4**(9) 6-10 http://dx.doi.org/10.14569/IJARAI.2015.040902 - See more at: http://thesai.org/Publications/ViewPaper?Volume=4&Issue=9&Code=IJARAI&SerialNo=2#sthash.MdG4yt79.dpuf
[6] http://legalacts.justice.bg/
[7] http://iovn.is-vn.bg
[8] http://www.justice.government.bg/15/, Draft Law amending the Law on the Judiciary

The future of preservation and rejunovation of cultural heritage

N Karatun, A Brolisha*

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019 Riga, Latvia

*Corresponding author's e-mail: abrolisha@gmail.com

Abstract

Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation. Culture can give people a connection to certain social values, beliefs, religions and customs. It allows them to identify with others of similar mindsets and backgrounds. Cultural heritage can provide an automatic sense of unity and belonging within a group and allows us to better understand previous generations and the history of where we come from, therefore it is important to preserve it and keep it for future generations.

Keywords: Museum, Cultural heritage,

1 Introduction

On June 15, 1985, at The State Hermitage Museum of Leningrad (now St. Petersburg) in front of a group of tourists Bronius Maigis, later judged by the court to be insane, threw sulfuric acid and cut the canvas of Rembrandt's "Danaë". The painting, created in 1636 by the most celebrated Dutch painter, was feared lost forever. After 12 years of restoration works the painting once again took its place in exhibition, however now kept under reinforced glass.

Automation of accounting of museum collections is an integral and topical part of the conservation of cultural heritage.

2 Key problems

There are many serious threats to cultural heritage, the first being the natural process of deterioration - acidity of paper, the copper corrosion of miniatures, the chemical burning of leather, the shrinkage of overheated parchment, the disintegration of red silk or the yellowed varnish of paintings.

Next to the inevitable natural causes of decay are natural hazards. The consequences of the tsunami in Asia in 2004, the Katrina hurricane during the 2005 Atlantic season and the earthquake in northern Pakistan just before the severe winter of 2005/2006, were first of all horrifying because of the huge loss of human lives, but at the same time left entire regions devoid of libraries, archives and museums.

Those threats are followed by manmade disasters, such as vandalism, war, theft, terrorism, civil dispute.

The Islamic State (IS) has destroyed much of the cultural heritage in the areas it controls in Iraq. At least 28 religious buildings have been looted and destroyed, including Shiite mosques, tombs, shrines and churches. In addition, numerous ancient and medieval sites and artifacts, including the ancient cities of Nimrud and Hatra, parts of the wall of Nineveh, the ruins of Bash Tapia Castle and Dair Mar Elia, and artifacts from the Mosul Museum were also destroyed.

3 Data bases

Automated systems of the accounting of collections – it's an instrument of reserving and using electronic information about the objects of cultural heritage. The goal of saving the electronic information:

- Ensuring long-term availability of digital materials, that preserve all functional and significant characteristics of their parent materials
- Ensuring possibility of search and use of those digital materials

The British museum has an online collection of its exhibitions at (www.britishmuseum.org). This database is an inventory of the Museum's collection and aims to record what is known about it. It is primarily designed to support curatorial and research work, and much of the text is specialised in nature and terminology.

4 3D printing

The use of 3D scanning technologies allows the replication of real objects without the use of moulding techniques that in many cases can be more expensive, more difficult, or too invasive to be performed, particularly for precious or delicate cultural heritage artifactswhere direct contact with the moulding substances could harm the original object's surface.

In the last several years 3D printing has been intensively used by in the cultural heritage field for preservation, restoration and dissemination purposes.

The Metropolitan Museum of Art and the British Museum have started using their 3D printers to create museum souvenirs that are available in the museum shops. Other museums, like the National Museum of Military History and Varna Historical Museum, have gone further

and sell through the online platform Threeding digital models of their artifacts in 3D printing friendly file format, which everyone can 3D print at home.

5 Risks and solutions

Though the law is unclear regarding copyright protection afforded to museum collection images, many museum policies and licenses encumber the use of art images with contractual terms and license restrictions often aimed at raising revenue or protecting the integrity of the art.

It's highly possible that museums can best ensure that shared cultural heritage is understood in a thoughtful and informed historical context by freeing their images.

The same goes about 3D printing, because even though it's possible to download some museum collection items or make the model in a computer program, it might be illegal to print it out.

Also the fact, that taking into account the electricity and material costs of running a 3D printer, churning out ones own desktop statuette of Amenhotep III at home might actually cost more than buying a replica in the museum giftshop, has to be noted.

References

[1] http://russiapedia.rt.com/on-this-day/june-15/ (viewed 07.03.2016.)
[2] Thornhill T 2015 ISIS continues its desecration of the Middle East: Islamic State reduces Sufi shrines in Libya to rubble in latest act of mindless destruction Daily Mail (retrieved 12.03.2015.)
[3] http://www.culture-and-development.info/issues/conflict.htm (viewed 07.03.2016.)
[4] Cignoni P, Scopigno R 2008 Sampled 3D models for CH applications Journal on Computing and Cultural Heritage
[5] http://www.britishmuseum.org/research/collection_online/about_the_database.aspx (viewed 07.03.2015.)
[6] https://en.wikipedia.org/wiki/3D_printing#Art (viewed 07.03.2015.)
[7] Scopigno R, Cignoni P, Pietroni N, Callieri M, Dellepiane M 2015 Digital Fabrication Techniques for Cultural Heritage: A Survey
[8] http://www.independent.co.uk/life-style/gadgets-and-tech/british-museum-releases-scans-of-artefacts-to-let-you-3d-print-your-own-museum-at-home-9837654.html (viewed 07.03.2015.)
[9] https://en.wikipedia.org/wiki/3D_printing#Art (viewed 07.03.2015.)
[10] http://www.cultureindevelopment.nl/cultural_heritage/what_is_cultural_heritage (viewed 07.03.2015.)

"Virāža - Z" branding

N Karatun, I Krumina*

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019 Riga, Latvia

*Corresponding author's e-mail: i.krumina92@gmail.com

Abstract

Nowadays, no company is able to function normally without the World Wide Web and its tools. Properly designed website means first and foremost - recognition, because without computers and mobile devices nowadays, nothing can happen. Through the Internet we can not only present our associations, but also show the next events, the results of the them and take pictures, and what is not less important - always keeping contact with the site visitors.

Keywords: Brand Book, branding, "Virāža-Z", logo.

1 Introduction

Branding has become one of the most important aspects of business strategy. Yet it is also one of the most misunderstood. Branding is sometimes considered to be merely an advertising function. And many managers and business writers hold the view that branding is about the management of product image, a supplementary task that can be isolated from the main business of product management.

2 Roles and functions of branding.

A Brand Book (also commonly referred to as a "brand guidelines," "brand standards," or a "style guide") is essentially a set of rules that explain how your brand works. These guidelines typically include basic information such as:

- An overview of your brand's history, vision, personality and key values.
- Logo set-up specifications — including tagline usage.
- Visual examples of your correct and incorrect logo treatments.
- Color palette.
- Type style(s).
- Business card and letterhead design [1].

A brand serves as an unmistakable and recongnizable symbol for products and services. It functions as the "business card" a company proffers on the competitive scene to set itself apart from the rest. In addition to differentiating in this way, a brand conveys to consumers, shareholders, stakeholders, society and the world at large all the values and attitudes embodied in a product or company. A brand fulfills key functions for consumers and companies alike.

The functions of a brand for consumers:

- Brands play a role in terms of communication and identification. They offer guidance, convey an expectation of quality and so offer help and support to those making purchase decisions. Brands make it easier for consumers to interpret and digest information on products.
- The perceived purchasing risk is thus minimized, which in turn helps cultivate a trust-based relationship.
- A brand can also serve as a social business card, expressing membership in a certain group. Premium brands, for instance, can even engender a sense of distinction and prestige.
- Consuming certain brands is also a means of communicating certain values. By opting for particular brands, a consumer demonstrates that he or she embraces particular values; the brand becomes a tool of identity formation [2].

3 "Virāža-Z" logo.

Logotype structure - it is a structure that reflects their nature and purpose. Logotype composition determines how elements behave towards each other: colors, letters, models, graphics parts.

The two main requirements for any logo - it is a recognition (easy to memorize and subsequent recognition) and originality. At the same time, the logo should be simple, without any unnecessary elements. The essential parts of logo design are:

1. Originality and individuality. From the first glance at the logo the consumer should clearly understand what company it is about.

2. External attractiveness. For the corporate identity not to be lost and perished in the background, the logo must have an interesting and attractive appearance - it will immediately attract the attention of potential customers, and only bring them positive emotions. And you can check it out if you hold a survey among potential customers to the company - among the target audience.

3. Good readability. A Logo must be clear and legible - it is important to make sure if it is applied in letters or souvenirs with the company logo, by fax, it is not disturbing and it

remains clear, recognizable and is attractive as a model.

4. The ability to create the right image. A Logo must be clear and appealing to potential clients - that looking at it any user can guess the main features of the organization and its activities.

Society "Virāža - Z" logotype is shown.

FIGURE 1 "Virāža - Z" logo

In the logotype the following items were chosen:

- the Finish flag - black and white checkered flag, it is used to indicate that the participant has taken down the length of the distance [3]. It is one of the elements of the race;
- wings - are associated with the speed and freedom. It is displayed in many motoring club flags;
- tires - association dealing with auto-moto sport, known that the vehicles are moving with the help of tires;
- metal – showing the car technique;
- name of the Society - auto-moto tracks one of the parts of the track are Virāža and the letter "Z" is because the society is a place called Zana, it brings the name "Virāža - Z".

4 Corporate identity guides

Creating brand standards that people will not break is a difficult task, but it becomes infinitely more difficult when you have nothing to compare it to. The truly great brand guides do one thing above all else, and that is inform. Your guide's most basic job is to teach everyone who sees it – whether it is an employee, a member of the media, or a graphic designer – what your brand is and how to effectively implement it. This can be done in a variety of ways, but it all comes back to what information your audience looks for in brand standards. Without a great brand, companies are faceless, lifeless entities. Brands take the heartless, faceless corporation and give it a personality. Make that personality evident in the identity guide [4].

Among various forms of advertising, advertisement printing has the most important role. It is one of the most important advertisement types. It can be seen on billboards, shop windows and on the office walls. Qualitatively made poster with original design can even become and interior decor in any room.

A business card is an essential attribute in business communication. A business card is a kind of identity card and usually includes: the name, contact number, e-mail address of the person belonging to any company or organization.

Poster-making is a very creative process that allows you to communicate with a wide audience using a limited amount of text and number of images. A Poster is able to provide important information in a very simplified manner, which is especially important in the field of advertising. [5]

The poster should be:

1. Easy to read.
2. Simple and easily understandable.
3. Have an attractive design [6].

Form sheet paper is usually the size A4, which publishes information about the company, which includes:

1. The company name,
2. The logo (if available)
3. Contact information (address, phone, e-mail, and website (if available).

Forms are products, which very often says a lot about the company. Today, print forms with company logos, are one of the most requested after printing services.

5 Conclusions

Branding is one of the most powerful tools in the marketing arsenal. So brandishing this tool comes with a responsibility to use it ethically. Firms use branding in an imperialist manner, feeding on consumers' base desires while ignoring issues of social welfare. Branding is a form of rhetoric—an instrument to persuade people to think differently. Branding can create considerable value. But it can also be used in an exploitative manner. A logo is the face and signature of the brand. It connects the brand to all forms of communication. The more consistent a logo looks and is used – the more likely it will be remembered and make an impact.

References

[1] Why your business needs a brand book: http://brandmakernews.com/top-stories/7209/why-your-business-needs-a-brand-book.html
[2] The functions of a Brand:
[3] http://www.brandxpress.net/2005/09/the-functions-of-a-brand/
[4] Nolikums par karogiem autokrosa un rallijkrosa:
[5] http://www.laf.lv/laf/wp-content/uploads/2010/08/Nolikums-par-karogiem.pdf
[6] Examples: What do great brand identity guidelines look like: https://milesherndon.com/blog/brand-identity-guidelines-examples
[7] Kā izstrādāt pamanāmu vizītkartes dizainu:
[8] http://sem.lv/lv/08-blogs/item/356-k%C4%81-izstr%C4%81d%C4%81t-paman%C4%81mu-viz%C4%ABtkartes-dizainu
[9] Plakātu dizaina veidošana:
[10] http://www.raksti.attika.lv/index.php?read=25&Plak%C4%81tu+dizaina+veido%C5%A1ana

Modernization of payment card data management system in bank "Skynet"

I Stefanišina, A Mrochko

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019 Riga, Latvia

Corresponding author's e-mail: aleksandrs.mrocko@isma.lv

Abstract

Company "Skynet" is one of the top universal banks in Latvia and provides its customers, both legal entities and private individuals, with competitive financial solutions as well as high quality services within its extensive branch network. One of main products of universal bank is payment cards. Processes of issuing and acquiring payment cards are very complex and require well managed information systems to organize them. This work analyzes payment card data management system "Internal Card Office", its functions and role in company's everyday processes, modernization options and tools.

Keywords: payment card industry, information security, data security standard, information systems.

1 Introduction

Payment card industry is growing every day. More and more purchases are paid by payment card. Therefore, banks and involved companies have to take care about large amount of transactions (Figure 1) [1].

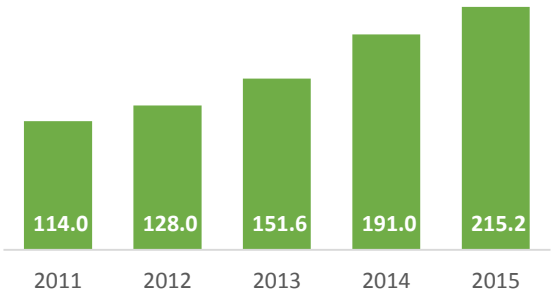


FIGURE 1 Card payments (volume – millions)

Some of processes are performed manually, e.g. investigation of errors and reclamations, and it is important to have information systems that provide needed functionality and information in comfortable way for company to perform its operations as effective as possible.

Internal Card Office system is an in-house solution to provide employees easier access to information about payment cards of clients. It helps employees to perform daily actions in quick and easy manner as system collects data from different sources and displays them in one web interface. Also it provides several database manipulation options which otherwise would be available only with direct access to database, for example, blocking and unblocking of payment cards. System allows company to provide better services for clients - when card search and blocking processes are simplified, client is served with quicker response on his requests and questions, so he can feel that his time and safety is a value for the company. Internal Card Office was developed in 1999 and therefore some of its functions are not effective or even needed anymore, but there is need for new functions.

Another important reason to review update of Internal Card Office is company's wish to be compliant with Payment Card Industry Data Security Standards (PCI DSS) and Payment Application Data Security Standard (PA DSS). The possible breach or theft of cardholder data affects the entire payment card ecosystem. Customers can lose trust in merchants or financial institutions, their credit can be negatively affected. Merchants and financial institutions can lose credibility (and in turn, business), they are also subject to numerous financial liabilities.

2 Overview

There are several options of dealing with outdated information systems. Company can search for entirely new solution in the market, update the system, rework it or even consider options about giving up the system at all.

As Internal Card Office was developed for internal needs and is working in synergy with other in-house solutions, it is close to impossible to find fitting product in the market without redesigning the architecture of other systems in company. Most of solutions that are available in market offer needed functionality, but it is often spread between several modules of information systems. In this kind of option there would be need to change business and operation flows in company, because, either each involved employee should have access to all needed modules of systems, to perform all functions, either business process flows should be designed so, that different functions are performed by different users and/or units. Also new information system in company will require training of

users. "Skynet" has more than 800 employees so trainings can be very time and money consuming.

3 Decision

To avoid risks and solve possible issues caused by Internal Card Office being an outdated system, it will be modernized by using internal IT resources. System is written mainly in C which generates HTML pages. It uses MySQL database and Apache web server. Some functions which were developed later are created in PHP. Modernization includes:

- Revision of unneeded functions, development of new ones
- Modifications to make sure system is compliant with PCI DSS and PA DSS
- Redesign of WEB interface
- Creation of documentation for users and administrators

4 Conclusions

Information systems should serve company's needs not otherwise. So modernization of Internal Card Office is necessary to provide better user experience and information security.

References

[1] Latvia's payment statistics https://www.bank.lv/en/statistics/payment-systems-statistics/latvia-s-payment-statistics

Design of an information system for a metal-processing company

M Neroba, A Mrochko

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019 Riga, Latvia

Corresponding author's e-mail: aleksandrs.mrocko@isma.lv

Abstract

The Information system (IS) is the basis of effective management for any economical objects. The development of globalization processes, the random nature of changes in the indices, which characterize the external and internal business environment, forces the entrepreneurs to engage in active improvement of the enterprise information system. Analysis of the existing IS and substantiation of its development strategy is an important task for any company, including production and manufacturing companies.

Keywords: economic information system, company's customer base, data consolidation, decomposition of business processes.

1 General

The company SIA Severstal Distribution is one of thelargest industrial facilities-exporters from Latvia and is in the TOP 20 companies in the country byevaluating many indicators.

The client base of the company today includes more than 2 000 customers, located in 15 countries of the European Union. Sales in 2015 amounted to 537 000 tons, which is by 24% more than in year 2014. The share of products produced at the steel service center of Riga, accounted for 30% of sales.

Daily, the informational and analytical work of the company faces a number of difficulties, associated with obtaining and consolidation data.

The main feature of the information flows in the company is the large number of sources of information with unstructured data presented in different formats. For example such as tables in MS Excel, MS Access databases, information sent from SAP into XML and others.

Analysis of the information support for business processes in the production facility possessing company SIA Severstal Distribution identified a number of shortcomings in the existing operating corporal information system:

- leak of scalability for the tasks of a developing business;
- fragmentation does not allow to form a consolidated picture displaying the company's activities;
- the lack of operativeness in obtaining and processing information, which reduces the efficiency of logistic solutions and business planning.

2 Possible solutions to the problem

There are several variants of solutions for information support of the company, regarding the current situation [1, 2]:

- further development of the existing system Epicor iScala, adjusting under the current processes in the enterprise;
- the acquisition of a new information system from another provider (e.g.: SAP / Oracle / Microsoft), that as much as possible satisfies the needs and requirements of an industrial enterprise;
- design, development and implementation of an own enterprise information system.

3 Proposals for solving the problem

The ability to make justified choices on the development standards for the corporal information system provides the creation of a developed model of IS, which is based on the business objectives and goals of the company [3].

The model of the corporal IS allows to determine the main components of the project:

- defining the objectives of the introduction / modification;
- decomposition of the implementation / modification purposes;
- a survey of business processes and business diagnostics / decomposition of business processes;
- analysis of the existing corporal IS;
- defining the further development strategy of the information infrastructure;
- formulation of automation tasks;
- determining the availability of resources for implementing the model;
- formation of the team performing IS design;
- formulation of requirements for IS and component suppliers;
- selection of the most suitable products and suppliers.

4 Conclusions

The existing corporal Information System in Severstal Distribution does not satisfy the needs and requirementsof a modern information system for managing a production facility.

Development of a business model and carried out analysis of the existing Information Support of the company's activities allows to articulate the requirements for the information system and generate its functional description.

References

[1] Смирнов Г Н 2001 *Проектирование экономических информационных систем* М.: Финансы и статистика
[2] Коцюба И Ю, Чунаев А В, Шиков А Н 2015 *Основы проектирования информационных систем. Учебное пособие* СПб: Университет ИТМО 206
[3] Советов Б Я, Яковлев С А 1999 *Моделирование систем. Учебник для ВУЗов* М.: Высшая школа 319

Group and phase velocity demonstration model

J Roberts-Kalnins

Ventspils University College, Latvia

Corresponding author's e-mail: simts@latnet.lv

Abstract

A simple model to demonstrate the essence of group and phase velocity concept was created in VensimPLE*. Model allows to change wave parameters and to deepen the understanding of the difference between phase and group velocity.

Keywords: model, group velocity

1 Introduction

A simple demonstration model, which clarifies the concept of group and phase concepts what is important in the electronic bachelor course Electromagnetic fields and Waves was created.

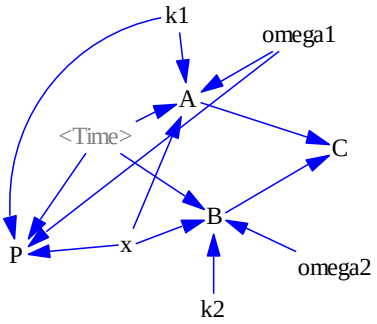


FIGURE 1 Vensim model scheme

Corresponding equations are:
A=SIN(omega1*Time-k1*2*x),
A=SIN(omega2*Time-k2*2*x),
C=A+B
P=2*IFTHENELSE(1/2*omega1*Time-k1*x>0:AND:1/2*omega1*Time-k1*x<0.2 , 1 , 0)

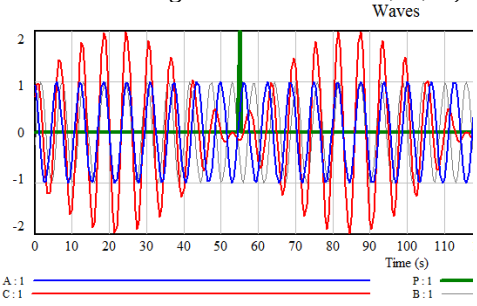


FIGURE 2 Wave dynamic picture. Separated pike is connected with one wave phase

Parameter x is presented by slider moving which we get dynamical wave picture. By choosing different k2 values (close to k1) we can demonstrate different ratio of phase and group velocity ratio. During the modulation students add third wave in Vensim model and more pronounced difference between phase and group velocities can be seen.

By using Vensim model we can stress the difference between the phase and the group velocity is the case of electromagnetic waves propagating through a waveguide. We observed see wave constant phase travelling along the coast line (video demonstration) and explain by the next graph.

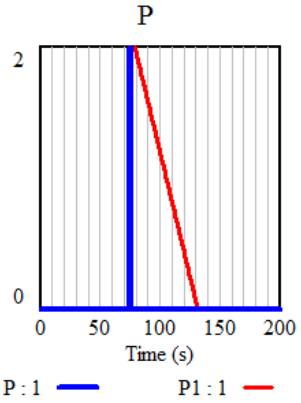


FIGURE 3 See wave travelling. Vertical moving line is wave front, inclined ine - a stedy coast line

The slope is changeable and so we can show the arbitrary phase velocity growth..

2 Conclusion

The concept of phase and group velocity may be successfully explained by using VensimPLE program. The possibility to build different interactive models in Vensim is also demonstrated see [1].

References

[1] Kalnins J R, Hilkevica G, Vitola E 2008 *Matemātiskā modelēšana* Ventspils

Development of IT infrastructure for hosting services company

A Karvelis, A Mrochko

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019 Riga, Latvia

Corresponding author's e-mail: aleksandrs.mrocko@isma.lv

Abstract

Nowadays, there are lots of different companies and almost every successful company need a web page in the Internet to represent information to potential customers from around the globe about itself, company's products and services. Web pages are not limited only to business card web sites, product or service description and advertisement sites, web pages are also a multimedia, government, banking, communication portals etc. Web pages are stored on web servers and web servers are held in data centres of hosting companies. Internet hosting is service that allows to access hosted web sites from anywhere in the world 24 hours a day, 7 days a week and 365 days per year.

Keywords: web, Internet, servers, hosting.

1 General

Idea is to investigate and develop a company that will be providing a variety of Information Technology solutions and services, not only to big organisations and customers but also to the end users.

The company's core business target is focused on the customer servicing package agreement, what means a subscription to guarantee the security, software and appliances for productive activity of customer's infrastructure. For example, if the customer will be using one IT service of described company, other services will be offered to customer to provide complex outsourcing solutions, signing a contract for a fixed period of time and minimizing cost of customers infrastructure fee and spent time on support by that.

The modern world is based on information technologies, if this company will be successful and will be able to offer high-quality IT solutions to market, then there is a very good chance to gain profit as it is main motivation for any company or start-up [1, 2, 3].

Described company will provide complex IT solutions like:

- web hosting;
- mail hosting;
- web design;
- information technology outsourcing;
- implementation of network and server infrastructures;
- e-commerce;
- and other services;

To be analysed and described:

- web hosting problems in Latvia, future tendency and analysis of possible concurrence;
- detailed description of hosting types;
- OS, services and hosting control panel comparison;
- plan and financial calculations;
- security questions and aspects, failover and load balance;
- automatization of server administration;
- server load tests, page load tests;
- future company development, cooperation.

2 Conclusions

Main IT infrastructure for described company must be implemented web page developed, advertisement made. Companies business strategy is effective, advantageous, simple to implement and competitive.

References

[1] Burnham C 2001 Web Hosting, a complete strategy for delivering high-quality Web hosting services Publisher: McGraw-Hill/OsborneMedia

[2] Kaye D 2001 Strategies for Web Hosting and Managed Services Wiley

[3] Pedersen A 2006 Web Host Manager. Administration Guide. Packt Publishing

Approaches to registration and processing laser ray reflection data in seismic monitoring of city buildings

S Bratarchuk[1*], Z Potilicina[2]

[1]Institute of Aeronautics, Riga Technical University, Lomonosova st. 1A, k-1, Riga, LV-1003, Latvia

[2] *SIA "Progmeistars", Pulkveža Brieža 6*-1, Riga, LV-1010, Latvia

**Corresponding author's e*-mail: sergey.bratarchuk@gmail.com

Abstract

Seismic monitoring of buildings is important to avoid collapses, especially in old cities or in cities that are located in the areas of high seismic activity, where the probability of collision is the highest. During the research, vibration data acquisition system that gets vibration data from building reflective surface was made. The main result is creation of working physical data recording prototype and vibration data processing software that is based on computer vision methods. Because of the simple and convenient structure, any researcher can use the created acquisition and processing systems to develop city infrastructure or for their own needs..

Keywords: seismic monitoring, elastic waves, reflective surfaces, computer vision

1 General

The main goal of this study is to: improve seismic process analysis methology. Getting seismic data sometimes is vital; it is possible to save a lot of lives, by predicting mudslides, volcanic eruptions and collapse of buildings with the help of seismic data received. Despite the high level of development of modern seismological equipment, such as: accelerometers, geophones and seismometers, they have common problems which complicate their use, [1] for example: device price, device usage complexity and device limits.

We show that by using irregural-shaped light spot coordinates from the video stream, it is possible without the mechanical contact with the object of the research to get the seismic waveform. Light spot position can be captured, despite the fact that the spot does not have the convex edges (Figure 1), and in every frame the shape of the spot can be different. The produced data acquisition and data processing systems can be used in seismic experiments, by getting data without mechanical contact with an object.

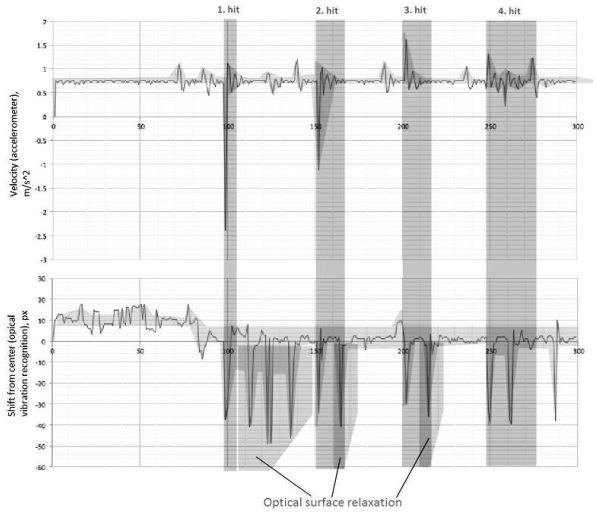


FIGURE 1 Verification of optical vibration recognition with using piezo accelerometer

References

[2] Cornet F H 2015 Elements of Crustal Geomechanics Padstow: TJ International

[3] Kroto H W, Fischer J E, Cox D E 1993 The Fullerenes Pergamon: Oxford

Projection network for systems of differential equations

A N Kovantsov

Riga Technical University, Riga, LV-1658, *Kaļķu iela 1, Latvia*

Corresponding author's e-mail:akovancova@baltinet.lv

Abstract

To solve the system of differential equations much easier if it reset. One method is a method of simplifying the system dividing the system into blocks, each of which - has its own autonomous system functions. The number of functions in each block is smaller than the original system. However, the geometry of the system dividing the block has not been investigated. It turned out that the reduction of the system is equivalent to the block form the construction of special systems of projection on a plane and in space. Such networks are transport networks.

1 General

Given a Euclidean space E_n. Let all points of the space are $M\left(y^i\right)$, where y^i - values of the unknown functions of the system of differential equations $\frac{dy^i}{dt} = f^i\left(y^j\right)$. Sets the non-linear transformation of the space E_n : $z^i = \overleftarrow{F^i}\left(y^j\right)$. We construct two degenerate conversion P_1 and P_2 :

$P_1 : z^{i^1} = \overline{F^{i_1}}\left(y^j\right)\ ,z^{i_2} = \varphi^{i_2}\ \overline{F(}\left(y^j\right)$,

$P_2 : z^{i_1} = \varphi^{i_1}\ \overline{F}^{i_2}\left(y^j\right)\ ,z^{i_2} = \overline{F^{i_2}}\left(y^j\right)$.

Each of these transformations transforms the space into two surfaces σ_1 and σ_2. Of the degenerate transformation coefficients P_1 and P_2 construct two degenerate matrix

$$P_1 = \left(\frac{\partial F^{i_1}}{\partial z^i}, \frac{\partial \varphi^{i_2}}{\partial F^{i_1}} \frac{\partial F^{i_1}}{\partial z^i}\right),\ P_2 = \left(\frac{\partial \varphi^{i_1}}{\partial F^{i_2}}, \frac{\partial F^{i_2}}{\partial z^i} \frac{\partial F^{i_2}}{\partial z^i}\right)$$

By requiring that these matrices are projectors, we get completely integrated system of equations for the transformation function F^{i_1} and F^{i_2}.

These functions define two surfaces in space, and in the event of complete splitting of the system - a network of surfaces, which is a transport network. In such networks, we can easily calculate the first quadratic form.

Theorem. Setting transport network uniquely defines as the original system of equations, and a split system.

References

[1] Kovantsov A 2015 Linear and nonlinear Projectors are in Project space The 13th International Scientific Conference Information Technologies and Management, Riga, Latvia

[2] Kovantsov A 2014 Geometry Splitting of Nonlinear Systems of Differential Equations into Blocks The 12th International Scientific Conference Information Technologies and Management, Riga, Latvia

Comparative analysis of simulators for neural networks Jooneand NeuroPh

E Zdravkova*, N Nenkov*

Faculty of Mathematics and Informatics, University of Shumen *"Episkop* Konstantin *Preslavsky"* 115, Universitetska St., Shumen 9712, Bulgaria

**Corresponding author's e*-mail: elitca_spasova@abv.bg, naydenv@shu-bg.net

Abstract

This paper describes a comparative analysis of two simulator neural networks - Joone and NeuroPh. Both simulators are object-oriented and java - based. The analysis seeks to show how much these two simulators are similar and how different in their characteristics, what neural networks is suitable to be made through them, what are their advantages and disadvantages, how they can be used interchangeably to give certain desired result . For the purpose of comparative analysis of both the simulator will be realized logic function, which is not among the standard, and relatively complex and is selected as a combination of several standard logical operations.

Keywords: neural network, neural network simulator, logical function, exclusive OR, neural network architecture

1 Introduction

Both the simulator selected for the study are Java - based and object - oriented simulators. The used simulators are Joone 4.5.2 and NeuroPh 2.92. Joone is object - oriented frameworks allows to build different types of neural networks. It is built on combining elements which can also be expanded to build new training algorithms and architectures for neural networks. The components are interchangeable with programming code modules that connect to be performed on the data stream and be deriving obtained information and relevant results. New components that the user adds, can be planned and again. Beyond simulation, Joone has opportunities for multiplatform deployment. Joone has a graphical editor for graphically deployment and testing of each neural network, and the teaching and testing of many examples, the network is configured and can be trained even from multiple remote machines. As of 2010 Joone, NeuroPh and Encog are main component - based environments for neural networks of java - platforms. [1, 2]

NeuroPh is lightweight frameworks allowed to simulate neural networks. It is java - based and can be use basic for the development of standard types of neural network architectures. It contains well designed open source library and a small number of core classes that correspond to basic concepts in neural networks. There is a good graphics editor toquickly build java - based components of neural networks [3].

2 Methodology

To be tested and analyzed both the simulator will realize logical function, and, which is relatively complex and is not among the standard. The generated neural network calculate the result of the following logical function:

((((A XOR B) AND C) OR D) → ((((E XOR F) AND G) OR H)) ↓ I)) AND (((J XOR K)↓(L XOR M)) OR (N ↓O))

First we will make the realization of simulator neural networks Joone.

The neural network is built by JOONE 4.5.2.0.

Contains: an input layer - Input - 15 neurons,

4 hidden layers respectively:

I 15 neurons

II with 10 neurons

III 8 neurons

IV with 15 neurons

And one output layer 10 neurons.

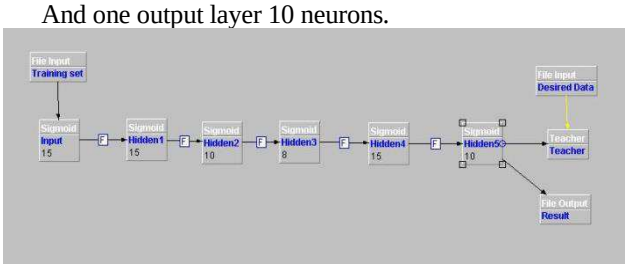


FIGURE 1 Layers of the Neural Network in Joone

The designed neural network can be used to predict the output of the implemented logic function. It gives good results on learning set and on examples of the test set.

It is follows to implement the same architecture of the neural network simulator NeuroPh.

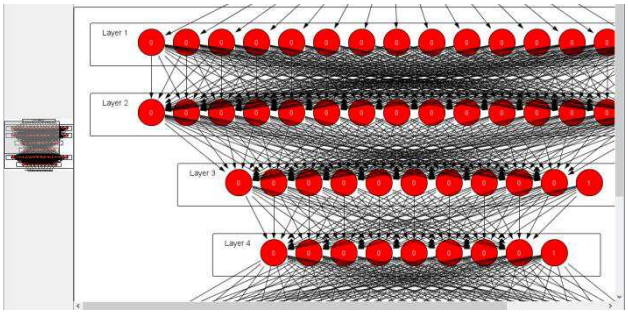


FIGURE 2 Neural Network in NeuroPh

The neural network has again four hidden layer neurons. Its structure is as follows - input layer (15 neurons), output layer (10 neurons), I hidden layer (15neurons), II hidden layer (10 neurons), III hidden layer (8 neurons), IV hidden layer (15 neurons).

In testing and training with the same learning set it proved that the neural network is not trained and cannot properly classify examples of the test set. Training and learning set are the same as those used in the previous simulator Joone.

3 Conclusions

After the conducted tests it shows that both the simulator for neural networks have some peculiarities. Both simulators are java - based and object - oriented. But they have different results in tests with certain types of neural networks. At the same architecture of the neural network (the same number of layers and neurons) and identical sets of test data, the both simulator give different results.

As the results shows, the simulator Joone gives much better results in the testing of arbitrary complex logical function, which is not among the standard. In this simulator there is a very good opportunities to create new types of algorithms and architectures of neural networks.

The simulator NeuroPh does not give good results in tests with random set, complex logic functions. Basic on a tests we can observe, that NeuroPh can be used in standard logic operations and it is suitable for beginners in the creation of neural networks programmers. The simulator Joone can be used by advanced programmers of neural networks.

References

[3] Introduction to Neural Network with Java, Paperback - November 25, 2005, Jeff T. Heaton, **ISBN-10:** 097732060X, **ISBN-13:** 978-0977320608

[4] Artificial Neural Network. Methods and Applications, Livingstone, David J. ISBN 978-1-60327-101-1

[5] Artificial Neural Networks. Industrial and control engineering applications, Intech, Kenji Suzuki, **ISBN** 978-953-307-220-3

[6] Zdravkova E 2015 Research of simulators for neural networks through the implementation of multilayer perceptron, Information Technologies, Management and Society The 13th International Conference inInformation Technologies and Management 2015, ISMA University, Riga, 55-6, ISSN: 1691-2489

Comparative analysis of environments for logic programming in the Prolog language

N Nenkov*

Faculty of Mathematics and Informatics, University of Shumen "Episkop Konstantin Preslavsky", 115, Universitetska St., Shumen 9712, Bulgaria

**Corresponding author's e*-mail: naydenv@shu-bg.net

Abstract

This paper presents the results of a survey of basic characteristics and parameters of logic programming environments. The object of the analysis are four systems: Strawberry Prolog [1], SWI Prolog [6], Visual Prolog 5.3 [4, 8], Visual Prolog 7.3 [2] and the C ++ compiler Visual [3]. The analysis represents different generations of systems for logic programming of the language Prolog comparing their parameters in the implementation of application for solving the problem: "The Tower of Hanoi" [8] by a recursive algorithm. There are criteria for classification, comparison and evaluation of community programming that can be applied to their choice in the implementation of a specific project.

Keywords: environment for logic programming, Prolog, predicate, recursion

1 Introduction

Prolog belongs to the group of non-procedural (declarative) programming languages, which is a characteristic that describes in detail the subject area of the problem. The language is closely related to predicate logic tier and the study of it helps us to understand better its nature and application.

The power of Prolog is manifested primarily in solving problems specific to artificial intelligence, such as: planning, modeling of complex systems, natural language understanding and computational linguistics, symbolic calculations, expert systems and others [4, 5].

Choosing the proper implementation depends on many factors and criteria that are the subject of further exposure. The approach used primarily allows a comparison of the practical possibilities of languages in solving specific tasks. This allows immediate assessment and well-founded selection of an appropriate environment for the realization of a similar project.

2 Research

2.1 FORMULATION OF "THE TOWER OF HANOI" TASK IN PROLOG

The Tower of Hanoi is a logical game, authored by the French mathematician Edward Luke [8]. The game consists of three pillars on the left one - L the discs are stacked in order of size, the largest is at the bottom and the smallest - on top. The aim is to move the discs to the right column - R. You can move only one disc and it can be placed on top of a larger disc or moved to empty pillars. Each move consists of taking the upper disk from one of the pillars and placing it on top of another pillar. Let us analyze the task of moving the n number of disks from pillar L (left) to pillar R (right). It can be used pillar M (average) in terms of the above conditions.

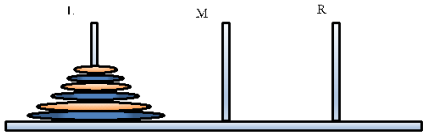


FIGURE 1 The Tower of Hanoi task

- **Complexity**. The task of course is a recursive solution, but it is not trivial, and complexity increases with the number of discs
- **Dimension**. The complexity of the problem depends on the number of discs, which is clearly associated with the requested dimension number of the disks which have to be moved.
- The task has a dimension **n,** can easily be reduced to two tasks of the same type, but with smaller dimensions:
  - To move n-1 discs from pillar L to pillar M (the same task with a dimension n-1).
  - To move the last remaining disk from pillar L to the pillar R (non-recursive task).
  - To move the set of n -1 discs from pillar M to pillar R (the same task with a dimension n-1).
- The task has simple recursive solution at zero dimension just do not need to do anything. In the beginning all disks are arranged in the leftmost column, as shown.

2.2 RECURSIVE STRATEGY FORMULATION

You have to move n discs from pillar L to pillar R. The

function is defined as follows: X (n-1, (L), (M)), so that the task can be solved. Firstly, you move n-1 disc from the pillar L to the pillar M, applying the function X, and then move the n-th disc from the pillar L to the pillar R (defined in this function: P ((L), (M)) and finally move n-1 discs from M to R. The algorithm can be written as follows:

1. X(n-1, (L), (M))
2. Π((L),(R))
3. X(n-1, (M), (R))

Now here is a case which is not recursive. If the disc is only one, it can be rapidly moved from pillar R to pillar L, so that the following equation is implemented: X (1, (L), (M)) = P ((L), (R)). The algorithm can be represented with the following diagram:

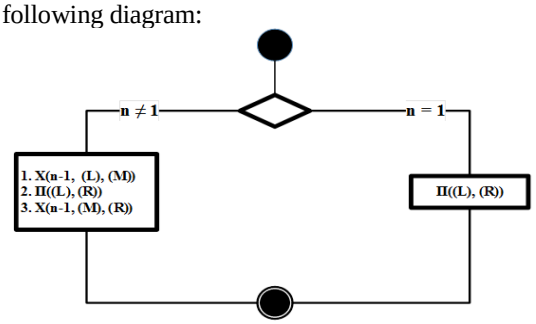


FIGURE 2 Algorithm for moving the discs (The Tower of Hanoi task)

One exemplary strategy for solving the problem is as follows: Only one disc can be moved at a time. You can transfer n disk in the following three steps:

Transfer n-1 disks to the pillar in the middle

Transfer disk N to the right column

Transfer n-1 from the middle pillar to the right one.

There are Implementation of Visual Prolog 5.2, SWI Prolog, Strawberry Prolog, Visual Prolog 7.3 andMS Visual C++.

3 Results from analysis of environments for programming

The experiment includes the source code of the task described above of each of the aforementioned realizations of Prolog. For this purpose, it is used the hardware configuration of the notebook processor Intel Core i3-4005U 1.70 GHz, RAM - DDR3L 1333 MHz, 4 GB, HDD 1000 GB 5400, SATA, under the operating system MS Windows 7.0 Professional. Programming environments installed as mentioned above. The data obtained are shown in Table.1.

Table 1 Memory and program execution time

Program environment	Memory	Execution time
SWI - Prolog	220 bytes	1 sec
Strawberry Prolog	210 bytes	1 sec
Visual Prolog 5.2	1 KB	3 sec
Visual Prolog 7.3	3.89 KB	3 sec
MS Visual Studio 2008	1,34 MB	4 sec

For Strawberry Prolog and SWI Prolog have studied interpreters, and for other –compilers

From the survey of the environments for logic programming can be seen (Figure 4 and Figure 5) that the interpreters of Strawberry Prolog and SWI Prolog have minimal memory requirements and they are fast during the performance.

The price of modern features and beautiful graphics capabilities in Visual Prolog 7.3 is cost almost four times greater amount of memory than the Visual Prolog 5.2.

The comparison between the compilers of Prolog and Visual C ++, which is part of the 2008 MS Visual Studio is based on projects of type console application in the given task.

There is a huge difference between the amount of code and longer and equal execution time, regardless of the lack of graphical elements in the project.

Prolog Compilers show a higher degree of efficiency with respect to that task, which has an exponential complexity in the increase of the dimension (the number of the disks). In conclusion, Visual Prolog is suitable for modeling and solving problems regarding the artificial intelligence field with the given characteristics

4 Conclusion

The analysis of the considered environments for logic programming shows some practical conclusions. There are similarities in the characteristics and the capabilities of SWI - Prolog and Strawberry Prolog. It could be said that having simple syntax close to the paradigm of the logic programming both languages are especially valuable for teaching logic programming and problem solving with less complexity and requirements.

Visual Prolog compilers are suitable for more advanced programmers. They could be used to design and build more complex systems with higher requirements to the interface and the range of the tasks.

References

[1] Dobrev D StrawberryProlog Available from: http://dobrev.com/download.html
[2] Costa E Visual Prolog for Tyros Available from: http://www.visual-prolog.com/download/73/books/tyros/tyros73.pdf
[3] Horton I 2008 Available in: http://www.wrox.com/WileyCDA/WroxTitle/Ivor-Horton-s-Beginning-Visual-C-2008.productCd-0470225904.html
[4] Nenkov N V 2006 Expert systems University Publishing House "K. Preslavsky", Shumen ISBN-10: 978-954-577-383-9, 274 (in Bulgarian)
[5] New Features in Visual Prolog 7.5 Available in: http://wiki.visual-prolog.com/index.php?title=New_Features_in_Visual_Prolog_7.5
[6] Blackburn P, Bos J, Striegnitz K Available from: http://lpn.swi-prolog.org/lpnpage.php?pageid=online
[7] Scott R 2010 A Guide to Artificial Intelligence with Visual Prolog Outskirts Press ISBN 9781432749361, 190
[8] Tower of Hanoi Available in: http://mathworld.wolfram.com/TowerofHanoi.html
[9] Visual Prolog Version 5.x, Language Tutorial, PDC Denmark, 1999, 542

Research of neural network simulators through two training data sets

E Zdravkova, N Nenkov*

Faculty of Mathematics and Informatics, University of Shumen *"Episkop Konstantin Preslavsky"*, 115, Universitetska St., Shumen 9712, Bulgaria

**Corresponding author's e*-mail: elitca_spasova@abv.bg, naydenv@shu-bg.net

Abstract

In the present study our aims is to analyze and test two neural networks simulators - Joone and NeuroPh. This will be accomplished by establishing a neural network of 4 layers constituting a multilayer perceptron with sigmoid links. For the purpose of the study were selected two test data sets, which contain integers. Through sequential training the neural network with each of them and subsequently the test results will be obtained for analysis. The study seeks to show how much these two simulators are similar and how different in their characteristics, what neural networks is suitable to be made by them, what are their advantages and disadvantages, how they can be used interchangeably to give certain desired result.

Keywords: neural network, neural network simulator, data set, training set, neural network architecture

1 Introduction

Both the simulator selected for the study are Java - based and object - oriented simulators. The used simulators are Joone 4.5.2 and NeuroPh 2.92. Joone is object - oriented frameworks allows to build different types of neural networks. As of 2010 Joone, NeuroPh and Encog are main component - based environments for neural networks of java - platforms [1, 2]. Joone can be considered not only as a simulator of neural networks such frameworks were, but as a fully integrated development environment. Unlike its trading partners, it has a strong focus on the code, building a neural network, but not on the visual design. In theory, Joone can be used to build a wide range of adaptive systems (including those with maladaptive elements) but generally, his focus is on building backpropagation - neural networks.

NeuroPh is lightweight frameworks allowed to simulate neural networks. It is java - based and can be use basic for the development of standard types of neural network architectures. It contains well designed open source library and a small number of core classes that correspond to basic concepts in neural networks. There is a good graphics editor to quickly build java - based components of neural networks [3].

2 Methodology

After conducting two data sets, we have to realize neural network through simulators NeuroPh and Joone.

The neural network that we will use for the study is multilayered perceptron with sigmoid relations and consists of four layers - entry (4 neurons) hidden layer (9 neurons), 2 hidden layer (6 neurons) and output layer (one neuron).

In each of the simulators we will conduct training with the first test set (in this case, the learning set) and then we test with the first data set and with the second data set. We will then conduct training with the second test set (in this case, the learning set) and then re-test with the first data set and with a second data set.

- NeuroPh

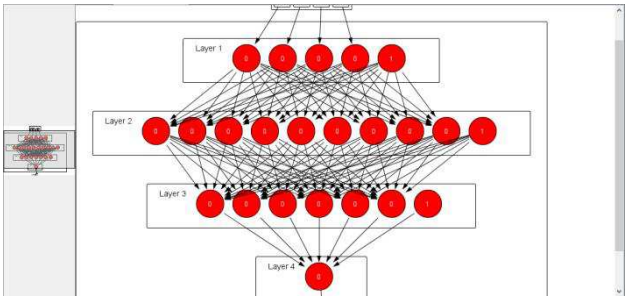


FIGURE 1 Neural Network in NeuroPh

Neuralnetworkis trained withtraining set 1 (learning set in this example) and thentested itonthetwotestsets.

Then neuralnetworkis trained withtraining set 2 (learning set in this example) and thentested itonthetwotestsets.

- Joone

The neural network is showed on the figure bellow.

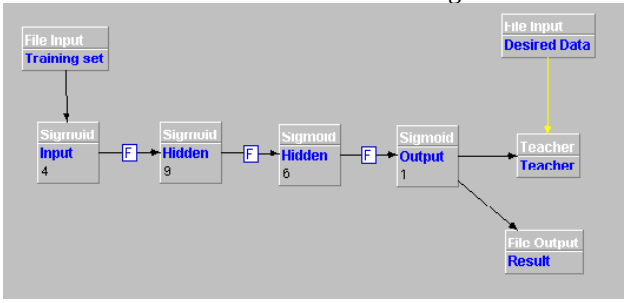


FIGURE 2 Neural network in Joone

Neuralnetworkis trained withtraining set 1 (learning set in this example) and thentested itonthetwotestsets.

Then neuralnetworkis trained withtraining set 2 (learning set in this example) and thentested itonthetwotestsets.These data sets are used by Mahmoud Iskandarani in " Disparity in Intelligent classification of Data Sets Due to Dominant Pattern Effect "(Mahmoud, 2015).

3 Conclusions

After the conducted tests it shows that both the simulator for neural networks have some peculiarities. At the same architecture of the neural network (the same number of layers and neurons) and identical sets of test data, the both simulator give different results.

In testing, it appears that the simulator Joone gives a little - good results in the training with both data sets. The simulator NeuroPh gives a less - poor output through education.

It can be argued in this case that Joone is suitable for the realization of any neural network to implement a certain number of test data. So it can be used by programmers of neural networks to create new types of neural network architectures as well as new algorithms for learning.

As the results, NeuroPh can be used in the implementation of standard architectures of neural networks and standard algorithms. Novice programmers can be familiar by him with the basics of neural networks.

References

[1] Heaton J T 2005 Introduction to Neural Network with Java Paperback **ISBN-10:** 097732060X, **ISBN-13:** 978-0977320608
[2] David J Artificial Neural Network. Methods and Applications, Livingstone ISBN 978-1-60327-101-1
[3] Suzuki K Artificial Neural Networks. Industrial and control engineering applications Intech ISBN978-953-307-220-3
[4] Disparity in Intelligent classification of Data Sets Due to Dominant Pattern Effect (DPE), Mahmoud Iskandarani Journal of Intelligent learning systems and applications September 2015

IBM Watson: natural language question answering system

M Nurgazy[1*], Yu Shunin[2, 3]

[1]Inter*national Information Technologies University, Zhandosov Str. 8"A", 050040*, Almaty, Kazakhstan

[2]Institute of Solid State Physics, University of Latvia, Kengaraga Str. 8, LV-1063, Riga, Latvia

[3]ISMA University, 1 Lomonosov Str., Bld 6, LV-1019, Riga, Latvia

**Corresponding author's e*-mail: meru.nurgazy@gmail.com

Abstract

Almost everything that is characteristic of people: language understanding, feeling, judgment, hard skills, learning, spatial perception, social behaviour, etc. – refers to the knowledge. Nowadays we increasingly expect similar cognitive behaviour of the machines that we use. IBM Watson - is the first step in the area of cognitive systems, a new era of computing in the sphere of artificial intelligence. In addition to computing, the Watson still has three abilities that make this system truly unique: natural language processing, formation and evaluation of hypotheses, dynamic training. Watson combines all of these powerful features by formerly unprecedented method, which leads to a radical change in approach to solving problems and its acceleration. Using Watson may go beyond simple data processing and can be applied to search for correlations, forming hypotheses and learning from the results.

Keywords: cognitive system, natural language, evaluation of hypothesis, artificial intelligence

1 Introduction

IBM Watson - one of the first cognitive systems in the world. This system is able to very many things, whereby Watson capabilities are used in many areas - from cookery to the prediction of accidents in populated areas. In general, most of the opportunities Watson is not something unique, but in complex, all of these features are very powerful tools for solving a variety of issues [1].

For instance - the recognition of natural language, dynamic training system, the construction and evaluation of hypotheses. All of them has allowed IBM Watson to learn to give direct answers correctly, with a high degree of certainty, to questions. At the same time, cognitive system can be used for large amounts of global unstructured data, Big Data.

2 What computers find hard?

Language serves as a means of expression of thought. It is used for transmission when communicating judgment of people. Using it we pass the fears, the hopes, the information about the past and the future installation. It lies at the heart of our consciousness, our ability to understand the world around us. At the same time, here is the paradox – human language is very inaccurate.

Please read through the following sections for more information on preparing your paper. However, if you use the template you do not have to worry about setting margins, page size, and column size etc. as the template already has the correct dimensions.

Our language - is infinite game of words, plenty of specific features, a lot of idioms, ambiguity and homonymy.

We manage to convey so much meaning and to achieve such an understanding, and participation, in spite of all the difficulties of the language!

In fact, in order to correctly answer the question, in many cases it is necessary to take into account the existing context. In the absence of sufficient factual information it is difficult to answer the question correctly, even if you can find the exact answer to the question of the elements in the literal sense [2, 3].

3 Surface processing of natural language

In many systems, natural language processing attempts to focus attention on accuracy within specific rules of well-formed. No further assessment of the context of such a system does not operate. Such an approach we call the surface of natural language processing (NLP), because, having high accuracy in a more narrow view, it is not quite correct.

The fact that these systems are designed in accordance with a set of rules, and perform a combination search for a specific keyword to determine the answer.

Such systems do not know how to distinguish between options that are not described in the rules. They may be accurate, but is not necessarily correct.

4 Deep natural language processing

When you need not only accuracy in narrow parameters, but the correctness also, natural language processing changes. In assessing the question, these methods are using much wider context. This approach we call the deep processing of natural language, or if it comes to answering questions in

natural language - question-answering system of content analytics (Deep Question-Answering, DeepQA).

IBM Watson relates to systems for deep natural language processing. In order to answer was right, the system seeks to assess the widest possible context. It is not only the context that is contained in the question itself, but also the context of the knowledge available to search for the answers.

Only after the creation of Watson system, we were able to finally achieve the correct level, which is essential for the successful operation of information systems in the real world, with extensive use of natural language.

5 IBM Watson – cognitive system

A cognitive system is a system (see, Figure 1), which performs the cognitive work of knowing, understanding, planning, deciding, problem solving, analysing, synthesizing, assessing, and judging as they are fully integrated with perceiving and acting [1, 4].

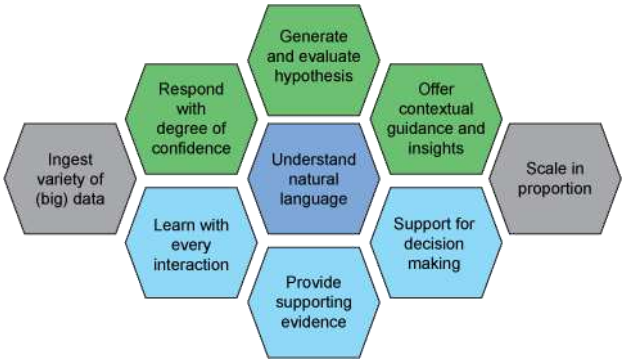


FIGURE 1 Characteristics of cognitive system

How Watson gets his answers to the questions? The system operates in the following order:

In Figure 2 you can see all of these steps visually.

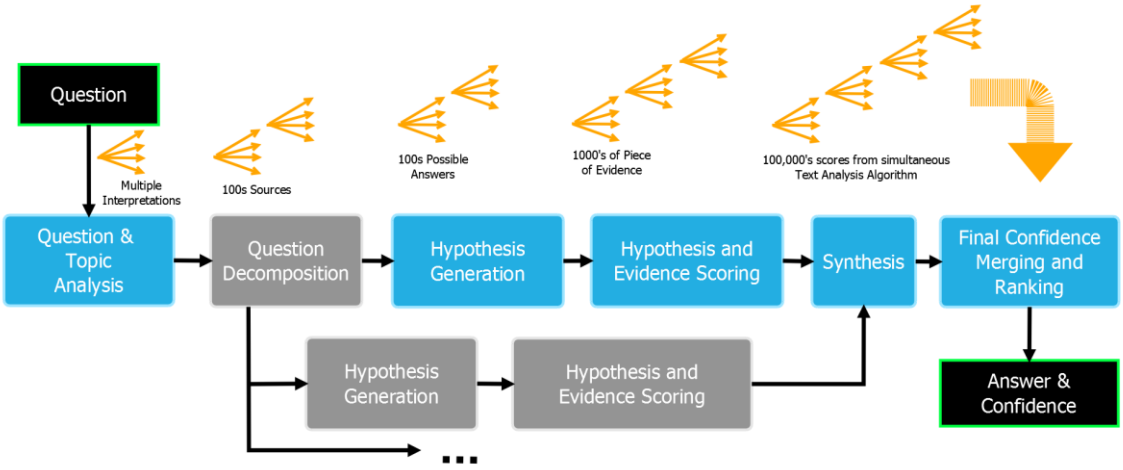


FIGURE 2 Basic architecture of finding answer

6 Conclusions

Currently cognitive IBM Watson system, through many years of training and improvement, can do the work in various fields. They are - medicine, cooking, linguistics, solving business problems with the scientific objectives.

IBM continues evolve and develop cognitive systems of this type. IBM expect that the system will be even more useful in finding the "best alternative" analysis of social sentiment, oil refining, and in many other areas. We only enter into an important new computing era, which focused not only on the accuracy as to correctness. Era of the application of human behaviour models for large-scale computing tasks. Era of cognitive systems [5].

References

[1] Lintern G 2007 What Is a Cognitive System? Proc of 14th Int Symp on Aviation Psychology April 18-21 2005 Dayton, OH 398-402 http://www.cognitivesystemsdesign.net/Papers/What%20is%20a%20Cognitive%20System.pdf

[2] Chandasekaran S, Di Mascio C 2014 Create a natural language question answering system with IBM Watson and Bluemix services http://www.ibm.com/developerworks/cloud/library/cl-watson-films-bluemix-app/cl-watson-films-bluemix-app-pdf.pdf/

[3] Farrel J 2009 IBM Watson: a Brief Overview And Thoughts For Healthcare Education And Performance Improvement https://www.google.lv/#q=%5B3%5D%09Farrel+J+2009+IBM+Watson:+a+Brief+Overview+And+Thoughts+For+Healthcare+Education+And+Performance+Improvement

[4] Balina I 2015 IBM Watson Analytics http://www.slideshare.net/IanBalina/ibm-watson-analytics-presentation

[5] Muhamediyev R I, Shunin Yu N, Gopeyenko V I (2007) Media and active dots optimal development strategies. Computer Modelling and New Technologies 11(4) 53-59

Reducing the number of road traffic crashes by using of smart cars

A Berdibek[1*], Yu Shunin[2, 3]

[1]*International Information Technologies University, Zhandosov Str. 8"A", 050040*, Almaty, Kazakhstan

[2]Institute of Solid State Physics, University of Latvia, Kengaraga Str. 8, LV-1063, Riga, Latvia

[3]ISMA University, 1 Lomonosov Str., Bld 6, LV-1019, Riga, Latvia

**Corresponding author's* e-mail: asetmumin99@gmail.com

Abstract

Road traffic crashes take 1.25 million lives every year. If it continues its way, road traffic crashes will be 7th leading cause of death by 2030. It is already a leading cause of death among young people aged 15-29 years. Many automobile manufacturing companies have already started working on realizing the smart car ideas and concepts. In 2009, Google Inc. started its own project on developing the smart car. By now, Google Inc. proposes full self-driving car concept. However, it is still in testing and of course, there are many bugs and some accidents on the road with its participation. The problem is what kind of car do we need exactly to diminish the number of road traffic injuries?

Keywords: road traffic crashes, google self-driving car project, smart cars

1 Introduction. Reasons to move on

20-50 million people are injured from road traffic crashes every year. According to survey made by US National Highway Traffic Safety Administration (NHTSA) in 2001, almost 23% of accidents happened because of "driver inattention" that means during driving there was something distracting the driver. It may be passengers, texting on smartphone, music, speaking with cell phone etc. There are a lot of examples. Next two causes are "vehicle speed" and "alcohol impairment". Both of them took almost 20% each. Moreover, we have to take into consideration the face that research was done mostly on car accidents that were happening with high frequencies.

Some automobile manufacturing companies have already published that some examples of smart cars will be announced till 2020. Even one of the most powerful and strong incorporations such as Apple Inc. and Google Inc. could not pass by this fact, which is becoming more and more hazardous [1, 5].

The other causes of road traffic crashes are shown in Table 1 [2].

TABLE 1 Results of survey

• DRIVER INATTENTION	22.7%
• VEHICLE SPEED	18.7%
• ALCOHOL IMPAIRMENT	18.2%
• PERCEPTUAL ERRORS (e.g. looked, but didn't see)	15.1%
• DECISION ERRORS (e.g. turned with obstructed view)	10.1%
• INCAPACITATION (e.g. fell asleep)	6.4%

In order to facilitate the accomplishing of main objective, NHTSA offered some examples of safety standards concerning safety and comfort [3, 4]. It is called 4-Level (Level 1 – Function-specific automation, Level 2 – Combined function automation, Level 3 – Limited self-driving, Level 4 – Full self-driving automation) **Crash Avoidance Scheme** with aim at Full Self-Driving Automation (see also Figure 1).

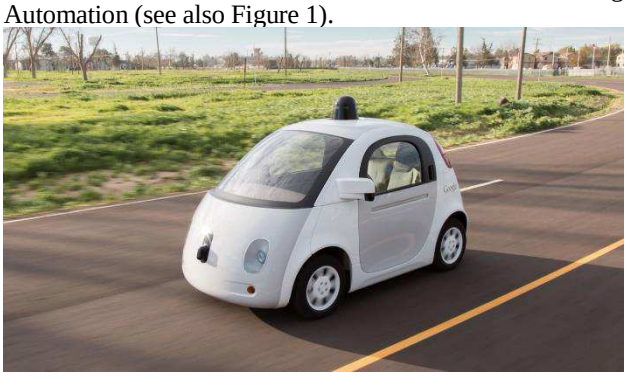


FIGURE 1 Google self-driving car [4]

2 Google Self-Driving Car

Google Inc started its own project on construction of new smart car prototype. At the beginning they were using various sensors and techniques, uniting them on Toyota Prius and Lexus RX450h. In 2014 they made fully autonomous car prototype. They have already completed over 300000 miles of testing on freeways. After that they focused on city streets with more complicated environment. Although they had some car accidents, they did not lead to serious injuries.

3 Conclusion

There is no doubt that if the project of smart car is accomplished, the number of deaths, injuries, car accidents will be decreased a lot. New prospective steps for smart cars conception development are expected in the nearest future. However, car driver's or passenger's dependence from interior smart system operations creates some new psychological problems.

References

[6] World Health Organisation Road traffic injuries http://www.who.int/mediacentre/factsheets/fs358/en/
[7] http://orfe.princeton.edu/~alaink/SmartDrivingCars/NHTSA_Hendricks2001_UnsafeDrivingActs.pdf
[8] Defect Prevention: Reducing Costs and Enhancing Quality - http://www.isixsigma.com/industries/software-it/defect-prevention-reducing-costs-and-enhancing-quality/
[9] Google Self-Driving Car http://www.google.com/selfdrivingcar/images/home-where.jpg
[10] Muhamediyev R I, Shunin Yu N, Gopeyenko V I 2007 Media and active dots optimal development strategies Computer Modelling and New Technologies **11**(4) 53-9

Advantages and features of "smart house" technologies

N Urmanov[1]*, Yu Shunin[2, 3]

[1]Computer Science and Software Engineering, International University of Informational Technology, 050040, Almaty, Kazakhstan

[2]Institute of Solid State Physics, University of Latvia, Kengaraga Str. 8, LV-1063, Riga, Latvia

[3]ISMA University, 1 Lomonosov Str., Bld 6, LV-1019, Riga, Latvia

**Corresponding author's e*-mail: urmnurbolat@gmail.com

Abstract

Growth and development of computer technologies and artificial intelligence software lead to construct smart devices or smart environments. Especially, nowadays smart house technologies growth so quickly. The goal of the project is introduce about smart house technologies and their features. Also to show progress in this sphere, considering smart houses of "SmartHouse" company. A typical smart house is highly characterized by heterogeneity elements that need to perform joint execution of tasks in an efficient manner. This thesis helps a lot of people who are willing to decorate their house into a smart atmosphere. The main points of consideration are: what is house automation, how many necessary components there are, how does this work, where to buy it and how much does it cost.

Keywords: smart house, artificial intelligence, house automation

1 Introduction

The house is an important place for the people. It should be safety, comfortable for peoples. Can we suspect that house can give this?

A smart house is generally referred to a fully equipped environment with sensors and different technology, which has its goal to help the user in as many conceivable situations and assisting him. It can control a lot of devices which can prevent theft, fires etc., and give safety for owners. In addition, you can control your house remotely and it give many capabilities of safe time and money and give comfort for you.

To see how a smart house environment can give to people safety and quality life in their own house, see Figure 1, where shown daily routine in smart house house [1-3].

2 Smart House definition and how it work, features

Smart House technology intelligently gives you ultimate control over your house by automating the lighting system, dimming, blinds, electrical appliances, audio and security systems. It equipped with special structured wiring to enable occupants to remotely control or program an array of automated house electronic devices by entering a single command (see also Figure 2).

Smart houses connect all the devices and appliances in your house so they can communicate with each other and with you.

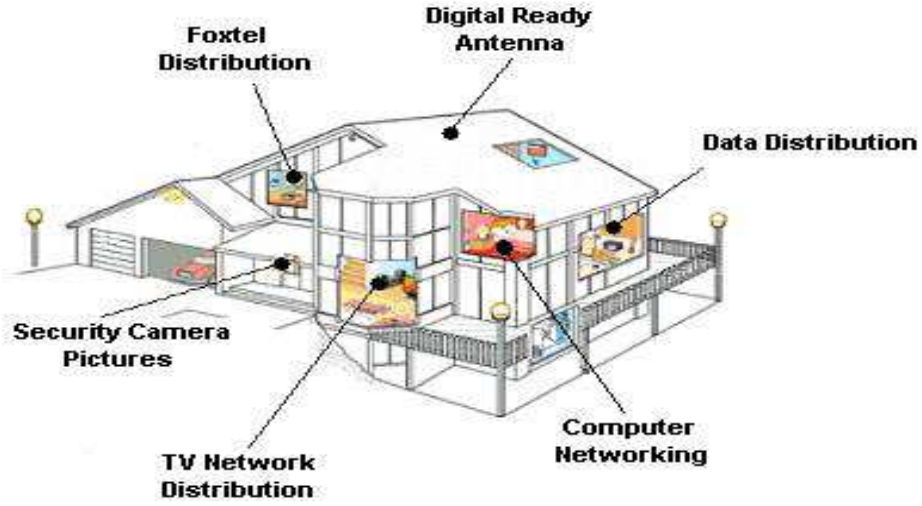


FIGURE 1 Smart house environment

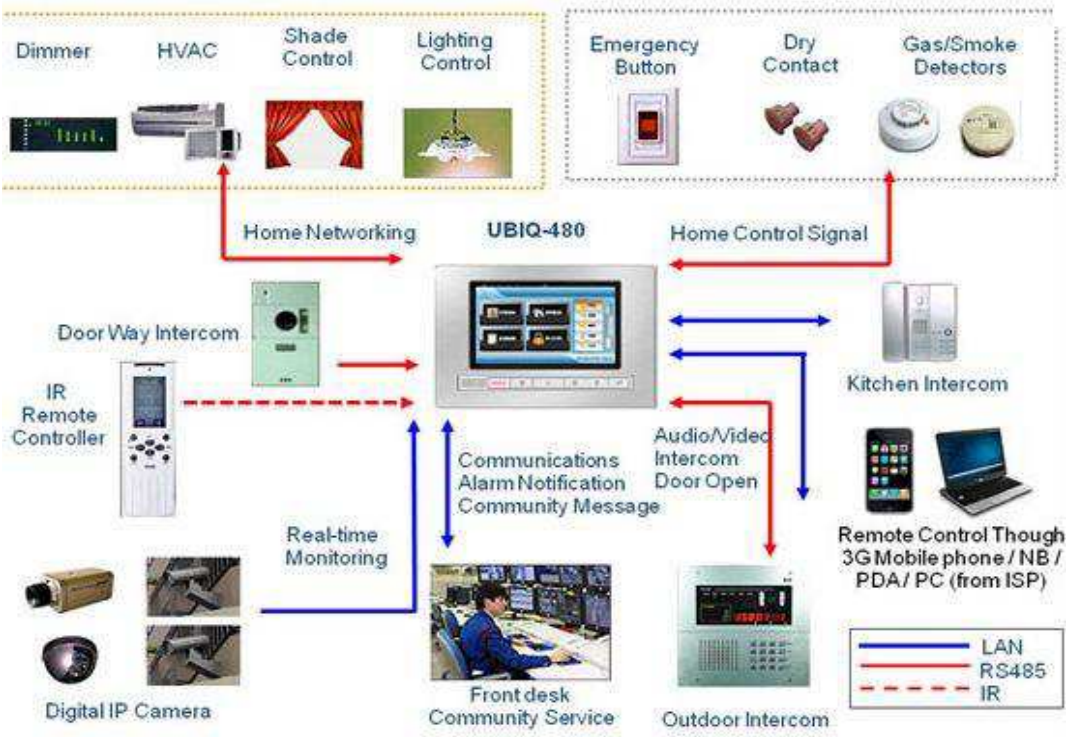


FIGURE 2 Smart house automation

An example of a house equipped with different sensors is shown on the Figure 3.

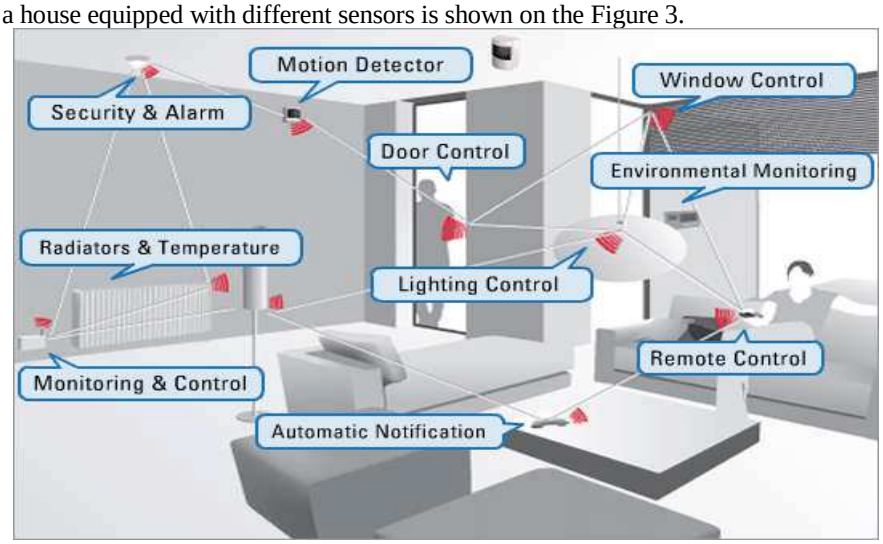


FIGURE 3 Smart house equipment. Features of Smart House: Lighting, Security, Temperature, Appliances, Entertainment, System Status

3 Smart House company

Smart House was founded in 2005 by group of experts in the field of IT technologies, engineering and design.

Throughout all time, Smart House offers for reasonable prices high-quality services of programming and system installation of «smart house».

Smart House offers the wide range of electromaterials and all necessary equipment for installation of «smart house».

The individual approach and exact understanding of wishes of the client is the main mission of Smart House.

What can do smart house of Smart House company?

1. Security alarm system
2. Operation of lighting
3. Effect of presence
4. Audio and video control of systems
5. Installation of heat-insulated floor
6. Centralized control
7. Climate control
8. Control system of curtains and jalousie.

Price Smart House system can vary depending on the given conditions (the manufacturer of the equipment, the number of functions, and etc.). Preliminary forecast point to the order price:

1500 euro - Smart lighting includes the ability to control lighting from anywhere, create light scenes, enable or disable it.

2000 euro - Clever lighting and climate control, includes a heating control, ventilation and lighting.

2500 euro - Smart lighting, climate control, centralized management, which allows you to manage and control all mobile phone systems, tablet, iPad.

3000 euro - Smart lighting, climate control, centralized management, and video surveillance. It includes control panel with numerous possibilities [2].

4 Conclusions

The work presented in this paper give information about smart house technologies and features, detailed information about company which engage in this sphere, their technologies and prices. Problems of "normal house", advantages of using "smart house" than "normal house".

References

[1] Kazmierzak F 2016 Smart House Environment Concepts and Solutions Jan 9, 2016
[2] http://www.docfoc.com/smart-home-environments-kazmierzak-pdf
[3] http://www.streetdirectory.com/travel_guide/159831/technology/smart_house_features.html
http://www.smarthouse.lv
[4] Muhamediyev R I, Shunin Yu N, Gopeyenko V I 2007 Media and active dots optimal development strategies Computer Modelling and New Technologies **11**(4) 53-9

"Arduino" – open-source physical computing Input / Output board

V Georgieva[1*], Yu Shunin[2, 3]

[1]University of National and World Economy, Sofia, Bulgaria

[2]Institute of Solid State Physics, University of Latvia, 8 Kengaraga Str., LV-1063, Riga, Latvia

[3]ISMA University, 1 Lomonosov Str., Bld 6, LV-1019, Riga, Latvia

**Corresponding author's* e-mail: vkg504@gmail.com

Abstract

The idea that you can manufacture objects digitally using these machines is something that "The Economist" magazine defined as the Third Industrial Revolution. This revolution follows well-known systemic principles. Actually, we can see that there is another revolution going on, and it's the one that has to do with open-source hardware and the maker's movement. So, you go to a website, you can download all the files that you need: the construction files, the hardware, the software, all the instruction is there. And also this is part of a large community where there are thousands of people around the world and there's a lot of innovation happening because it's all open-source. You don't need anybody's permission to create something great. And that space is like the personal computer in 1976.

Keywords: system theory, systems thinking, computers, communication.

1 Introduction

Let's take a look to Ludwig von Bertalnffy back in the 1968 when he proposed systems thinking - different parts or subsystems that are interrelated to and interdependent on each other and the whole entity with an overall capability to maintain stability and to adapt behaviour in response to external influences [1, 2, 5].

Something you cannot deny about computers is that they are great communicators. Communicate with each other and communicate with us. But what is not reaching them to be perfect, it is the ability to communicate with the world around him. Unlike "Arduino". You have to have something that actually interacts with people.

Arduino is an open-source physical computing platform based on a simple i/o board and a development environment that implements the Processing / Wiring language. Arduino can be used to develop stand-alone interactive objects or can be connected to software on your computer.

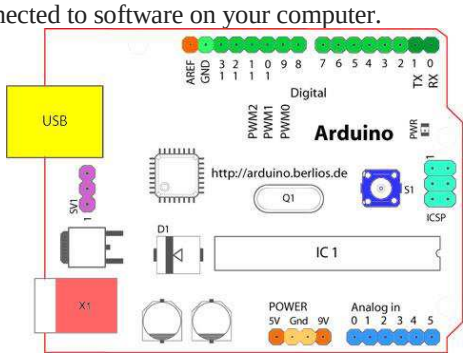


FIGURE 1 Introduction to the Arduino Board

Starting clockwise from the top center:

- Analog Reference pin (**AREF**)
- Digital Ground (**GND**)
- Digital Pins 2-13
- Digital Pins 0-1/Serial In/Out - **TX/RX**
- Reset Button - **S1**
- In-circuit Serial Programmer (**ICSP**)
- **Analog In** Pins 0-5
- Power(**5V,9V**) and Ground Pins (**Gnd)**
- External Power Supply In (9-12VDC) - X1 (pink)
- Toggles External Power and USB Power - **SV1**
- USB (used for uploading sketches to the board and for serial communication between the board and the computer; can be used to power the board) (yellow)

Arduino was basically designed to make the process of using electronics in multidisciplinary projects more accessible. It is intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. Because of these features, Arduino finds extensive application in various fields. Arduino projects can be stand-alone or they can communicate with software running on a computer.

This idea that you can take design from the simple shape of an object and you can move it forward to design the way you interact with things. Well, when you design an object that is supposed to interact with a human being, if you make a foam model of a mobile phone, it does not make any sense [3].

2 Overview

Why is Arduino popular?

- **Starter Projects**: Editing and rewriting is often easier than writing from scratch. It's the same with electronics. Commercial software testing tools
- **Cost and Durability:** At $30 for a piece, an Arduino is an inexpensive investment for someone who wants to try it out. One reason why the Arduino is so cheap is because it is easy to clone. The microcontroller is completely open source so the "components are all commodity
- **A Thriving Community:** Arduino's popularity means it's easy to get started.
- **Maturity is the key.**
- **Simple is attractive:** it has a very welcoming attitude towards beginners and tries not to scare them too much [4].

3 Future scope

Over the years, Arduino has gone out to become a huge success and a common name among students. With google spreading it, people's imagination has gone out to a much higher level than before. A developer in the annual GOOGLE IO conference commented about the case when Arduino and Android are coming together and this really proves "INFINITY EXISTS" or it could – in the future. In my opinion, a study on Arduino and practices on Arduino must be added for courses of engineering, to help students into getting to a higher level of their talents, and imagination [5, 6].

4 Conclusions

The Arduino board is for anyone who wants to build a basic level of intelligence into an object.

Defending the thesis of Mr. Ludwig von Bertalnffy and his theory of interactive systems in the face of computers with this thesis, we give just a passing glance over the comprehensive capabilities that allows Arduino. We are far from the years when technologies were rejected as an unnecessary necessity. People today have more trust the robots than themselves. We come to the topic of artificial intelligence and the work of our imagination, being creators of our future in a very accessible and interesting way.

References

[1] More than just digital quilting 2011 The Economist http://www.economist.com/node/21540392
[2] von Bertalnffy L1968 General Systems Theory *Arduino's Official* Website https://www.arduino.cc
[3] Banzi M 2016 How Arduino is open-sourcing imagination - https://datascience.berkeley.edu/massimo-banzi-arduino-open-sourcing-imagination/
[4] Lobanova-Shunina T, Shunin Yu 2014 Nanothinking and nanoeducation: nanoscientific literacy for responsible consumerism Computer Modelling and New Technologies **18**(1) 13-24
[5] Lobanova-Shunina T, Shunin Y 2013 Nanotechnologies: challenges and controversy on the way to scientific citizenship, new emerging identities and intellectual consumption in P. Cunningham (ed.) Identities and Citizenship Education: Controversy, crisis and challenges. London: CiCe 182 – 93

The automated system for gravimetric monitoring of the oil and gas deposit

A B Nazirova[1*], F N Abdoldina[1], M Aymahanov[1], R I Muhamedyev[2], G K Umirova[1]

[1]Kazakh National Research Technical University after K.I.Satpayev, Satpayev Str., Bld. 22a, Almaty, Kazakhstan

[2]ISMA university, 1 Lomonosova Str., Bld.6, LV-1019, Riga, Latvia

**Corresponding author's e*-mail: assem.berlibayeva@gmail.com

Abstract

In recent years in the Republic of Kazakhstan much attention has been paid to questions of geodynamic and ecological safety of the oil and gas deposits development. The technogenic influences caused by deposit development can cause the events of geodynamic character which are caused by geodynamic processes (extensive sags of the terrestrial surface and activate the fault zones). In order to avoid manifestation of such geodynamic processes it is necessary timely performance of high-quality monitoring which includes gravimetric monitoring in measurements of gravity variations, display of wells location and their types, volumes of pumped water, production volume, reservoir pressures, isobar cards, data interferometer, profiles, well status. One of the ways of geodynamic researches is measurement by the gravimeter.

Keywords: GIS, gravimetric monitoring, oil and gas deposit, process model, functional modeling, information system.

1 General

Processing of significant volume of primary gravimetric monitoring data involves using of graphic, visual and interactive technologies. Development own software that automates processing and provides storage, accumulation of the gravimetric researches given for the long-term period and also application of geoinformation system (GIS) opportunities allows to facilitate work of experts and to improve the visibility of research results.

The program used gravimetric measurement data carried out on one of the oil and gas deposit located in the south-eastern part of Caspian Depression. In work [1] is shown high efficiency of carrying out gravimetric researches for this region. For creation of data model and definition of the automated system functional part is carried out functional modeling of research and production center, which is engaged in gravimetric researches of the oil and gas deposits development [2].

The cartographical Google Map technology was chosen as the GIS-system of monitoring for visualization of data as the simplified service working in the web mode. Special program module has written for this service and visualizes a set of additional layers on fragment of district map territory of the oil production. To visualize the deposit data information on coordinates of wells, field contours, supervision points, profiles and GPS data is necessary. In figure 1 the example of some layers visualization of the oil and gas deposit is represented.

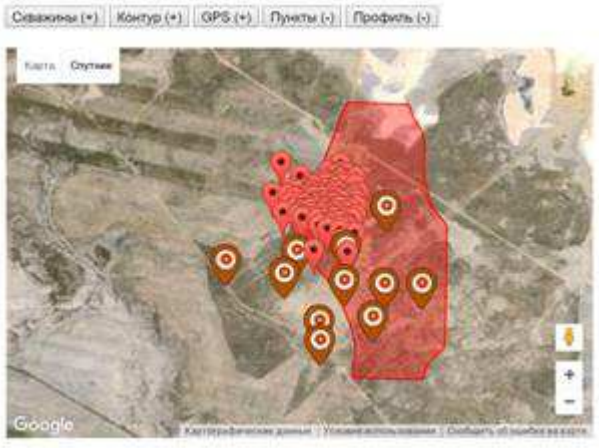


FIGURE 1 Example of layers visualization of the oil and gas deposit

For development of the primary data processing system it is necessary to automate process of loading and data processing for their further entering in the database that will provide convenient and fast information search and will allow to form and keep reports, to build schedules according to the user parameters.

Automation of gravimetric monitoring data processing on the oil and gas deposit allows to increase efficiency of processing and interpretation of gravimetric data.

References

[1] Matusevich A V 2013 Gravity of the Caspian Depression Livny: Mukhametov G V, 176

[2] Abdoldina F N, Berlibayeva A B, Umirova G K 2015 Data processing automation of geodynamic monitoring on an oil and gas field // Joint release on materials of the International scientific conference "Computing and Information Technologies in Science, Equipment and Education": Messenger of KazNU after Al-farabi, Almaty, Volume XX, P. IV, **3**(86) 73-82

Research of the acousto-electronic and acousto-optic effects in heterolaser with InAs quantum dots

R Peleshchak, O Kuzyk, O Dan'kiv, M Seneta

Drohobych Ivan Franko State Pedagogical University, Ivan Franko Str. 24, 82100 Drohobych, Ukraine

Abstract

The theoretical model of process of frequency modulation of radiation at recombination transition between the ground states of electron and hole in InAs/GaAs heterostructure with InAs/GaAs quantum dots by means of an acoustic wave is constructed. Character of dependence of amplitude of frequency modulation from frequency of an acoustic wave is established. The theoretical model of process of modulation of the direction of radiation of the InAs/GaAs heterolaser with InAs quantum dots (QDs) under the influence of the acoustic wave is constructed. The character of the dependence of amplitude of a corner of deviation of the heterolaser on the acoustic wave frequency and geometrical sizes of quantum dot is determined.

Keywords: quantum dot, acoustic wave, deformation, frequency modulation

1 Introduction

Future progress in the development of heterolasers is connected with the application of structures with QDs in their active region [1-3]. Semiconducting heterostructures InAs/GaAs with InAs QDs have a high quantum yield of photoluminescence, being a promising material for the creation of lasers is the near infrared spectral region [1]. QD-based lasers demonstrate considerably better properties as compared with lasers based on quantum wells. The former have a higher laser gain, they are completely insensible to the lattice temperature, and the quantum energy of radiative recombination for them is much easier to be controlled [2]. Sources of infrared radiation, which can quickly change the oscillation frequency and the emission direction, are important elements of high-resolution laser spectroscopy and optical communication systems [3]. One of the important research directions is a possibility to control the lasing frequency of QD-based heterolasers. An important factor that affects the spectral characteristics of radiation emitted by InAs/GaAs heterosystems with InAs QDs is the elastic deformation [4, 5]. For instance, in work [5] the influence of the field of internal elastic deformations, which is a result of different coefficients of thermal expansion and of discrepancy between the lattice parameters in the QD and matrix materials, was studied. The external stresses can also affect the electron subsystem in semiconducting hetero-systems [4]: they can change the energy spectrum of charge carriers, the energy gap width and the frequency of emitted radiation, respectively.

In this work a theoretical model for the modulation of the energy of recombination radiation of InAs/GaAs heterosys-tems with InAs QDs by an acoustic wave has been developed.

2 Model

Consider an InAs/GaAs nanoheterosystem with strained spherical InAs QDs, which undergoes an acoustically induced deformation.

Since the lattice constant of the InAs material (a_1 = 0,608 nm) is larger than that of the GaAs matrix (a_2 = 0,565 nm), then, during heteroepitaxy in the limits of the pseudomorphic growth of InAs on GaAs, InAs is compression-strained while GaAs is tensile-strained. Therefore, the spherical QD can be represented as the elastic dilation microinclusion in the form of a sphere of radius R_0, which is incorporated into a spherical void in the GaAs matrix. The volume of the void is smaller than the volume of the microinclusion. In order to insert such a spherical microinclusion, it is necessary to compress it in theradial directions and, contrarily, the GaAs matrix should be tensed in the limits of a sphere.

In the case of heterostructures with strained QDs, the depth of the quantizing potential is determined by both the internal deformation in the contacting QD and matrix materials, which arises owing to the mismatch between the lattice parameters in them, and the deformation induced by the acoustic wave.

The shifts of the edges of both allowed energy bands as a result of elastic straining can be expressed as

$$\Delta E_c^{(i)}(t) = a_c^{(i)}\varepsilon^{(i)}(t) = \Delta E_{c1}^{(i)} + \Delta E_{c2}^{(i)}(t), \quad (1)$$

$$\Delta \mathrm{E}_{\upsilon}^{(\mathrm{i})}(\mathrm{t}) = \mathrm{a}_{\upsilon}^{(\mathrm{i})}\varepsilon^{(\mathrm{i})}(\mathrm{t}) = \Delta \mathrm{E}_{\upsilon 1}^{(\mathrm{i})} + \Delta \mathrm{E}_{\upsilon 2}^{(\mathrm{i})}(\mathrm{t}), \quad (2)$$

where $\Delta \mathrm{E}_{\mathrm{c1}}^{(\mathrm{i})}$ ($\Delta \mathrm{E}_{\upsilon 1}^{(\mathrm{i})}$) are the energy shifts of the edges of the conduction (valence) band in the QD and matrix caused by a mismatch between the lattice parameters in the contacting materials; $\Delta \mathrm{E}_{\mathrm{c2}}^{(\mathrm{i})}(\mathrm{t})$ and $\Delta \mathrm{E}_{\upsilon 2}^{(\mathrm{i})}(\mathrm{t})$ are their counterparts emerging owing to the action of an acoustic wave; $\mathrm{a}_{\mathrm{c}}^{(\mathrm{i})}$ ($\mathrm{a}_{\upsilon}^{(\mathrm{i})}$) are the constants of the hydrostatic deformation potential of the conduction (valence) bands.

Provided that the Hamiltonian changes in time slowly

enough, one may expect that the stationary characteristic functions of the energy operator calculated for the given time moment will approximate the solutions of the Schrödinger equation. Therefore, any characteristic function found for a definite time moment continuously transforms into corresponding characteristic function for a latter time moment (the adiabatic approximation).

3 Energy spectra of electrons and holes, modulation of the energy of radiation in the strained InAs/GaAs heterosystem with spherical InAs QDs

The amplitude of the energy modulation for radiation the corresponds to the recombination transition between the ground states of an electron and a hole in the InAs/GaAs heterosystem with the InAs QDs depends considerably on the QD radius. In particular, if the QD radius is reduced from 9 nm to 3 nm increase of the energy modulation amplitude from 0,38 meV to 1,17 meV at σ_0 = 150 bar (σ_0 is the amplitude of the mechanical stress created by an acoustic wave at the matrix surface). This can be explained by the fact that quantum dots with smaller dimensions are more sensitive to deformation.

The theoretical calculation of the energy modulation (spectral line width), which were carried out in the framework of the presented model, qualitatively coincide with the experimental data obtain in works [6]. In this paper, according to spectral analysis found that in heterostructures on InAs/GaAs/AlGaAs influenced acoustic wave is modulated radiation energy and expansion of the emission lines in their time-averaged spectra.

Acoustic wave, which is the source of periodic non-homogeneous elastic deformation, leads to a periodical changes of components of the tensor of dielectric permeability of the heterostructure's material. Thus, acoustic-optic interaction leads not only to change of refraction coefficient with time, but also to its non-homogeneous spatial distribution perpendicularly to the resonator. Therefore, the direction of radiation of the heterolaser will be changing with time.

To determine the heterolaser's direction of radiation deviation angle there have been calculated components of tensor of deformation material of the quantum dot and matrix that undergo the influence of an acoustic wave.

It has been established, that the direction of radiation amplitude of the deviation angle depends on the acoustic wave frequency, length of resonator and sizes of quantum dots. The maximum deviation is observed at the moment of time when there is no shift of the radiation frequency.

The emission direction modulation amplitude is governed by the deformation gradient, which depends on both the acoustic wave frequency and the deformation amplitude. If the acoustic wave frequency ω increases from 10^7 s^{-1} to $6 \cdot 10^{10}$ s^{-1}, the angle deviation amplitude grows as $\alpha_{max} - \omega^3$. The further increase of the acoustic wave frequency is accompanied by a non-monotonous variation of the heterolaser-emission deviation angle, with a maximum located at the frequency $\omega \approx 10^{11}$ s^{-1}, which is associated with the growth of a deformation amplitude in the QD material. The growth of a deformation occurs as a result of the approach of the acoustic wave frequency to the characteristic vibration frequency of QD atoms.

4 Conclusions

The electron-deformation model of nanoheterosystem with QDs, which is under influence of acoustic wave, is constructed. The uniform deformation of InAs/GaAs heterostructure with InAs QDs is calculated. The offered approach takes into account as a strain, caused by a misfit of parameters of lattices of contacting materials, and the influence of acoustic wave on intense state of heterosystem with QDs. The reduction of the QD radius is shown to result in an increase in the modulation amplitude of the radiation energy, which is explained by the growth of deformations in the QD material.

A theoretical model for the direction modulation of emission from an InAs/GaAs heterolaser with InAs quantum dots under the influence of an acoustic wave has been developed. As the QD dimensions become smaller, the direction modulation amplitude for the emission from an InAs/GaAs heterolaser grows, which is explained by an increase of the deformation gradient in the QD material.

References

[1] Ledentsov N N 2011 Semicond. Sci. Technol. 26 014001
[2] Sadeghi E 2015 Physica E: Low-dimensional Systems and Nanostructures **73** 1
[3] Nadtochiy A M Blokhin S A,Mutig A, Lott J A 2011 Semiconductors **45** 688
[4] Peleshchak R M, Guba S K, Kuzyk O V, Kurilo I V, Dan'kiv O O 2013 Semiconductors **47** 349
[5] Novikov B V, Zegrya G G, Peleshchak R M, Dan'kiv O O 2008 Semiconductors **42** 1076
[6] Gell J R, Ward M B, Young R J, Stevenson R M, 2008 Applied Physics Letters **93** 081115

The efficiency of using electronic manuals in music education

L Zavatskaya*, L Kozina*

IITU, Kazakhstan

**Corresponding author's e*-mail: lilya.zavatskaya@gmail.com, lyudmila.kozina@gmail.com

Abstract

The publication is devoted to the effective use of electronic manuals in music education. It provides an overview of researches on the use of information and computer technologies in music education, the importance of electronic learning; conducted a survey on the use of information and computer technologies among the students. In conclusion, it is a proposal to implement electronic manuals in the education process of Kazakh National Conservatory named Kurmangazy.

Keywords: electronic manuals, information and computer technologies, e-learning

1 General

The effectiveness of electronic learning (e-learning) is widely used in global education and recognized by leading universities in The Republic of Kazakhstan. The e-learning is the education with the help of information, electronic technologies. E-learning includes independent work with electronic materials and with the using of PC; the ability to use web resources; the use of electronic manuals; the ability to get knowledge from any place in the world. Through developing of e-learning, it is possible to expand the range of subjects which students can explore themselves.

The researchers' interest increases in introducing of e-learning in the educational process of creative universities in recent years. A Usenova developed electronic manual "The musical style in the artistic space of culture" for students, in Rochester University it was developed course "Fundamentals of audio and music engineering" by R Clark and M Bocko for students to learn the basic concepts of acoustics. I V Zaboltovskaya implemented the method of the use of new information technologies in the practice of teaching musical disciplines at the various stages of the modern music education, which allows significantly increase the level of understanding the material which is provided. O N Piksayeva considers the problem of computer technologies in the process of teaching music on the examples of vocal preparation of the Faculty of Pedagogical ' students [1]. N D Petrakovskaya searched the effectiveness of the use of information and computer technologies on the music classes and explained the importance of the use of electronic manuals [2]. I S Avramkova researched the pedagogical innovations in the primary learning to play the piano on materials of modern teaching aids. I M Krasilnikov researched electronic musical creativity in the system of art education. S.P.Polozov researched and implemented educational and electronic manuals in musical education [3]. I.V.Shlykova's work is taking important place, in which she showed the importance of technological resources in teaching music by using educational materials in music classes. All of the above of researches shows the implementation of e-learning not only in theoretical disciplines, bus also shows the successfully using in special classes. However, there is passivity in this area study.

The survey (Table 1) about using information and computer technologies (ICT) in educational process at the faculty of "Musical education and pedagogical innovations" in Kazakh National Conservatory, named Kurmangazy was conducted for two groups: students who are musicians (54) and students who are not musicians (42):

TABLE 1 Survey about using ICT

	The group of future specialists – musicians	**The group of students who are not musicians**
The knowledge and the using of ICT	53%	78%
Do not know about the using the ICT in education process	47%	12%
Are familiar with the using of the ICT in the education process	38 %	78 %
Existing barriers for the using of ICT in the education process	68% - don't have skills 15% - don't have knowledge 5 % - don't have practice 12% - don't have barriers	28% - don't have skills 11% -don't have knowledge 3% - don't have practice 58% - don't have barriers

According to the survey, it is seen that in musical education most of students do not have skills in the using of ICT in educational process. In this regard, the use of e-learning in music education is especially relevant in the training of musicians, as this will help to develop self-learning activities of the student, select the individual trajectory of training.

2 Conclusion

It was proposed two projects to implement ICT in education at this institution: electronic manuals on playing the flute and vocal with using cloud technologies, which makes it convenient to use them. Manuals contains the necessary information gathered from several books, collection of notes, audio and video materials, and metronome; to create them were used PHP and JavaScript. They can be applied to teachers of creative institutes in the educational process. The developed manuals successfully implemented in education process of the Kazakh National Conservatory named Kurmangazy and can be used by students who are musicians, both in academic and in independent work.

References

[1] Пиксаева О Н 2008 *Компьютерные технологии в процессе обучения музыке на примере вокальной подготовки студентов педагогического факультета* Москва
[2] Петраковская Н Д 2007 *Механизмы использования информационно-компьютерных технологий на уроках музыки* Россия
[3] Полозов С П 2000 *Обучающие компьютерные технологии в музыкальном образовании* Новосибирск

Monitoring smart city infrastructure

A Khamitov[1*], R Muhamedyev[2]

[1]International University of Information Technologies, Almaty

[2]Institute of Information and Computational Technologies, Almaty, Kazakhstan

**Corresponding author's e*-mail: alikhamt@umail.iu.edu

Abstract

Such processes as active urbanization, automobilization, increase in population number and growth of cities' settling density led to the whole complex of problems of modern megalopolises: transport, ecological, social, complications with population mobility, restriction of natural resources, and disappearance of cultural and historical heritage. Smart City model implementation can be one of the decisions today. Development of Smart City infrastructure is an introduction step for integration of the intellectual city platform and its architecture. According to Smart City model, the key issue at infrastructure development stage with the goal to increase the municipal economy efficiency is the construction of monitoring system. This task can be achieved through the use of multilevel monitoring systems and evaluation model of these systems.

Keywords: Smart City, ICT, green terminal, taxonomy, green energy

1 Introduction

The analysis and assessment of existing Smart City models, correspondingly applied infocommunication technologies (ICT) [1], their influence on green energy area [2, 3] allowed us to construct the extended ICT taxonomy in the field of intelligent cities and to offer multilevel system of Smart City monitoring which consists of several components: additive model for the assessment of different levels of monitoring system, the intelligent "green" terminals, smart wearable devices which main function is based on the Crowdsourcing principles for data collection. The concept is illustrated by figure 1.

The model and system, offered in this article, apply several methods of data preprocessing, instruments of data analysis in the big distributed systems and their assessment by machine learning methods. As the result, this work brings the following important questions to discussion: the analysis of shortcomings in the developed additive model, the analysis of integration difficulties in the data collection systems developed according to various standards, the need of assessment of the obtained data on Smart City and its verification.

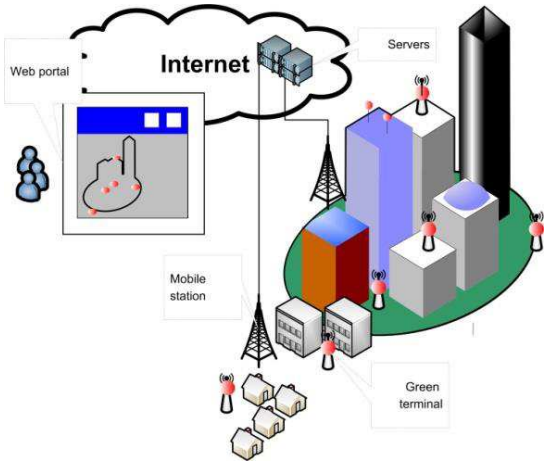


FIGURE 1 System of monitoring Smart City infrastructure

References

[4] Muhamedyev R I, Amirgaliyev Y N, Muhamedyeva J, Khamitov A N, Abdilmanova A 2015 Revelation of new ICT domains for upcoming Kazakhstan's participation Proceedings of the 2015 Conference on Electronic Governance and Open Society: Challenges in Eurasia, EGOSE-2015. St.Petersburg 179-88

[5] Muhamedyev R I, Alihodzhaev I, Ishmanov A, Muhamedijeva J 2015 Monitoring of renewable energy sources in RK: technological preconditions, architecture of system and market volume Proceedings of 16th International Symposium on Advanced Intelligent Systems, ISIS 777-91

[6] Muhamedyev R, Ishmanov A, Andreev A, Muhamadijeva J, Alikhodzhayev I 2015 Technological preconditions of monitoring of renewable energy sources of the Republic of Kazakhstan Proceedings of the 2015 Twelve International Conference on Electronics Computer and Computation (ICECCO), IEEE 101-7

Gaming addiction through System Dynamics

I Melnikov

Kazakh-British Technical University (KBTU) Kazakhstan, Almaty

Corresponding author's e-mail: data.set.pub@yandex.com

Abstract

While the number of gamers increasing in a big way every year, gaming addiction has become a serious problem for gamers, and the people around them. This paper seeks to examine the process of gaming industry, by breaking them down into interconnected components. These components are then formalized using the System Dynamics approach. Based on the systemic model that we created, we are able to see how certain parts of the system interact with and can be influenced by other parts of the system. It helps us propose several policy measures and regulations, which can potentially help society address the looming gaming addiction problem and prevent from becoming even more dangerous. The gaming industry also was evaluated from the financial perspective, and this helps us analyze important connections and understand which parties are involved and who should be held responsible for people who are being addicted.

Keywords: Gaming addiction; System Dynamics; Factors; Connections;

1 Introduction

These days, over a billion people play video games [1], and this has made the gaming industry a multi-billion dollar industry [2]. However, this ability to get some people to move up the ladder as they play video games more and more and for increasingly longer intervals, and "progress" from being non-players to casual players, to enthusiasts, to hardcore enthusiasts, and finally to addicts, is creating huge problems from the social, economic and other points of view. With increasing Internet availability and affordability around the world [3], and faster penetration of cheap mobile devices [3], access to the video games is also accelerating.

The gaming addiction problem has received a significant amount of attention from analysts and researchers over the last decade or two, but the alarm bells have started going off in several countries such as South Korea and China, where the gaming addiction problem is now being recognized officially as a serious one [4]. Researchers have tried to look at the gaming industry to evaluate and describe it based on different criteria and approaches such as using internet addiction as a foundation for their research; drawing links to other addiction problems such as gambling addiction, addiction to alcohol and narcotics, and so on; and using socio-demographic variables etc. [5].

It is important to explore the gaming industry further, and describe it in a more formal-sense. In order to do that, the System Dynamics approach [6] can be very helpful, in that it enables us to build a system with carefully chosen parameters and analyze the problem from a number of different policy points of view. There are very few, instances of studies that have used this approach [4, 7].

We believe that our model based on the System Dynamics approach could be used as a yardstick for governments, at the national, provincial or local level, to help evaluate various policy measures and alternative rules and regulations, and to formulate and implement the policies most suited to their context and to their needs. There are several examples of these countries, for instance South Korea and China [8], that have started formulating policy responses to the gaming addiction problems their citizens are facing.

This research will go further into details of the gaming industry and address these issues:

1. Why do people play video games?
2. What is the connection between different components?
3. What should be done to try to prevent gaming addiction?
4. What can be done in order to help people who are addicted?

2 General

The aim of this paper was to provide a more specific, formalized representation of the gaming industry, and to analyze the number of different ways that it can affect society from social, and economical perspective. We believe that the System Dynamics-based model of the gaming industry would help analysts better visualize, measure the gaming industry, formalize and evaluate various policy prescriptions, and so on. This gave us an opportunity to look more closely at specific parts or aspects of the gaming industry-system, and to explore some scenarios that might be obtained in the future. It could facilitate greatly the process of formulating and implementing policies at the government level and it can also be useful as a self-study tool.

Many factors of the gaming industry have been carefully

reviewed [9, 10], and identified. For instance, the number of hours spent (consecutively and per unit of time such as week or month) playing video games, how players are connected to each other, to game providers, and increasingly to members of an online or offline audience, what factors determine which people are more likely to progress from being just casual players to enthusiasts, to addicts, etc., and how much time these people spend playing video games, what are the main parameters and variables that need to be included in an analytical model, and so on.

Moreover, research shows what factors can help society fight against this addiction, by specifying factor which could decrease the number of population who play and cannot control themselves in terms of playing time e.g., building a treatment centers and offering more substantive and potentially successful treatment regimens, educating and hence increasing the awareness of the addict's or would-be-addict's close circle of people (relatives, friends).

3 Conclusions

Numerous researchers have been working on trying to find what parameters and variables are critical in gaming addiction modeling and analysis; understanding the connections to and correlations with other disorders; on providing sources of statistical evidence; developing different assessment tools, and so on. This paper connects all of these, by using the System dynamics approach (Figure 1). After examining the system that we have created, we will be able to "test-drive" alternative regulatory and policy approaches, which can be used to make well-founded and better decisions in the future.

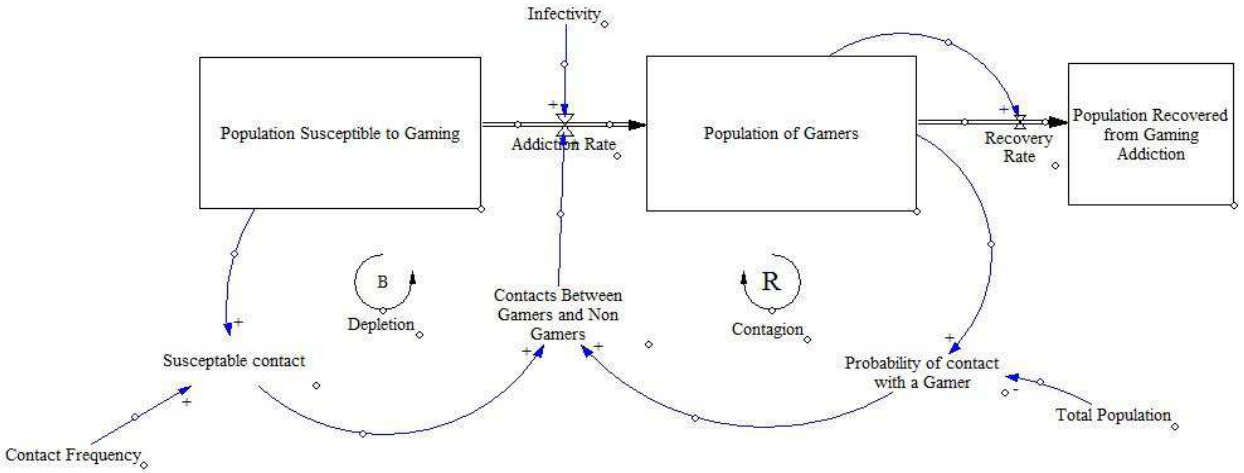


FIGURE 1 System Dynamics model of propagation of gaming addiction through a population of susceptible individuals

References

Newzoo Top 100 Countries Represent 99.8% of $81.5Bn Global Games Market 2014 Available from: https://newzoo.com/insights/articles/top-100-countries-represent-99-6-81-5bn-global-games-market/ Accessed March 7, 2016

[1] Newzoo Top 100 Countries by Game Revenues 2016 Available from: https://newzoo.com/insights/rankings/top-100-countries-by-game-revenues/ Accessed March 7, 2016.

[2] Newzoo The 2015 GMGC Global Mobile Games Industry Whitebook is Now Available 2015 Available from: https://newzoo.com/insights/articles/the-2015-gmgc-global-mobile-games-industry-whitebook-is-now-available/ Accessed March 7, 2016

[3] Bong-Won Park, Jae-Hyeon Ahn 2008 Imposing Tax and Rebate Policy for Addressing Game Addiction Problem Business School KAIST

[4] Griffiths M, Kuss D, King D 2012 Video Game Addiction: Past, Present and Future Current Psychiatry Reviews **8** 308-18

[5] Sterman J 2000 Business Dynamics: Systems Thinking and Modeling for a Complex World Irwin McGraw-Hill Boston MA

[6] Bong-Won Park Jae-Hyeon Ahn 2010 Policy analysis for online game addiction problems System Dynamics Review **26**(2) 117–38

[7] CNN South Korea pulls plug on late-night adolescent online gamers 2011 Available from: http://edition.cnn.com/2011/11/22/world/asia/south-korea-gaming/ Accessed March 7, 2016.

[8] Griffiths M 2014 Gaming addiction in adolescence revisited Education and Health **32**(4)

[9] Shang Hwa Hsu, Ming-Hui Wen, Muh-Cherng Wu National Exploring user experiences as predictors of MMORPG addiction Computers & Education **53** 990–9

Development of OWL model for Smart-system of distance learning of visually impaired people

G A Samigulina, A S Shayakhmetova*

The Institute of Information and Computational Technologies, Almaty, Kazakhstan

**Corresponding author's e*-mail: asemshayakhmetova@mail.ru

Abstract

The article discusses the use of language OWL (Web Ontology Language) for creation of the combined ontological model of Smart-system of distance learning of visually impaired people to the editor of ontologies Protégé. Development of intellectual systems of distance learning by means of ontological approach is an actual problem. At creation of Smart-system intelligence techniques as neural networks, fuzzy and neuro-fuzzy logic were used.

Keywords: distance learning, visually impaired people, ontological approach, OWL-model.

1 Introduction

In last years in the construction of distance learning systems (DL) intelligence methods are actively used [1], and also ontological approach is widely used. In work [2] the technology of the description of process of learning is presented in the form of ontological models and applications of received results for solution of problem of management of educational activity. In article [3] creation of ontological model on the basis of artificial intelligence and expert systems is offered.

Development of intelligent systems of DL people with disabilities, including the visually impaired people is actual.

2 The aim of research

The aim of research is development of Smart – system of distance learning for visually impaired people on the basis of ontological approaches.

The combined OWL model of DL of visually impaired people of the model consists of the learner, learning and joint use laboratory are constructed in the ontology editor Protégé. The proposed model [4, 5] are complementary and interrelated. This combined model allows to deeper analysis of numerous connections between ontological models and take account them software development. The multi-dimensional data processing is implemented based on intelligent methods: neural networks, fuzzy and neuro-fuzzy logic in Smart-system of DL.

3 Conclusions

Thus, the proposed Smart - system of distance learning for visually impaired people based on combined OWL model allows to structure input and output data, takes into account the feature functioning of the software for visually impaired people.

Acknowledgement

This work is carried out on the grant "Development of the Information Technology, Algorithms and Software and Hardware for Intelligent Control Systems for Complex Objects under Conditions of Parameter Uncertainty" (2015-2017) at the Institute of Information and Computational Technologies.

References

[10] Razmerita L 2011 An Ontology-Based Framework for Modeling User Behavior – A Case Study in Knowledge Management IEEE **41**(4) 772–83
[11] Aggelopoulou N, Pierrakeas C, Artikis A, Kalles D 2014 Ontological Modelling for Intelligent e-Learning ICALT 25-7 (in Greece)
[12] Samigulina G, Shayakhmetova A 2015 The information system of distance learning for people with impaired vision on the basis of artificial intelligence approaches. Smart Education and Smart e-Learning Springer International Publishing Switzerland **41** 255-65
[13] Samigulina G, Shayakhmetova A 2015 Combined ontological model for distance education of visually impaired people. Problems of Informatics **3** 28 – 36
[14] Samigulina G, Shayakhmetova A 2015 The construction of the intellectual system of distance learning for the people with impaired vision SEMW **2** 848-52 (in New Zealand)

Discrete model of borehole application in classifier quality analysis

K Yakunin[1*], Y Kuchin[2], A Abdilmanova[3], R Muhamedyev[4]

[1]International Informational Technology Univercity, Almaty, Kazakhstan

[2]LLP *«Geotechoservice»,* Kazatomprom, Almaty, Kazakhstan

[3]International Informational Technology Univercity, Almaty, Kazakhstan

[4]*IICT MES RK, Almaty, Kazakhstan, ISMA university, Riga, Latvia*

**Corresponding author's e*-mail: yakunin.k@mail.ru

Abstract

Evaluation of classification models is a vital part of classifier optimization, as it provides metric, which allows tuning different parameters of the classification model to achieve better quality of recognition. However, in some cases it might be unclear, if applied methods and/or available data can be theoretically tuned to achieve desired quality. In such cases, digital model of the studied phenomena (geological boreholes in this case) can be used to clarify the question. Discrete model of geological borehole was developed, a series of computational experiments were conducted and results were analysed, in order to define further development direction.

Keywords: machine learning, digital borehole model, classifier evaluation

1 Introduction

Uranium extraction at deposits of Kazakhstan is performed using underground Acidic In Situ Leaching (ISL) method (Figure 1). This methods requires knowledge about structure of underground rocks and layers, so full-scale geological research is required. However, manual interpretation of the research data takes time and is affected by human factor, so delays and errors can lead to significant economical drawbacks. For this reason, the issue of automated classification is very important.

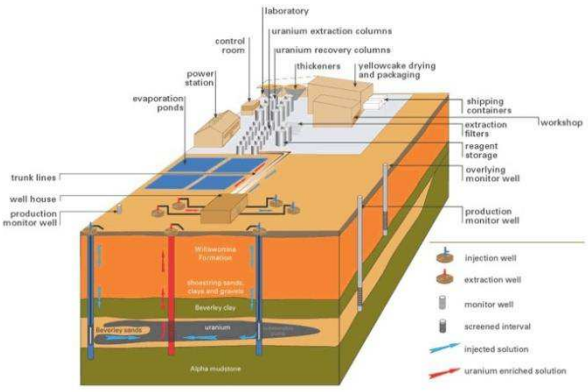


FIGURE 1 Underground leeching method of uranium extraction [1]

The problem was discussed earlier in [2-5] The existing programs for geophysical data processing does not support automatic classification process [6]

A system for storage, processing, classification and analysis of data was developed, which adopts a variety of data analysis and machine learning algorithms and models [7, 8]. The work on improving the quality and speed of data recognition is ongoing.

The development of the system faced with what seemed to be a ceiling for recognition quality. However, from scientific point of view some evidences and proofs of this "ceiling" are needed, as well as the analysis of whether the problem lies in data or applied methods.

One of the measures that were taking to resolve the question is creating digital model of borehole. In practice, data gathered in the course of geological research of uranium deposits of Kazakhstan is never perfect. From natural noises, unperfect measurement tools, to the big complexity of some of the measurement procedures subject to human factor may lead to significant distortions and errors. However, in practice, unfortunately, there is no real way to know if the data is good or distorted beyond any recognition.

The digital borehole is not subject to such problems, as it is generated based on geological theories and physical models of ideal measurement tools. And in case, if distorted data is needed to be tested, any type of noise, errors or distortions can be added to digital (synthetic) boreholes.

So, synthetic digital boreholes can be used as test case for processing and recognition models, in order to isolate data faults from method faults, so that further course of work and research can be defined. Either problem lies in data, so some changes regarding data acquisition and processing have to be made, or methods of recognition are what create the "ceiling" for the quality and have to be changed or improved.

2 Data method interpretation

Data obtained in the course of the geophysical research can be interpreted by a specialist or an intelligent system based on machine learning methods. Note that systems of automatic recognition and classification are used in many spheres of human activity, including processes of solving problems of lithology.

The developed system includes functionality for formation of learning samples, preprocessing of the data, training Machine Learning models, integrating them into ensembles of models and using the models/ensembles to interpret the data. Each of the steps is an important factor improving interpretation quality.

Usually, there is a lot of geological research information available, but it is not effective, to just use all of the possible information when training a learning model. So, the issue of formation of learning samples is important and the developed system allows users to form the samples based on several algorithms and rules.

The quality of recognition depends a lot on preprocessing of data. The geological research data obtained from uranium deposits of Kazakhstan using electromagnetic logging can contain several types of artefacts and problems, which have to be dealt with in order to train models and interpret data correctly.

Machine Learning models have different features and the interpretation result may vary from one model to another. However, the research has shown that there is no one universal machine learning model, which is strictly better, than any other.

Geophysical data obtained during the course of geological research of uranium deposits of Kazakhstan typically contains several electrical methods: induction logging (IL), apparent resistively logging (AR) and the method of the natural polarization (NP). The raw data is measurements of each of the electrical properties of the rocks (IL, AR, NP) on each 10 cm of depth. Then this data is used by expert geologist to identify what type of rocks (sand, clay, gravel, etc.) are located at every depth, based on its electrical properties. The main goal of the developed system is to automate the process of data interpretation.

Interpretation methods include artificial neural networks (ANN), metric methods (K nearest neighbours), other machine learning modes, as well as heuristic interpretation method, based on knowledge extracted from experts geologists.

3 Discrete borehole model

The developed tool generates data for discrete intervals 10 centimetres each. This length is defined by technological process – most common measurement equipment used at uranium deposits of Kazakhstan performs measurements at this rate.

The developed tool for generating synthetic discrete boreholes performs three steps:

1) Generating lithological types
2) Generating physical (electro-magnetic) properties values
3) Simulating measurement process

First step is generating lithological types. List of possible lithotypes, weights, which define frequency of occurrence of each lithotype, and probability distribution function for lithotype layer width is defined in a separate configuration file.

Output of the first step is a list of lithotype codes, generated according to real borehole properties. For example, layer of the same lithological type cannot have width lower, than certain value, different lithological types are statistically distributed same as in real boreholes.

Next step is generating values for physical properties. Separate configuration files contain distribution function for each of the generated parameters for each lithological type. For each lithotype distribution function is defined separately and can be either uniform, normal distribution, or discretely defined using weights (number of weights may vary, in order to allow high accuracy for tuning the distribution function).

However, data generated in second step has significant differences from the real data obtained in the course of geological research (Figure 2). The reason lies in measurement process – although recording occurs every 10 centimetres, a tool has length of about a meter.

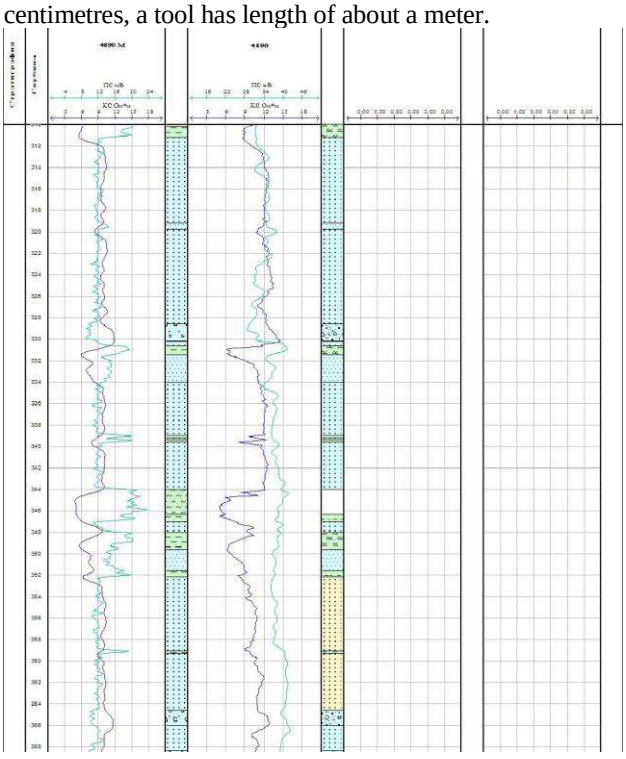


FIGURE 2 Synthetic (left) and real (right) data

Different tools can have different length, position of electrodes and position of recording point relative to the electrodes. This means, that every discrete point of data (with period of 10 centimetres) actually contains aggregated information about one meter of geological rocks. A configuration file contains weights and flags, which describe position of electrodes, recording point and measure of influence of distant lithological rocks on the record.

This process is simulated in the third step. During this process values are, in a sense, aggregated and averaged

(with weights). Figure 3 illustrates this. For example, high "real" values at around 109-112 after simulating of measurements. Such averaging makes it much more difficult to analyse and interpret, however it is the features of real geological research, so this data has to be handled.

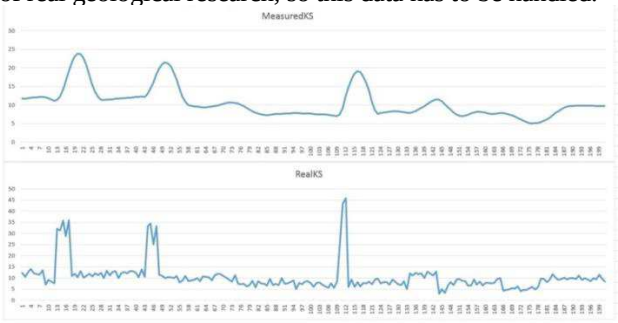


FIGURE 3 Sample of synthetic borehole

4 Experiments and analysis

A set of experiments was performed, in order to compare the results of developed processing and interpretation methods on real and synthetic data.

The results are below:

If we compare Table 1 and Table 2, it is clear, that synthetic data is interpreted with much more accurately and all of the quality metrics, such as Kappa and T1Score confirm it.

TABLE 1 Quality of interpretation of synthetic borehole

Borehole number	Accuracy	Kappa	Wm recall	Wm precision	T1Score
1	0.9122	0.889	0.9174	0.8605	0.888
2	0.9295	0.911	0.9196	0.9053	0.912
3	0.9391	0.923	0.9411	0.8993	0.919
4	0.9545	0.942	0.9621	0.9281	0.944
5	0.9591	0.949	0.9625	0.9355	0.948
6	0.9678	0.96	0.9713	0.9458	0.958
7	0.974	0.967	0.9733	0.9621	0.967
8	0.9748	0.968	0.9761	0.9623	0.969
9	0.9789	0.973	0.9788	0.9733	0.976
10	0.9792	0.974	0.9783	0.9744	0.976
11	0.9801	0.975	0.9775	0.9762	0.976
12	0.9809	0.976	0.9812	0.9781	0.979
Average	0.9608	0.9505	0.9616	0.9417	0.951

TABLE 2 Quality of interpretation of real boreholes

Borehole #	Accuracy	Kappa	WM recall	WM precision
1	0,68	0,509	0,383	0,385
2	0,75	0,547	0,312	0,427
3	0,31	0,138	0,268	0,265
4	0,60	0,449	0,416	0,427
5	0,48	0,316	0,400	0,361
6	0,53	0,264	0,247	0,229
7	0,48	0,146	0,178	0,236
8	0,44	0,156	0,246	0,258
Average	**0,53**	**0,315**	**0,306**	**0,323**

Under the assumption, that synthetic borehole model correctly represents real borehole properties, it can be stated, that the "ceiling" of results quality is defined by data, because on ideal model of borehole, the developed methods perform with high, accuracy, while real life data results are significantly worse.

5 Conclusions

Digital borehole model was developed and a set of computational experiments was performed. The results of interpretation of synthetic boreholes was significantly higher, than results for real data.

If we assume, that developed discrete borehole model represent real borehole properties and features, does it mean, that further development of processing and interpretation of algorithms will yield no result? No.

Further research regarding different approaches to working with the geological research data is going to be executed. Machine learning must not become a tool to put responsibility for unsatisfying results solely on bad data. Some other approaches, or some other knowledge added to the system may still improve the results.

Acknowledgments

The work was funded by grant No. 0168/GF4 and 2318/GF3 of the Ministry of Education and Science of the Republic of Kazakhstan.

References

[1] World nuclear association - http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium.aspx
[2] Kuchin Y, Muhamedyev R, Muhamedyeva L 2001 Analysis of the data of geophysical research by means neuronet methods The proceedings of the VIII international scientific conference on Electronics And Computer technol*ogies, IKECCO'2011.*-Almaty: SDU ISBN 9965-792-10-0. 289–97 Kroto H W, Fischer J E, Cox D E 1993 The Fullerenes Pergamon: Oxford
[3] Muhamedyev R I, Kuchin Y, Gricenko P, Nurushev Z, Yakunin K, Muhamedyeva E 2012, October Recognition of geological rocks at the bedded-infiltration uranium fields by using neural networks. In Open Systems (ICOS), 2012 IEEE Conference on 1-6
[4] Gritsenko P, Iskakov S, Muhamediyev R, Yakinin K 2014, October Integration of results from recognition algorithms and its realization at the uranium production process In Application of Information and Communication Technologies (AICT), 2014 IEEE 8th International Conference 1-4
[5] Muhamediyev R I, Amirgaliyev Y, Iskakov S K 2014 Integration of Results from Recognition Algorithms Applied to the Uranium Deposits Selected Papers from The 6th International Conference on Soft Computing and Intelligent Systems and The 13th International Symposium on Advanced Intelligent Systems (SCIS&ISIS2012)). Journal of advanced computational intelligence and intelligent informatics **18**(3) 347-52
[6] Kuchin Y, Muhamedyev R 2015 Automation of data processing of geophysical well logging data on stratum-infiltration type uranium deposits Cloud of Science **2**(3) 451-64
[7] Bektemyssova G, Kuandykov A, Muhamediyev R, Iskakov S, Khamitov A 2014 Construction of recognition system at the uranium production process In Control, Automation and Systems (ICCAS), 2014 14th International Conference 1462-5 IEEE
[8] Amirgaliev E, Isabaev Z, Iskakov S, Kuchin Y, Muhamediyev R, Muhamedyeva E, Yakunin K 2014 Recognition of rocks at uranium deposits by using a few methods of machine Learning. In Soft Computing in Machine Learning 33-40 Springer International Publishing

The research of information system in balance of currency exchange rates

L Kalymbetova

International Information Technology University, Zhandosova Str. 8, Almaty city, Kazakhstan

Corresponding author's e-mail: lyazzatkalymbetova@gmail.com

Abstract

In a world economy the free-convertible currency is important task of determining the balance of exchange rates. So that it was build a mathematical modelling of the currency exchange rates. Exchange rates will be balanced, if we exclude the possibility of speculative profit on closed sequences buying currency transactions. In the case of imbalance problem arises of determining the sequence of operations leading to the production of speculative profits. This requires information decision support system containing a database, mathematical models and interactive graphical interfaces and media analysis. The paper main purpose consists of working out of mathematical methods and the models, allowing to analyze operations on purchase and sale of currencies, to predict, advance speculative cycles, to give the necessary information for decision-making for banks of the second level with the purposes of quotation price adjustment.The research main purpose consists of working out of mathematical methods and the models, allowing to analyse operations on purchase and sale of currencies, to predict, advance speculative cycles, to give the necessary information for decision-making for banks of the second level with the purposes of quotation price adjustment.

Keywords: World economy, graph theory, exchange rates, decision-making, currency, speculative cycles.

1 Introduction

The world's economics has entered the challenging period, having the American financial system to be in the centre of this issue. The innovations in the area of mortgage loan could be considered to be one of the main reasons for the crisis. In the conditions of the world's financial crisis, governments have to manipulate the exchange rates in order to change the conditions of an external trade. To achieve that decision makers have to use methods such as balancing exchange rates, dual exchange market, devaluation and revaluation.

Exchange rates have a significant impact on foreign trade in different countries, as tool among values of national and world markets, affecting the price ratios of exports and imports and causing a change in domestic economic situation and changing the behaviour of companies operating in the export or compete with imports.

In general, depreciation of the national currency allows exporters to this country to reduce prices for their products in foreign currency, which received the award at the appreciated exchange proceeds of foreign currency to the national cheapened and are able to sell products at prices below the world average, which leads to their enrichment at the expense of their material losses countries. Exporters increase their profits through mass export of goods. On the other hand, at the same time the depreciation of the national currency increases the cost of imports as to obtain the same amount in its currency, foreign exporters are forced to raise prices, which stimulates the growth of prices in the country. The decline of the exchange rate reduces the real debt in the national currency, increases the severity of the external debt denominated in foreign currency. It becomes unprofitable to export profits, interest, dividends received by foreign investors in the currency of the host countries. These profits are reinvested or used to purchase goods at domestic prices.

The problem of determining the balance of exchange rates is relevant in a market free-convertible currency. Exchange rates are balanced, if we exclude the possibility of speculative profit on closed sequential operations buying currencies. In the case of imbalance arises the problem of determining the sequence of operations leading to the preparation of speculative profits.

Therefore, it is obvious, that it is necessary to develop information systems, which based on decision-making, containing a database, mathematical models and interactive graphical interfaces, data analysis tools. It should be developed information systems decision-making support for 2nd level banks in order to adjust exchange rates, using an expert system. In short, these systems based on cross arbitrage system, which means making profit from exchanging rates of 1 currency with other currencies, and those currencies with each other.

The professor of doctor science Mr. Kurmashev and Mr. Mutanov dedicated their research in given area. Some parts of research work have been used at scheduling of departments PKO on currency transactions in following branches of banks: «KaspiBank» and "BTA-BANK".

The developed mathematical model of the balance of exchange rates is an example of the financial and mathematical model, the application of which in the practice of banks and other financial institutions will allow making

informed, reasoned decisions. The construction of models and research, problem solving on the balance, provides definitions and statements of evidence, and suggests methods for their solution. Delivered in the study of problem of definition and forecasting of speculative transactions in the foreign currency market for the first time a mathematically formalized as the problem on directed graphs. It is developed new, not previously encountered methods for solving the above mentioned problems. Mathematical model of buying and selling currency operations, which also takes into account the limitations and conditions arising from the carrying out of operations with currency, and formulated the problem of balance. The criterion of the model is to determine the bank balanced exchange rate. The model suggests the possibility of carrying out calculations in simulation mode that allows you to change the conditions and parameters under various assumptions about the state of the money and foreign exchange markets.

The main factor, directly and indirectly determining the rate of one currency against another - is the difference in interest rates in force in two currencies (Interest Rate Differential).

Suppose a bank customer has € 1 million, which is 3 month period are exempt from the turnover of the company and can be placed in a deposit for income. In this case, assume that interest rates on euro 2.65 per cent per annum, and the dollar are higher rates 5.28 percent. Then, converting euro to dollars, you can get more revenue. For example, today the euro EUR = 1.19 $. If you put the amount of EUR 1 million in a deposit, then after 3 months will be the amount obtained: $1+\frac{2.65}{100}\cdot\frac{90}{360}=1.006625$ million euro.

If you convert 1 million euro into dollars at the exchange rate of EUR and place them in a dollar deposit, the amount will be received

$$\text{EUR}\cdot\left(1+\frac{5.28}{100}\cdot\frac{90}{360}\right)=1.19\cdot 1.0132=1.205708 \text{ million \$}$$

If the euro exchange rate for the 3 months would remain the same EUR = 1.19 $, the result of a second embodiment of the euro stood at 1.0132, and the difference between the amount obtained by converting the received dollars back into euro, and resulting in a first embodiment, the result of:

1.0132–1.006625= 0.006575 millions = 6575 million euro, amounted to euro benefited from the translation of US dollar and dollar deposit operations obtained by the difference in interest rates on the dollar and the euro.

2 Mathematical modelling

To making real this system it is necessary to realize mathematical algorithm of the project. For that, the term of graph theory should be taken into consideration.

Graph theory is the study of graphs, which are mathematical structures, used to model pair wise relations between objects. A graph in this context is made up of vertices, nodes, or points, which are connected by edges, lines [1].

Let's consider n as a currency types. For each type of currency it is associated a vertex of a directed graph:

$$G=(N, E), \quad (1)$$

$N=\{1,\ldots,n\}$. Each edge $(i, j) \in E$ assign the positive number $\alpha(i, j)$ - Currency conversion factor of type i in the currency type j. The difference in the rate of purchase and sale is taken into account by the equation: $a(i, j)\ \alpha(j, i)<1,\ i \neq j$ (fees). We assume that graph G has all edges and vertexes, it means $(i, j) \in E$, and $\alpha(j, i)=1$, i= 1,..,n. Circuit $K=((i_1, i_2), (i_2, i_3), ..., (i_p, i_1))$ defines a sequence of operations on purchase (exchange) rates. Let: $|K| = P$ - number of edges in the loop:

$$\alpha(K) =((i_1, i_2), (i_2, i_3), ..., (i_p, i_1)). \quad (2)$$

Contour K will be called profitable, if $\alpha(K)> 1$. Profitable circuit determines the sequence of operations leading to speculative profit. A graph G will be balanced, if it does not exist profitable circuits. A balanced graph corresponds to a balanced exchange rate. It is noticeable that, if K - lucrative circuit that $|K| \geq 3$.

3 Statement and solution of the problem of the balance of exchange rates

The problem of the balance of exchange rates formulate as follows manner. For a given graph G= (N,E) and specify the number of $\alpha(i, j)$, satisfying the above conditions, it is necessary to determine whether a graph G is balanced; if the graph G is not balanced, it is necessary to find at least one circuit profitable. The general problem is that to find all the lucrative circuit (for which $\alpha(K)> 1$). For this, conversion factors are replaced by their logarithms, which are called the lengths (or weights) arcs. And then, this problem is reduced to determining the contours of positive length.

Let $\beta(i, j)=lg\alpha(i, j)$, $\beta(K)=lg\alpha(K)$. From (2) follows $\beta(K)= \beta(i1, i2) +...+ \beta(ip, i1)$. Each vertex (i, j) of graph G assign the number of $\beta(i, j)$, which is called the length of the vertex (i, j). The contour K is profitable if and only if the length of $\beta(K)$ of this circuit will be a positive number [2].

A simple task was posed and solved, and invented an algorithm for determining whether there is a profitable path or not.

For solutions offered a simple polynomial algorithm to solve the problem of appointments - simple polynomial problem. In order to determine the contours of positive long formulate the following problem.

$$f(x) = \max \sum_{i=1}^{n}\sum_{j=1}^{n} \beta(i, j)\cdot x_{ij}, \quad (3)$$

$$\sum_{j=1}^{n} x_{ij} = 1, \quad i = 1, \ldots, n, \quad (4)$$

$$\sum_{i=1}^{n} x_{ij} = 1, \quad j = 1, \ldots, n, \quad (5)$$

$$x_{ij} \geq 0, \quad i, j = 1, \ldots, n. \quad (6)$$

The problem (3) – (6) – a task assignment. The

components x^0_{ij} of the optimal angle of the vector $x^0 = (x^0_{11},\ldots, x^0_{1n},\ldots, x^0_{n1}, \ldots, x^0_{nn})$ of this problem is either 0 or 1. The vector x^0 defines a set of $\{K_1, K_2,\ldots, K_r\}$ disjoint paths in the graph G [1]. Equality $x^0_{ij} = 1$ means that edge (i, j) belongs to one of these circuits. Any vertex of G belongs to one of the circuits.

Let x^0 – the best corner vector problem (3) – (6), $\{K_1, K_2,\ldots, K_r\}$ – a plurality of contours defined by the vector x^0. Then:

1. $f(x^0) \geq 0$;
2. if $f(x^0) = 0$, the graph G balanced;
3. if $f(x^0) > 0$, one of the graph $K_1, \ldots, K_r$ is profitable.

To continue research in this area formulated the task of determining in the digraph with given weights (lengths) circuit arcs with maximum arc weight average value (maximum density contour). The need to address this problem arises in the study of mathematical models of the balance of exchange rates. Solution of the problem is reduced to solving a number of tasks assignments.

The basic calculation when making a purchase of a currency is the calculation that for a certain period of time, its rate will rise to calculated value. If this period of time will be stretched or rate increase by a smaller amount, the transaction can not only bring profits, but also create losses as the implementation of arbitrage, there are certain commission expenses on conversion [4].

5 Experimental study of the balance model

Consider a specific example for the solution of the problem of the balance of exchange rates (data are taken from the bank's exchange points). According to these data constructed a directed graph G and a table of currency exchange rates. In this case the exchange rates rigidly attached to a base currency (the US dollar) and the conversion factor is not the main one currency to another is not uniquely determined by the ratio of the basic conversion factors of the currency in the primary. The challenge is that you need to determine whether the exchange rates balanced and excluded any possibility of making a speculative profit on closed sequences buying currency transactions (Figure 1, Table 1).

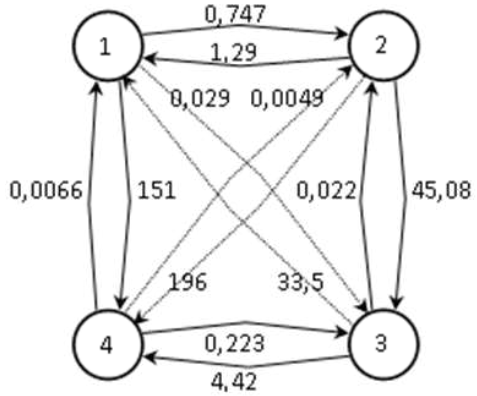


FIGURE 1 Oriented graph representation of the system

TABLE 1 The graph length according to the currency exchange rates

№	1 USD	2 EUR	3 RUB	4 KZT
1 USD	1	0,747	33,5	151
2 EUR	1,29	1	45,08	196
3 RUB	0,029	0,022	1	4,42
4 KZT	0,0066	0,0049	0,223	1

The solving of the problem with simple search options.

Consider first the contours on the 3 vertices:

1–2–3–1 K = ((1,2),(2,3),(3,1)) α(K) = 0,747 × 45,08 × 0,029 = 0,976
1–3–2–1 K = ((1,3),(3,2),(2,1)) α(K) = 33,5 × 0,022 × 1,29 = 0,951
1–2–4–1 K = ((1,2),(2,4),(4,1)) α(K) = 0,747 × 196 × 0,0066 = 0,966
1–4–2–1 K = ((1,4),(4,2),(2,1)) α(K) = 151 × 0,0049 × 1,29 = 0,954
1–3–4–1 K = ((1,3),(3,4),(4,1)) α(K) = 33,5 × 4,42 × 0,0066 = 0,977
1–4–3–1 K = ((1,4),(4,3),(3,1)) α(K) = 151 × 0,223 × 0,029 = 0,976
2–3–4–2 K = ((2,3),(3,4),(4,2)) α(K) = 45,08 × 4,42 × 0,0049 = 0,976
2–4–3–2 K = ((2,4),(4,3),(3,2)) α(K) = 196 × 0,223 × 0,022 = 0,962

Conclusion: among the vectors built on the 3 vertices of the graph is not profitable, because the circuit α(K) < 1.

Consider now the contours on 4 vertices of the graph:

1–2–3–4–1 K = ((1,2),(2,3),(3,4),(4,1))
α(K) = 0,747 × 45,08 × 4,42 × 0,0066 = 0,982
1–2–4–3–1 K = ((1,2),(2,4),(4,3),(3,1))
α(K) = 0,747 × 196 × 0,223 × 0,029 = 0,946
1–3–4–2–1 K = ((1,3),(3,4),(4,2),(2,1))
α(K) = 33,5 × 4,42 × 0,0049 × 1,29 = 0,936
1–3–2–4–1 K = ((1,3),(3,2),(2,4),(4,1))
α(K) = 33,5 × 0,022 × 196 × 0,0066 = 0,953
1–4–2–3–1 K = ((1,4),(4,2),(2,3),(3,1))
α(K) = 151 × 0,0049 × 45,08 × 0,029 = 0,967
1–4–3–2–1 K = ((1,4),(4,3),(3,2),(2,1))
α(K) = 151 × 0,223 × 0,022 × 1,29 = 0,955

Conclusion: among the vectors constructed on the 4 vertices of the graph is not profitable because the circuit α(K) <1. Then in the end we find that the circuit is not profitable, the graph is balanced, which means that there is no buying and selling transactions of currencies, bringing speculative profit [3].

4 The Analysis of existing information systems to currency exchange balance

Currently there is no analogy product as balancing exchange rate in the domestic market. However, there are several programs in exchange currencies and each of them leads unique functionality. For instance, there is application on Android platform, which called "Exchange rates". This application new smart application which includes integrated calculator, the global currencies, override rates, display multiple currencies at the simultaneously. In addition, this application works in offline mode and automatically synchronize the data. It can be seen the graph of changing in currency exchange. The picture below demonstrates the interface of application (Figure 2).

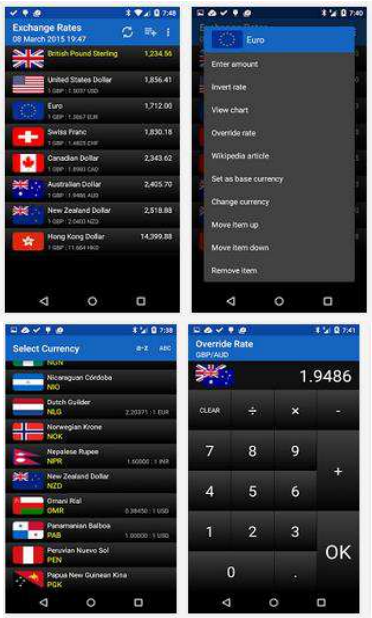


FIGURE 2 The illustration of "Exchange rate" application

Likewise, there is a web application, named "XE". This universal system contains IBAN calculator, exchange rate graph illustrator, currency converter, and even transferring money [4].

Moreover, there are many domestic application which focused on exchange currency rates. For instance, there is bot program called "KZTbot" in "Telegram" application, which gives currency rates at current time (Figure 3).

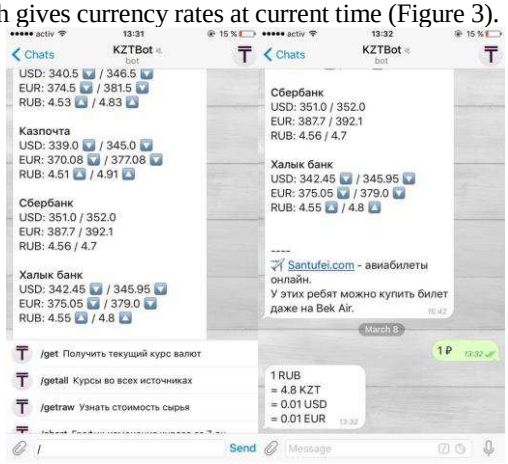


FIGURE 3 The "KZTbot" program

TABLE 2 The comparison table

Opportunities	Exchange rate	XE	Our system
Use through PC	-	+	+
Used through tablet (ios, android, windowsPhone)	+	+	+
Offline mode	+	-	+
Graph analysis of the currency rates	-	+	+
Online calculator	+	+	+
Updated data	+	+	+
Goal:	Analyzing the currency rates, currency converter, transferring money. It intended for users of internet.	Analyzing the currency rates, currency converter, transferring money. It focused on people over the world.	Analyzing the currency rates, currency converter, transferring money and tackle the problem of misbalancing the currency rates for 2nd level banks

It can be seen from the table 2 that each of the system leads its own approach, so I want to say that those two systems, except mine, I will used to develop of my own system (Table 2).

7 Conclusions

The foreign exchange market is round the clock, it is not associated with specific hours of operation of stock exchanges and trade takes place among banks located in different parts of the globe. The mobility of exchange rates is that the magnitude of the changes in interest rates happen quite frequently, which enables to make several transactions every day. If you have an elaborate and reliable trading technology, it is possible to make a business out of it, which beats any other performance. Not without reason the largest banks buy expensive electronic equipment and include the states of hundreds of traders trading in the various sectors of the foreign exchange market.

Proposed mathematical model of the balance of exchange rates is an example of the financial and mathematical model, the application of which in the practice of banks and other financial institutions will allow making informed, reasoned decisions. For that in this paper described mathematical modeling of balanced system in exchange rates. Furthermore, at the result, the basic concepts of the information systems which lead a great interest in future analyzing. They also discussed the optimal tools and features for given application. Other important aspects are the technical analysis, where the resembling system described, and system architecture, which is a powerful tool and that its possession allows the analyst to obtain reliable predictions of movement of the currency market. It was given a detailed analysis and study of the foreign exchange market that the further development will be used.

References

[1] Graph Theory Wikipedia, https://en.wikipedia.org/wiki/Graph_theory
[2] Kurmashev I G 2005 Information decision support system for the purchase and sale of currencies (for example, bank level 2) Almaty
[3] Mutanov G M, Kurmashev I G 2009 Information support system a decision on the purchase and sale of currency transactions Ust-Kamenogorsk: EKSTU 130
[4] Kurmashev I G 1999 The problem of balance of currency exchange **4-5**
[5] Android (Exchange rates) May 2015 Available: https://play.google.com/store/apps/details?id=net.xelnaga.exchanger [accessed 10th of May 2015]

Application of electronic educational resources for physics study

Ye A Daineko[1, 2*], M T Ipalakova[1], M A Brodyagina[1], M V Yunnikova[1]

[1]International IT University, *34 «A»/8 «A» Manas str./Zhandosov st*r., Almaty 050040, Kazakhstan

[2]Institute of Applied Sciences and Information Technologies, Almaty, 050040, Kazakhstan

**Corresponding author's* e-mails: yevgeniya2001@gmail.com, m.ipalakova@gmail.com

Abstract

The main idea of this article is using the electronic educational resources (EER) in higher educational institutions. The main advantages of virtual instruments are given. It is shown, that implementation of virtual instruments in studying physics play the important role at the creation of original and sometimes fundamentally new physical practical works.

Keywords: information technologies, virtual instruments, physics

1 General

At present, in such areas as education, science, engineering and technologies computer information systems are of great interest. Moreover, the continuous development of science, engineering and technologies leads to the appearance of new information systems, as well as to the development and improvement of existing ones. With regard to education, the introduction of new technologies, as well as the comprehensive modernization, is the main issues, to which special attention not only in Kazakhstan, but also around the world is paid. The authors believe that the main focus of the modernization of education is the use of new information technologies, computerization of educational institutions and innovative activity of the teaching staff of higher education institutions.

The use of electronic educational resources (EER) in higher educational institutions has become common nowadays. The latest information technologies facilitate this process. Particularly, the development of laboratory works on science and technology disciplines requires the use of technology of virtual instruments (VIs). The advantages of this technology are significant and appear as the use of EER, and during their development.

In the study of natural-scientific and technical disciplines an integral part of the educational process is a laboratory session. Its task is to develop students' practical skills during work with equipment, production and processing of experimental data, the ability to design an experiment, analyze and compare the results with data in the literature. Nowadays, there is a sharp increase in the development and implementation of computer-based training systems, in particular, the creation of automated learning systems as virtual computer laboratories. The basis of a virtual computer lab is a computer program or a set of related programs, carrying out computer simulations of certain processes.

However, it is necessary to consider that introduction of information technologies in educational process will be justified, if they are effectively supplemented with the existing technologies of training or have additional advantages in comparison with traditional forms of education. For example, the use of virtual laboratory works in teaching natural-science disciplines allows making laboratory works in physics, chemistry and biology more interesting, increasing at the same time quality of the higher education.

The use of virtual instruments is particularly important in cases, where it is impossible to make a real experiment as an example, when teaching physics. Here you can simulate almost everything. For example, the motion of material points and bodies in gravitational, electric and magnetic fields, the processes occurring in the different states of matter - solid, liquid, gas, plasma, and etc.

1.1 VIRTUAL LABORATORY WORKS - ADVANTAGES AND DISADVANTAGES

A virtual laboratory work represents the hardware and software system that allows making experiments without direct contact with the real installation or at its total absence.

At the same time it is necessary to distinguish such concepts as a "virtual laboratory" and a "virtual remote laboratory". The basis of the virtual laboratory is a computer program or a complex of programs, which carry out computer modeling of some processes. The virtual remote laboratory represents a network organizational structure of several groups of scientists who belong to various scientific centers and interconnected by the relations of mutually beneficial cooperation, thanks to the Internet.

In comparison with traditional laboratory works virtual laboratory works have a number of advantages. Firstly, there is no need to buy the expensive equipment and

dangerous radioactive materials. For example, for laboratory works on quantum or nuclear physics specially equipped laboratories are required. Virtual laboratory works allow studying such phenomena as photo effect, Rutherford experiment on dispersion of alpha particles, definition of the period of a crystal lattice by method of diffraction of electrons, Zeeman and Stark's effects, nuclear reactors, etc.

Secondly, there is a possibility of modeling of processes that are not available in the laboratory. In particular, the majority of classical laboratory works in molecular physics and thermodynamics represent the closed systems, the output of which is measured by a set of electrical quantities, which then are calculated using the equations of electrodynamics and thermodynamics. All the molecular-kinetic and thermodynamic processes occurring in experiment at the same time remain inaccessible for supervision. During performance of virtual laboratory works on these sections of physics or chemistry students can observe by means of the animated models dynamic illustrations of the studied physical and chemical phenomena and processes inaccessible for supervision in a real experiment, at the same time it is possible to observe graphic construction of the corresponding dependences of physical and chemical quantities during the experiment.

Thirdly, virtual laboratory works have clearer visualization of physical or chemical processes in comparison with traditional laboratory works. It is also possible to get into the processes happening in fractions of a second or lasting for several years, for example, studying of the planetary motion by gravity of the central body.

One of the main advantages of virtual instruments is that programs that simulate physical processes can be developed and written in any programming language.

One more advantage of virtual laboratory works in comparison with traditional is security. Compared with the use of real laboratory equipment using virtual instruments for the study of physical processes is undoubtedly safer way of learning. Basically, the use of virtual instruments is more than justified in cases where we work with high voltage or dangerous chemicals.

However, virtual laboratory works also have disadvantages. The main one is the lack of direct contact with the object of research, devices, equipment. It is absolutely impossible to train an expert who has seen technical object only on the computer screen. Therefore, the most reasonable decision is the combination of introduction of traditional and virtual laboratory works in educational process taking into account their strengths and weaknesses.

1.2 APPLICATION OF VIRTUAL LABORATORY WORKS IN STUDYING OF PHYSICS

Deep assimilation of physics is possible by studying the theory and in the process of its application for the solution of various computational, qualitative and experimental tasks. If on lectures students are introduced with theoretical questions, on laboratories they apply the theory, and practical skills in carrying out physical measurements, processing and representation of results.

High-quality performance and successful defense of the results of laboratory works by students are impossible without independent preliminary preparation for laboratory researches. Preparation for the next lesson includes study of the description of the performed work. However, you should not be limited only by preparation, because theoretical introduction to each work cannot be considered as sufficient minimum for deep understanding of physical bases of task. Therefore, it is necessary to read the material corresponding to the subject according to the textbook. You should not start a task without mastering the basic theoretical positions, without having realized logic of the procedure of measurements, without being able to use the measuring devices related to this work. Getting started, a student should understand the purpose of the work, the general plan of the work, i.e. sequence of actions when carrying out measurements. This is the main reason to start working on the task during interview with the teacher at the beginning of classes.

For ensuring quality and mobile education at the International IT University the project of innovative training of students – a virtual computer laboratory on physics is developed and implemented (FIGURE 1) which includes four main laboratory works from the sections "Mechanic", "Molecular Physics", "Electricity and Magnetism".

The virtual computer laboratory contains the methodical instructions to perform the task, constructed uniformly in the following form: purpose of the work, theoretical materials, experimental installation, steps to perform the work, report. Besides, each laboratory work contains the test, which includes the assessment of the basic knowledge, necessary for successful performance of the task, and the final test, which is directed to control the residual knowledge of the results of the laboratory work.

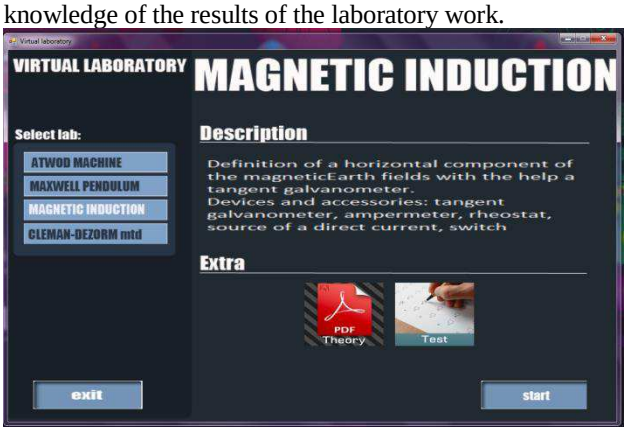


FIGURE 1 Fragment of virtual computer laboratory of Physics

The theoretical materials in the virtual laboratory work is accompanied in the form of the electronic textbook, i.e. material is presented in the form of the hypertext, which contains evident dynamic and graphic objects, and also references and hints, animation means, help data, which allow expanding the possibilities of students at questions answering.

The virtual laboratory work includes a structured description of the technical facilities, which are located inside the graphic illustrations (photographs, diagrams, pictures) and hyperlinks, under which more graphic illustrations of a similar type are "hidden", as well as video and audio clips, animations. To improve the efficiency of perception of

educational materials special processing methods are also used, such as flash-animation (FIGURE 2) that allows seeing experimental installation as a whole and considering its small details. At the end of the description of each laboratory work, there are questions for self-checking and training on the passed materials with the short comments "hidden" under hyperlinks that allows intensifying process of mastering of a training material, making it interactive, and helps with preparation for examinations.

FIGURE 2 An example of flash-animations for understanding of the principle of Maxwell's pendulum

Students make up results of measurements in the form of the summary report. In the virtual laboratory work sample forms of reports are given. They show exactly which tables, graphs and calculations are required. The reports must contain the conclusions obtained on the basis of the results. If there is a need, the student may correct a report form, trying to obtain the maximum clearness of representation of the results. In processing the results of measurements, it is necessary to pay much attention to calculation of errors of measurements and the critical analysis of the obtained results, which has to be presented in conclusions.

Thus, modern information and communication technologies allow carrying out any forms of experimental activity, open broad prospects in creation of original and sometimes essentially new works of physical practical training sessions.

2 Conclusions

The use of virtual instruments as a computer "simulator" allows the students to prepare better for the physical experiment, to improve the understanding of the effect, to acquire skills in instrumentation (if a virtual workshop includes computer models of measuring devices with properties similar to the properties of real instruments).

Therefore, the use of virtual instrumentation allows any form of experimentation, open up broad prospects in the creation of original and sometimes fundamentally new physical practical works.

Acknowledgement

The work was funded by Ministry of Education and Science of the Republic of Kazakhstan science fund program 2015 (No. 2622/GF4).

References

[1] Daineko Ye, Dmitriyev V 2014 Software Module "Virtual Physics Laboratory" in Higher Education 8th IEEE International Conference on Application of Information and Communication Technologies - AICT2014, Kazakhstan, Astana, 15-17 October 2014 452-4

[2] Bessonov A S, Kolbas Y Y 2010 Priminenie technologii virtualnyh priborov pri sozdanii laboratornyh practikumov dlya izucheniya slozhnyh technicheskih obyektov. Internet- zhurnal *'Otkrytoe* obrazovanie **2** 1-8

[3] Daineko Ye A, Dmitriyev V G, Chaiko Ye V, Ipalakova M T, Maratov M M 2012 Use of computer modles in the physics course Vestnik ENU **6**(91) 87-91

Using gaming technology for the development of a virtual physical laboratory

M Ipalakova*, Y Daineko, D Tsoy, I Khametov, Y Bushmina

International Information Technology University, Computer Engemeering and Telecommunication Department,
34 «A»/8 «A» Manas Str./Zhandosov Str., Almaty 050040, Kazakhstan

**Corresponding author's e*-mail: m.ipalakova@gmail.com

Abstract

In the article the results of the development of the Virtual Laboratory "Verification of Malus's law" within the framework of the high education applying to the physics tasks of optics phenomenon are presented. The review of virtual learning systems is shown. The information technologies for the design and development of the virtual laboratory work are described.

Keywords: Virtual laboratory, Unity 3D, C#, physics

1 Introduction

Today it is difficult to imagine modern society without information technology. They have become an important part of our everyday life, greatly simplifying some of its moments. Moreover, this integration is enhanced day by day. With the development of ICT we have access to more and more increasing number of new tools that make faster, cheaper and more comfortable some daily processes. In addition, information technology contributes to the accelerated development of all sectors of the economy, such as industry, construction, medicine, agriculture, and others.

The new technology education also significantly affects the core processes, including the interaction of teachers and students in the context of knowledge transfer [1]. Thus, recently, computer training systems used within the lecture or laboratory studies gain popularity [2]. Areas of application of such systems, as well as subjects where they are used are varied. In the process of teaching physics such training systems are implemented as virtual laboratories for simulation of physical experiments [3]. The results of the development of a virtual laboratory on the example of the laboratory work "Verification of Malus's Law" are presented.

2 General

The Virtual Laboratory is implemented using the Unity 3D game engine. It is a computer simulation of a real laboratory work named "Verification of Malus's Law" (Figure 1). A user interacts with the virtual laboratory by using the keyboard and mouse. Access to the laboratory is carried out using any browser with Unity Web Player plug-in installed. The virtual laboratory includes a description of the laboratory work, in which an executable module is embedded, the order of the work execution and questions for self-control. Also, the laboratory includes a test for the assessment of basic knowledge.

FIGURE 1 General view of the virtual laboratory "Verification of Malus's Law"

The virtual physical laboratory work is controlled by data held in the tasks to perform the laboratory work. This allows you to supplement and change the format of tasks for each lab. The assignments are text files in JSON format that simplifies the editing, and storing them in a database.

3 Conclusions

Thus, the virtual physical laboratory for the study of the light polarization was developed. It is supposed to be used within the process of teaching general physics for the students of technical majors. In addition, such project can be practically applied in research institutes and laboratories, as well as be used in the training centers and centers of advanced training of employees for industrial and commercial organizations.

Acknowledgments

The project was accomplished with the financial support of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan according to the Program of grant funding of scientific research in 2015-2017, 2622/GF4, reg.№ 20150115PK01145.

References

[1] Daineko Y, Ipalakova M, Dmitriyev V, Giyenko A, Rakhimzhanova N 2015 3D Physics Virtual Laboratory as a Teaching Platform AVR 2015 LNCS 9254 458–66

[2] Daineko Y, Dmitriyev V 2014 Software Module "Virtual Physics Laboratory" in Higher Education 8th IEEE International Conference on Application of Information and Communication Technologies - AICT2014 Kazakhstan Astana 452-4

[3] Daineko Y, Ipalakova M, Dmitriyev V, Giyenko A, Rakhimzhanova N 2015 The use of virtual laboratory works at the teaching of natural sciences subjects Proceedings of the 19th International Conference on Computers. Zakynthos Island, Greece 340-2

Geodatabase development for renewable energy facilities as an approach to increase data usage efficiency

P Kargashin*, S Kiseleva, B Novakovskiy, A Prasolova, Yu Rafikova

Faculty of Geography, Lomonosov MSU, Leninskiye Gory. 1, Moscow, Russian Federation

*Corresponding author's e-mail: p.e.kargashin@mail.ru

Abstract

Renewable energy utilisation is actual for different consumers and rapid development of special technologies proves its importance. Project management in this sphere requires mutual analysis of a wide range of spatial and non-spatial data. Geodatabase creation and utilization becomes an optimal solution to aggregate data and manage its processing. In this paper we have described our approach to geodatabase development. Particular basical requirements and concepts of geodatabase have been described. Conceptual model is based on well known principles and it considers peculiarities of implementation area. Moreover, we have shown that geodatabase is used not only as storage but also processing environment and have demonstrated some examples of data utilisation.

Keywords: renewable energy, geodatabase, GIS technologies, facility life cycle

1 Introduction

Several past decades showed the efficiency of power generation based on renewable energy sources. Nowadays this sphere rapidly develops due to investments growth. It allows to evolve technologies to increase their performance and to spread geography of power stations on renewable sources. This sphere is actual area for scientific and applied researches. Geographical information systems (GIS) is widely used in many areas which require decision making based on collection and processing of various data. Practical implementation of renewable energy faces a lot of problems referenced to natural, social-economic features of territory [1, 2, 3]. It is critical to consider climate (e.g. wind and solar parameters), relief, legislation, market requirements and many other factors. All of them must be analyzed mutually. So it becomes evident to use databases to integrate data from different sources, manage its storage and processing.

There are several common stages of database development and the result of each stage is a model: conceptual, logical or physical. The first model is conceptual and it represents the general description of the subject, lists of essential data, significant terms and notions. The following models depend greatly on the database concept. Geographers mostly use geodatabases instead of relational databases. It allows to consider not only object attributes but its spatial location and spatial relationships. It gives full analysis results. So it is common to consider data domain as a set of spatial objects with specific attributes, behavior and relationships.

2 The idea of approach

This paper shows the result of the research performed to outline the optimal structure and content of geodatabase, which can be applied for renewable energy sphere. The reported study was funded by RFBR according to the research project № 16-05-01015. First of all there were listed basic requirement to geodatabase. They are: 1) full and detailed description of the subject including related themes; 2) geodatabase structure must be logical and clear for developers and users; 3) conceptual model must be convenient for further implementation; 4) geodatabase is not only a data storage but environment for analysis of non-spatial and spatial data; 5) included data must be applicable to many cases [4]. These requirements describe the general idea of our approach of geodatabase construction.

3 Results

Basics of system analysis were used to describe data domain. Considered system is a plot of a certain extent, where the natural and anthropogenic objects which collaborate within the plot are located. It is suggested to divide all objects into 4 groups: «Nature», «Economy», «Society», «Renewable Energy Facilities» [5]. Such division is usual for geography, so it will be clear for a large group of specialists. On the other hand it allows to focus on renewable energy peculiarities. Practice of energy facilities designing shows benefits of such approach. The following research was aimed at description of each group.

The «Nature» group summarizes data about environmental components including relief, vegetation, soils, climate and atmosphere, hydrology. These components formed a list of subgroups. Each subgroup has a number of objects located in space and described by a number of attributes. The examples of attributes are slope inclination for relief, vegetation type, wetness for soils,

velocity of wind, solar radiation and many others. The main argument to include an attribute in the list is its possible influence on facility location. The «Economy» group consists of anthropogenic objects which are would-be-users of renewable energy. It is necessary to estimate their energy requirements and remoteness from energy sources. This group stores information about industrial, agricultural, transportation facilities. Moreover there are included current units of power industry (conventional power plants and power electricity lines). The «Society» group is divided into «Population», «Distribution», «Demographic Statistics», «Social Policy» subgroups. These ones store data about population (size, density, distribution), manpower etc.

Three described groups show the environment of renewable energy facility and data from them is the basis to answer such questions as: which source of energy is more effective to use (solar, wind or another one), where it would be better to establish the facility, what design of facility will be the most effective. The name of the fourth group is «Renewable Energy Facilities» and it embraces essential data about types of facilities, their technical parameters (power, required square, resources), potential impact on the environment. Data in this group is divided into 3 subgroups: «Power Plant», «Auxiliary Facilities», «Offsite Objects».

Such structure describes basis and shows minimal content which is necessary to maintain life cycle of renewable energy facilities of any type. It is previously shown that geodatabase is not only storage but the processing environment for modeling. However the developers of geodatabases often ignore this function and its benefits. In our research we simulated 2 typical scenarios of facility life cycle: 1) Assessment of environmental conditions to answer a question whether it is necessary to implement facility. This branch of analysis is based on the assumption of power plant productivity and electric power demands in the region; 2) Selection of the optimal location for the facility. The analysis takes into consideration the territories with appropriate resource base, comfortable natural conditions and current opportunities of energy transportation. Each scenario is converted to algorithm performing spatial and attribute analysis by means of taking raw data from the storage and returning the output in geodatabase.

4 Conclusion

The result of our research is conceptual model of geodatabase destined for renewable energy applications. It aggregates a wide range of data about natural and social-economic conditions. Moreover our approach requires to develop not only the data storage but an environment for analysis. We have simulated several stages of facility life cycle and outlined geodatabase application for actual scenarios. Described approach helps to create more effective databases and implement them to support decision making by means of GIS technologies.

References

[1] Calvert K., Pearce J.M., Mabee W.E. Toward renewable energy geo-information infrastructures: Applications of GIScience and remote sensing that build institutional capacity//Renewable and Sustainable Energy Reviews. -Elsevier, 2013. -Vol. 18. -Issue C. -P. 416-429.

[2] Burger J., Gochfeld M. A Conceptual Framework Evaluating Ecological Footprints and Monitoring Renewable Energy: Wind, Solar, Hydro, and Geothermal//Energy and Power Engineering. -2012. -Vol. 4. -P. 303-314.

[3] Resch B., Sagl G., Törnros T., Bachmaier A., Eggers J.-B., Herkel S., Narmsara S., Gündra H. GIS-Based Planning and Modeling for Renewable Energy: Challenges and Future Research Avenues//ISPRS International Journal of Geo-Information. -2014. -Vol. 3. -Issue 2. -P. 662-692.

[4] Sterman J. Business Dynamics: Systems Thinking and Modeling for a Complex World. -McGraw-Hill, 2000. -982 p.

[5] Kargashin P.E., Novakovsky B.A., Kiseleva S.V., Prasolova A.I., Verevkina N.S. Developing geodatabase for designing renewable energy facilities // «GEOINFORMATIKA», 2015, №4, pp 2-9

New phytocomposition for the disease prevention

A T Mansharipova[1*], E A Severova[2], Yu V Arkhipov[3], A K Eshmanova[4], R I Muhamediev[5]

[1]KRMU, Almaty, Kazakhstan

[2]KazNU named al-Farabi, Almaty, Kazakhstan

[3]KazNU named al-Farabi, Almaty, Kazakhstan. Assotsiatsiya Aksham, Almaty, Kazakhstan

[4]Kazakh National Medical University S.D. Asfendiyarov, Kazakhstan

[5]Institute of Information and Computational Technologies, Kazakhstan, Almaty

*Corresponding author's e-mail: dralma@mail.ru

Abstract

The aim of work was to study the plant antioxidant phytocomposition for regional anti-aging programs and correction of age-states. . An original technology of oil balm herbal considering laws yield of biologically active substances from the technological factors, and develop the quality of the specification and standardization phytocomposition. In operation phytocomposition it was created by an original technique which contains pumpkin seed oil, wheat germ oil, nettle, buckthorn, palm at appropriate concentrations and proportions. Thus, the action of the main component phytocomposition - pumpkin oil due to their member of biologically active substances: tocopherols, carotenoids, phospholipids, sterols, phosphatides, flavonoids, vitamins, saturated, unsaturated and polyunsaturated fatty acids, trace elements. Thus, we conducted the preclinical studies of herbal remedies, revealed that phytocomposition no toxicity, which can be used for disease prevention.

Keywords: prevention, antioxidant, phytocomposition, anti-aging programs

1 Introduction

As we know, the therapeutic common age-related diseases are connected with an imbalance indicators pro- and antioxidant system [1, 2]. A variety of antioxidant drugs are offered in order to normalize these processes [3]. With a wide range of pharmacological activity, the combined effects on the body with herbal remedies antioxidant action are widely used in gerontological practice [4]. Therefore, the phytocomposition "Yuvelaks" was developed and exhibits antioxidant properties, and can be used for the active longevity improving.

The aim of work was to study the plant antioxidant phytocomposition for regional anti-aging programs and correction of age-states.

2 Materials and methods

An original technology of oil balm herbal considering laws yield of biologically active substances from the technological factors, and develop the quality of the specification and standardization phytocomposition (patent number RC 24818). Physical and chemical properties were studied by spectrophotometry phytopreparation. Studies of chronic toxicity "Yuvelaks" were carried out in accordance with the "Rules of the pre-clinical studies, medical and biological experiments and clinical trials in the Republic of Kazakhstan" approved by Order of the Minister of Health of the Republic of Kazakhstan (№442) in accordance with the State Standard of the Republic of Kazakhstan "Good Laboratory Practice. Basic provisions "approved by Order of the Minister of Industry and Trade of the Republic of Kazakhstan on December 29, 2006 (№ 575 and № 557). In the experiments, guided by the recommendations, contained in the "European Convention for the Protection of Vertebrate Animals used for experimental and scientific purposes", Strasbourg 18 March 1986

Tests were conducted on 124 white laboratory rats of both sexes to determine the toxicity of the drug (12 months). Animals before the experiment were placed in quarantine for two weeks. During the quarantine is carried out daily inspection of the animals. The experimental animal group was formed by random sampling based on body weight as a defining indicator.

The study took into account the recommendations contained in the "Manual on experimental (preclinical) study of new pharmacological substances". [5] All animals were determining body weight and their bodies (BL 120 scales Sartorius), hematological, biochemical, macroscopic, histological parameters (DM2500 Leica) according to standard methods in the blood analyzer. The distributions that are approximately normal, describes the mean (M) and

standard deviation (SD) for all animals in the group. To describe the distributions are not normal, and used the median interkvantilny scope. Interkvantilny magnitude is given as 25% and 75% percentiles. Comparison of having a normal distribution between the two groups was performed using two-sided t-test [6]. When comparing the figures, which are not normally distributed, using T-Mann-Whitney test [6].

3 Results and Discussion

In operation phytocomposition it was created by an original technique which contains pumpkin seed oil, wheat germ oil, nettle, buckthorn, palm at appropriate concentrations and proportions. Thus, the action of the main component phytocomposition - pumpkin oil due to their member of biologically active substances: tocopherols, carotenoids, phospholipids, sterols, phosphatides, flavonoids, vitamins, saturated, unsaturated and polyunsaturated fatty acids, trace elements [2].

Phytocomposition passed the state certification system of the Republic of Kazakhstan and has the certificate of conformity (KZ.7500678.05.01.01959 of April 17, 2013), recorded in a public register and comply with safety and quality, set ST TOO 01330509-02-2006 pp.3.2.2 3.2. 3, 3.2.5.Phytocompositionwas registered and established that phytocomposition comply with the "Hygienic requirements for safety and nutritional value of foods."

Test report on the organoleptic properties showed that phytocomposition compliance with GOST. It is easily movable oily liquid without sediment, the color of the respective raw materials used, with a reddish tinge, with taste and smell inherent in raw materials used, without any foreign smell and taste.

Research on the toxic elements, pesticides, mitotoksiny, radionuclides and microbiological parameters showed that the drug does not contain these elements.

Studies of physicochemical properties of phytocomposition showed that its content of tocopherol acetate is 47.5 mg per 100 g of beta-carotene - 26.9 mg per 100 g of ascorbic acid - 5.7 mg per 100 g, there were traces of vitamin A. Phytocomposition density of 0,914g / cm3 dry matter - 72.4%, an acid number corresponds to 0.26 mg KOH / g.

With long-term oral administration means "Yuvelaks" no signs of intoxication and death of animals. There were no sex differences in sensitivity to the drug in rats. Results toxicmeters, observations over 180 days of daily administration "Yuvelaks" showed no pathological changes in behavior and physical performance in animals. The results of the study "Yuvelaks" when it is orally administered once a day for 60, 90, 120, 150, 180, 210 days, at a dose of 0.3 ml / kg in rats of both sexes, in comparison with the control substance revealed that the quantities changes in physiological parameters, caused by the use of drugs is not significantly different from each other. In all tests, the rate of change indicators, caused by the control of substances and preparations "Yuvelaks" was almost the same; significant differences were noted between the groups ($p > 0,05$). In the study of the impact of the application of "Yuvelaks" on hematological parameters revealed no pathological changes at all stages of monitoring. Thus, during the chronic experiment is not a statistically significant difference in the number of erythrocytes, leukocytes, platelets and hemoglobin level in animals treated with "Yuvelaks" as compared to control animals. In conditions of chronic use "Yuvelaks" revealed no significant change in the level of total protein in the serum, indicating that stability of protein formation liver function ($p > 0.05$). In order to identify the possible damaging effect of "Yuvelaks" on the liver, we examined the activity of aspartate-alanine aminotransferase, alkaline phosphatase and total serum lactate dehydrogenase. Throughout the experiment, chronic changes in activity of these enzymes in the serum of all the animals of the experimental group did not exceed the limits of physiological norm for this type of laboratory animals ($p > 0.05$). Activity aminotransferase, lactate dehydrogenase, and alkaline phosphatase in animals of both sexes who received "Yuvelaks" during the experiment were not significantly different from those in the control ($p > 0,05$). These macro and microscopic studies showed no toxic effect "Yuvelaks" when chronic administration.

4 Conclusions

Thus, we conducted the preclinical studies of herbal remedies, revealed that phytocomposition no toxicity, which can be used for disease prevention.

References

[1] Obukhov L K 2002 Experimental antioxidants prolong life: the boundaries of possible biological mechanisms of aging V International Symposium Abstracts May 30 - June 1, 2002, Kharkov 7-8
[2] Clinical Pharmacology of Goodman and Gilman Under the general edition A.G. Gilman. - M., Practice, 2006, 1648
[3] Byshevsky A S, Galya S L, Ralchenko I V, Rudzevich A Y, Alborov R G, Vinokourov E A, Volkov A I, Umutbaeva M K 2005 Combination effect of antioxidant vitamins on hemostasis in experimental peroxidation Experimental and Clinical Pharmacology **68**(3) 34-6
[4] Gumanova N G, Artyushkova E B, Metelskaya V A, Kochkarev V I, Pokrovskaya T G, Danilenko L M, Korneev M M, Pokrovsky M V, Pashin E N 2007 Effect of resveratrol and antioxidants πQ510 on endothelial function in rats with simulated arterial hypertension Bulletin of Experimental Biology and Medicine **143**(6) 619-22
[5] Manual on experimental (preclinical) study of new pharmacological substances. Under the general ed. corresponding member of the Academy of Medical Sciences Professor.RU. Habrieva.-2-ed., Revised and Sub M.: of "Publisher" Medicine" 2005832
[6] Glantz S 1999 Biomedical statistics M.: Praktika 215

Analysis of the structure of the publication activity in the field of ICT and renewable energy

K A Akhatova[1*], R I Muhamediyev[2], R N Beysembekova[1], A Abdilmanova[3]

[1]Kazakh National Research Technical University after K.I.Satpaev, Almaty, Kazakhstan

[2]IICT MES RK, Almaty, Kazakhstan, ISMA university, Riga, Latvia

[3]International Informational Technology Univercity, Almaty, Kazakhstan

**Corresponding author's e*-mail: akhatova_k@mail.ru

Abstract

The article presents bibliometric analysis of publications array according to Scopus and Web of Science databases between 2005-2015 years in the field of information and communication technologies and renewable energy. The work consists of analysis of scientific institutions and universities in Kazakhstan which publish their articles in above mentioned databases; analysis of the amount of publications in field of ICT and renewable energy in developed countries compared with Kazakhstan was performed.

Keywords: Scientometrics, bibliometrics, publication activity, ICT, renewable energy

1 Introduction

The strategic development plan of the Republic of Kazakhstan until 2020 notes that the rapid development and adaptation of information and communication technologies have become important factors in the modernization of society, influencing on not only economic performance, but also on human lifestyle. In order to create modern information and communication space development of the telecommunications sector is being stimulated, also the creation of modern ICT infrastructure areas distribution of telecommunication and electronic services, as well as laying the foundations of a dynamic information society. [1]

The development of ICT is currently attached great importance in republic as to an important factor and the condition of integration in the world's scientific space.

Publications in scientific top-rated journals are an indicator of development and productivity of science in the world. Bibliometric indicators are applied today in the awarding of academic degrees and conferring academic degrees, when funding for research projects is allocated , the development of public policies for the development of science and others. For a comprehensive and objective analysis of publication activity, it is advisable to use a reputable databases Scopus of Elsevier company [2] and Web of Science of Thomson's Reuters company [3]. Also, considering that their use is determined by state regulations in Kazakhstan, for example, in the awarding of academic degrees and titles.

Scientometric indicators of publication activity allow us to determine the most important and rapidly developing research in the field of ICT. Today these are - bioinformatics, cloud computing, machine learning, neural networks, and robotics [4, 5].

2 Analysis of publication in Scopus and WoS between 2005 – 2015

Due to our main goal, first task was to look through the publications in mentioned databases. By analyzing the total amount of publications, we got some worthy to be mentioned data, related to works published by Kazakhstani authors.

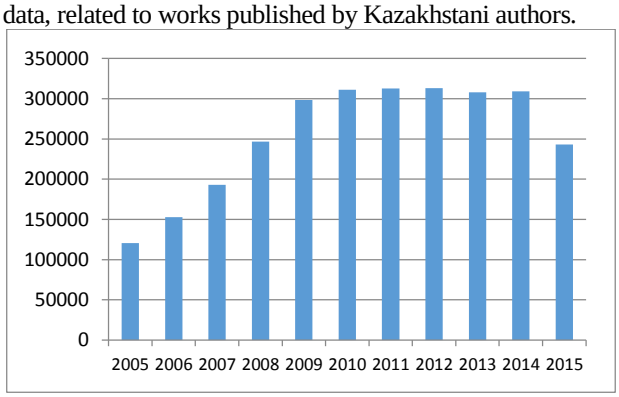


FIGURE 1 Changes in the number of publications in the field of ICT in the world between 2005-2015, by the Scopus

As the analysis of publication activity in Figures 1, 2 illustrate, between the 2005-2015 years in the Scopus and Web data of Science databases the amount of publications in ICT are more than 2800000 and 1300000, respectively. When compared bibliometric indicators of Scopus and Web of Science a correlation is observed, herewith there is a significant difference between the data. Figure1 illustrates the publication activity, which shows a stable growth trend in Scopus, while Web of Science shows dynamic growth between 2005-2009 followed by a significant decline in publication activity by almost 40%.

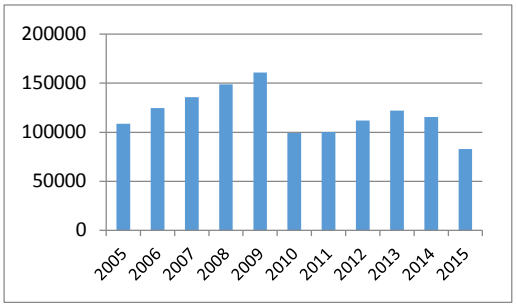


FIGURE 2 Changes in the number of publications in the field of ICT in the world between 2005-2015, by the database Web of Science

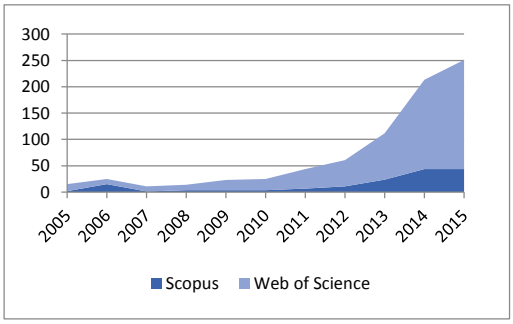


FIGURE 2 The dynamics of growth in the ICT publications in Kazakhstan

Since 2011, there is noticed a sharp increase in the publication activity of Kazakhstani scientists and researchers. At the same time, the share of publications in Kazakhstan is 0.09% in 2015.

A significant increase in publication activity is also associated with changes in the state policy in the field of Education and Science of the Republic of Kazakhstan. Under the new rules of awarding academic degrees and titles in the Republic of Kazakhstan, a certain amount of basic scientific results of the dissertation for the degree of Doctor of Philosophy (PhD), Doctor of the profile is published in an international scientific journal, which has according to the information base of Web of Science (Thomson Reuters) non-zero impact factor or part of the Scopus database (Elsevier).

Figures 3, 4 show the top 10 Kazakhstani companies with the highest number of publications. It is worth noting, that according to the analysis in Scopus, and Web of Science among with Kazakhstani organizations greatest publication activity in the field of ICT generally have the same group of the same universities as Kazakh National University after Al-Farabi, KNRTU after K.I. Satpaev, ENU after L.N. Gumilev, Nazarbayev University, KBTU.

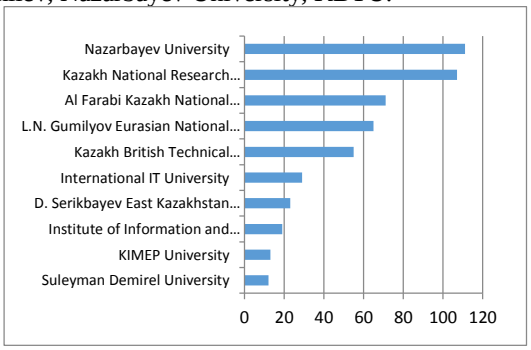


FIGURE 3 Rating of Kazakhstan's organizations by the number of publications between 2005-2015, according to the Scopus

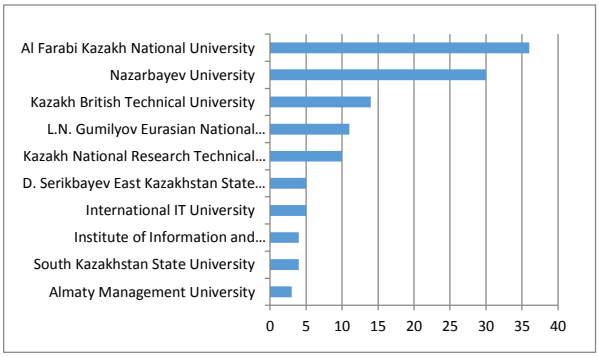


FIGURE 4 Rating of Kazakhstan's organizations by the number of publications between 2005-2015, according to the Web of Science

Over the past decade, the transformation in all areas of human life under the influence of ICT has happened. However, ICTs have made a significant contribution to the modernization of the world's electric power, namely, made possible to increase the profitability and efficiency. Today, ICT is used for monitoring in the sphere of energy saving and rational use of resources.

Renewable energy sources in recent years, considered as one of the important directions of development in the energy sector. The global demand for renewable energy is growing. In all of the developed economies today are developed and implemented programs related to alternative energy. The main advantages of renewable energy sources is - inexhaustible and environment friendly.

The Republic of Kazakhstan is not an exception; it demonstrates a number of measures from the government and businesses, aimed at their effective implementation. According to the RK Law of July 4, 2009 №165- IV «On support of renewable energy», sources of renewable energy are sources of energy, which continuously renew by natural processes. Following types are considered as renewable: solar energy, wind energy, hydrodynamic water energy; geothermal energy: heat the soil, groundwater, rivers, reservoirs and anthropogenic sources of primary energy: biomass, biogas and other fuel from organic waste used to produce electricity and (or) thermal energy.

3 Place of Kazakhstan in world's fields of ICT and renewable energy

Today Kazakhstan begins to rebuild the economy on the basis of the green. In Kazakhstan, in 2015,were launched 14 projects of renewable energy sources total power of 120 MW. In general, over the past year, the amount of electricity generated from renewable energy sources amounted to about 700 million kW / h.

In addition, it adopted the concept of the transition of Kazakhstan towards a green economy and a corresponding action plan until 2020. Under President's control was formed the Council of the green economy.

In the diagram (Figure 5) is represented the growth of the number of articles in the field of renewable energy and ICT. The figure shows that the majority of works was published in the last five years. It is worth noting, that the share of renewable energy publications in 2015 is 0.5% of the total number of publications on ICT of the same year.

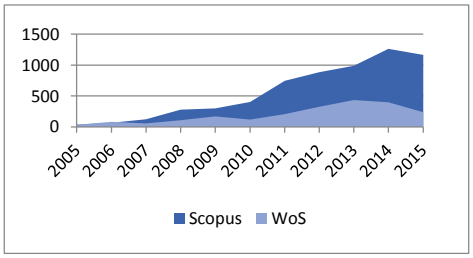


FIGURE 5 Trends in the field of renewable energy and ICT publications

The Tables 1 and 2 show the number of countries rated by publications. Leading positions on the number of publications in the field of ICT and renewable energy are the United States and China. Countries represented in the ranking of publication activity - China, USA, Germany and Japan. They are also leaders in terms of development of alternative energy in the world.

According to Scopus, the global flow of publications in these areas, Kazakhstan occupies the 73th position, publications of Kazakhstani scientists on the Web of Science is not revealed.

TABLE 1 Ranking of countries by publication activity in the field of ICT and renewable energy for 2005-2015, in the Web of Science DB

#	Country	Publication number
1	USA	368
2	China	241
3	India	184
4	Germany	114
5	Canada	113
6	Italy	98
7	England	74
8	Spain	67
9	France	66
10	Australia	57
57	Russia	4
57	Latvia	4

TABLE 2 Ranking of countries on the publication activity in the field of ICT and renewable energy for 2005-2015, in the Scopus DB

#	Country	Publication number
1	USA	1149
2	China	850
3	India	505
4	Germany	388
5	Italy	336
6	United Kingdom	335
7	Canada	257
8	Japan	205
9	Spain	203
10	France	180
53	Russia	20
62	Latvia	10
73	Kazakhstan	5

4 Conclusions

According to the publication activity in the field of ICT analysis, it can be concluded that the issues of ICT development in the world and in Kazakhstan are considered from different angles and in different directions. For now, Kazakhstan occupies the middle place in amount of publications is ICT and renewable energy, but due to new politics of Kazakhstan in renewable energy sphere, we can predict, that in few years, the amount of publications will grow rapidly.

Acknowledgments

The work was funded by grant No. 0168/GF4 of the Ministry of Education and Science of the Republic of Kazakhstan.

References

[1] Strategic Plan of Development of Kazakhstan till 2020.- http://www.akorda.kz/ru/official_documents/strategies_and_programs
[2] Bibliographic database of academic journal articles. - www.scopus.com
[3] Online subscription-based scientific citation indexing service. - www.webofknowledge.com
[4] Abdilmanova A, Khamitov A, Muhamedyev R 2015 Relationship of semantic concepts of ICT domains Proceeding of the 13th International Scientific Conference "Information Technologies and Management", 2015, April 16 - 17, Riga, Latvia 106-8 ISSN 1691-2489
[5] Muhamedyev R I, Amirgaliyev Y N, Muhamedyeva J, Khamitov A N, Abdilmanova A 2015 Revelation of new ICT domains for upcoming Kazakhstan's participation Proceedings of the 2015 Conference on Electronic Governance and Open Society: Challenges in Eurasia, EGOSE-2015, St.Petersburg, Russia, 24-25 November 2015 179-88 ACM, NY, USA

Scientometric analysis of visualization phenomenon

A Sabyrzhan[1*], A Abdilmanova[1], R Muhamedyev[2]

[1]International Informational Technology Univercity, Almaty, Kazakhstan

[2]IICT MES RK, Almaty, Kazakhstan, ISMA University, Riga, Latvia

**Corresponding author's e*-mail: aika.sabyrzhan@gmail.com

Abstract

Visualization is a vital part in graphical illustration of concepts in computer science. By visualizing the results of science and engineering, it became more convenient to present any sort of data. There were chosen four directions in visualization sphere: infographic, geo-information systems, augmented reality and virtual reality. There were defined types of visualization and their dynamics of growth in use during last 2 years. By performing the research in amount of publications on visualization theme, it was stated that visualization is going to be one of the most popular and rapid enhancing spheres in ICT, specifically virtual reality is growing more rapidly.

Keywords: visualization, infographic, GIS, virtual reality, augmented reality

1 Introduction

During the development of visualization and its types, it became more convenient to track the data flow, processes and other engineering concepts in ways that are more detailed. From static pictures and graphs, visualization enables to create dynamic data representation. Due to such improvements and enhancements of visualization abilities, other spheres such as GIS (geo-information systems), infographics, augmented reality and virtual reality expand their functionalities and lead to impressive results. Rapid development of visualization was proved earlier [1, 2], where among prominent ICT domains visualization was marked. In process of performing research on visualization subject, we pointed out 4 most prominent subdomains and looked through visualization types, by gazing the amount of publications since 2014 till today for each type.

2 Amount of publications in visualization

The goal of this work is to study the prospects and development of visualization. As a tool for research were chosen Angela Zoss from Duke University [3] and Google Scholar databases (scholar.google.com). In the process of performance, we have gathered all information about its types and publications amounts during 8 years.

In the Google Scholar database were chosen 4 most prominent directions of visualization: infographic, geo-information systems, augmented reality and virtual reality. Their growth dynamics were tracked during 8 years, since 2008 until 2016. By entering each keyword in each year, we collected amount of publication for each year. All gathered data is represetnted in TABLE 1 and illustrated in Figure 1 below(Note. Last edition of this paper was prepared in February, 2016. Therefore, it shows partial information related to 2015 and 2016 years).

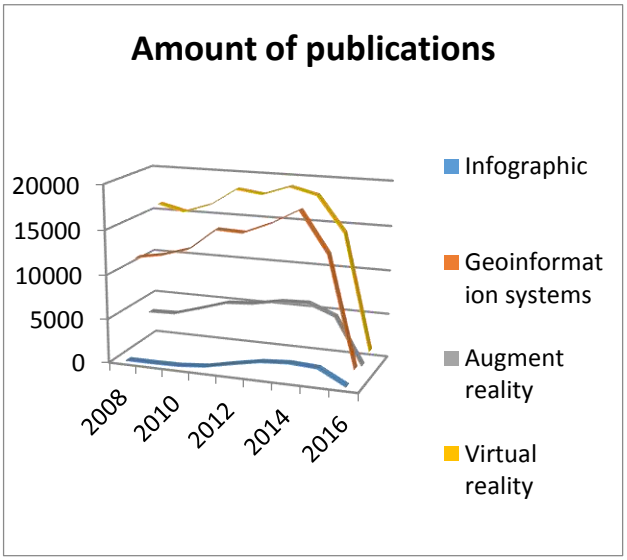


FIGURE 1 Amount of publications about visualization during last 8 years

3 Types of visualization

In the Duke University library were found all required descriptions of visualization methods and their examples. In order to study the development of certain sectors of visualization, we have collected the general number of scientific publications in period from 2014 to 2016 years. This way we discovered which of types are widely applied and what types are less used in recent years. The illustration of dynamics of these 3 years is represented in Figure 2 below.

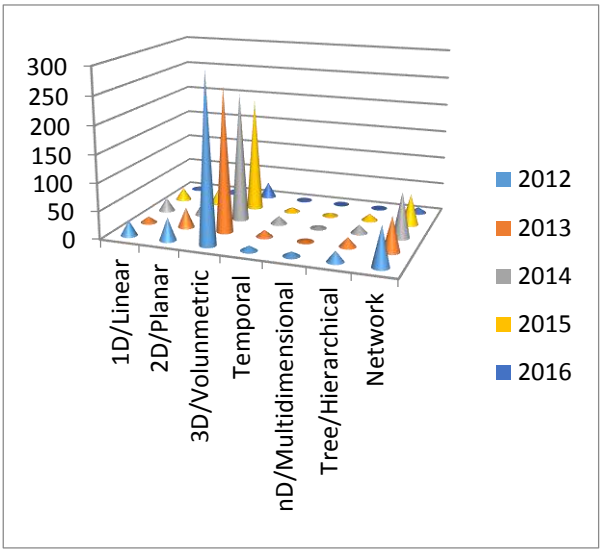


FIGURE 2 Dynamics of changes in applying visualization types

From this figure, it is seen, that most progressive visualization type is 3D/Volumetric. During years between 2012 and 2015 years, it has been showing the highest amount of usage. Network visualization is also worth to be considered as relatively wide used type of visualization. Multidimensional visualization is still not widely applied, but it can mean that it will develop in further years. 1D visualization is going to be obsolete, because 3D has already substituted it.

In Figures 3-7 we can see methods of graphical visualization proper to each visualization type.

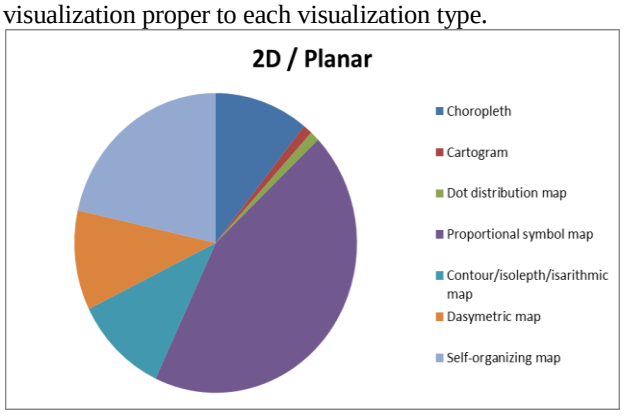


FIGURE 3 2D/Planar type graphics

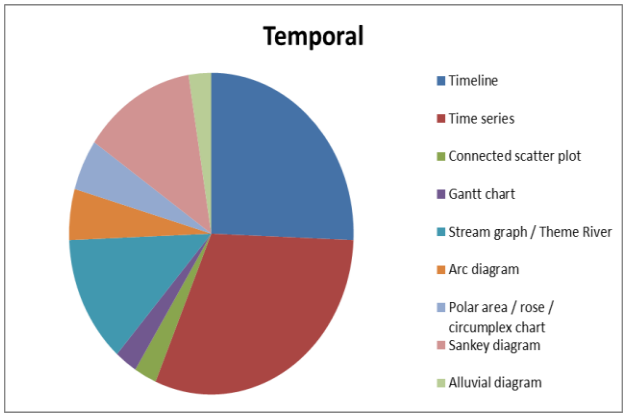


FIGURE 4 Temporal type graphics

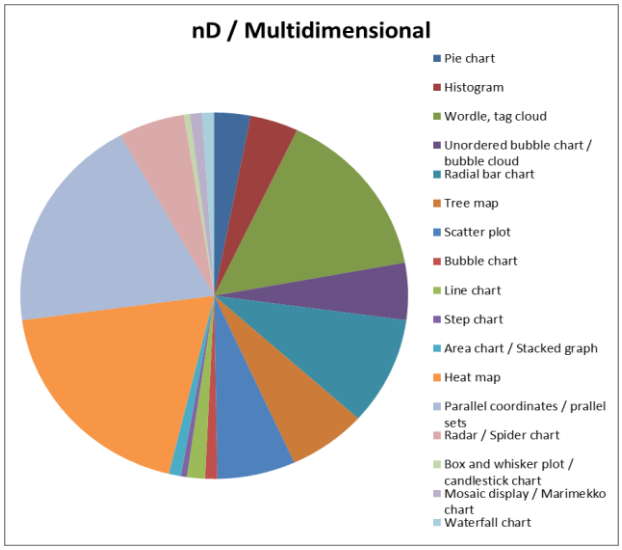


FIGURE 5 nD/Multidimensional type graphics

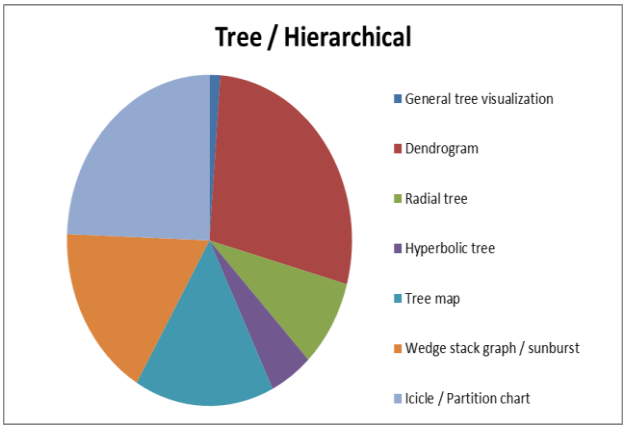


FIGURE 6 Tree/Hierarchical type graphics

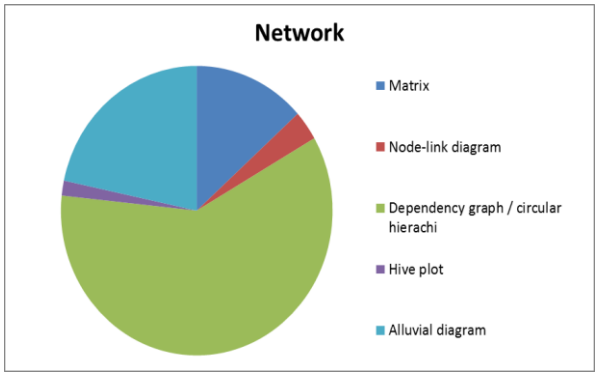


FIGURE 7 Network type graphics

All types mentioned above have got appropriate method of illustration in graphical format. As was mentioned, 3D visualization is the most developed type. However, nD/Multidimensional type has got wider range of examples ad in practice, most of them are used in visualization in different spheres and aims.

4 Conclusions

The graphical illustration of performed research in publication amount represents the dynamics of growth of

specific spheres. Recent years show fewer publications in all 4 domains. However, among them virtual reality has the most amount of publications.

Among types of visualization, the 3D visualization is the most prominent, due to its wide application nowadays.

Acknowledgments

The work was funded by grant No. 0168/GF4 of the Ministry of Education and Science of the Republic of Kazakhstan.

TABLE 1 Amount of publications from 2008 to 2016

		2008	2009	2010	2011	2012	2013	2014	2015	2016
1	Info graphic	94	97	149	437	1091	1689	1915	1734	87
2	Geo information systems	11121	11657	12587	15009	14876	16144	17803	13319	988
3	Augmented reality	3967	4060	4961	5911	6130	6700	6826	5614	343
4	Virtual reality	16022	15294	16317	18300	17911	18973	18215	14259	1036

References

[1] Muhamedyev R, Kalimoldaev M, Uskenbayeva R 2014 Semantic network of ICT domains and applications Proceedings of the 2014 Conference on Electronic Governance and Open Society: Challenges in Eurasia 178-86 ACM New York, NY, USA ©2014, ISBN: 978-1-4503-3401-3, doi>10.1145/2729104.2729112

[2] Abdilmanova A, Khamitov A, Muhamedyev R 2015 Relationship of semantic concepts of ICT domains Proceeding of the 13th International Scientific Conference "Information Technologies and Management", 2015, April 16 - 17, Riga, Latvia 106-8 ISSN 1691-2489

[3] Zoss A Introduction to Data Visualization: Visualization Types http://guides.library.duke.edu/datavis/vis_types#linear

Development of a stock exchange robot for forecasting exchange indicators by using neural networks and artificial intelligence algorithms

Zh N Sarsenova

IITU, Kazakhstan

Corresponding author's e-mail: zhibeksarsenova@gmail.com

Abstract

All articles must contain an abstract. The abstract follows the addresses and should give readers concise information about the content of the article and indicate the main results obtained and conclusions drawn. As the abstract is not part of the text it should be complete in itself; no table numbers, figure numbers, references or displayed mathematical expressions should be included. It should be suitable for direct inclusion in abstracting services and should not normally exceed 200 words. The abstract should generally be restricted to a single paragraph. These pages provide you with instructions on how to use this word template to prepare your paper according to the required layout and style for IT&M papers.

Keyword: transfer and receive data, broken, software, Stock Exchange, securities, secondary market, debt.

1 Introduction

Now the major stock exchanges and large companies are working on the automated exchange robots. Such complexes are proving their worth, earning hundreds of millions of dollars to owners. According to research by foreign experts they say that now is about 70% of the robots perform trading operations. The securities market is an indispensable tool to make investment in securities and to assess the value of assets. It facilitates the conversion of cash savings into investments, increases the possibility of production growth and scope of treatment used by the state for the purpose of macroeconomic regulation. An active role in the securities market plays banks and investment companies. For them, a very important problem of forecasting prices in the securities market, especially in times of crisis, when volatility and increased risks are increasing. To improve the quality of forecasts possible with the methods and algorithms that take into account the fundamentals of the companies' issue, technical indicators, constantly coming news, the mood of other traders; also promising way is the use of neural networks and artificial intelligence. Applying these methods will increase the quality of decisions; investment companies solutions that will strengthen their position in the market. Over the past fifteen years, a view has emerged that computing based on models inspired by our understanding of the structure and function of the biological neural networks may hold the key to the success of solving intelligent tasks by machines [1].

2 Overview of the study area

Trading robots simplify trading, spare your time and can even provide risk management thus limiting your losses. However, they are incapable of replacing a human trader.

"No fear, no greediness", - this is how trading robots are usually described. They are deprived of emotions which can lead to certain trading mistakes. They are attentive and careful; their actions are exact and logical. Robots can assist you in routine work and they also can implement trade strategies which are difficult or impossible to use manually. However, you should not overestimate trading robots. After all, the machines are invented by people [2]. However, with help of neural network it is possible to solve this problem.

One of the new approaches to improve the forecasting system of exchange rates for traders will be the using of training neural networks and artificial intelligence's technology. This socio-economic system can improve the accuracy of forecasts, exchange rates, and improve the quality of investment management. What is a neural network? In the second half of the nineteenth century two schools contended for scientific prevalence: the reticularists claimed that the neurons system formed a continuous, uninterrupted network of nerve fibres whereas the neuronists asserted that this neural network is composed of a vast number of single, interconnected cellular units, the neurons [3]. Neural networks solve the problem, algorithm of solution, which we do not know.

Neural networks can already have been used in their programs.

Modelling of biological neural networks is only available to supercomputers

The artificial neural network consists of artificial neurons (neurons biological analogues)

Artificial neural network has the following structure:

1. The input layer - transmission of information into the network
2. Hidden layer- information processing
3. Output layer- output the necessary information.

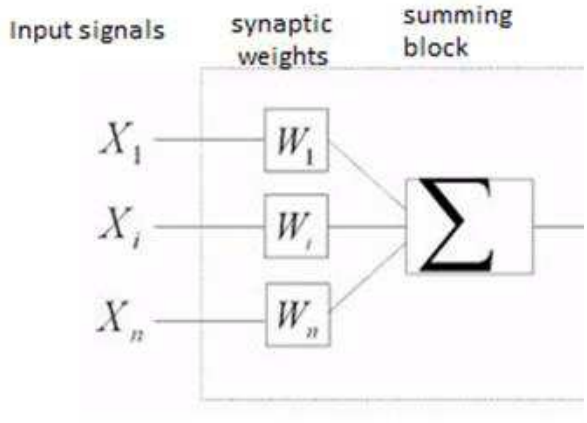


FIGURE 1 Artificial neuron

Figure 1 shows the general scheme of artificial neuron.

2.1 AGGREGATION – ADDER

The modified by weights signals are aggregated by neuron. Most often, they are simply added together. The signal at the output of adder is called postsynaptic excitation. The passage through the activation function. Sometimes for getting output signal uses function .It is called the activation function of the neuron.

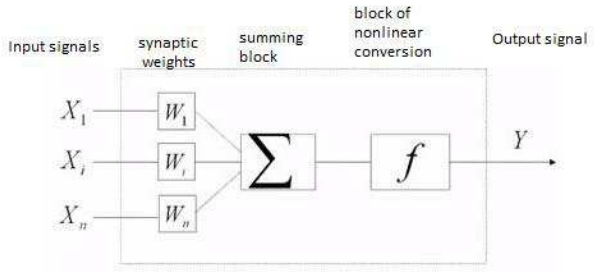


FIGURE 2 Model of artificial neuron

Figure 2 shows the simplest model of an artificial neuron. Those x_1, x_i, x_n are the input signals

W_1, W_i, W_n - the weight of the input signals.

Further, the input signal is multiplied and summed weight. Then, the output signal is output directly or through a function called activation function and it produces a value, which is also transmitted to the output.

3 Adopting relevant technology

There are 2 classes of neural networks:

1. Feedforward network

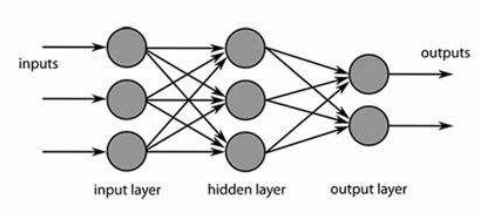


FIGURE 3 Feedforward network

Figure 3 shows the classification of neural networks. Firstly, in input layer we get data, then those data handles in hidden layer and preprocessed data outputs in output layer.

The Feedforward network signal is like a straight line. It doesn't have feedback.

2. Recurrent Network

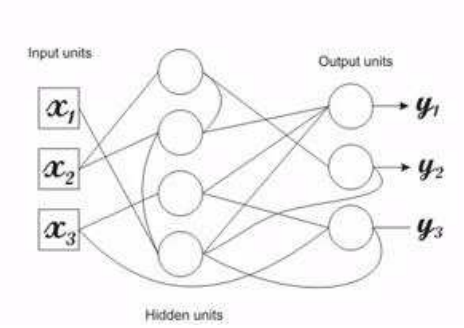


FIGURE 4 Recurrent Network

Figure 4 depict the second class of neural network it calls, Recurrent Network.

In recurrent networks signal is like circulates. It has feedbacks.

They allow us to solve complex problems than the first class, which are not able to solve such problems.

3.1 NORMALIZATION AND SCALING

To all input data were equal, apply normalization

To get comprehended output, applies scaling.

If you want to send / receive the nominal data, use the method "one of N".

Separating the network solves several tasks at a number of separate networks that solve one task often yields positive results.

Hidden layers form a combination of pre-processed data, which uses the output layer in the outputting of the decision.

Hidden layers can find common signs and clues in solving problems.

Training of Network

There are two stages of "life" of the network.

1. Training - training network perform the tasks for which it was created.
2. Functioning- network is used to perform a task and gives correct results.

Two stages of training network

1. Training by a teacher
2. Training without a teacher

Figure 5 depict ways of Network training. Indeed the ways is very much. One of them - the quickest descent method. Training takes place with the teacher. The set of all possible combinations of the weights and errors fault. The

purpose of the quickest descent is fall into the cavity, where the error is smallest.

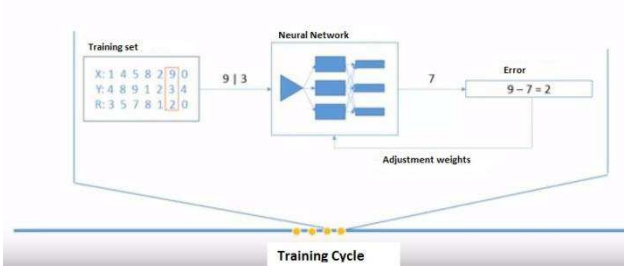


FIGURE 5 Cycle of training

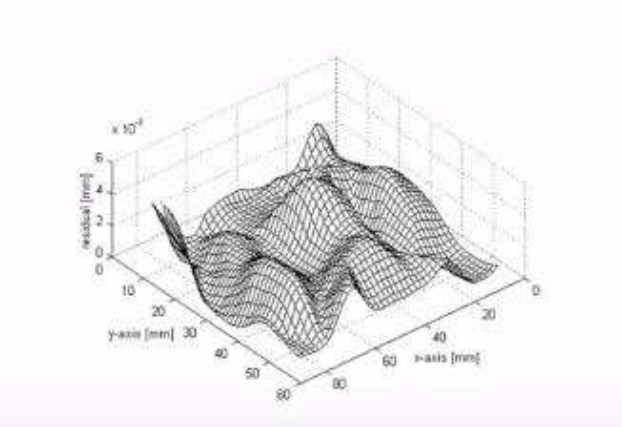


FIGURE 6 Surface of errors

We need to find a middle ground training factor. If the training rate is too high then you can quickly achieve a result, but the training may not be accurate. If the training rate is too small, the process in the computer can take a long time. There is such a thing as a moment, it helps to find a point where you have to reduce or increase the rate or delay.

Coefficient of training - how much the values of the weights of neurons every step of learning is changed.

In order to quickly arrive to a minimal error, introduced a moment that changes their own training rate.

The initial values of the weights of neurons in feedforward networks set accidentally. The networks have innate abilities.

Figure 6 show the surface with errors. Hidden layers of neural network trained using the method of error propagation.

Eligible to do a great training set. After each stage of the training sample must be random jumble. A neural network that is trained independently must be at least three times more neurons compared to the number of options.

The random distribution of the starting weight factors are not suitable for self-organizing neural networks.

The training set is a set of samples used to adjust or train the weights in the neural network to produce the desired outcome. The validation set (sometimes called the test set in machine-learning vocabulary) is a set of samples used to find the best neural-network configuration and training parameters. For example, it can be employed to monitor the network error during training to determine the optimal number of training iterations or epochs. It can also be used to determine the optimal number of hidden neurons. The validation set is used to stop to choose between multiple trained networks. When the validation set is used to stop training, the neural network is optimistically biased, having been exposed to the data[].

5 Conclusions

Since the purpose of the study is to solve scientific problems, testing trading strategies and training algorithms of neural networks and artificial intelligence, you can implement this program in all companies, and automate the sales and purchases.

References

[1] Yegnanarayana B Prentice 2006 Artificial Neural Network Hall of India Private Limited New Delhi 110001 ix
[2] Pariev N 2011 Foreign exchange trading: the Golden Rules PROEKT-EDEM & Samshwords Edition, License Notes
[3] Muller B, Reinhardt J, Strickland M T 1995 Neural Networks An Introduction Physics of Neural Networks Second Updated and Corrected Edition 3-4
[4] Kevin L, Priddy and Paul E Keller 2005 Artificial Neural Networks An introduction SPIE-The international Society for Optical Engineering P.O.Box 10, Bellingham, Washington 98227-0010 USA 45-6

Expert system on prophylaxis of eye diseases

U Akylbekova*, L Atymtayeva

Kazakh-British Technical University, Almaty, Tole bi str., 59, 050000 Kazakhstan

**Corresponding author's e*-mail: u.akylbekova@gmail.com

Abstract

This paper explores an approach to building the expert system for prophylaxis of diseases, which analyzes answers of customers from survey and give probable diagnosis with some prevention methods to this diagnosis. In this paper we discuss the problem of establishing diagnosis. Components of an expert system are identified, with an emphasis on the mechanisms that enable adaptive behavior to occur. Knowledge representation is based on the rules, and object-oriented expert system is described through the establishment of appropriate relationships utilizing heuristic rules, objects, and agents.

Keywords: Expert system, prophylaxis of eye diseases, inference engine, knowledge-base

1 Introduction

In healthcare field, we can observe many problems related to the late recognizing of diagnosis and as a consequence non-effective treatment. The early recognizing of different diseases especially in eyes diseases field may help to prevent the inefficient therapy. Because of enormous symptoms of different kind of diseases, there is a risk to define the wrong diagnosis. The modern expert systems in healthcare field [1] become the blessing for the physicians.

However the existing expert systems usually very large and difficult to manage and require the special knowledge not only in certain healthcare area but also in the ways to use the software application. Therefore, they become inaccessible for the ordinary users who want to recognize earlier the different diseases and get the appropriate treatment.

In the field of eye disease treatment it is an actual problem when people may do not notice the signs of the impending disease. Some easy monitoring and control of the state of body and recognizing the first signs may help to prevent the troubles.

In this case, the special constructed expert systems like a "family doctor" may help to identify the signs and give the recommendations how to avoid the problems or how to make the prophylaxis.

2 Expert systems analysis

The purpose of such expert system for prophylaxis of diseases is to provide to the users some assumptions of the diagnosis, recognize the signs, and give recommendations in terms of probable treatment or preventing the troubles.

On the market of the expert systems, we can find a lot of examples such as "family doctor" - a simple medical expert system [2] system Ubertek [3] and others. These expert systems contains the database of the diseases and may provide the response by receiving users results of dialogue. The knowledge base includes about 100 common diseases. In the medical system Ubertek the input data consists of the inference cycle of the symptoms and diagnosis, the users enters with the help of the data input interface. Each user may be specified for any symptom and diagnosis confidence factor. The samples of input data may be represented as the follows:

- Symptoms:
- back pain;
- high pressure + 100%;
- metabolic disorders: + 75%.
- Diagnoses:
- migraine with aura;
- colds: + 100%.

This system may give the recommendations with the degree of confidence in diagnosis. System does not give the actual results.

The system, which based on the symptoms, is not comfortable for the users because it requires the special knowledge [4]. To identify the signs and symptoms we can use the simple questionnaire that is understandable for the ordinary users and may help in getting the appropriate recommendations based on the answers of the users.

Modern technical facilities allow us to reach a qualitatively new level of presentation of the disease in the visual form by using the appropriate mathematical models in order to simulate the typical spatial development of the pathological process in a particular disease. Expert system will provide automatic recommendations from the obtained results of the survey using various methods of computer decision support.

3 Knowledge base and Database

Knowledge Base is the central part of the expert system. It contains rules describing the relationship or phenomenon,

techniques and knowledge to meet the challenges of the application of the system. [5] Knowledge base of proposed experts system contains different diagnosis with related symptoms. Inference engine complies with the rules, determines when an acceptable solution found and transmits the results of the program with a user interface. The user interface system receives information from the user and transmits the information to him.

The process of the interaction between the user and the system and other components may be demonstrated on Figure 1.

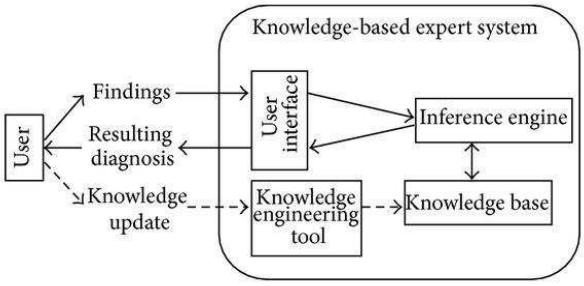


FIGURE 1 Interaction processes within the Expert system

4 Discussion of testing results

For construction and testing the system, we used the prolog language [6]. We stored diagnosis and symptoms in knowledge base and constructed the special rules for that.

By using "Yes-No" answers we can find some recommendations of diagnosis with clear inputs. However, in many cases, it is not enough and for more accurate recommendations we need to use the degree of the confidence in diagnosis and results. We are going to add this feature to our system by using the fuzzy rules in which we have some experience by the development of fuzzy expert systems for information security audit and management [7, 8].

5 Conclusion

The development of accurate expert systems in the area of healthcare still is very difficult task. In this research, we tried to create the convenient forms of the user's understanding of the symptoms and making the appropriate recommendations based on his answers to questionnaire. Our attempts were to find the ways in construction of the expert systems for facilitating the dialogue between the user and expert system.

References

[1] Jackson P Introduction to Expert Systems 3rd edition, Addison Wesley, ISBN 0-201-87686-8
[2] http://sharasoft.com/10327
[3] http://ubertek.ru/Project/medicinskaya-ekspertnaya-sistema-diagnostiki
[4] http://ubertek.ru/Project/medicinskaya-ekspertnaya-sistema-diagnostiki
[5] Hudson D L, Cohen M E 1984 Development of decision-making rules for transportable, microcomputer-based expert systems in medicine J Clin Eng **9**(4) 301–12
[6] Giarratano J, Riley G Expert Systems, Principles and Programming PWS Publising Company, Boston ISBN 0-534-93744-6
[7] Merritt D Building Expert Systems in Prolog 214–5
[8] Atymtayeva L, Kozhakhmet K, Bortsova G 2012 Inoue A. Methodology and Ontology of Expert System for Information Security Audit Proceedings of the 6th International Conference on Soft Computing and Intelligent Systems and the 13th International Symposium on Advanced Intelligent Systems, 20-24 November 2012, Kobe, Japan 238-43
[9] Kanatov M, Atymtayeva L, Yagaliyeva B 2014 Expert systems for Information Security Management and Audit. Implementation phase issues Proceedings of the Joint 7th International Conference on Soft Computing and Intelligent Systems and 15th International Symposium on Advanced Intelligent Systems, SCIS & ISIS, December 3-6, 2014, Kitakyushu, Japan 896-9 978-1-4799-5955-6/14

Risk management simulation approach for banking sector in Kazakhstan and developed world

Y Rakhimov*, L Atymtayeva

Kazakh-British Technical University, Kazakh-British Technical University, Almaty 050000 Kazakhstan

**Corresponding author's e*-mail: ertiren1990@gmail.com

Abstract

Evaluating new bank loans has been considered as one of the main dilemmas that banks managers have to deal with in order to reduce the probability of default. This paper describes the simulation tools and techniques that approach to provide risk management for banking sector. Based on simulating with different cases, results were provided for 3 important variables such volume of loans, actual RoE, loan loss provisions. Furthermore, it can be used with confidence for exploring various future scenarios for financial institutions.

Keywords: bank loans, risk management, risk management models

1 Introduction

Bank lending to individuals in Kazakhstan today is a mass and yet risky phenomenon. The current economic situation is pushing banks to extend credit offers. Along with lowering or increasing interest rates and the simplicity of the rate of the loan are the factors of competition for bank customers. Interested partners in the financial institutions lending to a wide population of the merchant companies. Today, frequent examples of the credit terminal bank directly at the large shopping canters. In these circumstances, the introduction of automated systems in banks assess the creditworthiness of borrowers is justified and timely step, opening a bank a lot of opportunities [1].

The four primary risks in this environment are business, credit, market, and operational risk. Credit risk, the primary focus of this thesis, has already been dealt with quite extensively, but to summarize, it is any risk arising because of a real or perceived change in counterparty's ability to meet its credit commitments. It covers not only potential non-payment, but also changes in risk grades that affect the market value of traded debt, and the possibility of incurring extra costs to get the money back.

2 Risk scoring

Scoring's greatest benefit has been in the realm of risk assessment. 'Risk' is being used here in the traditional sense of investing, relating to whether an investment will be diminished or destroyed. It covers not only loss probability, but also loss severity. Credit risk is the primary area where scoring is used, and what the term 'credit scoring' is usually associated with. Credit risk scores are used primarily to predict delinquencies, and include most application, behavioral, stomper, collections, and bureau scores. They are often the only scores used to make decisions, but value can also be gained by combining them with response, retention, and revenue scores; or alternatively, by deriving probability-of-default (PD), exposure-at-default (EAD), and loss-given-default (LGD) estimates. The aspects of clients' behaviour is shown in the table 1 [2].

TABLE 1 Aspects of customer behaviour

	Influent	Effluent
Risk	Credit	Will he pay?
	Fraud	Will he cheat?
	Insurance	Will he claim?
Response	Response	Will he call?
	Cross-sell	Will he buy others?
Retention	Churn	Will he use me and leave?
	Attrition	Will he leave?
Revenue	Utilization	Will he use it?
	Profit	Will it be worth it?

3 Risk modelling

System dynamics provides with representation of complex system dynamic behaviour, in comparison to the traditional methods. The System Dynamics simulation approaches to establish and contribute users with a number of working real life models that could be adapted to financial institutions. Thus, with the help of this tools we can find various strategies, and behaviour of the system, whereas researchers could understand the dynamic behaviour for different reasons, as to analyse and design a dynamic complex problem solving cases [3, 4].

To come up with a construction of credit risk data flow diagram, we have used decision rule for new loans and extensions.

As we know, return on equity (RoE) in Kazakhstan and developed world is always influenced by economic factors. Thus, when the credit demand is high and financial

institutions are to gain and expand market share, RoE is should be reduced. That also implies that RoE is used to be more important if economic growth slows down and market share is still has to be expanded.

In the figure below for new loans and its extensions the model of decision rule was formed.

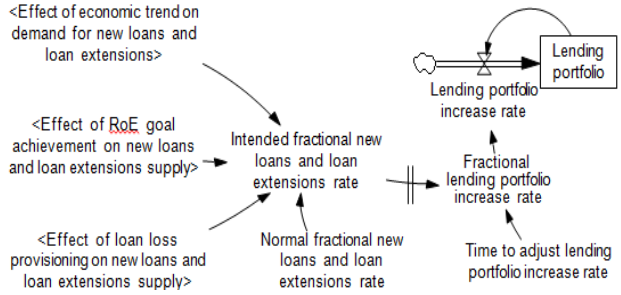


FIGURE 1 New loans and extensions decision rule

For this, if economic situation slows down then demand on number of new loans and extensions will go down. The modelling of that scenario was based on direct relationship within GDP growth trend and demand on new and extended loans. Within the model for dimensional consistency, check function was used in simulation software. As to carry out behavior test, 12 key variables have been used. In the figure below, 3 important variables are represented as the output of simulating a case.

By using those cases in modeling analysis, it can also be explored for various expected future scenarios.

That also could be used for estimating the worst case and best case scenarios to better understand high level picture for financial institutions.

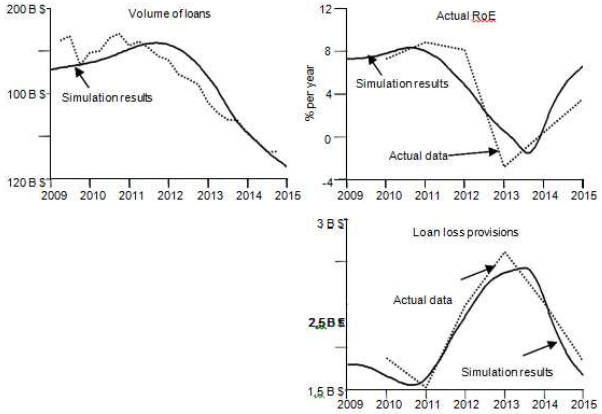


FIGURE 2 Simulating results in comparison with actual data

4 Conclusions

From technical part of view, a great number of models could be used by applying simulation models for financial institutions as well as for price prediction and market analyses [5, 6, 7]. It undoubtedly effectively and efficiently would analyse different risk credit factors and parameters in its input and output.

Interest moments also appeared, while simulating different approaches, with cases to increase and decrease a number of new loans and number of extended loans. That came back with the effect on manipulating data for changing GDP growth rates as well as credit rate. However, nowadays, we also can see that different countries use different approaches to attract "credit" clients. Most of the developed world used to decrease credit rate (by using L-model), while developing countries, in particular Kazakhstan, used to increase credit rate during the crisis periods.

References

[1] Thomas Lyn C 2009
[2] Anderson R 2007 The credit-scoring toolkit: Theory and practice for retail credit risk management and decision automation OUP
[3] Fu Rong Wu Sha 1975 Online mall operators of system dynamics model and simulation: Shop example Soft Science **27**(2006) 101-4
[4] Eaton D I Porous glass support material US Patent **3** 904
[5] System dynamics simulation model for assessing socio-economic impacts of different levels ofenvironmental flow allocation in the Weihe River Basin, China, European Journal of Operational Research
[6] Mirseidova Sh, Atymtayeva L, Inoue A 2012 Evaluation of Fair Market Price of Resources in Oil and Gas Industry Using Fuzzy Sets and Logic. Proceedings of the 10th International conference: Information Technologies and Management 2012 April 12-13, 2012, Information Systems Management. Institute, Riga, Latvia 53 Journal *"Computer Modelling and New Technologies"* **16**(1) 30-4
[7] Mirseidova Sh, Inoue A, Atymtayeva L 2012 Applying Soft Computing to Estimation of Resources' Price in Oil and Gas Industry Proceedings of The 23rd Midwest Artificial Intelligence and Cognitive Science Conference, MAICS, April 21-22, 2012, Cincinnati, USA 6-10 http://ceur-ws.org/Vol-841/
[8] Mirseidova Sh, Atymtayeva L 2012 Definition of Software Metrics for Software Project Development by Using Fuzzy Sets and Logic Proceedings of the 6th International Conference on Soft Computing and Intelligent Systems and the 13th International Symposium on Advanced Intelligent Systems, 20-24 November 2012, Kobe, Japan, 272-6

Expert system for the correct career determination

T Sadykova*, L Atymtayeva

Kazakh-British Technical University, Almaty, Tole bi str, 59, 050000 Kazakhstan

**Corresponding author's e*-mail: sadykovatolkynai@gmail.com

Abstract

This paper focuses on the construction of an online Expert System, which guides students for the selection of their suitable future profession in IT sphere. The system is online in the sense that it provides information for users in real time. The system will have the knowledge-base which contains the details about the range of positions that vary in their requirements and expectations in IT industry. To start an IT career, people should have a reasonable idea of the requirements of the area they're interested in. Especially, IT professionals need not only appropriate technical skills and experience, but also a broad understanding of the context in which they operate. So, the focus of this paper is the creation of Expert System that finds out which career is best for you in IT industry by psychological testing. Psychological testing for career guidance takes into account your preferences and selects the profession the most suitable for you.

Keywords: expert System, inference engine, knowledge-base, career determination.

1 Introduction

Choosing career guidance is not always an easy task for students, especially since the choice should be selected on IT sphere. Nowadays, IT was held up as one of the professions of the future, where more and more of the best jobs would be migrating as computer-automated processes replaced manual ones. According to the analysis of the labor market, based on the information of recruitment agencies, in Kazakhstan, in particular, and all over the world there is a high demand for professionals in IT industry. Thereby, IT professionals need not only appropriate technical skills and experience, but also a broad understanding of the context in which they operate. For this purpose we have developed an online Expert System which guides students for the selection of their suitable future profession in IT sphere by special type of survey which contains the psychological aspects. In this way, in the preliminary stage we collect information from human experts who have experience in the preparation of a psychological survey to determine the profession in the field of IT.

2 Existing Expert System in Career Determination

We analyzed existing expert systems for career choice like "X-222" and "Profi" [1] in terms of functionality, the order of testing, types of reports generated. We investigated the structure and functional model of the systems. According to these analyzes it was revealed that the systems gather information about the client, including gender, age, education, preferred areas of activity, reveals his professional interests and inclinations. This is realized in the form of a dialogue with user (survey). After the finishing this survey the system generates a list of professions the most relevant for the certain user. For the generation of recommendations system uses tendencies and interests of the users by taking into account his age, level and type of education. By the process of getting result the system gives the explanation and conclusions why this certain recommendation was chosen for this user and introduces the main characteristics of the professional activity. The main principles of such systems are to use the knowledge about the logical, cause-effect relationships between professions and inclinations, personal qualities, patterns and heuristics "reasoning" [2].

However, the existing systems for choosing IT profession cannot be called so effective. The difficulty lies in the dynamic build-up of knowledge in the industry and significant isolation from the learning process. They have some gaps in terms of expanding the knowledge base.

3 Knowledge base and Database

The expert systems are currently the most widely used type of system based on rules. Rule-based system consists of rules IF-THEN, facts and interpreter, which controls how the rule should be called depending on the availability of the facts in the working memory. As knowledge-based systems became more complex, the techniques used to represent the knowledge base became more sophisticated.

Expert system for career determination consists of three main components [2].

A knowledge-base (KB), the construction of which requires the choosing of a strategy leading to a model of knowledge gathering, the aim of which is to orderly collect and symbolically represent the available information for career determination.

An Inference Engine verifies the consistency of the KB and extracts consequences automatically from the symbolic formulation of model information.

An Interactive Graphic User's Interface that is used by users not necessarily familiar with the logical and mathematical details of the system construction. The structure of ES can be showed on the figure 1.

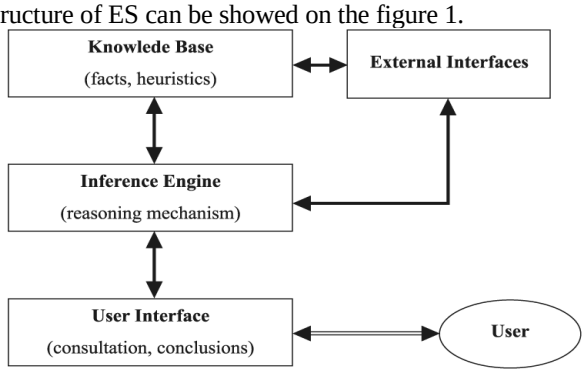


FIGURE 1 The structure of expert system for career determination

Initially, the rule based expert system (ES) were constructed on Visual Prolog [3, 4] for checking the main principles of connections and finding new links, for updating knowledge base and launching inference engine. The database stores the user answers for special questions. These data can be affirmative or have negative response. Example (ES identification and choosing the profession):

- profession_is («IT Programmer»),
- it_is («Php programmer»):
- positive («has», «progressiveness»),
- positive («has», «creativity»),
- positive («has», «high concentration of attention»).

We can describe the knowledge of other majors in the same manner. Rules of KB correlate user data with the data in the rules of positive and negative, usually we add the statements to database with answers 1 (yes) and 2 (no) used in pattern matching. After that, we store characteristics of different professions in database such as conditions:

- cond (l, «analytical mind »).
- cond (2,«high concentration of attention, long-term memory»).
- cond (3,« long intellectual concentration»).
- Also, there are data on the types of profession.
- topic («developer»)
- topic («systems analyst»)
- topic («web designer»)

4 The process of testing

Psychological testing for career guidance takes into account the preferences of users and selects the profession that most suitable for them. In the field of information technology there are many specializations for every taste and character. First, the combination occurs very close to each other profession: for example, "Web Developer" and "Web Designer". Answering to questions may be repeated several times and you can choose among them - one or two of the most popular. It can be assumed that the test in relation to these professions there is a clear interest and possible addiction. If there is no clear leader among the professions, all the answers can be classified according to some meaningful base. Career choice is a developmental process that extends throughout life; it involves series of decisions. In reality career decision is not just a matter of selecting an occupation that is good match with person's characteristics. That is why to give some advice in career determination we try to create the questions based on psychological analysis.

By using psychological analysis, we identified skills and characters that IT programmers should have and created test with about 13 questions to determine percentage of human suitability for IT sphere. There are "Yes/No" answers. Further we plan to extend the scope of answers by making them fuzzier because the real human answers usually have some degree of "Yes" or "No". The testing contains the questions about the attitude to this or that activity and phenomenon. Some experience in the development of fuzzy expert systems may help us in this research [5, 6].

5 Conclusion

It is obvious that the expert system in career determination has great significance, because it provides accurate and proper career choice based on character performance. Career choice is a delicate decision making problem since it has reverberate effect on efficiency and competency if not properly handled. People who have chosen a profession that does not meet their entity, often frustrated in their profession. In this way right choice of future profession as early as possible may help to build the suitable career and the construction of expert system in this area may serve as a good instrument.

References

[1] Profix – find your profession. Retrieved from: http://proftest-online.ru/
[2] Jackson P, Introduction to Expert Systems, 2nd Edition
[3] Flex V P 2002 Expert System Toolkit, version 1.2. Logic Programming Associates Ltd. London, England 2002
[4] Bratko I Prolog – Programming for Artificial Intelligence, 3rd Edition
[5] Atymtayeva L, Kozhakhmet K, Bortsova G, Inoue A 2012 Methodology and Ontology of Expert System for Information Security Audit Proceedings of the 6th International Conference on Soft Computing and Intelligent Systems and the 13th International Symposium on Advanced Intelligent Systems, 20-24 November 2012, Kobe, Japan 238-43
[6] Kanatov M, Atymtayeva L, Yagaliyeva B 2014 Expert systems for Information Security Management and Audit. Implementation phase issues Proceedings of the Joint 7th International Conference on Soft Computing and Intelligent Systems and 15th International Symposium on Advanced Intelligent Systems, SCIS & ISIS, December 3-6, 2014, Kitakyushu, Japan 896-9 978-1-4799-5955-6/14

Expert system for pharmacy

A Sagdoldanova*, L Atymtayeva

Kazakh-British Technical University, Almaty, Tole bi str., 59, 050000 Kazakhstan

**Corresponding author's e*-mail: aiym.sagdoldanova@gmail.com

Abstract

This paper is devoted to the issues of the constructing the expert systems in the area of pharmacy. The use of expert systems in pharmacy allows reach a new level in the process of intelligent search the appropriate pharmacy products for the clients and pharmacists.

Keywords: expert system, pharmacy, intelligent search

1 Introduction

Nowadays on the pharmaceutical market, we can observe many different information systems that work only with storing and extracting the data. For example, in Kazakhstan there are some web-oriented systems like vidal.kz, i-teka.kz and eurapharma.kz [1, 2] which allow searching drugs, sorting the search results by price and gives some special information about this drug. These types of systems use only data management and processing. But in the most cases the pharmacists and clients need more intelligent results and recommendations about the proposed drugs. For example, the relevance of certain drugs for people with some contraindications by health. By using some types of expert system this process of selection of the appropriate drugs may become easier and efficient for clients (pharmacists) especially in unusual situations when the selection needs to be more accurate and complete. It may also help to reduce the number of errors due to human factors.

2 Expert System structure

To develop the expert systems we are going to consider the following components like user interface, inference engine and knowledge base.

User Interface enables an interaction between the user (pharmacist) and system. Interface of this system should be simple and easy to use. For the main page as a front-end part, we use search input button to search drugs by alphabetical order, also check boxes to select one disease from the list. The other web pages describe the information about drugs; use the tables with columns like, indication, dosages, adverse effects, prices and so on.

Inference Engine is a mechanism that's manages the expert systems and decide if the problem has reached an acceptable solution or not [2]. In our case, we use the classification by categorizing all the drugs. For example, user (pharmacist) pick out one disease from the list, then system analyzes all the drugs recommendations and selects one suitable and essential drug. In addition, system shows other drugs, which have same number of symptoms, contraindications (sub drugs) with essential.

3 Knowledge base forming

The core of the proposed expert system is Database. It is very important to know how data are stored in database and by which logic or rules they interact with the interface. In our case, we use nested rules up to three levels. For example, after selecting one disease, appears another page which gives list of contraindications only for selected disease and after that user can get recommendations. In order to give recommendation system will use if-then rules by comparing columns like adverse effects and indications. For instance, if adverse effects are less and indications for use are more, then system will recommend more suitable drug by using classification (categorization of drugs).

4 Using software tools and system effectiveness

Today, expert systems developers have the opportunity to distribute their applications via Web. Since all data are stored in the database, we should choose and connect it with one web based programming language. The development of the most web based expert systems embodies a number of benefits. For instance, the use of an internet based database was effective in storing large amount of facts and data for web based expert systems, also using PHP or HTML makes it easier to enhance the expert system user interface [3].

After analyzing and testing various types of Web oriented programming languages, we stopped at the PHP, because this language is simple to use and allows complex conditions and complex conclusions. By using PHP and production model of the expert system we can achieve approximately 70% of the efficiency of the proposed recommendations. In order to increase effectiveness of the system we plan to expand database in terms of diseases and recommendations for them.

5 Conclusion

The development of such types of expert systems relates to the different issues of the data store structure, its relationships representations, and relevance of the appropriate rules models [5] that serve as a base for intelligent search and filtering. The main idea is to find the relevant links between the data stored, special conditions (rules) and proposed solutions (recommendations). Thus, further researches in this area may discover some new options for selection process and facilitate the process of choosing the essential drugs.

References

[1] Bayan Bakyr Elyas 2015 Expert pharmacy for drug interactions and diagnoses
[2] Dokas I M Developing web sites for web based Expert Systems: a web engineering approach
[3] Duan Y, Edwards J S, Xu M X 2003 Web-based Expert Systems: benefits and challenges
[4] Ajith Abraham Rule –based Expert Systems USA
[5] Sheriyev M, Atymtayeva L 2015 Automation of HCI Engineering processes: System Architecture and Knowledge Representation Int.Journal "Advanced Engineering Technology and Application (AETA)", Natural Science Publishing **4**(2) (May 2015) ISSN 2090-9535 41-6

The development of expert system as a framework for choosing the mobile operators

A Baybakova*, L Atymtayeva

Kazakh-British Technical University, Tole bi Str. 59, Almaty, Kazakhstan

**Corresponding author's e*-mail: akerke.baybakova@gmail.com

Abstract

This paper presents the main processes of the development of expert system, which can serve to the users in solving the problem of a suitable choice for mobile communication operator and tariffs. We discuss the problems of choosing appropriate mobile connection conditions and the relevance of the presented expert system. The expert system is implemented in the web-based form as a special case of knowledge processing by using the production model of knowledge representation. We describe the processes of the building of questionnaire, structure of knowledge and database, the problem-solving algorithms etc.

Keywords: Expert system, mobile operator, inference engine, knowledge-base

1 Introduction

Nowadays, the modern people cannot imagine daily life without using a mobile phone. With the increasing popularity of mobile phones and smartphones, number of mobile operators is growing. Competition among them gives a large variety of communication conditions and tariff options.

Today, in Kazakhstan we have five mobile operators, such as Activ, Kcell, Beeline, Tele2 and Altel. After the signing of the law on the abolition of mobile slavery by the president of Kazakhstan in November 2015, subscribers have opportunity to change mobile operator at no charge while keeping their number. Since this is a new decision for the sphere of mobile services, subscribers still are not able to select the appropriate tariff services operator in an automated way. Sometimes mobile phone users have to call or come to the office of the mobile company in order to get full information, it is a wasting of time and needs human resource to consult with customers to give them recommendations [1].

Exploring this area, we tried to find a system to eliminate tariffs, which act as a filter of the official websites of some brands of mobile operators (for example, the main web-site of "Beeline" mobile operator company owned by "VimpelCom" has the filter by categories to choose tariff options). However, it is not enough for users knowing the tariffs of separate mobile operators. The aim of our work is the creation of an expert system as a common framework for different mobile operators and their tariffs to make the process of selection of mobile operators easier for users. To achieve this goal we developed the expert system with smart functions of choosing the appropriate operators, tariffs and recommendations for the users.

2 The structure of expert system

The purpose of expert system for choosing the mobile operators is to provide to customers easy way to find and choose suitable tariffs from all available mobile operators, which are offered by various brands. Web based expert systems have several advantages in user experience over standalone systems [2].

Mobile operators and tariffs have a set of parameters for choosing (for example, connection conditions, internet access, roaming, cost etc.).

The customer may have a set of tasks that he wants to solve by the selected product and by the identification of the restrictions for the selection process.

The algorithm for solving the problem can be presented in the following steps:

1) The construction of the proposed classification mobile operators and tariffs;

2) Identification of the customer needs;

3) Determining the set of given tariff with identified needs;

4) Selection of the best set of tariff;

5) Filling and maintenance of knowledge base using knowledge acquisition module [3]. As a source of knowledge can act descriptions of operators and tariffs in the form of text documents.

In order to give more clearly explanation of the working process of the expert system an interaction diagram of a system has been developed, which is shown on Figure 1.

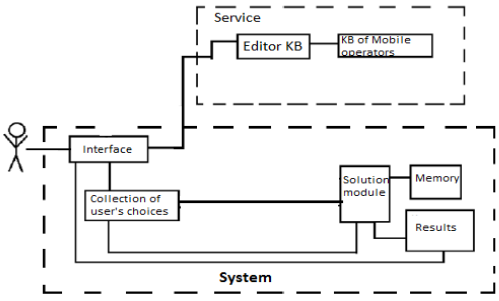


FIGURE 1 Diagram of interaction inexpert system

Interface is responsible for the exchange of information between the user and the expert system by choosing the right mobile operator. Collection of user's choices consists of questions asked user to choose the appropriate connection conditions.Editor knowledge base of mobile operators provides the ability to edit, change and complete information about tariffs and mobile operators. Results provide the user with a report, which listed mobile operators and tariffs that meet specified characteristics. Memory stores selected characteristics and conclusions. Solution module is designed to produce new facts based on comparison of the original data from the memory and knowledge from the knowledge base, implements a decision-making algorithm[4]. Knowledge base of mobile operators contains information on all mobile operators and their tariffs.

3 Process of building questionnaire for the system

Thus, the expert system includes the following components: web-based questionnaire for users (customers); knowledge base where all rules are written; and database to save appropriate information about mobile operators and their tariff options. The following list of connection options may be incomplete, but it helps to create the groups of questions from which customer can choose one or another tariff:

- Cost
- Quality of connection
- Internet access
- International roaming
- Connection conditions
- Other opportunities

The user has more than one answer to choose when selecting conditions of the connection: it may be a simple question to answer as "yes \ no", and may consist of several options. For example, when choosing a size of access to the Internet, he should choose one of three options: a) less than 2 GB per day; b) from 2 to 6 GB per day; c) more than 6 GB per day. After answering the questions, the system accumulates all received performance and gives to the user the report which shows all the conditions.

4 Knowledge base and database

The knowledge base of the system contains the rules, which helps to get the solutions that meet specified characteristics by user. We decided to organize productions of expert system into a decision tree [5, 6]. The following result shows that depending on the answer for particular question, the knowledge base excludes not appropriate mobile operators and tariffs. The sample of decision tree is shown on Figure 2.

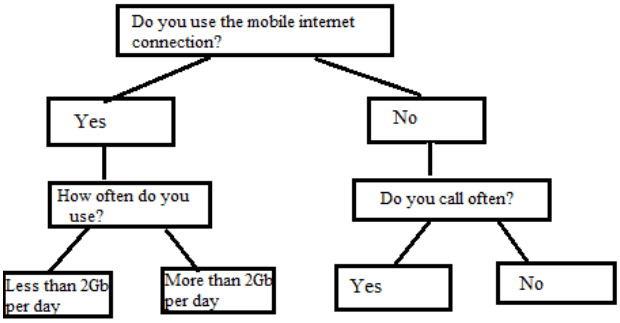


FIGURE 2 The sample of decision tree for questions in knowledge base

5 Conclusion

By summarizing the work above the development of expert system for choosing the mobile operators, we can conclude that in the area of user selection it can be many variants to choose. The categorization and well-developed rules for knowledge base may help to decrease number of variants and come to more optimized solutions. The creation of expert system as a framework for different brands in mobile operators may help to develop the interoperability between the different mobile platforms and customize the user needs.

References

[1] Makhambaev A S The results of the first month of the cancellation of "mobile slavery" in Kazakhstan Retrieved from: http://www.inaktau.kz/news/1111453 04.02.2016
[2] Ceri S, Fraternali P, Bongio A, Brambilla M, Comai S, Matera M 2003 Designing Data-Intensive Web Applications Morgan Kaufman: San Francisco et al.
[3] Durkin J D 1996 Expert systems: a view of the field IEEE Expert **11**(2) 56-63
[4] Turban E, Aronson J E 2001 Decision Support Systems and Intelligent Systems. 6th Edition Prentice Hall, Upper Saddle River, New Jersey
[5] Henrion M, Breese J S, Horvitz E J 1991 Decision Analysis and Expert Systems AI Magazine **12**(4)
[6] Atymtayeva L, Kozhakhmet K, Bortsova G 2012 Some Issues of Development of Intelligent System for Information Security Auditing Proceedings of the International conference of Computational Intelligence and Intelligent Systems 2012, June 1-2, 2012, London, UK **2** 725-31

Expert system for e-commerce issues

A Alkuat*, L Atymtayeva

Kazakh-British Technical University, Almaty, Tole bi str., 59, 050000 Kazakhstan

**Corresponding author's e*-mail: aselalkuat@gmail.com

Abstract

This paper presents the description of expert system development for e-commerce issues by using probabilistic technique based on Bayes Theorem to analyze user goals and make recommendations in choosing the products. We present the design of intelligent rule-based system for online e-commerce in the area of construction. This system can help customers to find products for choosing and purchasing components with associated elements. The expert System learns from a customer and predicts variants of different products that probably he will find most valuable.

Keywords: Knowledge-base, Expert system, E-commerce, Bayesian

1 Introduction

Nowadays, Internet is globally used and everyone have access to it from their home, workplace or anywhere with mobile devices, which leads to growth the number of users respectively. Consequently, one of the problem is information overload that makes users difficult to find what they need. For example, an online website for construction materials has a great number of items, which cause users to waste time to find what they want. However, sometimes potential buyers may be interested in receiving recommendations about what to purchase and what is popular among peers. Expert systems used to solve this problem in E-commerce sphere by using users preference to produce a recommendation result, which can be valuable for them [1 - 3].

2 Brief overview of relevant Expert Systems

After analyzing the e-commerce market, we understood that many companies use content-based filtering technique [4] in recommendation systems. It finds the products to recommend by using user profile. One drawback of this technique is that it provides a limit degree of novelty and if there is not enough information to build a user profile, the recommendation will not be provided correctly.

Another technique is using questionnaires in order to find the most suitable product. One more example of such expert system is Sotovic.ru website [5], which recommends users related products depends on characteristics of products based on answers from particular questionnaires. This website based on EXSYS CORVID Expert Systems Development Tool, which uses IF/THEN logic to describe the steps in a decision making process [6].

Our proposed expert system works with collaborative filtering, knowledge-based recommendations and smart search. The collaborative filtering is used to find other users that have similar preference or same interest which we can call "neighbors". It makes recommended result that has popularity among other users based on choices of them. Similarly with Amazon.com website which, has BookMatcher recommender system [3], in which they ask customers to rate a number of books. Amazon.com then matches those ratings with other customers to find other books each customer is likely to enjoy. Amazon.com reports that recommender systems help sell more books, and help ensure customer loyalty, though they have not published results that are more specific.

3 Knowledge Base and Database

The main logic of Expert System is based on Bayesian Theory. Bayesian method is a famous algorithm that can be used in the expert recommendation and prediction field. When it comes to the prediction field, naive Bayesian method is able to directly calculate the probability of products in which user can be interested using his previous queries. It is always fairly difficult to measure whether the definition is suitable or whether the parameter is optimal. On the other side Bayesian network has good performance although it has a big computational complexity [7].

Prediction and recommendation based on formula below:

$$P(H : E) = P(E : H) * P(H) / (P(E : H) * P(H) + P(E : \text{not } H) * P(\text{not } H), \quad (1)$$

where P(H) – full probability of purchasing,
P(E : H) and P(E : not H) conditional probability based on prior queries

A Bayesian classifier is a probabilistic framework for solving classification problems. It is based on conditional probability, which are complement products to purchased ones. In addition, the concept of prior queries is very

important as they represent our expectations and predictions about next purchase.

TABLE 1 Sample of database where products are stored

№	Priorqueries
1	Brick
2	Linoleum
3	Wood

TABLE 2 Database of associated products with probability of purchasing

№	Queries	Prediction1	Prediction2
1	Brick	Cement (0.8)	Sand (0.6)
2	Linoleum	Glue (0.7)	Nail (0.6)
3	Wood	Nail (0.8)	Lak (0.5)

In Table 1, all users' queries should be stored. On the other related Table 2 complement products that can be probably purchased by user next time will be organized with probability of purchasing analyzed by expert in this field. Using the formula (1) we can calculate probability of more suitable product among complements for recommendation.

4 Used software tools

The expert system is designed and implemented by using Node.js, which is a JavaScript framework, integrated Java object manipulation with rule-based inference. It supports both forward and backward reasoning and has the full features of a programming language, thus providing flexibility for future development of the expert system. Customer's information is stored in a database. The database is accessed using the JDBC (Java Database Connection) capability of the Java servlet [8]. The web server include a standard HTML compatible web server and a servlet engine. The web server handles communications with the client and accesses the images and the HTML documents as necessary.

The smart search in the system is organized by input and output data:

- Input: list of parameters of the goods generated based on the responses of the user;
- Output: a list of products, selected on the basis of the generated parameter list.
- Main features:
- Dialog mode;
- Recommendations;
- Providing graphic materials (product photo);
- The output of the search

The knowledge base of Expert System contains both factual and heuristic knowledge. Knowledge representation is the method used to organize the knowledge in the knowledge base. Knowledge bases must represent notions as actions to be taken under circumstances, causality, time, dependencies, goals, and other higher-level concepts.

In expert system we use several methods of knowledge representation.

Frame-based systems that are employed for building very powerful ESs. A frame specifies the attributes of a complex object and frames for various object types have specified relationships.

Production rules which are the most common method of knowledge representation used in business. Rule-based expert systems are expert systems in which the knowledge is represented by production rules [9, 10].

A production rule, or simply a rule, consists of an IF part (a condition or premise) and a THEN part (an action or conclusion). IF condition THEN action (conclusion).

5 Conclusion

In this paper, a sample implementation of a knowledge based expert system for electronic commerce is described. The system consists of the knowledge base of the product domain, inference engine and user interface module. Expert systems are demonstrating the practical importance ranging from machine learning to personalized agents, in E-commerce. By using this expert system we realize recommendations to the customer before the purchase or complement products after the purchase based on its popularity among peers.

References

[1] Hans Bossenbroek, Hans Gringhuis Recommendation in e-commerce Luminis Recommendation Services
[2] Robert Driskill and John Riedl, EdenPrairie Recommender Systems for E-Commerce: Challenges and Opportunities Minnesota 5344
[3] Schafer J B, Konstan J, Riedl J Recommender Systems in E-Commerce Minneapolis, MN 55455
[4] The implementation of knowledge-based recommender system for electronic commerce using Java Expert system library In-Gook Chun, In-Sik Hong, ISIE 2001, Pusan, KOREA
[5] http://www.sotovik.ru/es/ Informational-*analitical agency "Сотовик"*
[6] http://www.exsys.com/ Knowledge automation Expert Systems Technology
[7] Meghna Khatri 2012 A Survey of Naïve Bayesian Algorithms for Similarity Recommendation Systems **5**
[8] Tutorial: Recommender Systems, International Joint Conference on Artificial Intelligence Beijing, August 4, 2013
[9] http://www.umsl.edu/~joshik/msis480/chapt11.htm Expert Systems and Applied Artificial Intelligence
[10] Sheriyev M, Atymtayeva L 2015 Automation of HCI Engineering processes: System Architecture and Knowledge Representation Int.Journal Advanced Engineering Technology and Application (AETA), Natural Science Publishing **4**(2) ISSN 2090-9535 41-6

Checking compliance of business processes with the normative approach

Yerbolat Yerlan

Kazakh-British Technical University, Tole By Str. 59, Almaty, Kazakhstan

**Corresponding author's* e-mail: e.e.erbolat@gmail.com

Abstract

In this paper we propose an abstract framework to model the deontic notions relevant for business process compliance. In particular, we provide a comprehensive classification of the obligation types relevant for modelling whether a process is compliant, and we describe their semantics in terms of execution traces.

Keywords: normative requirements, regulatory compliance, business processes

1 Introduction

The study of IT technology to support compliance is gaining momentum in the field of Enterprise Information Systems. The number and complexity of compliance and the scope of initiatives is growing, and more and more businesses are required to provide a certificate of compliance frameworks such works. Several research approaches have been proposed to the last few years.

The aim of this work is not to create another system for compliance, but abstract conceptual framework, regardless of any language and to model regulatory requirements. The resulting structure can be used for several purposes: the first is to study the possible use of the formal properties of the corresponding business processes, such as computational complexity of determining the problem, whether the business process with a specific regulation [1] and, possibly, to identify tractable subclasses; second application, to provide an accurate basis for comparison between different approaches to compliance of business processes, to identify gaps in modelling of regulatory requirements, as well as to assess their suitability for modelling the compliance of business processes [2]. For the purposes of this work process will be understood as a set of sequences of tasks. In addition, each task has an associated set of effects where the effect is a basic formula for the language.

To present regulatory requirements, we propose a classification of the different regulations (for example, obligations, permissions, prohibitions), and we provide additional clarification to them on various aspects (eg, time, offset, per durance). For each class, we provide the semantics and examples drawn from real-world acts, rules and regulations, illustrating the specific types of regulations.

2 Business process modelling and compliance

A process is compliant with a normative system if it is possible to execute the process without violating the normative system. The normative effects of importance - deontic effects are: obligation, prohibition and permission. Obligations and prohibitions are constraints that limit the space of action of processes; the difference from other types of constraints is that they can be violated, and a violation does not imply impossibility to continue the business process but permissions cannot be violated. Compliance means to identify not a set of obligations process. The classification has been obtained in a systematic and comprehensive way when one considers the aspect of the validity of obligations or prohibitions and the effects of violations on them.

3 Normative Requirements

The scope of norms is to regulate the behaviour of their subjects and to define what is legal and what is illegal. Norms typically describe the conditions under which they are applicable and the normative effects they produce when applied. A comprehensive list of normative effects is provided in [3].

In a compliance perspective, the normative effects of importance are the deontic effects (also called normative positions). The basic deontic effects are: obligation, prohibition and per- mission.

4 Conclusion

In this paper, framework, which describes the key concepts of business process compliance, is presented. As far as we know this the first time that the problem of compliance has been give a precise and formal treatment taking into account

the formalization of the normative requirements. In particular, comprehensive classification of obligations and their semantics[4] in terms of the execution traces of a process are provided. The stated model is different from specific logics because of reasoning with norms and process model formalisms. Moreover, examples for each type of obligation are taken from actual real life legal codes and legislative acts.

References

[1] Colombo Tosatto S, Governatori G, Kelsen P, van der Torre L 2012 Business Process Compliance is Hard NICTA Technical Report
[2] Hashmi M, Governatori G 2013 A Methodological Evalua- tion of Business Process Compliance Management Frame- works AP-BPM 2013. **LNBIP 159** 106–15 Springer
[3] Gordon T F, Governatori G, Rotolo A 2009 Rules and Norms: Requirements for Rule Interchange Languages in the Legal Domain RuleML **LNCS 5858** 282–96 Springer
[4] Ghose A, Koliadis G 2007 Auditing Business Process Com- pliance ICSOC 2007 **LNCS 4749** 169–80 Springer

Expert Systems for beauty products

I N Yersari*, L B Atymtayeva

Kazakh-British Technical University, Tole bi 59, Almaty, 050000 Kazakhstan

**Corresponding author's* e-mail: inkarayersari@gmail.com

Abstract

This paper describes the main principles of the development of an expert system in a beauty sphere. The use of this expert system will simplify the selection of cosmetics for skin care, by identifying the type of skin without a visit to a specialist. The main stages of the design of an expert system, including: analysis of tools to build expert systems, the choice of knowledge representation model, the development of the logic module, user interface development. The main criteria for the development of expert system were addressed to determining skin type, the convenient, intuitive graphical user interface and easy integration with the Web site.

Keywords: Expert system, skin care, user interface

1 Introduction

Today the most of women use beauty products for skin care. Everyone loves to look their best. By looking at survey results we can say that 79% of women make it a priority to look their best [1]. When choosing beauty products 62% of women prefer to be based on expert opinion [2]. The main problem of women in the selection of beauty products is that not everyone can afford to visit an expert. To do this, the popular sites cosmetic products created on its website an expert system, due to of which each buyer can pass the test and get recommendations. For example, the big cosmetic company "Renee Rouleau" (USA) in the official website has a special Expert System (ES) [3]. After consideration of ES for cosmetic products, we can see that each has its advantages and disadvantages. As a drawback we can identify that each company usually recommends only their own products for the purpose of advertising. Considering this fact, we can conclude that not for everyone the product may be available. For the average buyer who cannot visit an expert is important to know what type of cosmetic skin care products suited him. Kazakhstani companies do not have such a special expert system for beauty products. The purpose of our work is to develop a website as a special common framework for the ordinary user who wants to buy a cosmetic product and be aware about what to buy. The Expert System as a common framework for the different beauty products of the various brands in this area may help to make the right choice for the users and give them more opportunities for selection based on their different income levels.

2 Developing Expert System for beauty products

The proposed Expert system is Internet oriented, consists of the database and knowledge base, inference engine with generation of recommendation and user Interface part in a form of survey for determining of user's skin type and giving the recommendations about the products.

Knowledge Base, contains information obtained by interviewing experts and logical rules, which have more than 300 possible versions of tests.

Inference Engine is based on the decision tree with the addition of classes of objects to the knowledge base of a new type of reasoning. For the creating special ES for beauty products we build a decision tree. Decision trees are well suited to represent problems where instances are vectors of discrete-valued features and the target function has predefined discrete values. Decision trees we construct manually by using expert opinions.

The user interface can help users work with the expert system and is performed by the special survey for detection of user's skin type.

3 Making decision tree algorithms

For the creating algorithm of expert system inference engine we construct the decision trees [4, 5, 6]. In order to enter in the expert system and the set of various facts we must represent knowledge in the form of the structure "decision tree" which is an oriented graph, whose vertices are the conditions and conclusions, and the arcs of the result of the (test) conditions.

Here is the example of creating rules for decision trees:

IF age under 18 AND skin tone very fair AND current environment dry AND sleep hours four AND wear sunscreen never AND travel by plane never AND skin care routine minimal AND 1 skin concern oiliness AND 2 skin concern acne or blemishes AND 3 skin concern clogged pores THEN skin type #1.

For each vertex inference path is determined and recorded rule. We divide our tree for categories. The depth of the tree is 12 and 4 categories. Such as: about you, your

lifestyle, your skin, top concern. After completing the survey we can result of survey. It is nine type of skin, which based on four type of skin. Such as normal, dry, oily and combination. For the testing system we had to interviewed peoples and specialists. According to the survey, were interviewed about 80 people and the most of respondents were satisfied with the results.

4 Conclusion

The most of people know that everyone's skin is unique. In order to have beautiful, glowing skin needs proper daily care. The most of women in the world everyday use different type of cosmetic products for skin care. Main problem for most of women is that they do not know their skin type and choose the unsuitable cosmetic products. Some cosmetic companies want to help their clients using of some surveys for determining skin type. After the determining skin type company's recommend own products for skin care. We create an expert system in beauty sphere for the average user, which help determine skin type and select the products based on their level of income without orientation to the brands. After determining skin type user has recommendation for the choosing cosmetic products. In comparison with other similar systems, our system provides the recommendation of the products of several companies with different prices.

References

[1] 79% of Women Strive to Look Their Best Daily 2014 July 10. Retrieved from https://insights.popsugar.com/79-Women-Strive-Look-Best-Daily-35030936
[2] 76% of Women Consider Brand Loyalty an Influence on Shopping Behaviors 2014 July 25. Retrieved from https://insights.popsugar.com/76-Women-Consider-Brand-Loyalty-Influence-Shopping-Behaviors-35031005
[3] *"Renee Rouleau" the skin care expert* USA. Retrieved from https://www.reneerouleau.com
[4] Leondes C T 2002 Expert systems: the technology of knowledge management and decision making for the 21st century 1–22
[5] Jackson P Introduction to Expert Systems 3rd edition, Addison Wesley, ISBN 0-201-87686-8
[6] Atymtayeva L, Kozhakhmet K, Bortsova G 2012 Some Issues of Development of Intelligent System for Information Security Auditing Proceedings of the International conference of Computational Intelligence and Intelligent Systems London, UK **2** 725-31

To the question of construction and investigation of dynamic properties of control systems with inaccurate data

N Yunicheva*, R Yunicheva

Institute of information and computational technologies CS MES RK, Almaty, Kazakhstan

*Corresponding *author's* e-mail: naduni@mail.ru

Abstract

Application of interval methods to problems of the control theory is actual. In case of the absence inside an allowable interval for various factors of the equations, of parameters and boundary conditions of any preferences of one operating mode or an estimation over others and the presence of the information on variables only as an interval of allowable values, it is necessary to use the interval analysis [1].

Keywords: inacurrate data, methods of the interval analysis, stability of control systems

1 Introduction

The modern condition of the theory and practice of control systems confirms, that real technical and technological objects function in conditions of parametrical uncertainty. Uncertainty of the similar sort is caused by the presence of the uncontrollable perturbations influencing on objects of control, through ignorance of true values of parameters of an object of control because of the technological process complexity, and sometimes their unpredictable changes in time.

Almost in all cases the above mentioned parametrical uncertainty is characterized by belonging of real values of parameters of a technical object to some intervals whose borders are priori known. Their mathematical models can be presented by systems of interval differential or difference equations with use of the rules and designations of the interval analysis, and the class of such objects of control can be named interval-given.

Thus, there is a problem of control by not the unique object, but a family or a set of objects.

The interval analysis is a new direction of calculus mathematics.

The basic idea of the interval analysis consists in the replacement of arithmetic operations and material functions above material numbers, interval operations and functions, transforming the intervals containing these numbers. The peculiarity of interval solutions consists of the fact that they contain exact decisions of the initial problems.

2 Conclusions

The most important dynamic property, such as stability is one of the necessary conditions providing normal functioning of control systems. Therefore it is extremely important to find out those conditions which provide fundamental efficiency of the system, its stability. If the classical theory assumes the research of stability by the known methods and algorithms which are widely covered in the literature, then the research of stability of the interval-given objects is at the stage of its development, and the application of the apparatus of the interval analysis is demanded.

It is planned to carry out the problem of parametrical synthesis by its transformation to the decision of the interval system of the algebraic equations, research of the existing types of the decision of such interval systems.

In given article the decision of parametrical synthesis task for multivariate intellectual control systems of objects with the inexact data is carried out with the method [2, 3] and methods of the interval analysis.

References

[1] Jolen L, Kiefer M, Didri O, Walter E 2007 The applied interval analysis M.: Institute of computer researches 467

[2] Ashimov A A, Syzdykov D Zh 1987 Identification by the common parameter method: Reference book on the theory of automatic control Edited by Krasovsky A.A. M.:Science 263-71

[3] Khlebalin N A 1991 Modal Control of Plants with Uncertain Interval Parameters *Proc. Intern. Workshop «Control System Syntesis: Theory and Application»*, Novosibirsk 168-73

Using Big Data technology for Vulnerability scanners

A Kulmanov*, L Atymtayeva

Kazakh-British Technical University, Almaty, Tole bi str., 59, 050000 Kazakhstan

**Corresponding author's e*-mail: cool.azamat@gmail.com

Abstract

This paper presents the general characteristics of expert systems for processing of data analysis and secure information systems using vulnerability scanners and Big Data technologies. The work of vulnerability scanners is usually based on OWASP security standard recommendations that insist on the processing of various vulnerabilities and attacks. The number of queries to web-sites used by vulnerability scanners during the checking process may increase very rapidly and reach the size of Big Data. Thus, the consideration of Big data analysis becomes actual in this case.

Keywords: Big Data, Hadoop, MapReduce, vulnerability scanner, Cloudera

1 Introduction

Big Data Processing is a challenge not only for the units working directly with clients, but also for the information security departments. Over the past ten years the demand for more reliable protection system led to the need to collect and analyze all the big context data about events and security threats. Below are statistics from the report «Information Security Is Becoming a Big Data Analytics Problem», published by Gartner March 23, 2012:

- The amount of data analyzed in enterprise information security units annually to double until 2016.
- By 2016, 40 percent of companies in order to gather information about security threats will actively analyze at least 10 terabytes of data. In 2011, these companies were less than 3 percent.

In the area of information security management there are some special issues regarding the using Big Data in the processing of Internet queries. For providing the good level of information security any system may be checked by using vulnerability scanners that generate a lot of queries.

2 Vulnerability scanner

Vulnerability scanners is hardware or software serving for the diagnosis and monitoring of networked computers that allows you to scan network computers and applications to detect potential problems in the security system, to assess and address vulnerabilities.

Vulnerability scanners allow you to check a variety of applications in the system for the presence of "holes" that can be exploited. Also, low-level tools can be used, such as a port scanner, to identify and analyze possible applications and protocols running on the system.

In consideration of checking the security level of any system vulnerability scanners gives log data about vulnerability and mistakes found. Manual processing of log data requires a huge amount of time, and hence it can be a tedious task. Since Volume, Velocity and Variety are being dealt in our case.

3 Using of Hadoop platform and MapReduce Technology

Big Data technology often implies the using of Hadoop [1] platform. Hadoop is a complex system consisting of a large number of components. Install and configure a system on their own - a very difficult task. Therefore, many companies now offer ready the Hadoop distributions, including the deployment tools, administration and monitoring.

Hadoop platform is usually distributed as a commercial (products from companies such as Intel, IBM, EMC, Oracle), and under free (Cloudera company products, Hortonworks and MapR) licenses [2].

We consider the using of Hadoop platform together with MapReduce technology by the reason that data processing is performed by using Hadoop MapReduce technology [3]. According to this technology a huge amount of information is divided into parts, and the processing of each of these parts are entrusted to a separate server. Typically, the data is processed on the same servers where they are stored, which allows for faster processing and avoid unnecessary data movement between servers. The results are then combined into a single unit.

MapReduce architecture (Figure 1) is built on the principle of master - workers. As the main acts

JobTracker server, distributing tasks subordinate nodes in the cluster and controls their implementation.

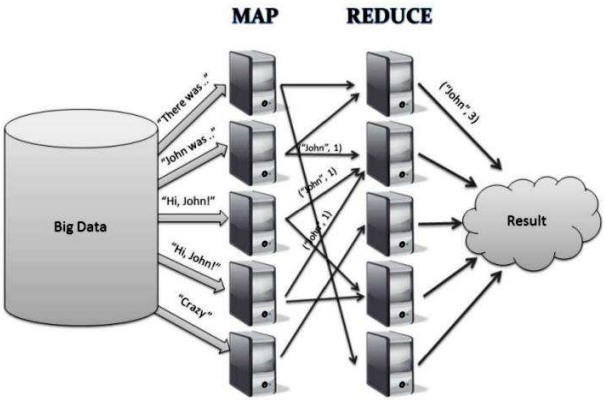


FIGURE 1 Architecture of MapReduce

MapReduce algorithm is used to process the data received from the Scanner vulnerability expert system.

Processing data is divided into the following stages:

1. Run the application: the transfer of the application code to the main (master) and slave units (workers);

2. Master assigns specific tasks (Map or Reduce) and distributes the input of the data on the compute nodes (workers);

3. Map-designated nodes read their input and start their processing;

4. Map-nodes locally store the intermediate results: each node stores the result in the local drives;

5. Reduce-nodes intermediate data read from the Map-Reduce nodes and perform data processing;

6. Reduce-sites store the final results in the output files, usually in HDFS [4].

5 Conclusion

By implementing the current technologies (IT security, Big Data, expert systems) within organization, there results a proper environment for analysis and development. Combining conceptual models of Big Data and IT expert systems [5 - 9] and worthless-considered data analysis. Looking ahead, Big Data have become one of the most discussed topics in recent years, and information systems analysis is an important factor in shaping business decision making systems.

Acknowledgments

This work is implementing at Kazakh-British Technical University under the research project “Expert systems for active audit and management of information security” funded by Ministry of Education&Science of the Republic of Kazakhstan as a part of the State Research Program “Development of the local products for Oil&Gas industry needs”.

References

[1] Lam C Hadoop in Action Manning Publications
[2] White T 2012 Hadoop: The Definitive Guide Third Edition 613–9
[3] Dean J, Ghemawat S 2008 Mapreduce: simplified data processing on large clusters Comm. ACM **51**(1) 107–13
[4] White T 2012 Hadoop: The Definitive Guide Third Edition 45–80
[5] Atymtayeva L, Kozhakhmet K, Bortsova G 2012 Some Issues of Development of Intelligent System for Information Security Auditing Proceedings of the International conference of Computational Intelligence and Intelligent Systems 2012, June 1-2, 2012, London, UK **2** 725-31
[6] Atymtayeva L, Kozhakhmet K, Bortsova G, Inoue A 2012 Methodology and Ontology of Expert System for Information Security Audit Proceedings of the 6th International Conference on Soft Computing and Intelligent Systems and the 13th International Symposium on Advanced Intelligent Systems, 20-24 November 2012, Kobe, Japan 238-43
[7] Atymtayeva L, Akzhalova A, Kozhakhmet K 2014 Main Issues of the Software Development for Knowledge Base Processing in the Intelligent Applications for Information Security Audit Proceedings of the 8th WSEAS International Conference on Computer Engineering and Applications (CEA '14), Tenerife, Spain, January 10-12, 2014 Journal Recent Advances in Computer Engineering, Communications and Information Technology ISBN: 978-960-474-361-2 271-80
[8] Kanatov M, Atymtayeva L, Yagaliyeva B 2014 Expert systems for Information Security Management and Audit. Implementation phase issues Proceedings of the Joint 7th International Conference on Soft Computing and Intelligent Systems and 15th International Symposium on Advanced Intelligent Systems, SCIS & ISIS, December 3-6, 2014, Kitakyushu, Japan 896-9; 978-1-4799-5955-6/14
[9] Atymtayeva L, Kozhakhmet K, Bortsova G 2013 Building a Knowledge Base for Expert System in Information Security Proceedings of the 14th International Symposium on Advanced Intelligent Systems (ISIS2013), 13-16 November 2013, Daejeon, Korea/ Springer Journal Advances in Intelligent Systems and Computing **270** Soft Computing in Artificial Intelligence 57-77

Some issues of expert systems in healthcare and education

N Ibrayeva, A Duisenbyeva, L Atymtayeva

Kazakh-British technical university, Tole bi Str. 59, Almaty, Kazakhstan

Author's e-mail: n.ibrayeva@gmail.com, a.duisenbayeva@gmail.com, l.atymtayeva@gmail.com

Abstract

A very significant and essential part of the development of an expert system is the creation of its knowledge base. The knowledge base includes not only the rules and the facts that form a part of the declarative knowledge, but also functions and procedures, which are responsible for the optimization of the algorithms used in the expert system. However, there is no clear and universal idea of creating knowledge base. This thesis will describe the attempt to develop ontology of the creation of knowledge base for different expert systems.

Keywords: expert systems, knowledge base [KB], medicine, education, future profession.

1 Introduction

Today healthcare and education sectors are ones of the most developing spheres in Kazakhstan and all over the world because of many unresolved issues in these fields. The governments of the countries have set the goal to improve the quality level of giving help to citizens and a significant improvement in existing services. All this is reflected in the any world documents regarding the development issues [1]. The expert systems in the field of education and healthcare still remain very actual and have a lot of issues to explore and improve. This paper describes the construction of knowledge base structure methods for the expert systems in these two fields.

2 Expert Systems

An expert system is a software which uses expert knowledge for providing high-level solution of non-formal problems. The foundation of the expert system is a knowledge base in specific areas, which build during developing system.

Nowadays the value of information support of different medical technologies steadily increases. Use of the modern information technologies becomes a critical factor in the development of the majority of branches of knowledge and areas of practical activities. Therefore, development and deployment of information systems are one of the most actual tasks [2].

The system can identify the problems and give out the most probable disease. The system defines diseases based on rules which were set by experts.

In educational sector we can consider the problems in choosing the right profession which relevant to the skills and abilities of school children or students who try to define the future work trajectory. Today a large percentage of high school graduates do not know who they want to be in the future, but even those who have already decided, and want to go in IT, do not clearly know the specifics of all specialties. There are tests to determine the future profession, but most of them give a very general answer without taking into account lots of implicit factors that may influence the choice. Hobby, zodiac sign or even enthusiasm of closest friends can influence the choice, and all these factors must be considered. So, this is how the idea of an expert system for determining the most suitable future profession for people who want to connect lives with IT appeared. So what makes this expert system different from the existing ones? First of all, it is narrowly specialized in the field of IT. All questions will be connected with information technologies and closely related aspects [3]. And in the end the answer will be clearly formulated within this sphere of activity. Again, the answer will be given very close to the reality.

3 Knowledge Base

The knowledge base is a set of the facts and inference rules allowing a logical output and intelligent information processing. The events are provided by depth (fundamental) knowledge of medicine or education, such as the hierarchy of diseases including hierarchy of parameters for the description of symptoms or hierarchy of the skills and abilities of people. Inference rules are surface (managing directors, practical) knowledge, such as rules of diagnosis of illness on symptoms and differentiation of diseases [4], or rules for identification more appropriate directions in future job. To build a knowledge base we use two methods of elicitation knowledge from an expert. We use one of the active methods is Interview and the second one passive Document analysis. For the interview we create questions and give for every answer it is weight (for example, Figure 1 for disease scores). After we fill KB by if/then rules (for example, Figure 2 as a construction of if-then rules).

Heart Rate	Low	normal	high	hypertony
>60	80%	20%	0%	0%
60-80	5%	75%	20%	0%
80-100	0%	10%	85%	5%
100-140	0%	0%	5%	95%
140<	0%	0%	0%	100%

FIGURE 1 Weights of answers

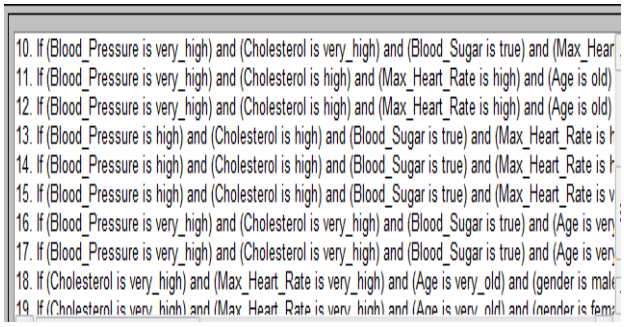


FIGURE 2 Construction of If-Then rules

The implementation of the knowledge base for determining the future profession is based on the building of competent ontology. While creating the knowledge base to determine the profession three main parameters may be considered: IT competence, specialty and skills.

Questions are focused on the identification of potential future professional competence in a particular specialty with respect to skills that are necessary and skills that the person already has. For example, the question "How much are you stable to stress?" can be answered as "Highly", "Low" and "Don't know". The level of stability to stress is a skill. On the basis of his reply specialties will be screened. If a person gives the answer "Low", the probability that he will be, for example, an IT-manager is reduced, because this specialty needs more resistant to stress people. Through the competent approach in ontology the unnecessary specialties can be removed and only the most suitable ones will be left [6].

4 Conclusion

The knowledge base is one of the most important components of an expert system. That's why the proper construction of knowledge base improves the efficiency and quality of the expert system. This paper describes just some ways to build knowledge base for experts systems by consideration the healthcare and education fields.

References

[1] Shayakhmetova K O, Syzdykova K Sh, Rakhimzhanova G B 2010 Development issues
[2] Kiselev Ye N 2003 Expert system in medicine Zaparozhe
[3] Herman O Introduction to expert systems and knowledge processing
[4] Gelman V Y 2002 Medical Informatics: Workshop St. Petersburg.: Peter
[5] Andreychikov A V, Andreichikova O N 2006 Intelligent information systems Moscow: Finance and Statistics
[6] Zagoruiko N G 2005 System "Ontogrid" for building ontologies / Computational linguistics and intelligent technologies. Tr. Intern. conference Dialog'2005 146-52

Architecture of web based intellectual vulnerability scanners for OWASP web application auditing process

S Nurmyshev, K Kozhakhmet, L Atymtayeva

Kazakh British Technical University, Tole bi 59, Almaty, Kazakhstan

**Corresponding author's e*-mail: kanik85@gmail.com, l.atymtayeva@gmail.com, s.nurmyshev@gmail.com

Abstract

Now, all business applications (e-commerce, banking, blogs, web mail, etc.,) are usually made as web-based systems. Increasing distinction and usage of these applications have made them more responding to attacks because they store enormous amount of sensitive user information. Traditional security mechanisms like network firewalls, intrusion detection systems, and use of encryption can protect the network, but cannot mitigate attacks targeted towards web applications. Vulnerability scanners are often used in web application security assessments, but there are few properly developed web-based vulnerability scanners, that used intellectual expert based tools. Development of intellectual web-based security scanners for OWASP security standard has high demand in security auditing area. Expert systems in vulnerability scanners can increase effectiveness and decrease a cost of OWASP auditing process.

Keywords: intellectual vulnerability scanner, expert system, OWASP auditing process

1 Introduction

Nowadays, expert systems were going to be widely used in information security auditing process [1-4]. It helps to decrease information security auditing process. Also, using of intellectual approach in OWASP security process becomes obliged, because of high complexity features in the auditing process. In recent years, increased the number of publications applied to this new trend in the field of information security, as an adaptive network security. This line consists of two major technologies - security analysis (safety assessment), and detection of attacks (intrusion detection). It is the first technology and the subject of this article.

Briefly illuminating active auditing process, we can highlight following issues; the network consists of communication channels, nodes, servers, workstations, application and system software, databases, etc. All of these elements need to be evaluated for their protection effectiveness. Security review tools and explore the network looking for "weak" place in it, analyze the results and create on their basis of various kinds of reports. In some systems, instead of "manual" intervention by the administrator found the vulnerability will be eliminated automatically (for example, System Scanner System). Here are some of the problems identified by the analysis of security systems:

- "Hatches" in the programs (back door) and programs such as "Trojan horse";
- weak passwords;
- susceptibility to penetration of unprotected systems;
- misconfiguration of firewalls, Web-servers and databases;
- etc.

Security analysis technology is an efficient method of implementing network security policies before completing its attempt to breach the outside or from inside the company in OWASP auditing process.

This is one of the aspects common to all systems of security analysis. They are designed to detect only known vulnerabilities have described them in the database, but multiple expertise of auditors can increase the effectiveness of OWASP auditing process.

2 Vulnerability scanner working process

A vulnerability scanner can assess a variety of vulnerabilities across information systems (including computers, network systems, operating systems, and software applications) that may have originated from a vendor, system administration activities, or general day-to-day user activities:

1. Vendor-originated: this includes software bugs, avoiding operating system patches, accessible services, vulnerable default configurations, and web application vulnerabilities.
2. System administration-originated: this includes inaccurate or unauthorized system configuration changes, loss of password protection policies, and so on.
3. User-originated: this includes sharing directories to unauthorized parties, failure to run virus scanning software, and malicious actions, such as carefully introducing system backdoors.

On the Figure 1 we can show a typical web application testing methodology with highlighted stages which can be partially automated with vulnerability scanners on Testing methodology [5].

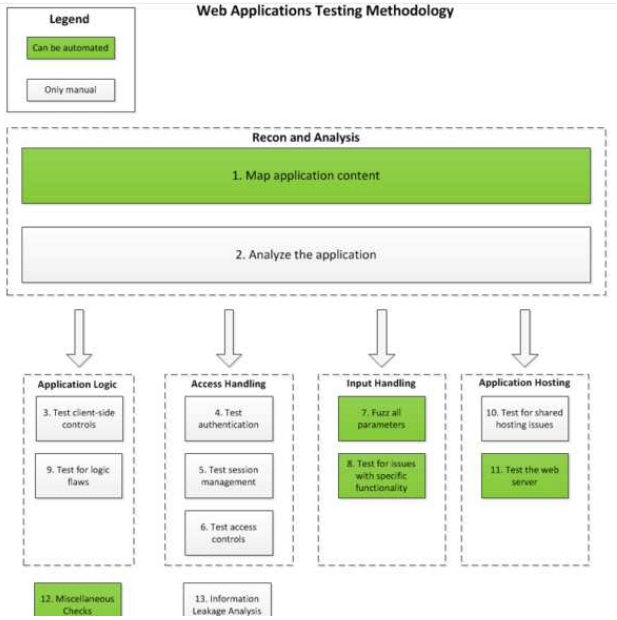


FIGURE 1 Web application testing methodology

3 The limitations of vulnerability scanners

The drawbacks of vulnerability scanners are:

1. Snapshot only: a vulnerability scanner can only assess a "snapshot of time" in terms of a system or network's security status [6]. Therefore, scanning needs to be conducted regularly, as new vulnerabilities can emerge, or system configuration changes can introduce new security holes.

2. Human judgement is needed: Vulnerability scanners can only report vulnerabilities according to the plug-ins installed in the scan database. They cannot determine whether the response is a false negative or a false positive1. Human judgement is always needed in analysing the data after the scanning process.

3. Others: a vulnerability scanner is designed to discover known vulnerabilities only. It cannot identify other security threats, such as those related to physical, operational or procedural issues.

4 The architecture of intellectual vulnerability scanner

In general, a vulnerability scanner is made up of four main modules, namely, a Scan Engine, a Scan Database, a Report Module and a User Interface.

1. The Scan Engine executes security checks according to its installed plug-ins, identifying system information and vulnerabilities. It can scan more than one host at a time and compares the results against known vulnerabilities.

2. The Scan Database stores vulnerability information, scan results, and other data used by scanner. The number of available plug-ins, and the updating frequency of plug-ins will vary depending on the corresponding vendor. Each plug-in might contain not only the test case itself, but also a vulnerability description, a Common Vulnerabilities and Exposures (CVE) 2 identifier; and even fixing instructions for a detected vulnerability. Scanners with an "auto-update" feature can download and install the latest set of plug-ins to the database automatically.

3. The Report Module provides different levels of reports on the scan results, such as detailed technical reports with suggested remedies for system administrators, summary reports for security managers, and high-level graph and trend reports for executives.

4. The User Interface allows the administrator to operate the scanner. It may be either a Graphical User Interface (GUI), or just a command line interface.

Most vulnerability scanners are characterized by their modular structure as explained above. However, there are also primitive scanners that are basically sets of scripts or Ccode exploits producing simple plain-text files as scanning results. Updates to these primitive scanners are infrequent and require manual intervention.

5 Using vulnerability scanners in OWASP auditing process

For those who are new in the web application security field; OWASP is short for Open Web Application Security Project. OWASP is a non-profit organization that raises web application security awareness. Every three years OWASP publishes the OWASP Top 10 list. The list highlights the most commonly exploited vulnerabilities and security problems found in websites and web applications.

The list as such is not the holy grail for web application security experts, but it serves as guidelines for organizations to ensure their web applications are not vulnerable to these most commonly exploited vulnerabilities and web application security issues. In fact there are many other vulnerabilities and security issues that can be found in web applications that are not listed in the OWASP Top 10 lists, and ideally all of them should be addressed with time.

6 Conclusion

Using intellectual scanners and development of knowledge base system can improve affectivity of information security auditing processing OWASP. In Addition, creating correct knowledge base of vulnerability sets in expert system of intellectual vulnerability scanners can reduce cost of auditing process.

Acknowledgments

This work is implementing at Kazakh-British Technical University under the research project “Expert systems for active audit and management of information security” funded by Ministry of Education&Science of the Republic of Kazakhstan as a part of the State Research Program “Development of the local products for Oil&Gas industry needs”.

References

[7] Kozhakhmet K, Bortsova G, Inoue A, Atymtayeva L 2012 Expert System for Security Audit Using Fuzzy Logic Proceedings of The 23rd midwest artificial intelligence and cognitive science conference, MAICS, April 21-22, 2012, Cincinnati, USA 146-51 http://ceur-ws.org/Vol-841/

[8] Atymtayeva L, Kozhakhmet K, Bortsova G, Inoue A 2012 Methodology and Ontology of Expert System for Information Security Audit Proceedings of the 6th International Conference on Soft Computing and Intelligent Systems and the 13th International Symposium on Advanced Intelligent Systems, 20-24 November 2012, Kobe, Japan 238-43

[9] Atymtayeva L, Kozhakhmet K, Bortsova G 2013 Building a Knowledge Base for Expert System in Information Security Proceedings of the 14th International Symposium on Advanced Intelligent Systems (ISIS2013), 13-16 November 2013, Daejeon, Korea Springer Journal *"Advances in Intelligent Systems and* Computing **270** Soft Computing in Artificial Intelligence 57-77

[10] Kanatov M, Atymtayeva L, Yagaliyeva B 2014 Expert systems for Information Security Management and Audit. Implementation phase issues Proceedings of the Joint 7th International Conference on Soft Computing and Intelligent Systems and 15th International Symposium on Advanced Intelligent Systems, SCIS & ISIS, December 3-6, 2014, Kitakyushu, Japan 896-9; 978-1-4799-5955-6/14

[11] Tsudik G, Summers R 1990 AudES in Expert System for Security Auditing. IBM Los Angeles Scientific Center

[12] http://www.infosec.gov.hk/english/technical/files/vulnerability.pdf

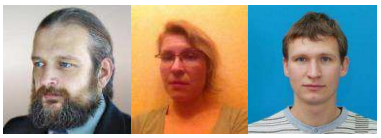
Algorithms for automation of the complex analysis of Russian poetic texts

V Barakhnin[1, 2*], O Kozhemyakina[1], A Zabaykin[1, 2]

[1]Institute of Computational Technologies SB RAS, Lavrentyeva Pr.6, 630090 Novosibirsk, Russia

[2]Novosibirsk State University, Pirogova Str.2, 630090 Novosibirsk, Russia

**Corresponding author's e*-mail: bar@ict.nsc.ru



Abstract

In this article we present the approaches to statistical analysis of lower structural levels (meter, rhythm, phonetics, vocabulary) of Russian poetic texts, also we describe the algorithms of the complex analysis of Russian poetic texts for the purpose of automation of the creating of metric reference books and concordances.

Keywords: automation of the complex analysis of the poetic text, metrical guides, concordances

1 Introduction

Multi-component structure of the literary text implies the complexity of the objective analysis, due to the need of considering multiple data belonging to different levels of poetics.

The levels of the structure of the verse represent a certain hierarchy (see e.g. [1]): meter, rhythm, phonetics, vocabulary, grammar, speech genre (composition-speech unity), theme, literary genre. Besides this the process of analysis of the verse provides for initial review of each level as an independent semantic unit with their subsequent mutual connection.

The semantic level of the text is definitely complicated for automated analysis, although it can be viewed as consisting of available automated analysis components. But information technologies are working quite objective when it comes to the other categories.

The purpose of this paper is to present the main approaches to the automation of the process of statistical analysis of the lower structural levels (meter, rhythm, phonetics, vocabulary) of Russian poetic texts, as well as the description of the algorithms of the complex analysis of Russian poetic texts in order to automate the process of creating metric reference books and concordances.

2 A problem's definition

The systematic study of the influence of the lower levels of the structure of the verse at higher levels has begun, apparently, with works of K. F. Taranovsky, who made the report "On the interaction of poetic rhythm and subject matter" in 1963 at the Fifth Congress of Slavists, in which the interaction of rhythmic features of the genre and the usage of iambic chorea based on the analysis of several dozens of Russian poetic texts. It has been shown that in many poems written by this size (starting with "I go out alone on the road..." by Mikhail Lermontov), "the dynamic motif of the way is contrasted to the static motif of life" (see [2]). In this work a method of definition of the semantics of one or another poetic dimension, consisting not in study of its individual consumption but in study of the traditions of its genre and thematic use that involves the analysis of array of poetic texts, is presented.

So, the study of the impact of the lower levels of the structure of verse on its higher levels is a very important problem of Russian Philology. One of the main difficulties in the decision of this problem is the need of analysis of the array of poetic texts of great volume. This task is extremely laborious, so often the researcher gets only a relatively small circle of the works of classical poets, what, without doubt, significantly reduces the completeness of the analyzed material and, accordingly, the reliability of the results. Thus, there is a task of the automation of the analyze of the different levels of structure of the verse, what should relieve the researchers from routine work and also dramatically expand the range of the analyzed authors.

Practically the only work in which a large program of the researches of metric, rhythmic and phonetic (including rhyme) characteristics of Russian poetic texts was outlined, is the article [3], based on the usage of the system STARLING [4]. This system contains, in particular, the web application for morphological analysis [5], created on the basis of the Grammatical dictionary of A. Zaliznyak. This web app is a morphological analyzer that provides, in particular, the full-accentuated paradigm of each word presenting in the dictionary of program.

This programme of the studies of the characteristics of the verse was a part of the project "Automated lingvo-and-poetry-investigating analysis of Russian poetic texts", which was directed by S. A. Starostin, but after his death in 2005, the work on this project was practically discontinued.

Thus, the work of V. B. Barakhnin and O. Yu. Kozhemyakina [6], devoted to elaboration of approaches to

automation of the complex analysis of Russian poetic texts, was of pioneer character. In this paper we develop approaches proposed in [6].

3 Algorithms of the analysis of the metric and strophic characteristics of poetry

At the analysis of metric and strophic characteristics of poetic texts, it is advisable to consider the following twelve parameters used in the preparation of metrical handbooks and concordances:

1. The quantity of verses excluding blank.
2. The metric of the poem.
3. The quantity of metric foots.
4. The rhyme scheme of strophic structure.
5. The quantity of the masculine endings of the last words in poetic lines.
6. The quantity of the feminine endings of the last words in poetic lines.
7. The quantity of the dactylic and other endings of the last words in poetic verses.
8. The quantity of the masculine endings without rhyme.
9. The quantity of the feminine endings without rhyme.
10. The quantity of the dactylic and other endings without rhyme.
11. The quantity of verses without the final words.
12. The type of strophic form.

Apparently, the simplest parameter for automatic calculation is the number of verses (specification 1). However, sometimes the verse is printed in the form of two half-verses for semantic reasons, but because of rhythmic reasons in all reference books this verse is considered to be a single that gives a discrepancy with automatic and with manual counting of verses. It is possible to identify such features in the graphic reproduction of the verses in the subsequent analysis of the rhymes.

A key challenge in the analysis of poetic texts is the definition of syllabic-tonic meters (specifications 2 and 3). To do this it's necessary to select a poetic foot consisting of one accented syllable in a strong position and one or more unaccented.

For automatic determination of the metric structure of the poetic text we have used the algorithm described in [3]. The algorithm involves the construction of a numerical vector as follows: character 1 denotes the unaccented syllables, 2 - the accented syllables of monosyllabic words, 3 – the accented syllables which occupy the first position in two-syllable word, 4 - the accented syllables, which occupy the second position in two-syllable word, 5 - the accented syllables of words that are longer than two syllables. The derivable vector is parsed according to the rules set out in [3].

The specification 4 identifies the type of the verse rhyming. For this purpose it is already required to obtain the phonetic information. The phonetic transcription is more necessary for a precise definition of rhyming verses, than the literal pairwise comparison (such rhymes which are called graphically exact, are represented only a small part of all rhyming). The first stage of phonetic transcription - the accentuation - is decided by us using the tools of automatic processing of the texts in natural language (Project AOD) [7], which was developed in the process of the creation of a system of automatic translation DIALING. Its dictionary contains about 3.5 million accentuated word forms.

For the phonetic analysis, we developed the module of phonetic analysis of words, which is based on sequential (order is important!) applying of the known rules of phonetics and orthography [8]. The words (graphemes) that are not included in the dictionary of accents, or, on the contrary, having different variants of accentuation, should be accentuated as follows. If the analysis of other strophes of the poem (in which there were no problems with the accentuation of the words) allows us to set its metro-rhythmic characteristics, than on the basis of these characteristics it is often possible to define the accentuation of words with uncertain accentuation and to make its phonetic analysis.

In the purpose of the definition of the type of rhyming when we divide a poetic text into quatrains, we use as basic variants of verification the enclosed rhyme, the couplet rhyme, the alternate rhyme and monorhyme. In the case of absence of the above-mentioned stanzas, the algorithm looks for a repeating structure of length up to 16 strings.

The specifications 5-7 noted in the reference book - the quantity of the endings of various types of rhyme (masculine, feminine and other) for each of the poetic text. To determine the type of rhyme in automatic mode it is necessary to determine the accented vowel what is carried out using the above-mentioned dictionary AOT and the above-described algorithm of elimination the uncertainty of accentuation.

The specifications 8-10 (the quantity of the endings without rhyme of the last words in the verses of different types) are defined similarly to the specifications 5-7 considering the type of the rhyming.

The quantity of verses without the end words (specification 11) is determined by identifying of the verses that stand out from the overall metrical structure by a smaller number of syllables.

Finally, a type of strophic form (specification 12) follows from the rhymes of the stanza structure (specification 4).

The building in the automatic mode of the concordances is rather trivial. The main problem is to separate the homonyms (homographs) and to relate them to the correct sets of lexemes. Now while solving this problem we see no alternative to the work of the expert in manual mode using a convenient software interface.

The presented algorithms are implemented in the computer language Python 2.7 in the form of processing software of the poetic text [9].

4 Conclusions

In this article we present the algorithms of statistical analysis of lower structural levels (meter, rhythm, phonetics, vocabulary) of Russian poetic texts, also we describe the software tool for the processing of the poetic texts which is developed on the base of these algorithms. The results of this analysis will allow to expand essentially the possibilities of linguists, and also to free the linguists from routine work, to expand the range of analyzed works by reducing the dependence of the quality of the comparative analysis on the personal knowledge of the researcher.

References

[1] Magomedova D M 2004 Philological analysis of lyric poems Moscow: Publishing center «Academy» (in Russian)
[2] Taranovsky K 2000 About the relationship between poetic rhythm and topic In: Taranovsky K About poetry and poetics Moscow: Languages of Russian culture (in Russian)
[3] Kozmin A V 2006 Automatic analysis of verse into the Starling system In: Computational linguistics and intellectual technologies: *Proceedings of the international conference «Dialogue 2006»* Moscow: Publishing center of the RSUH (in Russian)
[4] The Tower of Babel. An etymological database project. Russian dictionaries and morphology – http://starling.rinet.ru/indexru.htm (in Russian)
[5] The morphological analyzer – http://starling.rinet.ru/cgi-bin/morphque.cgi?encoding=win (in Russian)
[6] Barakhnin V B, Kozhemyakina O Yu 2012 About the automation of the complex analysis of Russian poetical text, CEUR Workshop Proceedings 934 (in Russian)
[7] Project *AOT* – http://nlpub.ru/AOT (in Russian)
[8] Rules of Russian orthography and punctuation. Full academic Handbook 2007 Moscow: Eksmo (in Russian)
[9] The analysis of the poetic texts online – http://poem.ict.nsc.ru

Comparative analysis of GIS in sight of view of renewable energy sources monitoring

A Y Jakupov

Institute of Information and Computational Technologies, Pushkin Str. 125, 050010 Almaty, Kazakhstan

Author's e-mail: jakupov.iitu@gmail.com

Abstract

At present there exists a great deal of GIS providing data on renewable energy on local and international level. In case of lack of field measurements the idea of using open source data along with field actinometrical measurements on the certain (or existing) sites seems to be efficient from the point of view of accuracy and costs. An overview of GIS commonly used in Russia and USA is given below. All the data used in the overview is available as project descriptions given on the web portal being discussed. All the systems have been analysed from the point of view of the data used on the portal, visualization tools and maps (wind, solar etc.).

Keywords: Renewable energy sources, monitoring, visualization tools, geospatial data

1 Introduction

Nowadays, the amount of data being produced and stored increases rapidly. Due to the rapid development and low cost of data transmission and storing tools the amount of stored data is steadily reaching enormous values. Naturally, in order to process all this data and process information 'usefully' it is necessary to develop more complicated methods and, in some cases, new fields of study. Moreover, from the point of view of processing speed more powerful calculation capacity is required.

Modern development of cloud computing allows to access, in the short period of time, almost unlimited resources for data processing and representation, and, in case of shortage, to broaden and deepen the needed data.

2 Data gathering and data processing used in modern GIS from the point of view of green energy monitoring

Data is the main valuable source of such systems. If certain data is confidential there exist several open source datasets providing correct data on renewable energy, and in some cases, with relatively high precision. Table 1 provides a brief overview of some datasets with information on solar energy.

Besides using these datasets it is also possible to use NASA SSE, open source datasets on solar energy, providing information about the whole Earth surface on the (1 x 1) grid. According to the researches held on the territory of Russia during several years, the NASA SSE data provides a sufficient accuracy level [1].

3 Maps categorization and comparative analysis of the existing representation models

In common case all the maps provided by renewable energy monitoring systems are classified with respect to the energy source they are representing. They are also classified concerning the means of their creation (i.e. raster and vector data model) [7].

Raster data is simple and faster to realize but in certain cases the map resolution may not be sufficient enough for proper analysis.

Vector data model requires more complicated and sophisticated tools but it is, in turn, a correct way of weather data representation. Thus, vector data model provides high quality resolution which may be extremely important in certain cases.

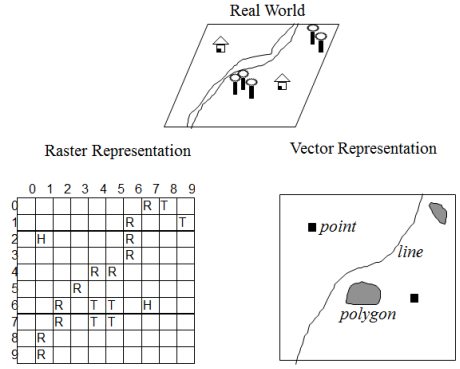


FIGURE 1 Differences in representation between raster and vector data models (http://www.utdallas.edu/~briggs/)

4 Conclusions

The comparative analysis of different GIS is an essential

part of defining proper functional parameters and requirements needed for creating a renewable energy monitoring system. A brief overview of existing GIS and their comparative analysis allow determining the following requirements list:

1. Data gathering. As it has been mentioned above the NASA SSE datasets prove to be sufficiently accurate and satisfy all the requirements. But still, all the GIS have their own weather stations (or at least data of field actinometrical measurements) to verify the NASA data. Thus, it is strongly recommended to obtain local weather data along with using open source information.
2. Data visualization and shape files. It has been mentioned that certain GIS provide their own shape files to be later used in other visualization platforms. In this case the data on local renewable energy sources is platform independent and allows the information to be later used for further researches. As the renewable energy monitoring system is used both for public and professional usage it is necessary to provide raster data for public (for easier access) and vector data for developers and researchers (for more accurate calculations).
3. Maps. During the overview the problem of inexplicit map categorization has been revealed as it is quite possible for user to be confused. Consequently, the maps are to be explicitly divided by quality and by energy types (as on the NREL website).

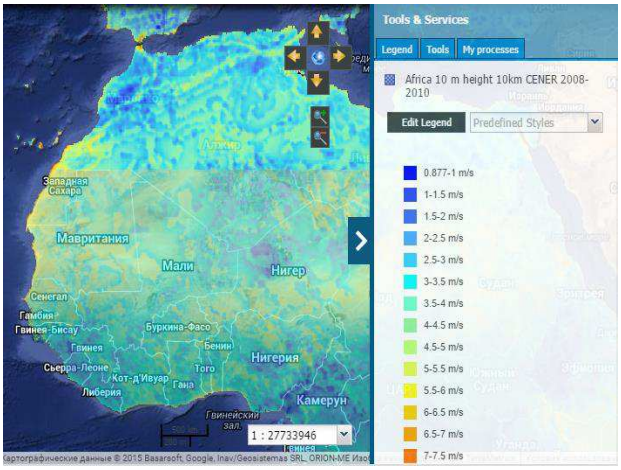


FIGURE 2 CENER data visualization sample on the IRENA portal

To sum up, it is possible to claim that for regions with high renewable energy potential the problem of energy monitoring is considered as an essential part of further development. In case of lack of field measurements the idea of using open source along with field actinometrical measurements on the certain (or existing) sites seems to be efficient from the point of view of accuracy and costs. In this case, the renewable energy monitoring systems may be considered as the strong foundation for alter development of alternative energy in the regions with high potential and high energy demands.

Acknowledgments

The work was funded by grant No. 0168/GF4 of the Ministry of Education and Science of the Republic of Kazakhstan.

References

[1] Попель О С, Фрид С Е, Коломиец Ю Г, и др. 2010 *Атлас ресурсов солнечной энергии на территории России* М.: ОИВТ РАН 85
[2] Muhamedyev R I, Alihodzhaev I, Ishmanov A, Muhamedijeva J 2015 Monitoring of renewable energy sources in RK: technological preconditions, architecture of system and market volume Proceedings of 16th International Symposium on Advanced Intelligent Systems, ISIS 777-91
[3] The NASA Surface Meteorology and Solar Energy Data Set http://eosweb. larc.nasa.gov/sse: 18.07.2015

The automated system for gravimetric monitoring of the oil and gas deposit

A B Nazirova[1*], F N Abdoldina[1], M Aymahanov[1], R I Muhamedyev[2], G K Umirova[1]

[1]Kazakh National Research Technical University after K.I.Satpayev, Satpayev Str., Bld. 22a, Almaty, Kazakhstan

[2]ISMA university, 1 Lomonosova Str., Bld.6, LV-1019, Riga, Latvia

**Corresponding author's e-*mail: assem.berlibayeva@gmail.com

Abstract

In recent years in the Republic of Kazakhstan much attention has been paid to questions of geodynamic and ecological safety of the oil and gas deposits development. The technogenic influences caused by deposit development can cause the events of geodynamic character which are caused by geodynamic processes (extensive sags of the terrestrial surface and activate the fault zones). In order to avoid manifestation of such geodynamic processes it is necessary timely performance of high-quality monitoring which includes gravimetric monitoring in measurements of gravity variations, display of wells location and their types, volumes of pumped water, production volume, reservoir pressures, isobar cards, data interferometer, profiles, well status. One of the ways of geodynamic researches is measurement by the gravimeter. Collected data and results of modelling should be presented in visual form that useful in the process of decision making. Specialized geographical information system is a good way for such visualization.

Keywords: GIS, gravimetric monitoring, oil and gas deposit, process model, functional modeling, information system, Google Map API.

1 General

Processing of significant volume of primary gravimetric monitoring data involves using of graphic, visual and interactive technologies. Development software that automates processing and provides storage, accumulation of the gravimetric researches given for the long-term period and also application of geographical information system (GIS) opportunities allows to facilitate work of experts and to improve the visibility of research results.

The program used gravimetric measurement data carried out on one of the oil and gas deposit located in the south-eastern part of Caspian Depression. In work [1] is shown high efficiency of carrying out gravimetric researches for this region. For creation of data model and definition of the automated system functional part is carried out functional modelling of research and production centre which is engaged in gravimetric researches of the oil and gas deposits development [2].

The data obtained in a process of measuring and calculation may be shown on the map. The cartographical Google Map technology may be chosen as the base of GIS-system. Google Map API provides rich tool kit for data representation in vivid spatial form that simplifies creation of specialized GIS for data visualization in the web mode.

By using special program module the additional layers were visualized. These layers (Figure 1) show wells on the territory of the oil deposit and the region of mining. The figure presents an example of some layers visualization of the oil and gas deposit. Data base contains the deposit data information on coordinates of wells, field contours, supervision points, profiles and GPS data.

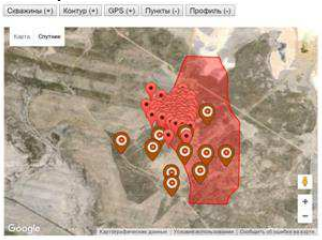


FIGURE 1 Example of layers visualization of the oil and gas deposit

For development of the primary data processing system it is necessary to automate process of loading and data processing for their further entering in the database that will provide convenient and fast information search and will allow to form and keep reports, to build schedules according to the user parameters.

Automation of gravimetric monitoring data processing on the oil and gas deposit allows to increase efficiency of processing and interpretation of gravimetric data.

References

[1] Matusevich A V 2013 Gravity of the Caspian Depression Livny: Mukhametov G V, p 176

[2] Abdoldina F N, Berlibayeva A B, Umirova G K 2015 Data processing automation of geodynamic monitoring on an oil and gas field Joint release on materials of the International scientific conference "Computing and Information Technologies in Science, Equipment and Education": Messenger of KazNU after Al-farabi, Almaty **3**(86) 73-82

Design of the inverted page table

Y Sultanov[1], A Duysembaev[2*]

[1]Kazakh-British Technical University, Almaty, Kazakhstan

[2]Kazakh National al-Farabi University, Almaty, Kazakhstan

**Corresponding author's e*-mail: yeskendir.sultanov@gmail.com

Abstract

The operating system takes one of two variants when solving any memory management problem. The first variant is dividing things into variable-sized pieces and it is called segmentation. It has inherent difficulties, when dividing a space into different-size chunks. The second variant to divide space into fixed-sized pieces and it is called paging. It may be worth considering the second variant and system that uses this variant called paged systems. The choice of the data structure for paged systems significantly effects on the performance of paged systems. In this paper, as a data structure we take Inverted Page Table (IPT), which optimizes parameters as a size of memory occupied by the page table and the time to transformation virtual address into physical address.

Keywords: Inverted page table (IPT), virtual memory

1 Introduction

The virtual memory paging assumes that all memory of the computer as a physical as well as virtual divided into successive pages of the same size and when the programs run, then each element of the program receives a virtual address, and correspondence between the virtual and physical addresses is done automatically by the operating system.

The exchange between auxiliary and main memory is realized by whole pages, and during the exchange CPU switches to execution of commands of other programs. If during the execution of the program takes place a link to a page missing in the main memory, the page faults occur (failure).

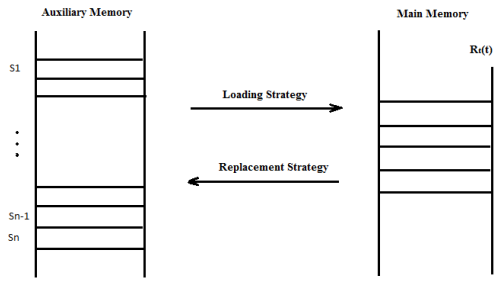


FIGURE 1 The exchange between auxiliary and main memory

The program is interrupted, at least, for the time necessary to swap the page you want. In this case, one or some of the pages of the program is deleted from the main memory, that is, the memory occupied by them is considered to be free. If the content of the page to be deleted, distorted during her stay in the main memory, then the system provides an overwriting of modified pages in the Auxiliary memory while preserving the original content of the pages of the original. Otherwise, the need to rewrite the page at the Auxiliary memory is not necessary. Select a page (or group of pages) to be deleted from the main memory; the system is carried out in accordance with a particular algorithm called page replacement strategy.

2 Page Table

The Page Table is a data structure that is used to map virtual addresses to physical addresses. Each row of the page table usually consists 1-bit cell, for show the presence in the main memory, virtual page number, and physical frame number [3-7]. Below in figure 2 you can see an example of Page Table.

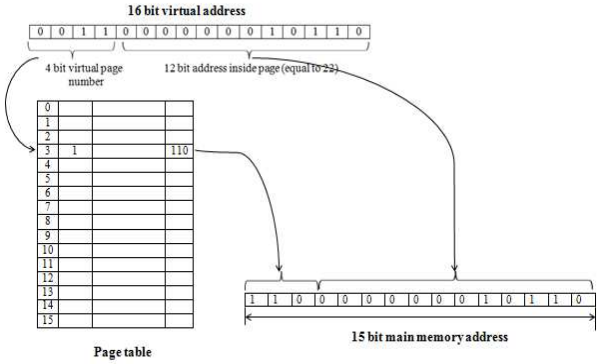


FIGURE 2 Page Table

Let's look in detail, in order to understand how it works. Firstly, operating system generates a virtual address, then we go to row that equal to the virtual page number, then if valid bit is 1, it means that it exist in main memory, after that

we take frame number of this row, finally, we get physical address with frame number and offset from virtual address.

3 Inverted Page Table

The presence of regular table scheme pages make such a scheme is not sufficiently effective. Storing in the main memory of the computer of excessive use information, so information on inactive pages, which makes up most of the page table, will slow down the entire storage management system and negatively affect the performance of the system as a whole. This leads to the idea that it would be more economical, at any point in the process of activity, stored in the main memory only information regarding only those pages that are currently in main memory. In this connection, instead of a regular page tables, we will use the inverted page table.

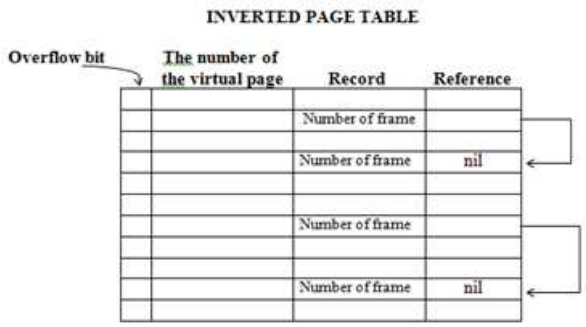


FIGURE 3 Inverted Page Table

IPT[I]:

bit_ovfl	nv	nf	ref

- bit_ovfl – field in which bit overflow is recorded
- nv – field in which page number is recorded
- nf – field in which frame number is recorded
- ref - link to the next link, if it exists

An inverted page table, at any time of the program, stores information about a virtual page part of the process, namely those in which the copy currently in the main memory, therefore it reduces the size of the memory occupied by page table, in spite of fact that we search through linked list elements[1-2]. Finally, if we get page faults, it means that page does not exist in the main memory and system should load it from the auxiliary memory.

4 Conclusions

We have introduced design of the Inverted Page Table for the transformation of virtual address into physical address. The Inverted Page Table in contrast to the page table stores only active pages, this leads to the idea that it would be more economical, at any point in the process of activity, stored in the main memory only information regarding only those pages that are currently in main memory. It optimizes the size of memory occupied by page table and it reduces the time of transformation virtual address into physical as system will not spend time to record information about inactive pages.

References

[1] Tanenbaum A 2006 Computer Architecture 5th Ed. Prentice Hall, NY
[2] Stallings W 2006 Computer Organization & Archtecture Pearson Ed.
[3] Harris S L, Harris D M 2012 Digital Design and Computer Architecture Elsevier Inc., 2nd Ed.
[4] Bryant R E, O'Hallaron D R 2015 Carnegie Mellon University. Computer Systems: A Programmer's Perspective, third edition
[5] Kamil A 2004 Inverted Page Tables Internet resource: http://web.eecs.umich.edu
[6] Madhusudhan Talluri, Hill M D, Khalidi Y A 1995 A New Page Table for 64-bit Address Spaces
[7] Holliday M A 1988 Page Table Management in Local/Remote Architectures Department of Computer Science of the Duke University, Durham, NC 27706

Formation of professional competence of future programming engineers at the level of master degree

V E Sedov

South Ukrainian National Pedagogical University named after K. D. Ushinskij, Staroportofrankovskaya Str. 26, 65 000 Odessa, Ukraine

Corresponding *author's e*-mail: viktor.sedov@dataart.com

Abstract

The article analyzes the impact of digital technology on the educational system from the point of view of the emergence of new and development of existing technologies. According to the mentioned technotrends, there was an introduction of the cooperation of the South Ukrainian National Pedagogical University with IT companies in order to introduce modern technologies, in particular the Internet of Things. The article defines the perspectives of development of modern engineers, programmers and how to improve the position of programmers and the educational system in general.

Keywords: the system of master's degree; emerging technologies, the Internet of Things.

The first fundamental study of the domestic market of software and IT services in Ukraine is described in [1]. Ukrainian companies are at the first place in Europe and the USA in the area of IT outsourcing [2].

South Ukrainian National Pedagogical University after K. D. Ushinsky together with companies Microsoft, Intel, DataArt conduct research in order to answer questions:

- How the present educational system in Ukraine should be improved to provide the necessary level of competence, of future programming engineers?
- What state policy can promote the development of new educational models for training the software engineers?

We established that the cooperation of universities with leading IT-companies is crucial to form practice-oriented competences of the university graduates, which are required at the labor market.

According to the international project «Global future of education» [3] in the next 10 – 15 years up to 65% of the existing professions will disappear or will be significantly changed. This brings forward the important questions: what programmers will be necessary over the coming years? What professional, technological, psychological and pedagogical competences will be required for the engineer-programmers in the 21st century?

To answer these questions we analyzed the current trends in the IT industry, investment plans of leading IT companies [4, 5, 6], the Atlas of new professions, which was created according to the results of the study «Foresight of competences 2030» [7].

The results of this analysis showed that a wide range of emerging technologies in the field of data processing techniques, cloud computing, robotics, Internet of Things promise to change our life style and to generate the new jobs.

A decisive role in changing of life style of the population is assigned to the technology of Internet of Things (IoT) [8].

We report the results of studies of educational innovations, practice-oriented events, which have been carried out in South Ukrainian National Pedagogical University for the last years, which were directed to the formation of high competence of future programming engineers at the level of master degree.

References

[1] Ukraine in IT style: 9 impressive facts. The economic truth December 21, 2015 [E-resource] http://www.epravda.com.ua/interactive/56756ff4a17a5/ (in Ukrainian)
[2] Ukraine took the first place in Europe in the area of IT outsourcing [E-resource] http://economics.unian.ua/other/1296123-ukrajina-posila-pershe-mistse-v-evropi-v-galuzi-it-autsorsingu.html (in Ukrainian)
[3] *Waiting for «the 9th wave»: competences and model of education for* the 21st century [E-resource] http://www.fassen.net/video/wTehWHQ6UfI/ (in Russian)
[4] Intel is increasing the number of IoT partners [E-resource] http://www.it-world.ru/download/pdf/itweekly/107/26.pdf (in Russian)
[5] Christie B (Cisco): how the Internet of Things and data form a need for new IT staff [E-resource] http://education-events.ru/2014/12/24/cisco-christie-how-data-and-process-are-reshaping-the-future-workforce/ (in Russian)
[6] Microsoft and the Internet of Things? The introductory article – how we see this concept [E-resource] http://habrahabr.ru/company/microsoft/blog/261367/ (in Russian)
[7] Atlas of new professions [E-resource] http://asi.ru/news/16379/ (in Russian)
[8] The Internet of Things [E-resource] https://ru.wikipedia.org/wiki/%D0%98%D0%BD%D1%82%D0%B5%D1%80%D0%BD%D0%B5%D1%82_%D0%B2%D0%B5%D1%89%D0%B5%D0%B9 (in Russian)

Tourism openness and visa policy of Bulgaria

K Levkov*, I Shopova

University of Agribusiness and Rural Development, 78 Dunav Blvd., Plovdiv 4003, Bulgaria

**Corresponding author's e*-mail: krasimir_levkov@yahoo.com

Abstract

Tourism openness is an important indicator for the development of international tourism. Still 2/3 of the world population is subjected to a strict visa regime. Increasing competition in international markets encourages the countries to enhance their tourism openness by facilitating visa policy in order to attract more inbound tourists. The paper discussed dynamics and changes in the structure of inbound tourist flow in Bulgaria. The relationship between spatial redistribution of outbound tourist markets for Bulgarian tourism and the need for flexible visa policy are analysed. In conclusion expanding opportunities for issuing electronic visas is recommended.

Keywords: tourism openness, Visa policy, e-visa

1 Introduction

Visa policy of individual countries and their tourism accessibility are essential for the international tourism development. The analysis of visa openness for 2014, made by experts from the WTO, shows that only 19% of the world population could visit other countries without a visa, while another 16% could receive a visa on arrival. The remaining 2/3 is put through much stricter visa requirements.

Developing countries have a more open policy for incoming international tourists compared to developed countries. Most open destinations remains the sub-regions of Southeast Asia, East Africa, the Caribbean and Oceania, while most restrictive areas are those in Central Africa, North Africa and North America. At the same time the most favored are the citizens of advanced countries, who benefit from visa-free travel regime to many countries. For example, in 2014 the citizens of the USA, Germany, Finland and Sweden may travel to 159 countries in the world visa-free; citizens of Denmark and Luxembourg - to 158, etc.

EU membership enables citizens of countries known as tourism destinations, like Bulgaria and Latvia, to travel freely within the European Union as well as in many other countries. In the global ranking of countries according to the travel freedom, based on Visa Restrictions Index, compiled by Henley & Partners jointly with the International Air Transport Association /IATA/, the first places are occupied by Western European countries. Respectively Latvia is on the 33rd place in the world and Bulgaria – on 43rd.

At the same time, Latvia and Bulgaria as EU member states are obliged to fulfil the requirements of the common European policies which, among other limitations, include some visa restrictions for citizens of many countries outside the EU. The latter has a negative impact on their tourism openness and accessibility and it requires the measures' implementation to their improvement. Such a measure can be procedure for obtaining e-visa as a step towards more flexible and modern visa policy.

The paper discussed one of the key determinant of the travel facilitation i.e. visa policies. Statistical data are analysed. WTO visa openness reports, indicators for measuring competitiveness in tourism, scientific research are introduced in literature review.

In conclusion some suggestions to enhance the travel experience of the countries are given. As an Annex the tourism openness of Bulgaria for inbound tourism is applied.

Project-based learning: the complexity and challenges in higher education institutions

V Vasilienė-Vasiliauskienė[1], J Butvilienė[2], T Butvilas[3*]

[1]Logistics and Transport Management Department, Vilnius Gediminas Technical University, Vilnius, Lithuania

[2]Department of Economics and Business, *Vilnius Business College, Kalvarijų 129, LT08221 Vilnius, Lithuania*

[3]Institute of Educational Sciences and Social Work, Mykolas Romeris University, Vilnius

**Corresponding author's* e-mail: tbutvilas@mruni.eu

Abstract

Within the context of the 21st century education paradigm competence and new skill require new authentic learning methods. The growing popularity of the project-based learning (hereinafter PBL) paradigm, as an active, student-centric methodology, is related to extended opportunities in terms of knowledge attainment, facilitating the acquisition of several transversal competences such as team work, search and selection of information and synthesis and analysis abilities. Therefore, in this paper authors would present main features of PBL identifying aspects that give both students and teachers a kind of drive for the involvement of all parties in the learning process; also discussion on the innovativeness within PBL paradigm is presented and finally some obstacles/challenges are dealt on the basis of leaving an open space for further considerations and possible explorations on the effectiveness using this approach in learning and teaching.

Keywords: knowledge-based cooperation, networking, and project-based learning

1 Introduction

The project-based learning is defined as "a teaching method in which students gains knowledge and skills by working for an extended period of time to investigate and respond to a complex question, problem, or challenge" (see [3]). To many scholars PBL is seen as a model, a philosophy of teaching and learning rather than as another educational strategy [2, 7-8]. Putting it in other words, a project-based learning is the model that organizes learning around projects.

According to the definitions found in PBL handbooks for teachers, projects are complex tasks, based on challenging questions or problems, that involve students in design, problem-solving, decision making, or investigative activities; give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations [8]. While other defining features found in the literature include authentic content, authentic assessment, teacher facilitation but not direction, explicit educational goals, cooperative learning, reflection, and incorporation of adult skills (Diehl, Grobe, Lopez, & Cabral, 1999, see in [8]). Thus, according to Thomas, we may identify some of main driving factors that enable all parties of education process to be extremely engaged within explorative activities in various fields of studies: i) PBL projects are focused on questions or problems that "drive" students to encounter (and struggle with) the central concepts and principles of a discipline; ii) projects involve students in a constructive investigation; iii) projects are student-driven to some significant degree; iv) projects are realistic, not school-like. Implementation of PBL concept addresses the European Higher Education Area (EHEA) call that urges students to be engaged in more autonomous work. Self-regulated educational process is seen as an effective pathway to involve digital-age learners, engage them in real-time problem solving through creative thinking. The PBL learning is approached as a managed process through projects that comprise a set of complex tasks, based on challenging questions or problems, investigative activities, decision making resulting in creation of realistic and meaningful outputs and their presentations [1, 7-8].

Therefore, the main goal of this paper is to describe theoretically the project-based learning process, define its content, main objectives and functions, and discuss some of the challenges for both learners and teachers in HEI.

2 The model of Project-based process

Viewing learning from a holistic approach, the PBL enables creating an integrated multilayer context composed of element from pure educational content and activities, practical experience of learners, as well knowledge led cooperation arising from networking of research and educational organisations and business companies (see Figure 1 below).

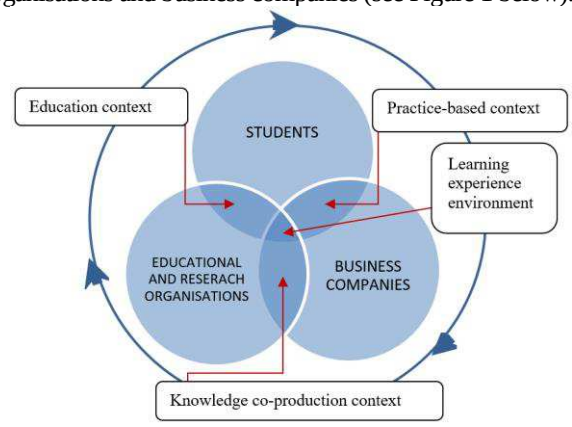


FIGURE 1 The PBL training model (adapted according [6])

This way the organised and managed learning-teaching continues process produces a qualitatively new learning environment, which ultimately not only enhances overall educational capacities, address the 21st century demands of business world and education but also puts in practice a culture of the learning organisation [6].

3 Conclusion

The project based learning is a student-centric methodology that extends opportunities of all participating parties of educational environment. Projects themselves are seen as curriculums that involve a wide range of tools and aspects necessary for a successful professional training.

The PBL concept is based on a close networking of student groups, research and educational institutions and business organizations. Also the PBL learning is approached as a managed process through projects that comprise a set of complex tasks and activities, oriented towards real-time problems solving.

Through PBL, students, teachers and business companies can gain different benefits, which all together create favorable conditions to address the challenges of a changing society in this day and age.

References

[1] Arce M, Míguez-Tabarés J, Granada E, Míguez C, Cacabelos A 2013 Project-based learning: application to a research master subject of thermal engineering Journal of Technology and Science Education **3**(3)
[2] Bell S 2014 Project-Based Learning for the 21st Century: Skills for the Future The Clearing House: A Journal of Educational Strategies, Issues and Ideas **83**(2) 39-43
[3] Bie. org 2014 What is PBL? Available at: http://bie.org/about/what_pbl [accessed 2014-10-12]
[4] Boss S, Krauss J 2007 Reinventing project-based learning: your field guide to real-world projects in the digital age 1st ed. Washington: International Society for technology and education (ISTE)
[5] Edelson D C, et al. 1999 Addressing the Challenges of Inquiry-Based Learning through Technology and Curriculum Design The Journal of the Learning Sciences **8**(3-4) 391-450
[6] Lidón L, Rebollar R, Møller C 2011 A collaborative learning environment Innovations in Education and Teaching **48**(3)
[7] Mapes M R 2009 Effects and Challenges of Project-Based Learning: A Review. Available at: https://www.nmu.edu/sites/DrupalEducation/files/UserFiles/Files/Pre-Drupal/SiteSections/Students/GradPapers/Projects/Junak-Mapes_Michele_MP.pdf [accessed 2014-10-28]
[8] Thomas J 2000 A review of research on project-based learning

Assessment of competencies for IS specialists

E Valavičius[1*], R Juodagalvytė[2], R Vipartienė[2]

[1]Vilnius Business College, *Kalvarijų* 129, LT08221, Vilnius, Lithuania

[2]Vilnius Cooperative College, Konstitucijos 11, LT-09308, Vilnius

**Corresponding author's* e-mail: eugvalav@gmail.com

Abstract

Vilnius Cooperative College conducts a study program "Information systems implementation and support" (informatics engineering). Before starting the study program, a survey was conducted to clarify demand of such specialists and to assess program's competencies (Valavičius, 2012). During program existence IT companies encountered with new challenges: cloud computing, big data, using of smart devices (BYOD) etc. Committee of study program decided to repeat the survey in order to improve the study program. The aims of the survey are to identify new demand and needed skills. This article analyzes results of the survey and makes conclusions.

Keywords: information systems (IS), skills of IS specialists, new skills for IS study program.

1 Introduction

In 2011 Vilnius Cooperative College started to create a study program "Information systems implementation and support". Idea for program arrived from several social partners: IT companies "Rivilė", „Stekas", „Labbis", „Informacinės konsultacijos" etc. Working group collected a set of IT competencies for this program and conducted a survey to identify the importance of these competencies.

Weights of study program's subjects were selected using the table of importance. Results of this survey identified that the biggest importance have deep knowledge of specific IS implementation and applying it in company's activity and less important are knowledge of programming, computer hardware, computer networks [2].

During existence of study program IT industry encountered with new challenges. One of most known new areas is cloud computing. As the beginners of cloud computing can be mentioned "Elastic Compute Cloud" service starting 2009 from Amazon and some later Google Docs [9]. IT companies through the whole world start to use virtualization of IT services, to move hardware and software to the "cloud".

Almost at the same time started a tendency to use smart devices (smartphones, tablets) in workplaces. Such possibilities are attractive for many users but there can be a challenge to adapt information to such devices and a risk for data security. This tendency has a name Bring Your Own Device (BYOD) [7]

Automated collecting of data and powerful data storages allow to keep huge amount of information in each company. But most traditional software (e.g., relational databases, statistics packages) are not suitable to analyze very big amount of data. This is "Big Data" challenge [6].

Computer systems, computer networks were created thinking only about limited trusted environments. But areas of IT appliances spread very rapidly and users faces data security and privacy problems [8].

New areas of computing establish new workplaces and demand new competencies and skills. Creators of any IT program have to consult constantly with social partners and to respond to actual trends of security development.

2 Overview

Competencies of IT specialists are analyzed in many articles. V. Denisovas [1] states that studies of informatics are influenced by many factors: wide spectrum of evolving new areas, many sources of potential requirements, standards of education etc. K. Figl [4] suggests that the main competence for IS specialists is teamwork ability. The same study mention most important knowledge and skills of IT specialists: data structures and algorithms, software testing, ability to choose the most appropriate model of implementation, databases and computer networks, ability to select software development model, ability to apply mechanisms of OS control and security, professional ethics. S. Ivanikovas [5] states that employers sometimes need more personal competencies (e.g., teamwork, responsibility) than specific IT skills.

The majority of respondents belong to small (about 70%) closed joint stock capital (>80%) companies. Remaining part of respondents work in big joint stock companies or state enterprises.

Figure 1 represents relations of companies with information systems. More than half (53%) of respondents are users of information systems, other companies create, implement, distribute them.

3 Importance of different competencies

Only about 40% of companies need such specialists for internship of work. Authors of this survey tried to find reasons of such answers. One of reason can be an economic situation in the world which is near stagnation. During phone interview some companies mentioned they are not planning expansion in the nearest future and even more – big companies plan to cut a number of workplaces.

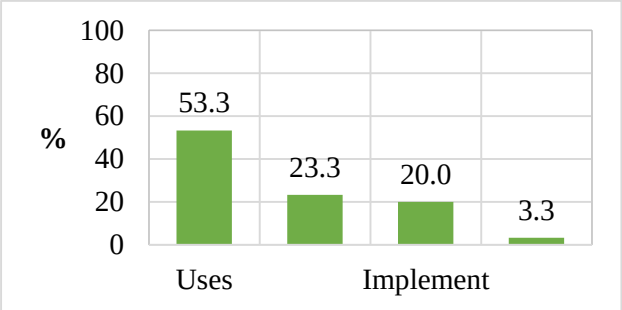


FIGURE 1 Relations of companies with information systems

Survey tool - questionaire placed in internet-based system <www.apklausa.lt>. 4-point scale (Very important, not so much, not important, completely irrelevant) was used to assess importance of study results. Invitation to participate in survey with links to questionnaire were sent to college partners and some other IT enterprises – about 100 companies. Only less than 1/3 of them (30 companies) answered questions.

The majority of respondents belong to small (about 70%) closed joint stock capital (>80%) companies. Remaining part of respondents work in big joint stock companies or state enterprises. Figure 1 represents relations of companies with information systems.

More than half (53%) of respondents are users of information systems, other companies create, implement, distribute them.

This study program has 5 main aims. Each aim generates 3-5 study results. In this article will be commented only study results with maximum (≥80% respondents answer „Very important “) and minimum (≤40% respondents answer „Very important “) importance. But the summary number of desired specialists are about 40 workplaces and average number of graduates in Vilnius Cooperative College is some more than 20 students. It shows that analysed study program is reasoned enough.

Three competences (study results) were graded with 80% or more answers „Very important “: „to try functioning of IS, to prepare it for operation... “), „to consult users “, „to comply with the principles of cooperation and ethics “).

Only one of them belong directly to informatics study field. These results show the importance of general (personal) competences. Minimum importance (less than 40% answers “very important “) have competences „To create websites, ... “, „To perform audit of implemented system “, „To have knowledge of accounting standards... “. At least 2 of 30 respondents mentioned the last competence as „irrelevant “ (see Fig. 2).

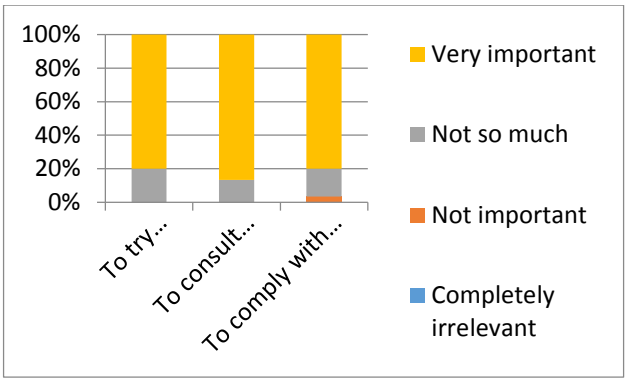


FIGURE 2 The most important competencies

4 Conclusion

Information systems specialists need competences from IT area but personal competences have the same of even higher importance.

There are not so much possibilities that graduates of this study program will remain unemployed. The demand of specialists only from social partners is higher than a number of graduates.

This study program has to reconsider workload dedicated to learn accounting and website creating competences and to strengthen personal competences.

References

[1] Denisovas V 2011 *Bendrosios ir dalykinės kompetencij*os informatikos *studijų kryptyje, jų nustatymas ir ugdymas* [cited 2016 03 24] http://www4066.vu.lt/Files/File/ Vitalijus%20Denisovas0427.pdf
[2] Valavičius E, Vipartienė R, Juodagalvytė R 2012 IS specialistų kompetencijų ir poreikio tyrimas Studijos *šiuolaikinėje visuomenėje* **3**
[3] 2010 Information Systems Education Journal for Information Systems Education **21**(3)
[4] K Figlathrin A Systematic Review of Developing Team Competencies
[5] Ivanikovas S, Valavičius E 2014 Studentų, absolventų ir darbdavių požiūrio į informatikos krypties studijų programas analizė Vadyba **1**(24)
[6] Rankin J G, Johnson M, Randall D 2015 Research on Implementing Big Data: Technology, People, & Processes Las Vegas, NV
[7] Tech S L 2015 Trend: Re-thinking BYOD Black Enterprise **46**(4)
[8] Shilling C G 2011 Privacy and data security: new challenges of the digital age, New Hampshire Bar Journal. Summer **52**(2)
[9] Velte T, Velte A, Elsenpeter R 2010 Cloud Computing A Practical Approach, McGraw-Hill, Inc. New York, NY, USA

The economic security problems of regions of Ukraine

I Amelina, M Hunchenko*

The Department of Management and Logistics, Poltava National Technical Yuri Kondratyuk University,
Pershotravnevyi avenue, 24, Poltava, Ukraine, 36011

**Corresponding author's e*-mail: Gunchenko_m@mail.ru

Abstract

The given paper is dedicated to the determination of the main trends of the economic security of the region as part of national security and problems economic security of regions is closely integrated into the economy.

Keywords: economic security, economic security regions, region.

1 Introduction

Today, Ukraine is a country that seeks to join the global socio-economic processes, integrate into the European community. However, with significant economic potential, Ukraine as a whole and its individual regions, the integrated assessment of economic efficiency, quality of life and environmental security and competitiveness of business entities still far inferior to Western and Central Europe. Uneven regional development and living standards creates conditions for social tension in society, threatening territorial integrity, inhibits the dynamics of socio-economic indicators slowing market reforms and reduce their effectiveness. In this regard, the state regional policy should be aimed at creating conditions for increasing regional competitiveness as the basis of dynamic development and eliminate significant inter-regional disparities. Therefore, the urgency of research in the field of economic security regions, the regional economy and local authority to address the socio-economic security at the regional level. The economic security of the region should be considered as part of the national security of Ukraine [1, 3, 4].

2 Main part

Under the economic security of the region understand especially the ability of regional authorities to ensure competitiveness, stability, stability, economic development as progressive territory seamlessly integrated into the economy of the country as a relatively independent structure [4, 5]. At the heart of the economic security of the region as a category of his life behind regional interests (providing and maintaining a decent standard of living, rational use of available economic capacity, the implementation of an independent social and economic policy in the region, the balance of national interests and integrity of the financial system of the country) and the need for protection from various internal (occurring within the region) and external (economic policy carried out by state administrations in other regions, foreign countries) threats that demand consistent with the balance of national interests.

Thus, economic security - a complex multi-faceted economic category, which has the complicated internal structure. Analysis of real socio-economic processes in modern Ukraine gives grounds for separation of the three key requirements, the implementation of which guarantees an efficient system of economic security [7]: economic independence, which means first of all the possibility of state control over national resources, the ability to use national competitive advantages to ensure equal participation in international trade; sustainability and stability of the national economy, providing durability and reliability of all elements of the economic system, protection of all forms of ownership, creating effective guarantees for entrepreneurial activity, deter destabilizing factors; the ability of the national economy to self-development and progress, that is, the ability to independently implement and protect national economic interests, to the constant modernization of production, efficient investment and innovation policy and develop intellectual and labor potential.

Economic security policy is based on certain principles that create the legal basis for the assessment of external and internal threats formation of national economic interests and economic security strategy.

The basic principles of economic security Ukraine include [8]:

- the rule of law in the economic security;
- adherence to balance the economic interests of the individual, family, society and the state;
- mutual responsibility of the individual, family, society and state to ensure economic security;
- timeliness and adequacy of measures related to the threat and protecting national economic interests;
- Priority contractual (peaceful) actions in addressing both internal and external economic conflicts;
- national economic security integration with the

international economic security.

The problems in ensuring the economic security of the region is the following.

1. Lack of legal framework which regulates the rights and obligations regions.
2. Budget and financial policies. In economically developed countries the share of local finance 50-60% of the financial resources of these countries. Ukraine is significantly behind in respect of the developed countries.
3. The absence or insufficient development of economic infrastructure, primarily business entities - entrepreneurs and businesses.
4. Unsatisfactory level of management training, the dominance of conservative leaders - opponents of economic reforms and transformation, especially in agriculture.
5. Poor roztlumachennyu put work on the masses of the population essentially economic reforms, as well as working out in the public consciousness host their region and state as a whole.

3 Conclusions

Thus, the economic security of Ukraine should be viewed as a system of interconnected its different levels: international, national, and regional levels separately taken economic structure of the individual. [9] At the same time, the system of economic security at the regional level should combine economic security subsystems regional economic entities and professional, purposeful activity of regional authorities to counter threats and challenges that arise in the region.

References

[1] Muntiyan V I Theoretical foundations of economic security Electronic resource: National Institute of Ukrainian-Russian relations: http://www.niurr.gov.ua
[2] Lisovska O L 2003 Economic policy and economic security of Ukraine / O.L Lisovska; The National Academy of Security Service of Ukraine. - K., Publisher National Academy of Security Service of Ukraine 182
[3] Kamlyk M I 2005 The economic security of entrepreneurship Economic-legal aspect: Textbook K: Atika 432
[4] Heyets V M, Klebanov T S, Chernyak O I, etc. 2006 Modeling of economic security: state, region, enterprise Ed. V.N. Heytsya Kharkiv, WA "INZHEK" 240
[5] Kovalchuk T T 2004 Economic security and politics, with professional experience analytics T.T. Kovalchuk. - K: "Knowledge" 638
[6] Guidelines on the assessment of the level of economic security of Ukraine National Institute of International Security Problems; Ed. A I Suhorukova K., 2003 64
[7] Novikova A F, Pokotylenko R V 2006 Economic security: a conceptual definition and mechanism support. Monograph Donetsk: Institute of Industrial Economics of NAS of Ukraine 407
[8] Lipkan V 2012 A National Security Ukraine V.A. Lipkan K.: Condor, 552
[9] Zakharov A I, Prygunov P Y 2011 Organisation and management of economic security of business entities. Tutorial - K: CST 257

Strengthening of the company's strategic position in the market

N V Bakalo

Tourism and Administration Department Poltava National Technical Yuri Kondratyuk University,
Pershotravnevyi Str., 24, Poltava, Ukraine, 36011

Abstract

It is very important one of the most effective ways of expanding business, namely the exploration and development the adjacent segments of the market on which the company's business has been successfully functioning. To develop an action plan that can simulate this situation is necessary carefully come to their design and analysis of the reasons for which the company started to lose market. Analysis of the situation will be effective when sales growth is slowing, but not when a company already has a clear rate of decline in sales.

Keywords: market segment, situation, growth rate, sales volume

1 Introduction

Go in a completely new business is sometimes too risky, so one of the most effective ways to expand business is the exploration and development of adjacent segments of the market on which the company's business has been successfully functioning. But the question immediately arises: how is it possible to identify or find a niche that will be interesting for business development? Suddenly, a niche is not enough suitable to our business? Or it may be that the existing competences and specialists in the company is not enough for the effective operation of the business in this market segment? Or for a new niche is necessary to expand production and to buy new equipment? In general, there are a lot of questions.

2 Main part

It is impossible to move on without a clear statement of objectives, because it is not clear where actually we want to get. The first phase of work is determined by the current situation within the company, its strengths and weaknesses. Further an external marketing audit is carried out. And here you cannot do anything without a minimum of market research and analysis of consumer behavior. If the study makes it possible to "get" a lot of information about the market in which the company operates, then it can be dispensed without a detailed study.

Certainly, seeing a negative trend companies are beginning to take certain, incidentally, not always the right decision. In the first place, they start not justified to reduce the prices of their products, which is even worse effect on sales and profits. After all, when you reach a certain minimum price level, the buyer begins to doubt the quality of the product and refuses to buy it. It turns we have "closed circle." But, of course, there are no hopeless situations, but in order to develop an action plan that can simulate this situation it is necessary carefully come to their design and analysis of the reasons for which the company started to lose market. To analyze the situation better when growth in sales is slowing, but not when a company already has a clear rate of decline in sales.

3 Conclusions

To sum it up, I wanted to point out that the companies that decided to develop a new group of consumers from the higher price segment, preferring the more expensive brands. If the company produces mass-market products, and wants to get in the up-market segment, then it should to weigh all the available resources of the company. And not only industrial, but also human. There are cases where a company of a mass segment, quickly won success in the economy segment (of course under another brand!), but in more expensive segment of the market it have got complete failure. Analyzing the data of the situation, we can came to the conclusion that in order to work in a higher price segment companies from a cheaper one, simply do not have enough marketing, business and management skills. In other words, the existing staff cannot work with more expensive segments, does not understand that there are working branding tools, does not know how to approach building a brand, how to manage it, etc. But in the economic segment of the staff everything is clear - it is a key factor in the decision is the price if you do not, the quality / price ratio. And if your production capacity for bespoke has a higher quality than competitors product at a lower price, then success is guaranteed.

The efficiency of enterprise improvement via crisis management in tourism

I Chernysh, V Mahovka*

Poltava National Technical Yuri Kondratyuk University, Tourism and Administration Department, Pershotravneviy Str., 24, Poltava, Ukraine

**Corresponding author's e*-mail: irinachernysh@gmail.com

Abstract

The paper deals with the conceptual framework of the implementation of the crisis management in tourism. It is stated, that the implementation of such anti-crisis measures as: stimulation of consumer demand; diversification within the proposed tourism product; selection of reliable partners (eg banks or accommodation establishments); reduce costs and minimize risks, improve efficiency and enhance business processes, improve the quality of tourism services, tours and the formation of economic programs; introduction of new Internet-technologies - improving the sites of companies; development and use of programs to encourage regular customers and partners should be promoted.

Keywords: crisis, management, tourism, improvement

1 Introduction

Tourism is one of the promising dynamic and profitable sectors of the economy that fully accumulates natural recreational potential, efficient use of which creates significant opportunities for income. According to the World Council of Travel and Tourism in 2015 tourism accounted for about 10% (7,170.3 billion. US) global GDP, 4.3% of the total investment, 9.5% of total employment and 6.1% of world exports [1].

Therefore, in view of the growing influence of the tourism industry on the economic and social development, branching economic relations, there is a need to develop effective ways to ensure the development of tourism enterprises under the current crisis conditions. Actualized the issue of developing effective anti-crisis measures with their main purpose to ensure the development of tourism industry.

2 Main part

Tourist industry is a collection of different businesses, the main production involved in the provision of services, production and sale of products to meet the needs of tourists [3]. Tourist industry is intersectoral complex business structures with the production and sale of tourist products for domestic and international tourism [2].

Studies show that the main causes of the slowdown of tourism development indicators is increasing inflation and growing concern in society due to economic and political instability, and, consequently, reduce the cost of leisure and travel. The tourism sector is at the crossroads with other sectors and much depends on them, as a result, rising transportation costs, problems in the construction industry have an impact on tourism. Finding opportunities to reduce financial costs of tourism enterprises have to resort to a simplified system of taxation, reduce internal costs and investments in fixed assets, their reconstruction and development.

3 Conclusions

Overcoming of these problems should promote the implementation of these anti-crisis measures, namely: stimulation of consumer demand; diversification within the proposed tourism product; selection of reliable partners (eg banks or accommodation establishments); reduce costs and minimize risks, improve efficiency and enhance business processes, improve the quality of tourism services, tours and the formation of economic programs; introduction of new Internet-technologies - improving the sites of companies; development and use of programs to encourage regular customers and partners.

Thus, in order to improve the process of managing by tourist companies in the crisis at the present stage of economic development is more pressing issues to develop effective anti-crisis measures that would ensure not only a way out of crisis and bankruptcy of significant part of tourism enterprises, but also contributed to the development of investment activities in this area.

References

[1] Travel & Tourism Economic impact world 2016 [electronic resource] World Tourism Organization Access: http://www.wttc.org/research/economic-research/economic-impact-analysis/

[2] Dyachenko L P 2007 Economics of tourism K: Center of educational literature 224

Kyfyak V F 2003 The organization of tourism in Ukraine Chernivtsi: Green Bukovina 648

Developing employers' and employees' professional competencies: in education system for tourism

M Zhivitere[1*], E Konstantinova[1], Z Oborenko[2], M Bespartochnyi[3]

[1]*Ventspils University College, 101a Inženieru* Street, LV-3601, Ventspils, Latvia

[2]ISMA University 1 Lomonosova str., Bld. 6, Riga, LV 1019, Latvia

[3]Poltava University of Economics and Trade, Kovalya str. 3, Poltava 36000 Ukraine

**Corresponding author's e-*mail: e-mail: marga.zivitere@isma.lv

Abstract

Tourism is one of the world largest employers and employees economical sector. This paper argues that one option for developing the new ways of developing employers' and employees' competency in a tourism sector is the use of complicated and miscellaneous tourism educational system. The analyses of tourism sectors' current educational curriculum designs show that being contemporary it is a new educational sphere. A special place is allocated to analyses of multi-disciplinary and inter-disciplinary studies programms in education. At the end a suggestion is made to discuss the conceptual issues regarding opportunities during studies coordination of the interests of students, employers and teaching staff and the need for more professional practice in enhancing the quality of a tourism education. Material for the paper has been gathered through contacting experts in the field and conducting extensive and literary reviews.

Keywords: developing, educational system, professional competenciy, tourism sector.

1 Introduction

Travel & Tourism is one of the world's largest employers. The sector directly employs over 100 million individuals and on the coming decade is expected to provide a total of 74.5 million new jobs [1]. In the next 40 years, according to Daniel Scott and Stefan Gössling forecasts, global tourism would anticipated continuing to double or even triple in the number of travelers and economic contribution (Figure 1) [2].

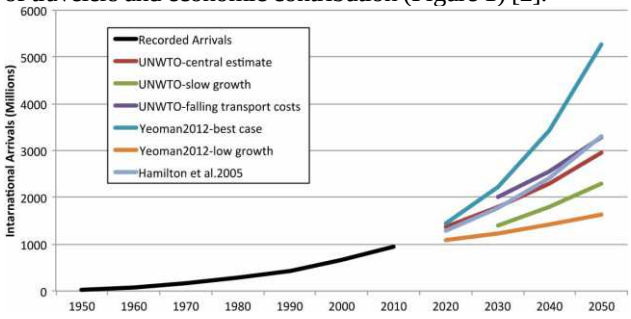


FIGURE 1 The next 40 years for global tourism

Building a strong and capable tourism sector essential is in order to respond to tourism trends and compete in a rapidly evolving tourism educational system [6. 63]. Topicality of the subject-matter is prescribed by a necessity of modern study programs in the tourism sector, new knowledge, skills and professionalism competence of these tourism employees which can be used in practical business [3. 77]. Policies and programmes introduced don't respond to these challenges and boost workforce development in tourism sector with a more proactive and long term approach [6. 10].

2 Overview

The analysis of the qualitative personnel, employed in tourism and other spheres related to it, shows that in many cases the employees are from other spheres – without education or qualification in the sphere of tourism. So far, many questions arise for those who train the specialists for tourism and chains involving many activities. The integrated studying-field approach to tourism educating and training is now required to encourage innovative practices and it is hoped that the development of a studying-field will upgrade the skills and competence for the tourism sector's entrepreneurs and employees.

The main problems of a discussion are that the tourism product is a composite one with its production, distribution and marketing being configured along a value chain involving many activities which are vertically, horizontally and diagonally related and integrated in varying degrees and that in sphere tourism are high share of SMEs. Those conditions need an innovative workforce development approaches and the greater changes in the field of tourism education [4, 27; 5. 133; 6. 9-10; 7]. There is to clarify the education situation of tourism sector for employers and employees. The following tasks are being solved:

- research papers and literature is being analyzed on drafting and implementing of tourism program occupational standard in programs of various levels;

- the latest trends and requirements are being studied for lifelong education;
- opinion of graduates of various Latvian educational establishments is being clarified about practical application of the acquired knowledge and necessary abilities, skills or theory which should be included in studies;
- proposed mechanism for solving of basic problems.

3 Decisions

The research has resulted with the novelty that the specialists of the field are ready for constructive change and are interested in taking part in making improvements in study courses and programs.

Areas and risks have been clarified to which more attention should be paid during the study process, in order to make study programs comply with tourism labour market requirements;

4 Conclusions

This article deals only with the suggestions of some problems and results of the developing employers' and employees' competencies for tourism sector in Latvia and the authors will be grateful for any discussion, criticism and contributions to the topic under discussion.

Finally conclusions may serve as basis for further research and activities

References

[1] World Travel and Tourism Council 2016 Human Capital Travel and tourism economic impact 2016-World http://www.wttc.org/focus/research-for-action/economic-impact-analysis/

[2] Scott D, Gössling S 2015 What could the next 40 years hold for global tourism? Tourism Recreation Research **40**(3) 271-82 http://dx.doi.org/10.1080/02508281.2015.1075739

[3] Akatieva L, Batalova L, Merzlyakova G, Okonnikova T 2015 Developing Graduate Competency Model for Bachelors of Tourism Procedia Social and Behavioral Sciences **214** 375 – 84

[4] Živitere M 2008 Innovation in Tourism Education Development Науковий вісник ЧДІЕУ Економіка Серія 1, Випуск 1. Економіка: збірник наукових праць Чернігів **1** 27 - 37

[5] Stacey J 2015 Supporting Quality Jobs in Tourism OECD Tourism Papers, 2015/02, OECD Publishing, Paris. http://dx.doi.org/10.1787/5js4rv0g7szr-en

[6] Dambe G, Atstaja Dz 2013 Knowledge, skills and attitude in tourism industry: case study of Latvia ISSN 1822–8402 European integration studies **7** 177-84

[7] *Nozaru kvalifikācijas sistēmas izveide un profesionālās izglītības efektivitātes un kvalitātes paaugstināšana* (vienošanās Nr. 2010/0274/1DP/1.2.1.1.1/10/IPIA/VIAA/001).

Demand analysis of wellness management specialist in Lithuania

J Bojoroviene*, R Kinderis

Klaipeda State University of Applied Sciences Jaunystes Str. 1, LT-91274, Klaipeda, Lithuania

**Corresponding author's e*-mail: j.bojoroviene@kvk.lt

Abstract

The article analyzes the demand of wellness services specialists in labour market. The survey comprised the enterprises and organizations of the wellness sector in accordance with the target unit of the business sector. The survey aimed to assess the demand of wellness services managers and their situation in labour market. The acquired data indicated that organizations providing wellness services experience lack of the specialists of wellness services management sphere. Having the survey completed the generic and professional competences of the wellness services management specialists have been identified. The employers noted that the basic factor influencing employment of the specialist in the organization providing wellness services is positive attitude towards work.

Keywords: wellness services, specialist of wellness services management sphere, generic competences, professional competences.

1 Introduction and research methodology

Fulfilling the demand of labour market depends on the students' specialization acquired. However, due to the consequences of the economic crisis, there are no criteria defined, which may be applied identifying the specialists demand in labour market in the national level, the target surveys of the employers of the business sector in order to identify the demand of specialists in labour market are carried out very seldom. Applying the method of target surveys the demand of different specialties in labour market may be assessed rather objectively. Therefore, the Tourism and Recreation Department of Klaipeda State University of Applied Sciences has initiated the survey of the demand of specialists in the wellness services industry.

Aim of the survey – having the data of survey processed to assess the demand of wellness services management specialists and their situation in the labour market.

To achieve the aim the tasks were set:

- to investigate the general demand of wellness specialist in the market;
- to identify the generic competences of the wellness sphere specialist;
- to analyze professional capabilities of the specialist of wellness sphere;.
- to ascertain the necessary personal features of the specialist of wellness sphere.
- to identify the factors influencing employment in the organization providing wellness services.

The period of the survey is the second half of 2015. The survey on demand of wellness services manager comprised three main stages. They are as follows: preparation of a questionnaire form, the survey and the analysis of the results. The basic informational source used for the report preparation was the data of survey on demand of wellness services manager.

78 enterprises and organizations have been surveyed; just 48 submitted the completed questionnaire form. The respondents were employers or their representatives from legally acting enterprises and organizations of wellness sector.

Method of survey – questionnaires. This method of information gathering is convenient because during the stipulated period the huge amount of respondents can be questioned. The method of survey is easily formalized and data is analyzed faster and easier [1]. Carrying out the survey information has been gathered using e-mails, e-questionnaire forms indicating the deadlines.

2 Results of survey

Having completed the survey on the demand of wellness sphere specialist in accordance with the target unit of business sector, it can be concluded that the organizations providing the wellness services need specialists of wellness services management sphere. Nowadays 62,5% of the respondents are ready to employ wide-ranging specialists of wellness services management sphere.

The generic competences of the specialist are interrelated and make an integral part of each competence: ability to adapt new situations, to apply knowledge into practice, formulate and deal with problems, to be able to learn, evaluate and analyze own activity, and to make decisions; above mentioned competences are referred to as the essential competences of the specialist of wellness services management sphere.

Having analyzed the professional capabilities of the wellness sphere specialist, it was concluded that the future employee has to be able to: sell services, perceive the processes of wellness business, and organize them; furthermore, the specialist of the wellness sphere has to manage and control the marketing business.

It was ascertained that such personal features as honesty,

punctuality, politeness, attentiveness, initiative, self-confidence, ability to work in a team environment are the essential and obligatory for the specialist of the wellness sphere.

The basic factor influencing the employment of the specialist in the organization providing wellness services is the positive attitude towards work. Additional factors making impact on the employment in the wellness sphere of the specialist were mentioned as follows: the level of employee knowledge and skills, personal features and character, work experience and the higher education.

References

[1] Kardelis K 2007 *Mokslinių tyrimų metodologija ir metodai: (edukologija ir kiti socialiniai mokslai): vadovėlis* 4-asis leidimas (Methodology and methods of the scientific research: (education and other social sciences): coursebook. 4th edition) Šiauliai: Lucilijus

[2] Lietuvos turizmo plėtros programa 2014-2020 (Programme of the Lithuanian tourism development 2014-2020) http://www.ukmin.lt/web/lt/turizmas/nacionaline_turizmo_pletros_programa

[3] Paškevičius L 2013 *Lietuvos turizmo klasteris: struktūra, tikslai, nauda* ir perspektyvos (Claster of the Lithuanian tourism: structure, objectives, benefits and perspectives) Vilnius

[4] L*ietuvos medicinos turizmo plėtros ir medicinos paslaugų eksporto skatinimo galimybių analizė ir rekomendacijos* (Analysis and recommendations regarding possibilities to develop the Lithuanian medical tourism and expand the export of medical services) 2011

The systems for financial management and control of Bulgaria's public sector

D Zagorcheva

Konstantin Preslavsky University of Shumen, Faculty of Mathematics and Computer Sciences, Department of Economics and modeling, Universitetska Str 1, Shumen, Bulgaria

Abstract

The subject the Systems for Financial Management and Control being reliable enough to serve as a major factor for the public sector financial stability is frequently highlighted throughout the years following the Worldwide financial and economic crisis.

The present work is targeted at defining the Systems for Financial Management and Control as a major factor for Republic of Bulgaria's financial stability. For that purpose we shall highlight the financial control procedure on public sector spending.

Keywords: financial management, financial control, cost planning, funding sources, verification of costs, financial stability, preliminary control, operational control and subsequent (post-action) control

1 Introduction

The Law for Financial Management and Control in the Public Sector and the Law on Internal Audit in the Public Sector regulate the financial control in Bulgaria. The establishment of Systems for Financial Management and Control in all units of the public sector was provoked also by the financial decentralization which took place in Bulgaria. The System for Financial Management and Controlconsists of different procedures and policies of public sectors' organizations, used as a guarantee for a reasonable confidence in the achievement of the organization targets by observing principles of reliability, economy, efficiency, legal compliance, assets and information protection.

2 Control structure

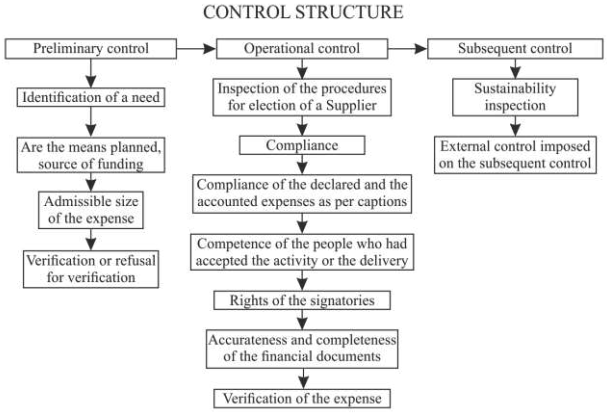
Public spending shall not be considered as an unilateral act but a process consisting of a few stages:

- Occurrence of public needs;
- Costs planning for providing the goods;
- Determination of funding sources
- Legal and financial inspection of the expense;
- Monitoring and reporting.
- Occurrence of the needs of the population
- It is a usual practice not to discuss the public needs as they are considered as known and of a permanent nature. The use of significant amount of financial resources may be imposed also by non-perceptible needs, of a single manifestation and concerning a restricted circle of consumers.
- Planning of the costs for providing the goods
- The second important stage includes the costs planning. Herein not only the proof of a need is provided but the definition of different costs and their provision with budget resources.
- Determination of funding sources
- The determination of the funding resources is a detailed mechanism on a local level.
- Legal and financial inspection of the expense
- This stage covers the most comprehensive volume of activities. It consists of inspection on the previous stages compliance and complete inspection of the documented spending before its payment.
- Reporting

The reporting is more of an accountancy procedure in its nature not a financial one and its implementation shall be related to the inspection and the results from the previous stages:

- Planned means: For what? How much? Where?
- Spending: For what? How much? Where?
- Reported means: For what? How much? Where?

The detailed consideration of the target planned means and the spending is also an important stage of the reporting. In cases of expenses, funded by borrowings, a report to the funding body is needed as well.



3 Procedures and mechanisms for conduction of reliable control

The control organization is defined on a local base. In Bulgaria the public sector organizations define their own procedures, policies and mechanisms for the control conduction.

The preliminary control is targeted at conduction of an inspection before taking an engagement or effecting a spending. Only a positive result would entitle the organization to proceed with the next actions related to the assignment and implementation of the spending activities. The control itself undergoes through few stages:

STAGE 1: Identification of a need

The only purpose of the first stage is to ascertain existence of an actual need for the spending to be made.

STAGE 2: Are the means planned, source of funding

This stage of the inspection shall be based on documents and the entries in the organization budget. It is important to inspect if there is a target source for funding or the means do not have a special purpose designation.

STAGE 3: Admissible size of the expense

This stage consists of two control procedures. The first one may restrict the volume of the engagement taken to the amount of the planned financial means, i.e. the expected spending should not surpass the financial resource provided in the organizational budget. The second procedure for determination of the admissible size is based on the spending activity itself.

STAGE 4: Verification or refusal for verification

The verification is the final procedure of the preliminary control. It is used for giving permission or a refusal for taking a particular engagement or spending. The verification is ascertained by a signature affixed by the responsible or authorized person.

The operational control covers the whole period from the moment of the commitment until the final payment of the expense. Its target is to give a final permission or a refusal for a given service or delivery to be made. It consists of the following stages:

STAGE 1: Inspection of the procedures for election of a Supplier

This stage has a few aspects: legal, financial and technical. A few procedures are included.

STAGE 2: Compliance

The purpose of this stage is to check for compliance of the agreed and the actually implemented activities and deliveries.

STAGE 3: Compliance of the declared and the accounted expenses as per captions

A comparison shall be made between the declared and the final expenses as per captions. The Inspection shall be done as per quantities and values.

STAGE 4: Competence of the people who had accepted the activity or the delivery

This inspection is targeted at ascertainment of the competence of the people who had accepted the activities or the deliveries.

STAGE 5: Rights of the signatories

Similar to the previous stage, the signatories shall be of a competence and of authority to sign the documents.

STAGE 6: Accurateness and completeness of the financial documents.

The accurateness and the completeness of the documents shall be checked. The values and the calculations shall be inspected.

STAGE 7: Verification of the expense

The expense verification shall be done through the means of the double signature system.

Subsequent control – it is frequent for this stage to be ignored. It is often believed that the verification of the expense is the end stage of the control process. However this stage is of the same importance as the other two stages.

The whole process of control over the public spending is regulated by the rules for risk management. Each control stage may be defined with certain risks. They are subject of analysis and they may determine the reaction model in case of different risks.

4 Conclusions

Public spending has been a popular subject of discussions in the society. From one side the tax payers want to find particular benefits for them and from another side – mechanisms guaranteeing that the public money are spent reasonably. Expenses prioritization and economical use of financial resources are the fundamentals of the fiscal management and discipline. The introduction of reliable Systems for Financial Management and Control in Bulgaria serve as a strong mechanism for monitoring, control and management of the spending.

Acknowledgments

The publication is funded from a project RD-08-107 / 07.02.2016, Paragraph "Scientific Researches" of "Bishop Konstantin Preslavski" Shumen University

References

[1] Broadbent J 2003 Control and legitimation in government accountability processes: the private finance initiative in the UK Critical Perspectives on Accounting, Critical Perspectives on Accounting **14**(1-2) 23-48

[2] Bovaird T 2009 Public Management and Governance Second Edition, Routledge

[3] The Law for Financial Management and Control in the Public Sector http://www.lex.bg/laws/ldoc/2135517848 (15 Jan. 2016)

[4] The Law on Internal Audit in the Public Sector regulate the financial control in Bulgaria http://lex.bg/en/laws/ldoc/2135519287 (15 Jan. 2016)

Use of social networks in modern business environment

D Diachkov*, I Potapiuk

Poltava National Technical Yurii Kondratuyk University, Poltava region, Ukraine,

**Corresponding author's e*-mail: dmiraf@ukr.net

Abstract

The article caused the main prospects for the use of Internet resources, social networks in today's business environment. Systematised and characterized the main directions of use of social networking tools.

Keywords: socialnetwork, socialnetworkingtools, businessenvironment, Facebook, Internet resources, socialnetworks management, Google

Social networking on the Internet - is the habitat of the modern enterprise. Thanks to social networks have opened a new business opportunity to be with his counterpart in any life situation, at any time of the day and clearly form an idea about their interests, tastes, preferences and desires.

One of the newest and most effective options to promote the company's website on the Internet is a social media management.

In recent years, the business is actively developing the potential of the Internet, not limited to only corporate sites, and the comfort and social networks. Internet has actually become media №1 for all business areas. And rightly so - "sharks" of the Internet, Facebook and Google now occupy a total of 15% of world traffic.

Business interests and opportunities in social networks are so broad that they should organize and highlight the main advantages such as:

1. Search for employees. If a company is looking for employees, the social network - this is the place where professionals in this field to communicate in groups with the same interests and expressed interesting thoughts on blogs. Thus, the company leaders have to position the opportunity to evaluate the potential of the candidate more fully. That's why any network so many HR-specialists.

2. Communicate with colleagues and competitors. Basically, the power of social networks is partially repeated opportunities ordinary Internet forums. But how would an honest and open social networks. You can not only communicate and ask questions in the group, but also carefully to learn interesting information.

3. Search of customers. Clients in social networks themselves are segmented by interests within the network. Therefore, the company is able to connect to the required community and search customers [1].

Important in this regard are the terms of an audience gathering - they vary in different areas. Conversion of remarketing in some cases may be as high as 100%, the experts claim [2].

4. Search for sellers. Regarding Internet resources, now in Ukraine, search the service provider operates in such a way - either cherezpoiskoviki or through the advice of friends to Facebook. After that there is a comparison of options, consideration and purchase of goods or services, in general, at random. All this can be remedied reviews. Reviews affect those people who are at the stage of comparing and evaluating choose their supplier, says E. Shevchenko, head UaMaster Agency [3].

According to statistics, 2/3 of Ukrainian enterprises before they make a deal with a supplier, acquainted with reviews of products, services and companies not on the official website of the seller or manufacturer, but independent sources. The use of official sources allows you to get feedback from the vendor, but the great benefit it brings to the supplier.

The Social Network serves a very economical way to increase the awareness of clients and create demand, because in using Facebook can generate potential customers desire, the need, which can be either conscious or unconscious. Overall, Facebook, according to B. Carter, is the most powerful marketing tool that has ever existed. [4]

4. Search of business partners. The same applies to the search for suppliers, partners and contractors.

5. Supplements and promote the company website. If the company has a web site, social media, it can post information about the company, to blog and to inform other participants about the activities of the organization (news and promotions, exhibitions, auctions, fairs and so on.).

Facebook bought the shopping search engine «TheFind» [5]. The search engine makes it possible to search for necessary goods at nearby stores will be incorporated into the social network in order to improve its advertising services.

At the same time, Facebook has launched a tool to study the views of the audience TopicDataFacebook brands in collaboration with the research firm DataSift, which introduced a new analytics tool that shows marketers, customer opinion on the social network, and their views on topics relevant to the company's business and industry generally. This information is designed to help brands make their product more relevant to consumers.

6. Promotion of the enterprise. Corporate site - this is the

so-called "store on the outskirts of the city", and the page in the social network - "in a shopping center point in a busy area." Therefore, the location of the interesting notes in a blog, helpful tips in groups - all this will give the company's popularity among a wide range of partners and consumers [6].

An innovation in this area also ranked by Google, according to which employers are able to add photos to the six new categories that will be displayed in the Search and post on Google+. These categories include the main photo of the company, interior photos, buildings, workplaces, personnel and additional photos.

7. Progress of the goods. Retailers around the world en masse to online, and sales in the existing online stores show rapid growth. Not the least role in the active development of e-commerce throughout the world play social networks, which have become, in essence, a platform for direct sales.

Dynamic PLA launches advertisements, consisting of several images - so-called "carousel". The new format allows advertisers to present more than one produktav one ad, or different views of the same product.

An innovation was the service "Desire", which integrirovans major online stores. You can purchase items from the catalogs of these stores, or add them to your wish list, and others can give him the goods.

8. Electronic payments through social bindings. This new tool allows the visitor to a third-party online store to be authorized by a "VKontakte" and make a payment with a card linked to his account on the social network. Using social bindings improves conversion of the store payments by 13-17% [7].

9. Insurance in case of "not deliberate" purchase. How to find the insurance company, will be popular among parents who are worried about their children spending more and more time on the Internet.

However, buyers of insurance can become a different company. Thus, the insurance can be used for the recruitment of PR-specialists who specialize in restoring goodwill.

Thus, with the development of the Internet space, information resources becoming weighty social networking tool for the development of the domestic business environment and the determining factor of their access to international markets.

References

[1] Lozovyk D B 2012 Business prospects in social networks
[2] Kasatkina T 2015 Social media as a factor in information security Information-*analytical bulletin Appendix to the magazine «Ukraine: events, facts, comments»* Overview of Internet resources
[3] Shevchenko L 2014 Assistance in Facebook: How can u help the Internet B2B-of business
[4] https://www.facebook.com/brian.carter.man
[5] http://uamaster.com
[6] MarketingMediaReview
[7] Kasatkina T 2015 Social media as a factor in information security Information-*analytical bulletin Appendix to the magazine «Ukraine: events, facts, comments»* Overview of Internet resources

The main trends of competitive professional training for the innovation economy requirements

M Drogomyretska, O Khrystenko*

The Department of Management and Logistics, Poltava National Technical Yuri Kondratyuk University,
Pershotravnevyi avenue, 24, Poltava, Ukraine, 36011

**Corresponding author's e*-mail: drogomyretska@gmail.com

Abstract

The given paper is dedicated to the determination of the main trends of training of specialists for the requirements of innovation economy. The existence of the intense competition for people with innovative qualities and creative thinking in today's world is defined by authors. It is proved that the economy of any European country develops rapidly due to the effective functioning of educational systems. That is why innovation educational systems create the necessary conditions for a breakthrough of educational technologies separate directions and contribute to the development of human capacity and training of specialists, able to learn the latest techniques and technologies.

Keywords: competency, higher education, innovation economy, innovation infrastructure, professional training.

1 Introduction

The new type of economy, the formation of which is taking place nowadays, is often called "the innovative economy", emphasizing in such way the significant role of innovations in the development of all aspects of social life. Following the position of Ruth Ann Hattori and Joyce Wycoff, "innovation is as much a mindset as it is a set of principles, practices, skills, tools and techniques. It is a belief in the future, strong conviction that things can always be better; confidence in the positive force of new ideas; faith in the power of people working together toward a common objective; trust in imagination, ingenuity, intuition and instincts as well as rational thought, analysis, evaluation and measurement" [1].

Companies are urged to be innovative to gain a competitive advantage in business, the survival of local organizations greatly depends on the capacity building that comes from various innovations; and even institutions of higher education often promote themselves as leaders in innovation. Higher education plays an important role in providing people with skills for innovation.

2 Main part

According to the well-known Lisbon Strategy [2], education and training entered the central stage of the European policy making. It was realized that lifelong learning is a key driving force for employment and, as part of the so-called "knowledge triangle", for growth, affecting innovation, competitiveness and sustainable development [3]. In other words, higher education systems are important for each country to develop the critical skills needed to accelerate development, especially under the innovation economy requirements.

In order to accelerate the innovation process in the economy, it is important to modernize the existing systems of higher education and to a large extent the development and further implementation of innovative models of learning in higher education designed to prepare qualified cadre. In any case, such a training model should be not only based on the principles of sustainable development, but also aimed at developing future specialists with new qualities, which are in demand by the companies functioning in the context of the innovation economy.

Tony Bates emphasizes that "innovation requires a broad mix of academic subject domains. For instance: in manufacturing industries, 50 % of highly innovative professionals have engineering / science degree. In contrast, in business and finance industries, the bulk of the highly innovative workforce is formed by the business graduates, social sciences graduates, and law graduates. Moreover, a significant proportion from all fields of work in a highly innovative job: 60 % of engineering / science graduates; 58 % of arts / agriculture; 50 % of education graduates" [4].

The critical skills that distinguish innovators from non-innovators can be determined as follows: creativity; ability to present ideas in audience; alertness to opportunities; analytical thinking, ability to coordinate activities; ability to acquire new knowledge.

The characteristics of the innovation economy of the future require that professionals have diverse skill sets (they should be able to create and implement different projects, as well as to explore, analyze, make, implement solutions of various problems in any area of the national or regional economy) and also have the modern higher education, which provides the know-how to obtain the existing skill set.

Institutions of higher education should be turned into innovative center of the educational system by creating an

infrastructure to support innovation (venture fund, technopark, training structures, expertise, consulting, certification and so on), focused on efficient economic results.

Being the significant part of innovation infrastructure, institutions of higher education usually promote innovation activity of enterprises and organizations. Innovation in the European universities develops in three main directions: research, educational and protect activities. All, which can be said concerning this fact, is that the main three areas in which education should focus in the nearest future are the following ones:

- supporting innovation.– as universities are the most perfect place for innovation creation, they need to provide more support for students who come up with new inventions to help them develop their valuable insights into feasible businesses;
- successful collaboration with industry – there is a great importance of having industry partners, able to provide input and ongoing support on curriculum offered by institutions of higher education and by providing students with industry experience;
- interactive teaching methods – students should be active learners, while teachers should be facilitators to teach students how to learn.

3 Conclusions

From the above mentioned we can conclude that higher education in the European countries is becoming massive and rapidly commercialized. Institutions of higher education are gradually transformed into full market actor and the emphasis in vocational education is shifting from the transfer of qualifications to the set of the key competencies.

References

[1] Hattori R A, Wycoff J 2004 Innovation training American Society for Training and Development 206
[2] The Lisbon Strategy 2000 – 2010 An analysis and evaluation of the methods used and results achieved. Final report Retrieved from: http://www.europarl.europa.eu/document/activities/cont/201107/20110718ATT24270/20110718ATT24270EN.pdf
[3] Schlotter M, Schwerdi G, Woessmann L 2008 European Expert Network on Economics of Education. Analytical Report No 3, prepared for the European Commission
[4] Bates T 2014 *Producing "innovative" graduates and how online* learning can help, Online distance and education resources Retrieved from: http://www.tonybates.ca/2014/02/08/producing-innovative-graduates-and-how-online-learning-can-help/

Knowledge technologies: medical product in tourism

K Yakovleva

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019

Corresponding author's e-mail: artdeks@inbox.lv

Abstract

The main aim of the present research is the implementation of a 'new medical tourist product' in the Spanish market. The fulfillment of the activity of the new medical tourist product is carried out in the grupopalas.com hotel network.

Keywords: tourists, hotel network, medical product, patient electronic card, insurance policy, Spanish market, enterprise's efficiency

1 Introduction

The medical tourist product is an additional medical policy for accidents not covered by the tourist insurance (dental treatment, sunburns, light injuries and bruises, body poisoning, alcohol overodose).

Topicality: the standard insurance does not cover accidents and extreme circumstances during tourists' leisure. The aim of the research is to analyse the necessity and possibility of implementing the new medical tourist product in the Spanish market.

Product positioning technology: a unique offer, a direct sale of the entire complex of medical services in one subscription by the tour operator.

Enterprise's positioning technology – a tour operator who takes care of his/her clients' health. [1, p.32-33]

1.2 STATEMENT OF THE PROBLEM (OBJECTIVES OF THE PRODUCT IMPLEMENTATION)

- sign contracts with the leading tour operators of Russia, Europe, CIS, Scandinavia and the Baltic states;
- sign contracts with hotels for the installation of equipment and the launch of a wellness programme from 15.04.2017.
- develop a regular system of consumption of the tourist medical product that will enable to increase the accuracy of the produced % of the income in the activity of the hotel in question before 15.04.2018, whilst the initial sum of the investment does not exceed 550.000 € in Spain.

2 Results of the Study

To determine the prospects for opening of this kind of business independent research was carried out in the form of a questionnaire for tourists residing on the territories of Hotel Palas Pineda 4* and Gran Palas 5*. The interviewed tourists from Europe and Russia, having a rest in the palasgroup.com network voted in favour of the availability of a medical tourist product in the hotel (95%).

In addition:

- 2,500 people (all respondents) - 100%;
- 2,375 people - 95% in favour of the availability of medical services at the hotel;
- 2,250 people - 89% in favour of the presence of a Russian-speaking specialist at the hotel;
- 125 - 5% against the medical services at the hotel.

It should be noted that the provision of services is not only limited to visiting tourists, but for the locals also – the Spaniards themselves. For many visitors it will be a unique opportunity to mix business with pleasure.

For most tourists, including former residents of Latvia, it will be a unique opportunity to get out on vacation to the sunny Spain from the UK, Ireland, Netherlands, Norway, Greenland, Wales; from any location in Europe and Russia. To have a rest in Spain and get an appointment with a highly qualified specialist through the customer database.

3 Adopting relevant technology

The development course of the organization can be viewed through the expanded model of the company's holistic picture. For this the following is to be analyzed:

1. external information (laws, taxes, social factors);
2. internal information (orders, sales, salary). In the construction of the model, the following steps should be considered:

2.1. model;
2.2. the system layout;
2.3. scenarios of implementation;
2.4. options of implementation;
2.5. solutions;
2.6. action (implementation). [2, p.9]

Six steps of creating the service:

1) Selection of the staff. Requirements for employees, operating under the formula (knowledge + skills + experience) x motivation = the perfect employee. (productive work) a perfect team made of specific

people.

2) The room is located in one of the 6 hotels in the resort area where within a radius of 20 km there are more than 40 hotels and more than 100 apartments, purchased by Russian-speaking tourists.
3) Location of the hotel 4*, being part of the hotel chain grupopalas.com and located on the first line of the sea
4) Generation of a marketing program made to attract the maximum tourist demand for a medical tourist product with the help of Russia's and Europe's leading tour operators, as well as through existing popular social networks and enterprise homepage, accessible from anywhere in the world.
5) Calculation of financial costs.
6) Calculation programme ratio of vacancies to the demand of the product. [3, p.275]

By developing criteria of efficiency of this product's consumption, we can provide a personalized approach for each tourist, using the patient's electronic card.

4 Conclusions

The solution of set tasks will improve the situation on the Costa Dorada coast in Spain. It will increase the flow of tourists willing to have a vacation in said region. It will allow each person to travel safely, feel comfortable in an unfamiliar environment for a period from 1 week to 1 month, purchasing an unlimited amount of subscriptions: for themselves, their family members, relatives and friends at a fixed subscription price of 250 € per 7 days.

- The analysis of tourist profiles has showed that 95% voted in favor of the existence of the medical tourist product in the hotel. Consequently, the service will have a good demand on the market.
- This service will be advertised through popular social networks.
- A fixed price has been selected for a subscription for a definite number of days for all ages and each tourist.
- The external market has been determined – these are the tourists from Russia and Europe. The domestic market of the product's customers are the Spaniards.

The ultra-product designed by the author allows you to check the effectiveness of a medical tourist approach, where the leadership is working in a supportive team, has a deservedly high level of qualification and experience of over 30 years and is certified according to European standards of medicine and is ready for implementation of the product in Spain.

References

[1] Грачева О 2008 *Организация туристического бизнеса. Технология создания турпродукта* 32-33
[2] Копытов Р 2009 *Бизнес проектирование в предпринимательстве* 9
[3] Котлер Ф 2007 *Основы маркетинга. Краткий курс*: Пер. с англ. - М.: Издательский дом «Вильямс» 275
[4] www.grupopalas.com
[5] *Конспект лекций «Маркетинг медицинских услуг»* 2011 Федеральное государственное бюджетное образовательное учреждение высшего профессионального образования «Российский государственный университет туризма и сервиса» 300

Rural tourism in Georgia

E Meskhia

Batumi Art State University, Batumi, L. Asatiani N 37, +995279353

Corresponding author's e-mail: ermile_mesxia@mail.ru

Abstract

Georgia has great development perspectives in tourism. Its unique nature, cultural heritage and geographical location give advantageous conditions for the development of different types of tourism. Important reforms have recently been carried out in the country aimed at creating tourism infrastructure. These tendencies have conditioned to encourage private initiatives in tourism business and contributed to rural tourism establishment. Rural tourism will help to develop local economy and create new working places.

Keywords: Georgia, Tourism, Business, Rural, Guesthouse

Significant reforms have been recently carried out in Georgia aimed to create tourism legislation base, develop infra-structure, implement contemporary educational programs and attract foreign investments. These tendencies have con-ditioned to encourage private initiatives in tourism business and contributed to the development of rural tourism.

Rural tourism in Georgia includes: to accommodate tourists in local traditional houses, provide them with local organic food and involve them in agricultural activities if they wish to.

The local communities build, own or run touristic objects in villages, they create working places and make economic profit from tourism expenditure. Successful development of rural tourism doesn't require any big capital investments, but it needs to be perfectly planned and elaborated. Local enterprisers engaged in rural tourism attended special trainings in service offering. For the first stage they were given an opportunity to get small loans and technical consultations. It's important to preserve an optimal level of development in every village not to cause any ecological and social problems [1].

In mountainous regions the most number of tourists are accommodated in small and medium guest houses in accordance with the market price. It gives an unique opportunity to a visitor to get acquainted with local residents, their culture and traditions.

Rural tourism, unlike other fields of tourism, has its own specificity, it requires minimum expenses for food and accommodation. Food is 2- 2,5 times cheaper in a village than in town. Life is cheap, especially in summer and it makes the price twice cheaper.

Guesthouses, which are financed by the United States Agency for International Development (USAID), get the certificate of International Standards. It is a guarantee that the tourists' expectations as well as the service quality of a host family will be improved.

Over 20 guesthouses funded by the USAID were renewed in Ajara, Kakheti and Samtskhe-javakheti and these guest houses were given scores by the local association "Elkana". Elkana" standards perfectly meet with the service quality of the hotels. Service Quality falls into four categories. Category I is a minimum standard, Category II - high quality (1 sun, 2 suns, 3 suns). The sun is a symbol for a certain category. Certification process is free-will and depends on the owner of a guesthouse. The certification process represents the classification of quality standards for the owners of the guesthouses.

Guesthouses should meet the following criteria to get certified: 1. Certificate is a guarantee of stability for the owner of a guesthouse; 2.It is a good mean to inform customers. Customers are often unsatisfied after booking a hotel, as they are provided with the information of different service, although they face another reality after visiting the place. Therefore, certificate proves the promised service. 3. After certification the hotel is already standardized and is able to attract more tourists [2].

Agricultural activities include producing local food products. Farmers run their own agriculture and are able to offer visitors ecologically clean organic products and show the process how it is produced. Besides that, tourists have an opportunity to visit cellars, pitchers, explore local customs, enjoy with folk shows, go hiking or horse riding, see natural and cultural sightseeing, take part in fishing and hunting, go skiing in winter, etc.

Local population gets the maximum profit from the development of rural tourism. The program aims to contribute to the development of small businesses in order to involve as many as possible inhabitants in tourism industry.

Mountain Lovers Union of Georgia together with Georgian representatives of the Friedrich-Ebert Fund have started working on rural tourism supporting program since 2005. The main product represented by the mountainous regions to tourism market is its beautiful mountainous-touristic routes with exotic natural landscapes and rich cultural environment. That's why lots of local and foreign visitors come to see these places.

In 2006, Swiss Cooperation Office (SCO) for the South

Caucasus was actively engaged in tourism development program. Establishing a tradition of holding exhibitions and festivals plays an important role for the development of tourism and it will lead to increase the number of tourists.

Rural tourism development in regions requires providing employed and all interested people in the field of tourism with an opportunity of professional trainings. According to existing requirements there were opened training centers in the field of tourism serving mainly local entrepreneurs.

It's also important, that a visitor satisfaction survey is periodically conducted in the regions helping the government and entrepreneurs to plan their service in a better way and improve the service quality in order to meet tourist expectations. A visitor satisfaction survey is conducted by special methodology coordinated by the National Tourism Administration of Georgia and in cooperation with the local private sector [4].

In rural tourism various means of advertising are used to attract more tourists. Nowadays the internet is the most popular form for advertising. It's important that tour operators actively cooperate with information centers functioning in every region of the country. These centers have got enough resources to provide local as well as foreign tourists with necessary information.

Rural tourism development can contribute to the development of village infrastructure, creation of new working places and overcome poverty; develop folk craftsmanship; protect old traditions and national heritage; reduce seasonal migrations; develop local traditional fields [3].

Thus, rural tourism is developed day by day in tourism industry and it has got great development perspectives.

References

[1] Okrotsvaridze A, Vadachkoria M, Okrotsvaridze A 2011 Tourism and Hospitality Management Tbilisi 270
[2] Rural Tourism Business Tbilisi 2005 39
[3] Tourism Development Perspectives in Georgia Tbilisi 2014 70
[4] https://matsne.gov.ge/ka/document/view/2024564

The improvement of the state management of investing in alternative energy

V Onishchenko, S Sivitska

Poltava National Technical Yuri Kondratyuk University, Pershotravnevyi Str., 24, 36011, Poltava, Ukraine

Abstract

The improvement of the state management of investing in alternative energy in terms of the energy dependence of the state at the modern stage has been offered and substantiated. The authors proposed the program of activation of investment processes in alternative energy, and also the expected benefits from its implementation are considered.

Keywords: investment process, organizational-economic mechanism, alternative energy

An important area is the definition of alternative energy in Ukraine as the institutional framework of the interaction of energy with the national economy. Alternative energy, in modern conditions, is an extremely significant resource in the economic development of the national economy. Regulatory enforcement and development of alternative energy does not meet the requirements of the market, hinders the development of competition and the use of the potential of the industry. These factors affect the results of economic activity, the level of welfare of the population and competitiveness of the national economy.

With the aim of improving institutional support, the author has substantiated the organizational and legal foundations of public administration of the development of alternative energy. According to the author, it is appropriate to summarize the wide range of bases of State regulation, namely: improvement of the existing normative-legal base regulating the issues of establishing "green" tariff; development of public-private partnership in the field of alternative energy; implementing programs for development of alternative energy; development of energy efficient standards; the development of new technologies of alternative energy sources that can be used in the field of alternative energy and determine means for its effective functioning.

Priority in the offered mechanism are actions of the state, because they affect the possibility of implementing measures from other areas and can carry out activities in order to achieve social impact in the field of alternative energy, not for profit, and also to incentive measures in relation to energy to increase opportunities to attract additional resources. Each of these areas of impact on the formation of investment resources has its own characteristics and methods of regulation. Successful investment process can be described only if both the parties involved in its implementation will receive positive results from it, the investor and the investment object [1].

The basis for effective development of investment in alternative energy processes is universal, not detailed, planning of these activities aimed at the achievement of the desired results, achievement of a certain goal. The authors have presented the offered organizational and economic mechanism of the investment processes in alternative energy through the development and subsequent implementation of its development programs.

Thus, the inclusion of measures for the introduction of alternative energy sources to the priorities of the regional energy policy should improve the reliability of securing energy resources of the economy and the population of the regions, reduce the harmful effects on the environment, create jobs and stimulate the development of local industry.

References

[1] Onishchenko V, Sivitska S 2014 Alternative energy developing investment support in terms of energy dependence Economic Annals-XXI **9-10**(1) 34-7

The service marketing and management

I Spica*, B Berzina, E Spics

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019, Riga, Latvia

**Corresponding author's e*-mail:inese.spica@gmail.com

Abstract

Latvia forms a bridge between the East and West European countries. A considerable part of service business transactions between East and West European countries is carried out through these countries. Unfortunately, at present income and profit from the transactions also flows away to these countries. However, the Republic of Latvia should keep the income by developing service marketing and management.

Keywords: Service, marketing, management, customers, clients

1 Introduction

Taking into consideration the present business environment of the Republic of Latvia, as well geographical position and te historical background, it is important to make use of these conditions for further improvement and development of the national economy.

The Service marketing and the service management are a perspective area. It offers access practically to people all over the world.

2 The Object and Subject of the Research Paper

The object of the present research paper is services during the transition period from command economy to market economy.

The subject of the research paper is analysis of the service marketing and management in Latvia.

3 The Ojective and Tasks of the Research Paper

The objective of the paper is to study the integration process of micro and macro business environment and service problems, to elucidate the factors influencing the service marketing and management effectiveness, to develop proposals for solving problems.

The tasks advanced in order to reach the objective:

- to identify the concept of business micro and macro environment,
- to carry out analysis of the factors influencing service marketing and management in the process of micro and macro enviroment integration,
- to carry out analysis of indicators characterising service marketing and management effectiveness.

4 Business environment and the service marketing management

Business environment is a set of objective and subjective facts defining and measuring the situation in business during a certain period of time and the factors influencing it.

A service is any activity or benefit that one party can offer to another which is essentially intangible and does not result in the ownership of anything.[1] In service industries are three types of marketing: 1) internal marketing; 2)external marketing; 3)interactive marketing [2].

Service is a social process, and management is the ability to direct social processes [3]. The service management system include five main components: 1) market segment; 2) service concept; 3) service delivery system; 4) image; 5) culture and philosophy [4].

5 Conclusions

This is the first research on the analysis of factors influencing service business in the macro and micro business environment integration process. Regularities of business environment and service business development have been revealed. The present paper includes further development of study of contents of business environment, factors influencing it, service business theory, service marketing and management practice in Latvia.

References

[1] Kotler F, Armstrong G, Saunders J, Wong V 1999 Principles of Marketing Prentice Hall Europe: London 646

[2] Kotler F, Armstrong G, Saunders J, Wong V 1999 Principles of Marketing Prentice Hall Europe: London 654-5

[3] Normann R 1995 Service Management: Strategy and leadership in Service business John Wiley & Sons Ltd.: Chichester 44

[4] Normann R 1995 Service Management: Strategy and leadership in Service business John Wiley & Sons Ltd.: Chichester 46-7

Threats to economic security of Ukraine: the mechanism of deflection and the regulatory process

Z S Varnaliy[1], S V Onyshchenko[2], A A Masliy[2]

[1]Taras Shevchenko National University of Kyiv, Ukraine, 90A, St. Vasylkivska, Kyiv, 01601, Ukraine

[2]Poltava National Technical Yuri Kondratyuk University, Ukraine, 24 Pershotravnevyi Ave, Poltava, 36601, Ukraine

Abstract

The necessity of introduction and implementation of organizational and economic mechanism against threats to the economic security of the national economy. The attention that the economic security of Ukraine's economy in current conditions based on situational responding to threats that have arisen, and therefore provides for the liquidation process and neutralize the negative impact. In contrast to the existing inefficient mechanism developed organizational and economic mechanism preventing threats to the economic security of the national economy, which allows for rapid adjustment of economic policy.

Keywords: Economic security of the national economy; Economic security threats; Threats warning mechanism; Government regulation threat prevention process

The necessity to an introduction and implementation organizational and economic threats preventing mechanism of the economic security of the national economy had been grounded. It's focusing that providing the economic security of the national economy in current conditions based on situational responding to threats that have arisen already. And result assumed the process of eliminating and neutralizing the negative impact.

The article purpose is to highlight and proposing threats preventing mechanism the economic security of the national economy, which involves the introduction of tactical measures of a preventive nature.

The basis of the fundamental research methodology put the theory of the government's economic policy of growth. Methods of theoretical generalization were applied for study and systematization of scientific public policy concepts, to ensure economic security. The functional and conceptual approaches were used. The system structural analysis was applied in the study the formation priorities of ensuring the economic security of the national economy.

The organizational-economic threats preventing mechanism the economic security of the national economy presented in the article allow rapid adjustment of state economic policy. That based on the collection and analysis information about its effectiveness based on the effect of feedback received from civil society, which is of particular relevance in the integration of the national economy to the global economy.

Organizational and economic threats preventing mechanism the economic security of the national economy formed on the basis of advanced control using methods of scenario modeling. It enables among alternatives solutions to choose the best and most effective way of forecasting possible consequences as a result of each and aims to prevent the destructive impact of potential threats to the economic security system of the national economy.

The functions of state regulation of the prevention of threats to rely on the Department of Economic Strategy and Macroeconomic Forecasting Ministry of Economic Development and Trade of Ukraine, including organizational and methodological (introduction of modern information technology to meet the needs of management, improving the methodology of information-analytical management software, etc.), control (software likelihood, relevance, timeliness of statistical information, organization of monitoring according to the needs of management), analytical (assessment of economic security, evaluating the efficiency and competitiveness of the national economy and its individual sectors relative to international standards etc.), planning and forecasting (simulation threats to the economic security of the national economy, formation Weather-state program of economic and social development of Ukraine for the short, medium and long term, etc.).

Instruments of state regulation of preventing threats to the economic security of the national economy including economic (tax rates and benefits, transfers, direct budgetary investments, grants, concessional loans, the discount rate, rates, foreign exchange restrictions, etc.), institutional (government support, advice, assistance staffing, information support), institutional (budgetary funds, technology parks, business incubators, think tanks, etc.), administrative (registration, licensing, quotas, contests, tenders, etc.) and regulatory (decisions, decrees, orders, regulations, policies, concepts, plans, projections, programs, etc.) methods, instruments and tools.

Ministry of Economic Development and Trade of Ukraine is the body that coordinates the activities of institutions within its powers engaged in the implementation of administrative decisions prevent threats. These institutions include line ministries and other executive

agencies, the National Bank of Ukraine and others. However, the formation of priority directions of economic security of the national economy based on revised data block using analytical software tools described above, appropriate management decisions, monitoring and control of the results achieved within the exclusive competence of the Ministry of Economic Development and Trade of Ukraine.

Mechanism for the prevention of threats to economic security, formed on the basis of advanced control using methods of scenario modeling enables among alternatives solutions to choose the best and most effective way of forecasting possible consequences as a result of each and aims to prevent the destructive impact of potential threats to the system of economic security national economy. The introduction of a strategic monitoring, situational modeling and forecasting the development priorities of economic policy in the framework of an integrated study procedures and strategic decisions will form the fundamental principles of economic security of Ukraine based on advanced management.

References

[1] Baranovs'kyy O I 2000 Financial Security in Ukraine (assessment, methodology and mechanism for maintenance) Kyiv: Institute for Economic Forecasting of Ukrainian National Academy of Sciences (in Ukrainian)
[2] Burkaltseva D D 2012 Institutional economic security of Ukraine Kyiv: Znannya Ukrayiny (in Ukrainian)
[3] Varnaliy Z S, Burkal'tseva D D, Sayenko O S 2011 Economic security of Ukraine: problems and priorities of strengthening Kyiv: Znannya Ukrayiny (in Ukrainian)
[4] Vlasyuk O S 2008 Theory and practice safety in the sciences of economics: research report Kyiv: National Institute of International Security Problems at the National Security and Defense Council of Ukraine (in Ukrainian)
[5] Ministry of Economic Development and Trade of Ukraine 2013 Economic situation and forecasts. Retrieved from http://www.me.gov.ua/ (in Ukrainian)
[6] Onishchenko S, Pugach A 2015 Threats to economic security of Ukraine: essence, evaluation and prevention mechanism Poltava: PoltNTU (in Ukrainian)
[7] United Kingdom HM Treasury [E-resource]. – Access mode: http://www.hm-treasury.gov.uk/

EVS as an opportunity to gain experience for youth in tourism

K Yatsenko*

Poltava National Technical Yurii Kondratuyk University, Poltava region, Ukraine

**Corresponding author's e*-mail: katyajatsenko@gmail.com

Abstract

The tourism industry is one of the sectors that are growing rapidly and making a significant contribution for the economy of each country. One of the main conditions for successful youth employment in the tourism industry is a knowledge of several languages, communication skills and experience. Today competition in the labor market is extremely high and people without work experience are not eager to be seen in most companies. The solution of this issue can be a volunteer activity that is increasingly spreading in Europe – European Voluntary Service (EVS).

Keywords: tourism, professional skills, experience, EVS

Today, the tourism industry is one of the sectors that are growing rapidly and making a significant contribution for the economy of each country. Tourism is not limited by recreation services organized by tour agents and tour operators. Tourist industry also includes tourist accommodation facilities, treatment and rehabilitation, transportation, food, entertainment, a variety of activities and implementation of other related services. In the view of the above-mentioned factors, education in tourism is becoming increasingly popular among young people, which leads to increased competition in the labor market of the hospitality industry.

In the tourism sector are working full of energy, presentable, language skilled professionals who like to communicate with others, to be the center of events and can organize different complexity measures. One of the main conditions for successful youth employment in the tourism industry is a knowledge of several languages, communication skills and experience. If a question of languages still can be solved by additional training what should be done with the acquisition of professional experience, experience of working with people, work as a team. Today competition in the labor market is extremely high and people without work experience are not eager to be seen in most companies.

The solution of this issue can be a volunteer activity that is increasingly spreading in Europe – European Voluntary Service (EVS) in conjunction with the project Erasmus+. Furthermore Erasmus+ is the main program of academic mobility of students and young researchers in the European educational space.

European Voluntary Service enables young people legally residing in one of the member states or partner-countries aged 17 to 30 years to become a volunteer in another country for a specified period – from 2 to 12 months.

In order to participate in EVS project people do not need to have extraordinary abilities and material support. It is enough to have a great desire for social activity and help people and express it clearly and thoroughly in the cover letter, the average level of know English or German, to be active and responsible. Previous experience and knowledge of the language of the country where the participant goes is required.

Preference is done for not employed young people from disadvantaged and single parent families. And it is an advantage and utility programs EVS – they make it possible for everybody to young people of different social levels and wealth to show their skills in social work as well as the service sector, tourism and others.

Voluntary actions may be undertaken in various areas: arts and culture, environment, sports and leisure, work with children and people ripe old age. Volunteer service is a unique opportunity to get in touch with a new culture; acquire and develop skills to interact with people of different cultures and languages; acquire new skills and abilities that are useful for your personal and professional growth; enhance their skills through practical experience abroad; the possibility of studying languages in a country vehicles; promote the development of local communities and cultures [1].

Erasmus+ program was approved by the European Commission and funded it. It has many sub-programs - academic, teaching, internships and volunteer work. Erasmus+ program participants receive full support during the project costs plus a return trip. EVS volunteers also get insurance cover local transport and even monthly pocket. At the end of the project participants receive a certificate Erasmus+ of informal education in the European Commission.

The goal of these organizations is hereby volunteer to help local communities in their social needs and to attract the attention of local and world community to the urgent needs of the culture, ecology and social sphere; through cultural exchange and informal education to promote mutual understanding, develop friendship and cooperation with young people from different countries; adequately represent and distribute information about their country; Ukrainian youth promote integration into the world community through the involvement of young people in international

projects and creative and socially beneficial actions; provide young professionals opportunities for personal development, learning, improvement and professional growth [2].

So, in terms of enhanced competition in the labor market and in tourism in particular important to young professionals acquiring experience in working with people to improve knowledge of languages, organizing events, activity and creativity. To help comes as an extraordinary worldwide program as European Voluntary Service (EVS), which allows young people on a full financing of the European Union to work in different fields of social and cultural life, and just realized gain vast experience to further their professional development.

References

[1] http://lifepotential.org/what-is-evs/
[2] http://europa.eu/youth/volunteering/project_en
http://www.union-forum.org/en/about-us.html

Conceptual framework of the regional development strategy of the region's innovation potential

Y Khudolii

Poltava National Technical Yuri Kondratyuk University, Finance and Banking Department, Pershotravneviy avenue, 24, Poltava, Ukraine

Abstract

The paper deals with the conceptual framework of the implementation of the regional strategy for the development of the regional innovative potential. They as opposed to existing ones include the principles, goals, tasks, functions and mechanisms for planning, financing and implementation of regional innovation programs and projects. And also allow forming target markets and using the innovative potential of the region-specific, trends and challenges of socio-economic development of regions of Ukraine.

Keywords: conceptual framework, innovative regional development, regional strategies, regional innovation potential

1 Introduction

Considered in the previous publications principles and systems of the region innovative potential management are interrelated and the formation of new systems should be used in the complex. Accordingly, the development of the regional strategy for the region's innovation potential of the most difficult task is to build the conceptual foundations of management. That will serve formally the formal graphic representation of the relationship between their constituent components and subsystems.

2 Analytical planning the development of innovative potential of the region

A conceptual model of the development management of the innovative potential, aimed at the group of regions with a sufficient level of innovation potential. It is based on the principles of systematic, dynamic, planned and complexity inherent in a complex multi-tasking system. Compliance with these principles will contribute to achieving the goals and objectives of the development management of the regional innovative potential. It is will contribute to the socio-economic development of the region through the effective use of innovative resources in the result.

The implementation and intensive application of planning, financing and implementation of regional innovation programs and projects mechanism, target market analysis mechanism and innovative potential of the region use mechanism embodied in the model will allow to control the functions of the regional actors of the innovation process and ensure the growth of the gross regional product in the midterm.

It should be noted that in these subjects are investors, regional authorities, public authorities, business leaders, researchers and developers of innovation, as well as the consumers, that is, the population of the region, but as the results of the analysis carried out in publication [4] the greatest impact on the execution of the functions and the implementation of control mechanisms is carried investors and public authorities.

Stated objectives and goals of the regionals innovative potential management frameworks are achieved in terms of system implementation management functions and effective use of the mechanisms embedded. In this case, when it leads to ensure the growth of the gross regional product is expected adjustment goals and objectives of management, in order to achieve new positive changes and increase in the GRP. In the case where the goals and objectives are not achieved, and the functions are not met, it is supposed directly adjusting mechanisms (or elements) to achieve them.

Conceptual bases of the region's potential for innovation management relate primarily to regional authorities, which have the most significant impact on this process, and offer the greatest amount of leverage. Accordingly, the role of the investor, as an essential subject of the influence is more limited and more concern to the elements of funding and the creation of innovative and investment environment in the region.

Considering the analysis of the strategic priorities the development of the regional innovative potential the region's innovation strategy should consist of 5 priority areas. On the basis of which is carried out specific activities for the implementation the development strategy of the region's innovation potential (Fig. 1). The block diagram reflects that all priorities are interrelated and focus on the tasks and goals of the innovation strategy.

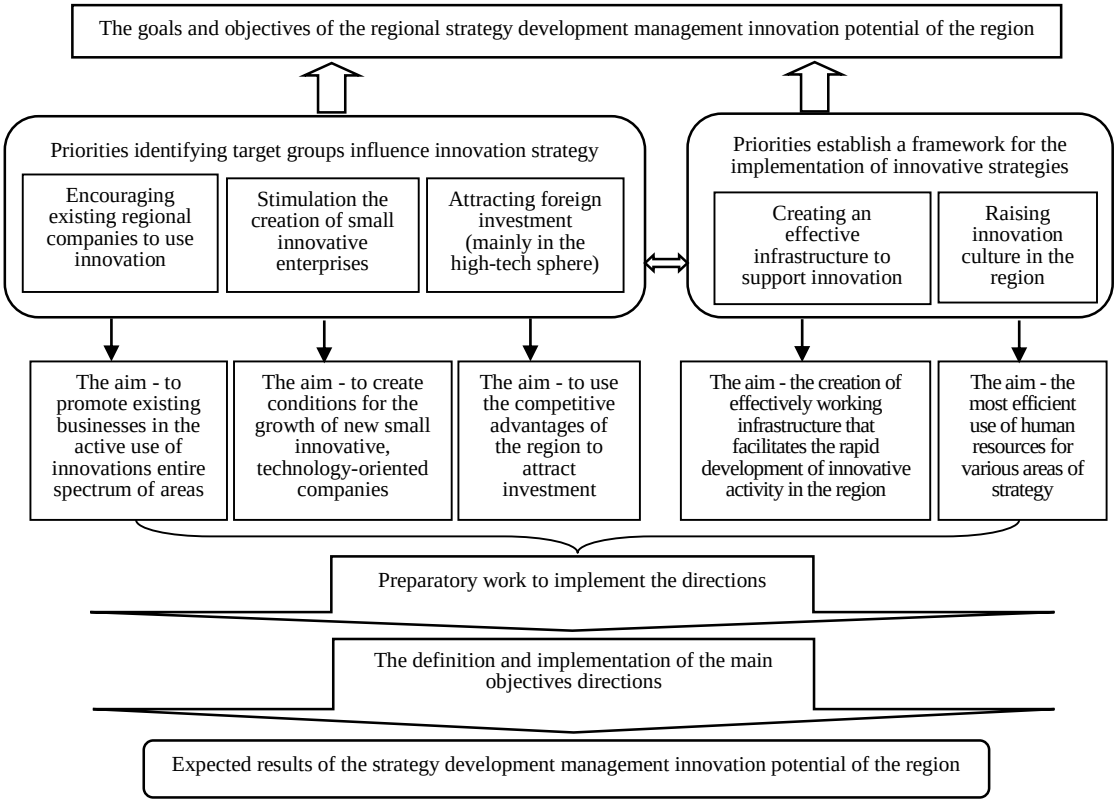


FIGURE 1 Scheme implementation of a regional strategy the development of the regional innovative potential

3 Conclusions

Thus, we have defined the principles of working out a regional strategy for the development of innovative potential which is seen as a complex system. This system is based on the principles of systematic, dynamic, planned and integrated approach. And through the implementation of its objectives embodied in the formation of innovative potential development of management strategies in the region, matching its main directions with the existing potential for innovation, development of the organizational structure and information system, it creates the conditions and opportunities for effective implementation of the management functions of the regional innovative potential entrusted to it.

References

[1] Lundvall B A (cd.) 1992 National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning London, Pinter Publishers
[2] Saaty T L 1980 The Analytic Hierarchy Process McGraw – Hill
[3] Dovgal Y S 2013 Strategic priorities of regional innovation potential development Socio–economic research bulletin. *Збірник наукових праць Одеського національного економічного університету* **50** 17 – 21
[4] Dovgal Y 2015 The priorities of improving the innovative potential of Ukraine's regions Theses of The 13th International Conference Information Technologies and Management, April 16 –17, 2015, Riga 232 – 3

The use of the new technologies on the Latvian market of escape rooms

K Liepina*, J Dehtjare

ISMA University, 1 Lomonosova Str., Bld. 6, Riga, Latvia

**Corresponding author's* e-mail: kristta2005@gmail.com

Abstract

The main aspects of the impact of modern technologies of the quest room popularization are reflected at the given abstract. The brand „Quest Lab" is taken as an example. The authors suggest a number of activities for improving the work and innovations at the company. That will contribute to gaming centre „Quest Lab" with an aim to occupy decent niche in the entertainment industry. To make full impression in the issue of escape room business, the quest rooms all over the world were analysed and compared. The practice result of the research should lead to the application of the new technologies at the „Quest Lab". Current topic is fully relevant at the present time. Use of new technologies is necessary to maintain the interest of consumer and expanding boundaries of intellectual entertainment.

Keywords: entertainment industry, escape room, new technologies, competitiveness

1 Introduction

Before to analyse the escape-room business, it should be understandable what does the word «escape room», «escape game» or «quest in reality» mean. The Cambridge vocabulary explain the word "quest", as „…a long search for something that is difficult to find, or an attempt to achieve something difficult…" [1]. Thus, authors of the work explain the word «quest», as an interactive game, where is necessary to solve different puzzles and logical tasks according to the plot. Throughout the game the story line is being developed, where in the end a player will come to the victory depending of the steps chosen. Strong demand has created big supply. In the whole world has appeared wide amount of escape rooms. They differ from each other by the plots, stories and types of the room, as well as with the number of players. For example, «quests in reality», «performance quest», «sport-quest», «Morpheus quest», «virtual reality quest» and etc. Therefore, in order to stay on the market, the firm needs innovative ideas and improving the quality of services (as an example we could take, ethno quests, use technologies of the virtual reality).

Firstly, uses of new technologies in the rooms are revolutionary. Secondly, the technological revolutions should not to destroy classical traditions of the quest rooms. Finally, in an escape room market should not happend supersaturations of IT.

2 Overview of the research object

Brand „Quest Lab" is a young agency of organizing entertainment and recreation activities for people. It was founded in September 2014 in Riga.

The main activity of entertainment and gaming centre „Quest Lab" are quest-rooms. „Quest Lab" – it is a quest in reality, fascinating game for teams from 2 to 6 people.

Gaming centre „Quest Lab" provides two rooms to solve – «The Captain's Room» and «Experiment».

3 The use of new technologies in quest rooms

Experts of „Quest revisor" rated technologies used in the rooms of „Quest Lab" in the following way, «Experiment» - 7 from 10, «The Captain's Room» - 5 from 10.

Thereby, for success and competitiveness is needed to develop additional services, upgrading existing rooms by using new technologies, i.e., virtual reality headset, neuroheadset and 3D mapping.

3.1 THE VIRTUAL REALITY HEADSET

Virtual reality goggles intended to render the media flow, usually in 3D format to form a user's sense of presence in the game or another graphic environment [7].

The principle of virtual reality headsets is very simple. Once a person puts on such goggles, he is immersed in the virtual world.

It's better to start using cheaper headsets in the quest rooms. A few test drives will show whether the people like it. The options of the virtual reality headsets are immersion in the game and view the image in 360^0, what will increase the attendance of the rooms. The most advanced device is Oculus Rift.

The viewing angel is 100 degree and resolution is 960 x 1080 pixels for each eye. Devise use the following sensors: gyroscope, accelerometer, infrared sensors and a magnetometer [5].

FIGURE 1 Oculus Rift DK2 [3]

There are no rooms in Riga which use current technologies. For the beginning company could start from VRbox (price – 50 euros).

3.2 NEUROHEADSET

In the escape room «Experiment» could be used neuroheadsets. With such device a person can manage special programs with the power of thought, for example, solving puzzles to pass the room.

Neuroheadset allows analysing brain activity, using imaging electrical waves that occur when we are working or resting (Figure 2) [6].

FIGURE 2 Neuroheadset Neurosky Mindwave [6]

One of the best models for use in quest rooms is Neurosky Mindwave Mobile "Myndplay" Edition.

3.3 3D MAPPING

Video mapping is the art of creating and imposing three-dimensional projection on physical objects. There are three types of 3Dmapping: architectural, interior, object, and interactive mapping.

This technology could help to transform the room according to the plot. In this way, much more interesting could be interactive and interior video-mapping.

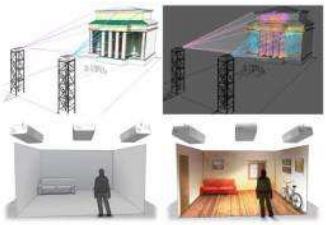


FIGURE 3 Example of using video mapping in architecture and interior [3]

For video mapping is necessary to use equipment as: projection equipment, video server, sound equipment, laser technology).

4 Conclusions

Entertainment industry enterprises constantly have to solve the problem of maintaining their place in the market. Escape rooms are not exceptions. It is necessary to make a painstaking and time-consuming work to stabilize their position in the market.

Relaying on the analysis of the „Quest Lab", was decided, that for rising its competitiveness in the entertainment industry is possible to apply new technologies such as – virtual reality headset, neuroheadset and 3D mapping.

One can assume, that, if to equip escape rooms with this new technics and change a little bit plots, the company could expect quite a large influx of the customers. It means that these devices could be paid off very quickly.

Assessing retail places of virtual reality headsets and neuroheadsets, changing plots for new gadgets, was decided that implementation of them could take up to one month. Advantage of introduction this new gadget is that „Quest Lab" could not to close the gaming centre on reconstruction, as it will not disturb to pass old escape rooms.

The main obstacles of such innovative ideas are its realization and amount of expenses necessary for it. Software is one of the most expensive and time-consuming elements of introducing new technologies.

References

[1] *Definition of quest from the Cambridge Advanced Learner's* Dictionary & Thesaurus © Cambridge University Press
[2] Videomapping http://mart-museum.ru/personnel/videomapping/
[3] *Компания ЕТС располагает современным парком профессионального видеооборудования* ETC Russia ETC - http://www.etc-russia.ru/equipment/
[4] Нессебар Д *Виртуальная реальность: очки для ПК* http://fb.ru/article/180871/virtualnaya-realnost-ochki-dlya-pk-obzor-luchshih-modeley
[5] *Нейроинтерфейсы* http://neuromatix.ru/

Artificial intelligence technologies in human resource development

I Buzko[1], Y Dyachenko[1*], M Petrova[2], N Nenkov[3], D Tuleninova[1], K Koeva[4]

[1]International Economics Relations Department, Volodymyr Dahl East Ukrainian National University, 59a Tsentral'nyi, Severodonetsk, 93406, Ukraine

[2]Director of Education Technologies Center, St. Cyril and St. Methodius University of Veliko Turnovo, 2 T. Turnovski, Veliko Turnovo, 5003, Bulgaria

[3]Department of Computer Systems and Technologies, *University of Shumen "Episkop Konstantin Preslavsky"*, 115 Universitetska str., 9712 Shumen, Bulgaria

[4]Faculty of Mathematics and Informatics, Sofia University, 5 James Bourchier blvd., 1164, Sofia, Bulgaria

**Corresponding author's e*-mail: yuriy.y.dyachenko@gmail.com

Abstract

An essential part of modern management is computing, particularly, Artificial Intelligence technologies. The Artificial Intelligence technologies which are based on reproduction of principles of human intelligence functioning. The Rising of General Artificial Intelligence is impossible without the acquisition of elements of self-consciousness and self-cultivation. But for the solution of applied problems we need applied Artificial Intelligence which performs particular tasks particularly in management. The most difficult task in Human Resource Development is to determine the effectiveness of training costs due to its branching and sophisticated feedback given by improved production results of staff who was involved in the process. To determine the impact of the performance of the company (labour costs, labour costs per person, income, profit, profit per person) based on indicators, characterizing the personnel training on the example of ALC "Severodonetsk factory of chemical non-standard equipment" we use cognitive system IBM Watson Analytics. Found that the main factor influencing the amount of training in the company is the net income of the company for the previous year. Considering this analysis, it could be argued that decisions on financing of Human Resource Development are carried out on the basis of income of the enterprise from the past period.

Keywords: Artificial Intelligence, Human Resource Development.

An essential part of modern management is computing. Rapid changes in business environment requires quick responses. In these conditions traditional approaches to developing of information systems through programming on Turing machines should be replaced by creation of continuous adapting systems with natural interface. Artificial Intelligence technologies meet these requirements. Especially The Artificial Intelligence technologies that are focused on the reproduction of principles of human intelligence functioning.

In our opinion, the rise of Artificial Intelligence is impossible without the acquisition of elements of self-consciousness and self-cultivation. The realization of such elements through the Luhmann's system approach provides the independence of artificial intelligence and will simplify its training.

Mandatory components of intelligence are:

1) communication with external environment by means of information;

2) feedback in form of self-consciousness.

Present in most successful realizations of Artificial Intelligence based on Artificial Neural Networks (ANN). Developed functional scheme of Artificial Intelligence (Figure 1).

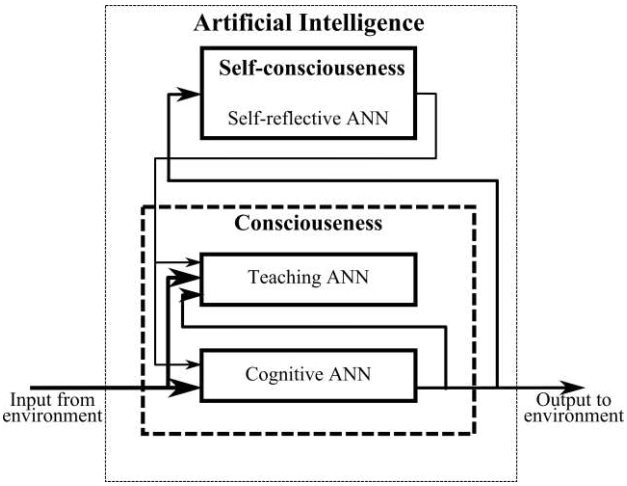


FIGURE 1 Functional scheme of Artificial Intelligence

It is in the basics of forming of strong Artificial Intelligence which has human-like (general) intelligence. This task is not yet solved. But we can use possibilities of applied Artificial Intelligence which perform particular tasks inter alia in management.

Artificial intelligence technologies enable the prompt analysis (cleaning, investigating and making conclusions) of

data by people that do not have special skills in data analysis. The most difficult task in HR Development is to determine the effectiveness of training costs due to its branching and sophisticated feedback caused by improved production results of staff who took part in it. The aim of the HR Development system is to make the knowledge, skills and experience of the staff correspond to the desired indices at different levels: enterprise strategy, branch activity, work duties. The specification of employees who need this training, its content and duration is the supposition of the effective work of HR Development system. The period during which learning outcomes have an impact on the performance of the company depends on many external factors regarding the company. Considering that the disclosure of financial opportunities for training and implementation of training going on for some time, changes in the financial situation of the enterprise affecting some delay on parameters that characterize training.

TABLE 1 Financial results, labour costs and share of employees trained in ALC "Severodonetsk factory of chemical non-standard equipment" in 2007-2014

Index	2007	2008	2009	2010	2011	2012	2013	2014
Number of employees	231	274	272	272	273	314	321	286
Labour costs, ths. UAH	4254,0	5849,6	2718,2	5044,5	6078,6	7109,6	6849,8	3640,0
Labour costs per person, ths. UAH per person	18,42	21,35	9,99	18,55	22,27	22,64	21,34	12,73
Income, ths. UAH	25740	49752	46250	47233	76628	70137	96649	98151
Profit, ths. UAH	-959	6022	1823	-6825	5711	7036	10766	14098
Profit per person, ths. UAH per person	-4,15	21,98	6,70	-25,09	20,92	22,41	33,54	49,29
Number of trained employees	49	46	36	25	43	42	21	14
Share of trained employees, %	21,2	16,8	13,2	9,2	15,8	13,4	6,5	5,0

As an example of Artificial Intelligence used for HR Management we consider determining the impact of performance of the company (labour costs, labour costs per person, income, profit, profit per person) on indicators characterizing the personnel training, the analysis of this relationship for ALC "Severodonetsk factory of chemical non-standard equipment" (Table 1).

This analysis is performed on the basis of cognitive system IBM Watson Analytics (Figure 2). This is a technology platform that uses natural language processing and machine learning. IBM Watson Analytics is an easy-to-use service for finding answers in data without downloading software. Discovery of visualization and smart solution available on the cloud, it guides data exploration, automated predictive analytics and makes creating dashboards and infographics almost effortless.

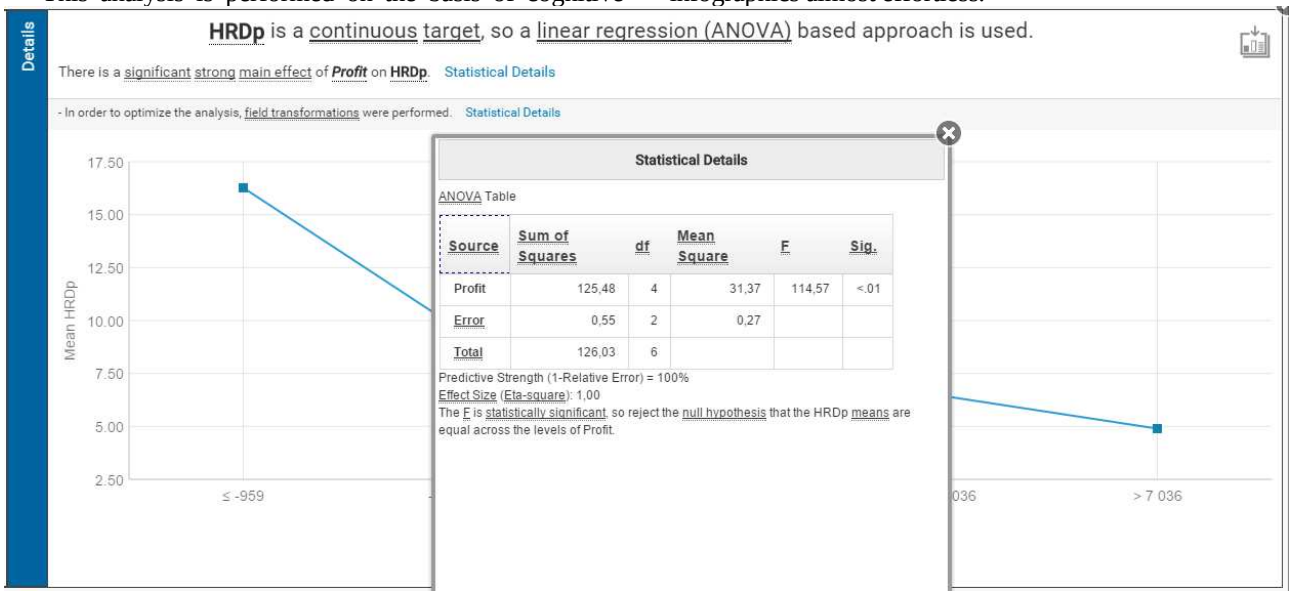


FIGURE 2 Results of IBM Watson Analytics analysis of data set

Found that the main factor influencing the amount of training the company is the net income of the company for the previous year. Considering this analysis could be argued that decisions on financing of HR Development carried out on the basis of income of the enterprise in the past period.

Transition from discrete paradigm of information processing (programming for Turing machines) to continuous paradigm (learning of artificial intelligence) allows faster and more accurate adapting to environmental requirements. In the modern conditions of business, it becomes more relevant to use the artificial intelligence technologies for decision making.

Acknowledgments

The publishing of this article was possible through support of the University of Shumen "Episkop Konstantin Preslavsky" and its program for development research project: „Models and algorithms for extracting knowledge from large data simulating neural networks and optimal training procedures“.

Principles of recruitment and personnel management

G Kabduyeva[1*], M Elubayeva[2], O Golub[3]

[1]Czech University of Life Sciences, Kamycka Str. 129, 165 21, Prague, Czech Republic

[2] Karaganda State Medical University, Gogolja Str. 40, 100000 Karaganda, Kazakhstan

[3]Moscow Business School, Voinov-Internazionalistov Str. 31, 100009, Karaganda, Kazakhstan

*Corresponding e-mail: guldenkabduyeva@yahoo.com

Abstract

The paper discusses the main issues of recruitment and selection, training and development, and retention and reward system for the employees in an organization. Different methods for each aspect are examined and presented in order to understand the nature of the issues, which deal with human resources in an organization. Those methods are recommended as the best tools for recruiting, training and retaining of the staff and at the same time not having to suffer the poorest. Hence, there are simple and ethical rules and to avoid hiring the wrong people and dissatisfaction of employees and they are based on examination of study materials.

Keywords: recruitment, selection, training, retention, rewards

1 Introduction

Recruitment, training and retention are meaningful processes for the effective operation of any organization. The staff of a human resource department in a company plays the main role. However, despite the fact that they have one main objective - employment aspect in the organization, their duties vary considerably depending on the type of recruitment, selection, training and retention.

The primary aim of this paper is to discuss what HR (human resource) managers can do in order to recruit, train and retain the stuff. The main terms and aspects are explained and some recommendations are proposed. Those recommendations, mainly, are connected to the negative issues of recruitment, selection, and retention. The issues of training in a company is linked to general learning and development program.

Discussion and recommendations in this paper are focused mostly on HR management in Anglo-Saxon countries.

2 Recruitment

Recruitment can be defined (Alfes, 2011) as an "any activity carried out by the organization with the purpose of identifying and attracting potential employees". The main aims of recruitment are to obtain a pool of suitable candidates for vacant posts; to use a fair process and be able to demonstrate that the process is fair; to ensure that all recruitment activities contribute to organisational goals and a desirable organisational image; and to conduct recruitment activities in an efficient and cost-effective manner. Before going through the recruitment process and procedures, the one question "Is there a vacancy to fill?" should be answered. The recruiters have to examine the process of task or job in order to design it in more suitable and "attractive" way for a future employee or understand if this work is appropriate at all.

For this reason, the job analysis should be conducted. It can be done via a questionnaire. Next procedure is to produce a job description. It contains job title, purpose of a job, major duties and other details. Job description can be used for other objectives, except recruitment, such as HR planning, day-to-day performance management, identification of training the needs, etc. The following step is to produce a person specification. Recruiter has to take into account the main traits, skills and efforts to perform this job successfully and to clarify what kind of person to recruit and what to test for in the selection. Fraser (1978) proposed the following five-fold framework for person specification purposes:

- Impact on others;
- Qualifications and experience;
- Innate abilities;
- Motivation;
- Emotional adjustment.

Hence, Recruiter has to take into account the main traits, skills and efforts to perform this job successfully and to clarify what kind of person to recruit and what to test for in the selection.

3 Selection

Selection is the process of choosing the best person for the job (fitting for a particular job) (Harvey, Erdos, 2014). The main objectives of selection include gathering as much relevant information as possible; organising and evaluating the information; assessment of each candidate; forecasting performance on the job and giving information to applicants

so that they can judge whether or not they wish to accept an offer of employment.

There are plenty of tools, which can be used in selection process. They may include different types of tests, such as intelligence, personality or aptitude tests. Another instruments consist of references, exercises, group works, assessments and interviews.

There are a lot of instruments used for the selection and it is more convenient to emphasize on the one type of selection, such as interview. This tool is chosen for the reason that, nowadays, many companies around the world use it as the primary instrument.

Face-to-face job interview is a selection procedure designed to predict future job performance and the main objectives of it are:

- Assess candidates against some selection criteria;
- Obtain and clarify information and views;
- Sell the job and organisation (e.g., branding);
- Add face validity to the selection procedure.

However, some errors can arise during the interview such as halo/horns effect (first impression), hiring people like yourself, stereotyping, gathering insufficient or irrelevant information and others. To reduce these kinds of errors, the interviewers must gather sufficient information, resist halo/horns effect, and give candidates every opportunity to present themselves fully.

4 Training

It has to be mentioned that the training will be considered from the point of view of learning and development in this paper.

In the development and training of staff, it is very important accurately identify the needs and gaps that are needed to fulfill with the help of training. More careful and attentive the performed diagnostics before training can bring more productive results. Often the supervisor cannot clearly articulate exactly what is required for the development of the event. However, he/she can always say what problems are needed to decide exactly what does not suit him/her at the moment. And on the basis of this information, literate HR specialist or an outsourcing company can provide with educational and developmental events, trainings, master classes, meeting for exchange experiences, etc.

The primary objectives of training and development are to increase performance in order to achieve organizational goals and growth, improve worker safety, identify those with potential and for promotion purposes, provide psychological contract, aid motivation and staff retention.

5 Retention and rewards

Retention is an effort by a business to maintain a working environment, which supports current staff in remaining with the company. Why does the company have to retain its employees? Many employee retention policies are aimed at addressing the various needs of employees to enhance their job satisfaction and reduce the substantial costs involved in hiring and training new staff. For example, high turnover of employees can damage an image and productivity of the organization.

Higher levels of turnover in private sector (16.8%) compared to not-for-profit (16.4%) and public sector (12.6%) (CIPD 2009). There are differences across industries, regions, professions (Are highly paid employees more or less likely to change jobs?), age groups (Which age groups have higher turnover rates?). The main indicators of turnover can be low motivation and productivity, poor employee relations, high absence levels, dissatisfaction with work, insufficient training, better pay and job opportunities elsewhere. In order to explain turnover, a company has to conduct surveys, interviews and quantitative approaches.

The best way to reduce the turnover is the creating the effective employer brand in order to make an organization distinctive and promises a particular kind of employment experience, and appeals to those people who will thrive and perform best in its culture.

Another way to decrease turnover is the reward or payment system. A pay system is the basis on which an employee is rewarded by an employer for contribution, skill and performance. It cannot vary in relation to achievements/performance (basic rate schemes) or can vary in relation to results/profits/performance (including the acquisition of skills or competencies).

7 Conclusions and recommendations

This paper emphasizes the main steps in personnel management such as, recruitment, selection, training, and retention and reward system. The main issues are discussed and the most important points are highlighted.

As the result, some recommendations are proposed for the effective recruitment, selection and retention of employees.

One of the basic issues during the recruitment process is to organise writing a job advertisement for print or internet/intranet. It should follow the principle of AIDA.

1. The ad should attract ATTENTION (borders, company logo, and effective use of white space, relatively large).
2. The ad should develop INTEREST in the job (pointing out range of duties, amount of challenge/responsibility, location, working conditions, job specifications).
3. The ad should create a DESIRE for the job (capitalize on interesting aspects of the job, unique benefits or opportunities (e.g., travel, career opportunities), stress employment equity, keep in mind target audience).
4. The ad should instigate ACTION (include closing date and a statement such as “Call Today” “Send your resume today” “Go to the site of our next job fair”).

One of the problems of recruitment is the desire to hire people who have huge experience and were highly valued in previous job. Those candidates can be called “stars”. However, the hiring “stars” can be risky and ccompanies should focus on growing talent within the organization and retain the stars they have.

The advertisement and other recruitment procedures have to avoid discrimination. They should be age-neutral. Also, procedures should not discriminate against people with low levels of literacy etc., where these are not needed in the job and etc.

There are 10 criteria to choose and evaluate a selection method (Alfes, 2011).

1. Selection criteria for the post (assessment centres vs. application forms).
2. Acceptability/appropriateness of method (IQ tests for Professors).
3. Ability of staff involved (personality tests require specialists/certification)
4. Administrative ease (large number of suitable candidates).
5. Time factors (in a rush, telephone vs. face-to-face).
6. Accuracy (validity: the extent to which performance on a measure is related to what the measure is designed to assess).
7. Reliability: the extent to which a measurement generates consistent results (e.g., in a panel interview – do two people generate the same scores for an applicant?).
8. Generalizability: valid in other contexts beyond the context in which the selection method was developed).
9. Cost (the extent to which something provides economic value greater than its cost).
10. Legal standards must be met (avoiding national origin discrimination, religious discrimination, disability discrimination, age discrimination and gender discrimination).

Learning and development should consist of four phases. All four phases should be thought through before learning and development begin. The first phase is an assessment, which provides the examination of the needs of organization and an individual. For finding out what a person needs, the best way is look at performance appraisals, interviewing managers and employees and conduct a survey. The second phase is called planning. There is a dilemma between choosing external or internal training, also planning for a variety of techniques, preparation and notification of participants. The most useful training tools include role-play, group discussion, projects and case studies. The third phase is implementation. Training can be set on the basis of development through experience, formal courses, appraisals, individual plans and discussions. Hence, the following question arises " which method should be used?" Generally, it depends on how company is organized, individual factors, resources (time, money) and material. If the material is behavioral then on-the-job training, simulation, group-based learning works well. If the material is factual then lecture, classroom, e-learning works well. The last phase is evaluation in order to prove the value of training. There are several methods to choose for evaluation: calculations, questionnaires and interviews. These methods are useful for providing the feedback after training.

References

[1] Alfes K 2011 Recruitment, learning and development and retention Bern University of Applied Sciences

[2] Chartered Institute of Personnel and Development 2009 Recruitment, retention and turnover. Annual survey report [online] Available at: http://www.cipd.co.uk/binaries/recruitment_retention_turnover_annual_survey_2009.pdf [Accessed 1 February 2016]

[3] Harvey J, Erdos G 2014 Human Resource Management Czech University of Life Sciences.

Current trends and perspectives of catering industry development in Latvia

G Petruhno, J Dehtjare*

ISMA University, 1 Lomonosova Str., Bld. 6, Riga Latvia

**Corresponding author's* e-mail: jevgenija.dehtjare@isma.lv

Abstract

The aim of this research is to study present statistical data of current situation in catering industry and thanks to an analysis provided to get acquainted with further development trends and perspectives of an industry. Received results should be used later with an aim to contribute to a successful establishment of a modern catering industry enterprise with a short and long run business plan analysis that accordingly should ensure mentioned company`s long time efficient productivity.

1 Introduction

The aim of this research is to study present statistical data of current situation in catering industry and thanks to an analysis provided to get acquainted with further development trends and perspectives of an industry.

Catering industry is a constant part of a modern society nowadays. The culture of eating away of home comes from ancient civilizations and was born thanks to the needs of armies, merchants and public body representatives due to their need of travel that is closely related with the necessity to eat during their stays out of the home towns.

2 Overview

The possibility to eat away from home with no need of cooking safes time and has also other benefits. Among them is possible to mention as follows:

1. Consumer time saving;
2. Saving of resources, workforce and financial included;
3. Work efficiency increase;
4. Increase of gross domestic product when local products are used to produced meals;
5. Healthy and rational nutrition of domestic population thanks to legislation and public bodies as well as to sanitary hygienic requirements;
6. Healthy and clinically approved meal types offered at hospitals, recreation centres etc.
7. Esthetical education of consumers [1, 8 p.]

Catering industry all together with hospitality is a common part of HORECA industry, representing over 7.8 mln people workforce within European Union [2]. Main characteristic of this industry can be described as follows: mostly small size family enterprises (less than 10 people), 48% of the staff is younger than 35 years ald, women form over 54% of the total workers amount. The industry is also representing low skilled workforce as only 1 of 10 people has higher education there. There are different examples of catering industry typology, most commonly the industry is divided into canteens, restaurants, café, refreshments, bars, buffets, culinary shops, tea cafes, home kitchens and mobile catering. Most of the enterprises limit their activity with few functions, among them producing of culinary pre-cooked meals, pre-cooked meals sale at special departments or brand shops, organized consumption of meal at a place of its production. Most of the buyers are consumers at once [1, 10.-13 p.]. Restaurants are mostly divided into two main groups: full services restaurants with wide meal offer and consumers are served by waiters; specialized restaurants (fast food, national cuisine)

Restaurant business in Latvia is admitted as one of the most risky especially due to the worsening of current economic situation within the country and abroad due to the fact this business is closely linked to tourism and represents also the common part of the tourism industry at large. There are different opinions how to improve current economic situation and to support an industry. Among them mention VAT rate decrease as is done already for hospitality industry (12%). According VAT rate decrease could lead to offered services price decrease and contribute to increase of the involved of the workforce at the industry.

Many factors of the industry development are hard to prognoses, however is clear that industry is oriented mostly to middle class income and interest. Restaurants in Latvia follow the masses and represent mostly Mediterranean cuisine. Due to the high risks within the industry to get a loan is quite complicated in Latvia, banks require also relatively high provision of the loan issued.

More than 20 education establishment offer to achieve professions related to occupation in catering business in Latvia, ISMA University offers also 2 level (college and bachelor) programs within that field.

Requested restaurants mention following problems of the industry development in Latvia:

- Uneven occupancy and influence of seasonality;
- Bureaucracy procedures and over control of public bodies and inspections;
- Monopolistic situation among food suppliers;
- Lack of qualitative staff and its leakage abroad [3].

3 Decision

To ensure fulfilment of the present research aim there should be following tasks accomplished:

- Current statistical data of the catering industry should be analysed.
- The results of analysis should contribute to a decision taking about a new catering company enterprise.
- That decision should lead to a business plan development for short and long run of the chosen type of a catering business establishment
- Prospected costs and profit calculation should ensure successful operation of the established company and its producing effectiveness.

4 Conclusion

Catering industry is represented mostly by small size family enterprises. Latvian restaurant business representatives must follow present legislation act and other necessary requirements, such as hygienic etc. This industry workforce use to work under high pressure and risks (burns, trauma, stress). Among most of the problems industry represent-tatives mention bureaucracy, VAT level, leakage and lack of professional workforce, as well as dependency on seasonality altogether with uneven consumers density over Latvian regions. Demographic factors lead to future decrease of domestic consumers. To attract clients local restaurants use modern information technologies (such as POS terminals, software), information dissemination throe promotion, social networks etc.

References

[1] Sjomina J 2011 *Darba organizācija ēdināšanas uzņēmumos*
[2] The HORECA – Hotel, Restaurant, Cafe Sector at a Glance. Desita.it http://desitablog.com/2015/01/28/the-ho-re-ca-hotel-restaurant-and-cafe-sector-at-a-glance/
[3] Ivanova A Restorāni – bizness skrūvspīlēs *Žurnāls "Nedēļa"* http://www.tvnet.lv/zinas/latvija/219064-restorani_bizness_skruvspiles

Modelling and analysing of bank risk management

A S Sagiyev

Kazakh-British Technical University, Tole By Str. 59, Almaty, Kazakhstan

**Corresponding author's e*-mail: alikbtu@gmail.com

Abstract

This paper discusses how to model and analyse bank risk management by using system dynamics. It outlines some of the theoretical underpinnings on contemporary bank risk management, with an emphasis on market and credit risks. It covers the how government can influence to banking system and how banks related with each other. In the example of crisis 2008, explains how can model financial crisis that caused by banks.

Keywords: risk management, scenario analysis, value at risk analysis, system dynamics

1 Introduction

Bankruptcy prediction has long been an important and widely studied topic. The main impact of such research is bank lending. Banks need to predict the possibility of default of a potential counterparty before they extend a loan. This can lead to sounder lending decisions, and therefore result in significant savings. To get an idea about the potential impact of the bankruptcy prediction problem, we note that the volume of outstanding debt to corporations in the United States is about $5 trillion. An improvement in default prediction accuracy of just a few percentage points can lead to savings of tens of billions of dollars. The credit risk problem is essentially the computation of the loss level, which is defined as the level for which there is a probability of 1% that the loss incurred in the portfolio will exceed that level in a particular time period. Credit risk has been the subject of much research activity, especially after realizing its practical necessity after a number of high profile bank failures in Asia.

One important dimension of the debate concerns the social costs of systemic risk. Determining the scale of these social costs provides a measure of the task ahead. It helps calibrate the intervention necessary to tackle systemic risk, whether through regulation or restrictions. There is a large literature measuring the costs of past financial crisis. This is typically done by evaluating either the fiscal or the foregone output costs of crisis.

2 Modelling approach

Active development of the consumer, education, mortgage lending, along with high competition in the credit market, requires more attention to the mathematical modelling of the evaluation process and credit risk management of commercial bank to reduce the losses associated with a significant increase of overdue loans. Significantly worsened the situation since 2008 the global financial crisis, the arrears led to a reduction in the main index of the banking sector - assets. At the end of October 2009 the banks, compared with the beginning of the year showed a decrease in assets is due primarily to the contraction of the credit market - from January to October, the portfolio of loans to individuals fell by 10.5%.

With the reduction in lending began to increase the share of overdue debt, which as of December 1, 2009 amounted to 8.5% of the volume of loans to individuals. Thus, the more acute was the need of building a credit risk assessment models that take into account the effect on him of indicators of economic development at the regional, federal and international levels, and development on the basis of their management models. Scientific and practical significance of the issues outlined above led to the choice of theme and structure of the research.

3 Theoretical frameworks

The theoretical framework for the assessment and management of credit portfolio of commercial banks received enough coverage in the scientific periodical of domestic and foreign literature. The agreement adopted by the banking activities, "Basel I" by the Basel Committee on Supervision, said the possibility of using two credit risk assessment methods: based on external ratings issued by international rating agencies, and developed on the basis of the Bank's internal rating system.

References

[1] Altman E 1968 Financial ratios, discriminant analysis and the prediction of corporate bankruptcy J. Finance **13** 589–609
[2] Haldane A G The $100 billion question
[3] Pruyt E, Hamarat C 2010 The Concerted Run on the DSB Bank
[4] Pruyt E 2009 Saving a Bank? The Case of the Fortis Bank In Proceedings of the 27th International Conference of the System Dynamics Society, Albuquerque, USA. System Dynamics Society http://www.systemdynamics.org/conferences/2009/proceed/papers/P1273.pdf
[5] Andreev A 2009 Dynamic modelling of the bank's credit risk in the interbank relations

Edutainment: challenges and risks

C Koryuhina[1*], T Shamshina[2]

[1]ISMA University, 1 Lomonosova Str., Bld. 6, Riga, LV-1019, Latvia

[2]Transport and Telecommunication Institute, 1 Lomonosova Str., Riga, LV-1019, Latvia

[*]*Corresponding author's e*-mail: jekaterina.koryuhina@gmail.com

Abstract

The article examines advantages and disadvantages of edutainment in education, singles out scientific and practical problems of its implementation and makes suggestions for improving this process.

To overcome the existing barriers in the educational sphere, in the authors' opinion, is possible through continuity of approaches to education, quality and effectiveness at development of educational competences (common cultural, preprofessional, professional, methodological).

Keywords: edutainment, gamification, education, social networks, intrinsic/ extrinsic motivators, consciousness, risks

1 Introduction

Technical advancement of the modern world, popularity of social networks are significantly changing the direction in education. Both the future of the education, and of society in general depends nowadays on understanding by all participants of educational process of the direction of a strategic development of education [1].

Along with the leading scientists and experts in the field of informational technologies, many modern teachers, philosophers, theologians and journalists, discussing a complex of problems of gamification in education, note that process of application and intensive development of informational technologies in the educational sphere has the hidden ambivalent character.

2 General part

The goal of edutainment, which is an educational approach to motivate students to learn by using video game design and game elements in learning environments, is to maximize enjoyment and engagement through capturing the interest of learners and inspiring them to continue learning [2].

The main reasons stimulating inclusion of educational games in modern educational process are to the opinion of the authors of the given article the following:

1. First of all, application of game techniques is directly connected with a number of the general sociocultural processes directed on search of new forms of social organization and culture of relationship between the teacher and the pupil, the teacher and the student, as well as among pupils within one class, group or team.
2. On the other hand, continuously improving the level of culture of communication in didactic process, today the problem of total decrease of interest in study, unwillingness to work hard, overcome difficulties more than ever is particularly acute.
3. It is not a secret that we live in dynamically developing information society, in a century of prompt development of innovative processes in which advance of goods and services by means of information technologies has become a norm.
4. Besides, it is obvious that game is one of the most ancient, and, at the same time, actual methods of training. The game elements can be found practically in any educational system as games are very conformable to the child's nature

In spite of numerous benefits brought by gamification, there are some serious drawbacks, such as, for example:

- priority of form over the contents in education;
- deliberate artificial simplification of educational material;
- possible risk of manipulation of consciousness;
- impersonalization of an individual;
- creating an artificial sense of achievement in case of total virtualization of an educational process [4];
- encouragement of unintended behaviours as a result of psycho-somatic disorders [5];
- deterioration of articulation and rhetorical skills due to overwhelming usage of electronic devices;
- stress to human organism due to prolongation of time spent online.

The educational continuity is, first of all, continuity in all-didactic approaches to education which are realized in a stable system of the interdependent contents and coordination of all components of educational process [4].

3 Conclusion

Edutainment represents both challenges and risks for

modern information society and, therefore, requires further research of scientists in the field of sociology and pedagogy. To achieve steady quality and effectiveness in education when implementing gamification it is vital to take into account: audience age, specific character of a subject, neurophysiological aspects, ethics, and remember that edutainment is not a panacea, recognizing that it is not an appropriate strategy to motivate every learner in every circumstance [3].

References

[1] Koryuhina C, Shamshina T 2015 Open Education: continuity of approaches and risks In: Information Technologies, Management and Society. Theses of the 13th International scientific conference "IT&M 2015", 16-17 April, 2015, ISMA University, Riga, Latvia ISSN 1691-2489 227
[2] Huang W, Soman, D December 10, 2013 *A Practitioner's Guide* to Gamification of Education. Rotman School of Management, University of Toronto
[3] Kapp K, Lucas B, Rich Mesch 2012 The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education John Wiley & Sons
[4] Rughinis Razvan 2013 Gamification for productive interaction: Reading and working with the gamification debate in education Information Systems and Technologies (CISTI)
[5] Educational Neurosciences – More Problems than Promise? Education Policy Research Series Discussion Document No. 3 UNESCO Bangkok, 2013 TH/DOC/EPR/13/046-E

Some modernization aspects of management system of educational institutions and additional professional education

N Ardalina[1*], M Ahmadejeva[2]

[1]ISMA University, 1 Lomonosova Str., Bld. 6, Riga, Latvia

[2]LU Latvian University

*Corresponding author's e-mail: altenza@inbox.lv

Abstract

The paper deals with some aspects of the development of modern education in Russia, makes recommendations on the modernization of educational institutions' management system.

Keywords: modernization, management, efficiency, funding, additional professional education.

1 Introduction

Economic transformation in Russia related to the change of socio-economic conditions of our society have led to a breach of the control system responsible for preparation and re-training of professional staff.

The transition to a market economy, has significantly changed the structure and the functioning of the system of education management at all hierarchical levels [1].

At present, new approaches to the improvement of vocational education are developped in Russia, the forms and methods of management of the system of training and retraining of personnel are reviewed, the legislation is changed, i.e. there is a search for ways and modernization technologies for upgrading vocational education system.

2 Main part

1. The economic and social situation in Russia, with constantly changing labor market conditions, increasing competition, technical and technological re-equipment of various sectors of the economy have led to a situation where the level of vocational education is far behind the pace of development and there is a need to modernize vocational education management system in order to optimize it.

2. Radical changes in socio-economic conditions have led to a breach of the training system. Currently, in Russia new approaches to the development of vocational education are worked on, forms of staff training system management are reviewed.

The vocational education system reform in Russia is carried out by its old structure change, which used to be controlled only from the center. The new organization of the vocational training system should be a flexible system to provide professional educational services that meets the requirements of a modern economy.

3. Federal education management authorities hold mainly coordinating and science-methodological functions.

The growth of regional educational system management authorities is expressed in increasing autonomy of educational institutions themselves.

The distinctive features of organizational models of vocational education and training are related to the organizational and pedagogical features and conditions of the training organization, funding sources, student dependence on the enterprise (organization), the state's role in the regulation of this process, taking into account the content of educational programs: the specificity and the ratio of theoretical and practical training, compulsory practical training and its volume, the ability to reduce or extend the duration of training by changing the intensity of courses, etc. [2, 3].

4. Currently, there are two major areas for improvement of the educational system management.

The first area involves the division of responsibilities among schools and education authorities of different hierarchy. This means that the educational establishment is responsible for its activities, and is regulated by the charter and the license for educational activity, and education management authority which issued the license to conduct educational activities, oversees the control over this activity.

The second area involves granting to educational institution sufficient freedom and broad rights (autonomy in the selection and placement of personnel, implementation of educational activity, financial and economic activities, etc.) in accordance with applicable law and the charter of the educational institution.

5. The modernization of vocational education management system in Russia should be based on:

- decentralization of financial provision of educational services to the population;
- the creation of state incentives for the revitalization of businesses in the field of vocational training;
- assignment of liability to the company for the professional level of their employees;

- monitoring of the situation on the labor market;
- monitoring of the quality of educational institutions;
- attraction of employers to develop curricula and standards of education quality;
- involvement of private and public financial and technical resources.

3 Conclusions

Given the Russian and foreign experiences in the effective management of the additional professional education, some aspects of modernization can be highlighted, namely:

- transition to the education funding system in which financial assets and flows are linked to the consumer of the educational service, and not to the manufacturer of educational services;
- the allocation of "development budget" for each institution, ensuring the implementation of the investment projects in educational system;
- creation of effective system of education to attract financial flows and human resources;
- the development and establishment of information support management systems in decision-making processes;
- creation of an educational consulting system in the field of educational management, and in the field of quality control services of vocational education;
- Creation of educational services marketing system and public relations services;
- creation of special service centers for procurement within the educational system, etc..

The above mentioned trends increasing the education system management efficiency are quite diverse, but they share a common goal - to ensure efficient use of all resources coming into the system of education (financial, human, material, information), which will help upgrade the educational institutions management system.

References

[1] Volkov A E, et al. 2008 Russian Education 2020: education model for the innovation economy Problems of Education **1**
[2] Kormakova V N 2010 Features of management personnel training abroad Journal: Scientific statements BSU Series: Humanities **5**
[3] http://www.market-pages.ru/taktikapersonal/10.htmlMARKET-PAGES.RU

Preparation of designers to the development of professional career

S Alieksieieva*

Kyiv, Ukraine

**Corresponding author'*s e-mail: svetlanav@i.ua

Abstract

At the present the problem of use of the acmeological technologies for training of future designers to the development of a professional career in the system of vocational education, analyzed career and professional plans of young people, their ideas about professional career, criteria of its successful realization. The use of these technologies in educational process is considered to be effective as personality zones of development of future specialists become the object of technology.

Keywords: technologies of developing education, technologies of personal orientation to education, method of projects, game modelling, training technologies, technologies of career coaching.

1 Introduction

One of the most important aspects of human resources is educational level, the willingness of a person to the professional self-realization, the development of a professional career. The modern career themes is the subject of sociological researches, management, psychology and today it is seriously investigated in pedagogics. Every science submits to the first plan of studying its aspect in particular, in sociology the great importance is drawn to social aspects in al, management – to organization in al, Psychology and Pedagogics – to aspects of a personality.

In Pedagogics a career is studied, in the first place, through such a conception as professional self-determination, professional self-conception, self-realization and preparing for a career progress in the context of a professional self-realization [1].

The perfection of the system of professional preparing of future designers to the career development is possible with the introduction of acmeological technologies, where the objects of technologization are becoming the personal zones of development, methods of preparing to a successful career and professional formation. The main aim of using of acmeological technologies in professional training of future designers to the development of a career is forming in a self-consciousness of a person the demanded necessity in professional self-development and self-realization in professional field. The main task of acmeological technologies is the actualization of professional and personal self development with the help of special methods and psychological technics. Acmeology introduces to the system of training of future designers ideology of progressive professional formation, purposeful career orientation, readiness to professional self-realization.

Acmeological technologies are the technologies of developing education technologies of personality oriented training, method of projects, game modeling, training technologies, and career-coaching technologies.

2 Overview

In such developed countries as USA, Great Britain, Japan and others despite the differences in the principles of organization and methods of operation are proposed various career coachings in different fields of activity, which are very efficient in the improvement of a career mastery, in the formation of the positive professional image. The analysis of the experience of other countries with the widespread acmeological service shows, that it provides the valuable and full psychological and acmeological service, gives the effective professional assistance to the future specialists of different professions [5].

3 Decision

Career coaching is a kind of a personal coaching. It helps future designers to solve many problems in a career development; namely in the investigation of a career; development of habits of the passage of the interview and formation of a personal confidence; creative job search strategies; writing the resume; appreciation of personal strong qualities; personal marketing and branding, appraising of future employers, conducting the talks about salary.

4 Conclusion

Based on the foregoing, it should be noted that acmeology introduces into the system of training of future designers the purposeful career orientation and the formation of readiness to future professional self-realization. Acmeological approach to technologies of training allows to advance the system of training of future designers and to improve the quality of vocational education.

References

[1] Ky`rt N L 2000 Dy`namy`ka predstavleny`j o professy`onal`noj kar`ere psy`xologov obrazovany`ya v processe professy`onal`nogo samoopredeleny`ya: dy`s. kand. psy`xol. nauk

[2] Pochebut L G 2000 Organy`zacy`onnaya socy`al`naya psy`xology`ya g-costs-and-enhancing-quality/

IT Technology in alternatyve form of tourism - Geocaching

R Navickiene*

Kolping University of Applied Sciences, Lithuania

**Corresponding author's e*-mail: regina@turinfo.lt

Abstract

Geocaching as an alternative travel movement began in the US in 2000 and today this activity has involved 220 countries. This is "great alternative tourism treasure hunt using GPS". This geocaching movement today has more than 6 million users, who lead an active lifestyle while traveling. Geocaching - it's a game, traveling with a purpose not only to know the sights, but also to find the caches using IT technology. This article deals with geocaching concept, types, classification of this alternative tourism industry attractiveness of today's tourism service user.

Keywords: geocaching, geocacher, alternative tourism, Lithuania

1 Introduction

The tourism business is still looking for new means of travel, which would be as an alternative to mass tourism. Researchers are also actively considering the needs and expectation of today's travelerss. Geocache is precisely the new alternative way of traveling, it is relying on the latest information technology (Schneider, Silverberg, Chavez, 2011; Boulaire, Cova 2012, 2013; Santos Mendes Rodrigues Freire, 2012; Boulaire, Hervert 2012; Ihamaki, Tuomi 2012; Ihamaki 2013 2015; VELIUTĖ 2014; Spencer, 2014). According to Ch. Boulaire, G. Hervet (2012), creating more and more different geocaches and all of them can be grouped into 13 types according to the detection method or tasks. These geocaches can be found in various areas: it can be a cache that can only be encountered with non-standard situations such as climbing trees or going into Downhill catacombs under the bridge with special equipment, and after finding a cache a task still needs to be done. These caches are named as Tradicional cache, Mystery or Puzzle caches, Multicaches, EarthCache, Event cache, Cache In Trash Out Event (CITO), Giga-Event cache, Wherigo cache GPS Adventures Maze Exhibit, Lab cache, Mail boxes, Commercial and other. T. Santos, R. Mendes et al, (2012), classifies geocaches in size and distinguishes 6 types: micro, small, regular, unspecified size, large and others, where even 40.1 percent geocaches are micro containers, which can accommodate only registration papers, and large - only 2.5 percent.

2 Research methodology

Research method - quantitative study using a questionnaire.

Research undertake - 149 respondents, who are active geocachers in Lithuania.

Socio - demographic data of respondents: the study included 58 percent men; 56 percent of respondents were 18-25 years of age and only 3.1 percent. 46-55 years of age and there were no older respondents. The vast majority of respondents have higher education or were studying, living in the city, gets average or less than average wage.

3 The results

Respondents says that they search for geocach several times a month (23 percent), and during the warm season (27 percent) Or only when you have free time, that is during the holidays (23 percent).

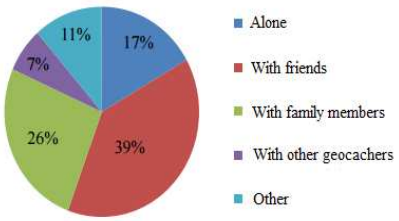


FIGURE 1 Distribution of the respondents according to with whom they are geocaching

The majority of respondents believe that geocaches are for young people (63 percent).

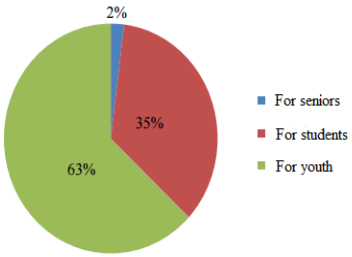


FIGURE 2 Geocaches are suitable for different age groups

It was asked of respondents (an open question) to

identifie geocaches operational weaknesses.

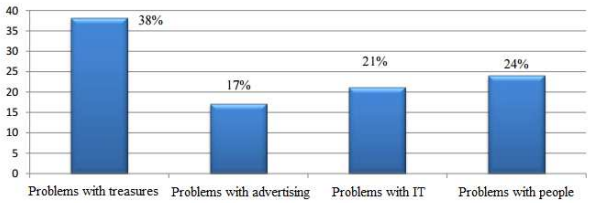


FIGURE 3 Geocaches shortcomings distribution

Respondents mostly enjoy traditional and mystery types of geocaches and the least enjoyables are commercial type.

4 Conclusion

After analysis of literature and internet websites, it was discovered that geocaching is a new alternative tourism activity.

Geocaching interests tourists who are motivated by an opportunity to find new places, challenges, the satisfaction of finding hidden treasures and the need of communication with each other.

The empirical research showed that geocaching is suitable for mass tourism providing it is more advertised and the quality of geocaching is increased.

References

[1] Boulaire Ch, Cova B 2012 The dynamics and trajectory of creative consumption practices as revealed by the postmodern game of geocaching Consumption Markets & Culture **16**(1)
[2] Boulaire Ch, Hervert G 2012 New Itinerancy: the Potential of Geocaching for Tourism International Journal of Management Cases **14**(9)
[3] lhamaki P 2012 Geocachers the Creative Tourism Experience Journal of Hospitality and Tourism Technology **3**(3)
[4] Ihamaki P 2012 Geocaching: Interactive Communication Channels Around the Game Eludamos. Journal for Computer Game Culture **6**(1)
[5] Ihamaki P 2015 Design 'the Pori hidden beauties geocaching series: computer supported collaborative web-based learning and sharing experiences Int. J. Web Based Communities **11**(2)
[6] Hamaki P 2013 Geocachers' creative experiences along coastal road in Finland International Journal of Leisure and Tourism Marketing **3**(3)
[7] Ihamäki P, Tuomi P 2009 Understanding 21st Century's Mobile Games within Boundaries
[8] Santos T, Mendes R, Rodrigues A, Freire S 2012 Treasure Hunting in the 21st century: A Decade of Geocaching in Portugal Proceedings of the European Conference on Information Management & Evaluation
[9] Spencer A 2014 Hide-and-seek in Macquarie University Library: geocaching as an educational and outreach tool The Australian Library Journal **64**(1)
[10] Veliūtė I 2014 *Kultūros paveldas: medžiagiškumo ir simbolinių prasmių sąveika* Kaunas: Vytauto Didžiojo universitetas

Image and reputation formation conceptualization of higher education institution

J Bojorovienė, R Kinderis*

Klaipeda State University of Applied Sciences, Lithuania

**Corresponding author's e*-mail: r.kinderis@kvk.lt

Abstract

Paper analyses situation of the higher education image and reputation in Lithuania. It examines various aspects of image and reputation of the concept of disclosure of the key factors influencing the higher education institution's image and reputation. It distinguishes means forming the image and reputation of today's higher education.

Keywords: image, reputation, image and reputation of higher education, forming means

1 Introduction

With the increasing competition in the country and the pressure from the international space, the image and, in particular, reputation of higher education institutions becomes crucial for their successful functioning or even survival. It often happens that, if the image and reputation of an organization is not formed purposefully, they form spontaneously in the unconscious mind of the consumers and are usually different from the expectations of the organization. In response to the changing situation, the national higher education institutions are using the marketing communication more and more aggressively, trying to reach the most important stakeholders - students, teachers, researchers, partners and public authorities [1].

Positive image and reputation of an education institution are not random; they are created, achieved and also managed. Efficient management of image and reputation can change the undesirable or reinforce the positive attitude of consumers: in this manner, the organization becomes more visible, more attractive and more desirable. The understanding of the importance of the image and reputation formation is slightly less developed in the field of higher education than in business in Lithuania. Therefore, those institutions that are not concerned with their image may lose a significant share of their interested persons, because image and reputation formation becomes random and reducing its exclusivity [2].

Thus, the problematization is expressed in the following questions: what factors determine the image and reputation of higher education institutions? What measures are recommended for the formation of image and reputation of higher education institutions?

The object of the research: Higher education institution image and reputation formation process.

The aim of the research: to develop a conceptual model of higher education institution image and reputation formation based on the identified factors of higher education institution image and reputation formation.

The tasks of the research:

1. To analyze the concepts of image and reputation and to provide the characteristics of higher education institution image and reputation.

2. To identify the factors having an impact on the image and reputation of higher education institutions.

3. To provide possible measures recommended for the formation of the image and reputation of higher education institution.

The methods of the research: a systematic comparative analysis of scientific literature, content analysis.

2 Research results: the concept of image and reputation

In summary it can be stated that the corporate image forms instantly, when an interested person contacts the company; meanwhile, reputation is a result of images created over a certain period of time. Therefore, corporate reputation may be defined as the whole of values that groups of interested persons assign to an organization through authentic perception and interpretation of a communicated corporate image. Corporate image and reputation is a strategic asset and a source of a competitive advantage of a company. Positive corporate image and reputation are important factors showing and giving the exclusivity of a company among other organizations, informing the society about the reliability and trustworthiness of an organization, adding corporate value, helping to attract material and non-material resources, when an organization is dealing with crisis, holding public initiatives, striving for recognition in the society. Corporate image and reputation create favourable environment for the development of an organization; thus, a purposeful and targeted forming of corporate image and reputation is necessary. Image and reputation formation models have a special significance: they reveal a process that is quite complicated and sometimes hard to identify, which leads to inadequate solution of image and reputation management issues. The development of image and reputation formation model and complementing its content with information about organization is a clear identification of a corporate image and corporate reputation to the target groups of the society [3, 4].

3 Research results: The peculiarities of image and reputation of higher education and its institutions

Higher education institution is a more complex organization than any other education institution. Higher education institutions are more attached to the traditions. Their prestige is directly related to the continuation of the traditions. Nowadays it is not enough merely to publish scientific achievements or to guarantee high quality of studies. The activities of higher education institution may not be limited to student preparation for labour market; it is also necessary to analyze the needs of the society and its specific groups, to look for ways to meet those needs and to train the students. The image of a higher education institution is important when looking for funding and partnership with other higher education institutions. In order to be able to implement such needs, a higher education institution must look for ways how to achieve this, how to attract the society, to win positive attitude of the audiences, so as to develop a good image and reputation [5].

In summary it can be said that higher education has become a mass phenomenon in Lithuania, thus, higher education is losing its image and reputation in the society. In fierce competition between the higher education institutions, it is important to ensure as positive an image and reputation in the society, as possible, because the financial situation, the number of students and partnership relations with other institutions will depend on this.

4 Research results: The factors forming the image and reputation of higher education institutions

The following groups of factors forming the image and reputation of higher education institutions may be listed among the min ones: personal-demographic (geographical position of school, demographic development, personal references, etc.), environmental (rating, general education policy, type of institution, social peculiarities, technological progress or public policy, economical development, etc.) and organizational factors (complexity of entrance examinations, size of libraries, exterior and interior of the institutions, study programmes, sports teams, internal atmosphere, etc.). Organization may not have any influence on the first two groups of factors or control them; it can only observe them and try to adapt to them in a timely manner [6].

5 Research results: A conceptual model of higher education institution image and reputation formation

The model consists of three stages and steps:

I stage is the forming the individuality of a college. Three steps are necessary during this stage: 1) to create philosophy of a college; 2) to formulate the values; and 3) to define the mission of the college.

II stage is the substantiation of the strategy of a college. The stage consists of three steps: 1) to define the vision of a college; 2) to update the study programmes; and 3) to develop the provided education services.

III stage is focused on the strengthening of the identity of a college. This stage is implemented in three steps: 1) to provide proper conditions for the professional development of the lecturers; 2) to identify the symbols, traditions and ceremonies of a college; and 3) to prepare communication systems.

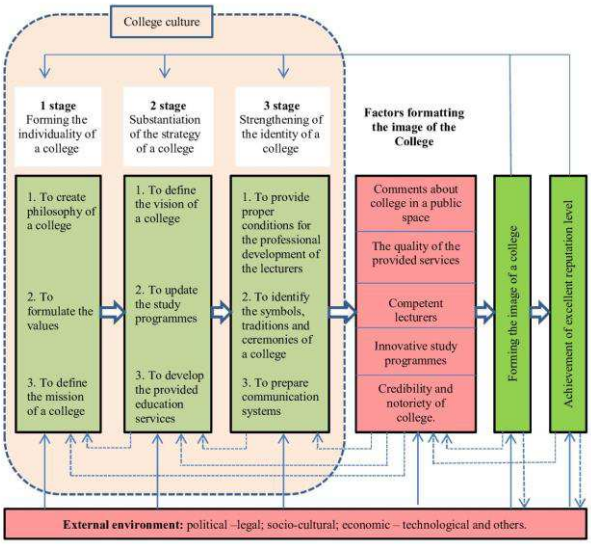


FIGURE 1 Higher education institution (college) image and reputation formation model

The main factors forming the image and reputation of a college are included in the model: comments about college in a public space, the quality of the provided services, competent lecturers, innovative study programmes, credibility and notoriety of college.

In summary, it can be stated that college image and reputation formation model provided by the authors is universal and can be used in many similar higher education institutions. However, each organization should assess and identify the main stages of a model and its component parts according to its needs, as each one of them can define their individuality and identity by different factors forming their organizational culture.

References

[1] Drūteikienė G 2004 Organizacijos įvaizdis ir reputacija: sąvokų konceptualizavimo problema Informacijos mokslai **28** 53-60
[2] Pikčiūnas A 2002 Organizacijos ryšių ir institucinio įvaizdžio valdymo patirtis Lietuvos įmonėse *Organizacijų vadyba: sisteminiai tyrimai* **21** 147 – 66
[3] Šmaižienė I 2006 Organizacijos reputacijos valdymas: prabanga ar būtinybė? Ekonomika ir vadyba: aktualijos ir perspektyvos **1**(6) 163-9
[4] Kinderis R, Žalys L, Žalienė I 2011 Viešbučio įvaizdį formuojančių veiksnių analizė. Mokslas ir edukaciniai procesai Science and Pracesses of Education **1**(14) 10 -22
[5] Želvys R 2005 Aukštojo mokslo kaita ir problemos Acta Pedagogika Vilnensia **14** 169-177
[6] Marčinskas A, Gudonienė V, Drūteikienė G 2007 Aukštojo mokslo institucijų įvaizdis: šališki veiksniai Informacijos mokslai **40**

Implementation of information services for tourism

N Stoyanova*

University of Agribusiness and Rural Development Bulgaria

**Corresponding author's* e-mail: natally_1971@abv.bg

Abstract

This report examines the development and implementation of e-services provided to the citizens of the municipality for tourist exploitation in Ruse region. in the period 2015-2020, the Administration introduced a considerable number of basic and applied information systems that provide the automation of activities, including an information system for management of investment processes and municipal property and public register of municipal property with options for displaying graphical information of the cadastral map. In the last year the municipality of Ruse was the 2015 beneficiary under the project "better service through electronic management in the Northwest, North Central and Northeast planning region" of regional administration Pleven, financed by the operational program "administrative capacity" (OPAC), co-funded by the EU through the European Social Fund (ESF). The project activities are in the best interest of all administrations, through the provision of electronic services, will improve service to citizens and businesses.

Keywords: e-services, tourist exploitation, electronic services

1 Introduction

In the last 2015 years the Municipality of Ruse was a beneficiary of the project "Better service through electronic management in North, North Central and North planning region" of Pleven Municipality, funded under the Operational Programme "Administrative Capacity" (OPAC), co-financed by the EU through European Social Fund (ESF). Project activities are in the interest of all administrations by providing electronic services will improve services to citizens and businesses. The project allows citizens holding electronic signature to declare the services provided by each municipality. In its work on the project, the contractor - a consortium Hey En Partanrs was assisted by experts of the beneficiaries and partners. The system is designed, tuned and tested to work with modules for connection with AIS. Integration has only AIS - Archimed eDMS, with developed module for connection, "said representatives of the Municipality of Ruse. Priority for the administration of this stage is to provide administrative services electronically. In 2013 the municipality plans to introduce online check for the amount of local taxes and fees.

2 Overview

At the stage of reforming the Bulgarian society has proved ineffective approach of systematic regulation of the economy by the state, including and her refusal of the management of public property. After a series of painful mistakes admitted to society can be found a certain consolidation of the positions of different social and political forces in the country on the need to form an effective system of state regulation of the market economy and implementation of innovations in the management of public organizations. Strengthening the role of government in the economy have in many ways. But above all it must manifest itself as a good owner, effectively managing public property in terms of market competition. In this regard actuality acquires the task of increasing the efficiency of the activities of public organizations offering services to the population.

Changes in public organizations aimed at increasing the level of efficiency of their operations. The monitoring of this process involves the use of a system of mechanisms and instruments for measuring and evaluating the activities of public organizations and their decision-making in this otnoshenieVazhen moment for tourism development in the municipality of Ruse is our application for "European Capital nakulturata" in 2019 . this initiative sees culture as a resource for sustainable renewal and development as a tool for inclusion and cooperation, as a civilizational model unfolds creative potential of local communities, ensuring a high standard, new added value and quality of life. In practice, so far the municipality is not possessed a working strategy in this area for one main reason: Ruse was underestimated and was not perceived by the local authorities for possible tourist destination as the potential of the municipality in this regard has not been used.

The effectiveness is reflected in the performance of works with the lowest cost resources. This particular segment of defining the phenomenon of "efficiency" raises a number of disputes especially when it comes to research on the effectiveness of management.

In these organizations performance management is seen, measured and evaluated in direct relation and depending on production efficiency. The prevailing opinion of the authors that the effectiveness of management in private organizations is limited mainly to obtain maximum performance with minimum labor costs of management workers.

3 Decision

3.1 NATIONAL AND REGIONAL TOURISM POLICY

Planning documents at all levels prioritize tourism development, while focusing on product development andissues (infrastructure, marketing, education). This forms favorable "environment" for the development of tourism by suggesting coordination with him the other sectoral policies, providing financial instrument and positive political commitment.

3.2 REGIONAL DEVELOPMENT STRATEGY FOR THE REGION OF RUSE

In the Regional Development Strategy Ruse Region tourism is directly linked to outline a vision for development and is one of the priorities for achieving strategic objectives.

The priority "Making full use of the competitive advantages of Ruse region to ensure sustainable development of the regions "includes and the realization of 2 measures directly related to tourism - "Making full use of culture as a unique resource Russe economy "and" Effective utilization of the Danube River as a resource for the development of cruise tourism, water sports, fishing and fish farming".

The main strategic goal To 2020 to improve the attractiveness of the municipality of Ruse and to become tourist center through purposeful and functional use of natural Strategy for tourism development in the municipality of Ruse 2020 and anthropogenic resources of the region to establish itself as a tourist destination in Bulgaria, the European Union and other major foreign markets.

Strategic Goal 1: Increase the number of tourists visiting the Ruse region.

Strategic Objective 2: Increase revenues from tourism.

Strategic Goal 3: Increase professional skills and knowledge of employees in the tourism industry.

Strategic Goal 4: Tourism is an important priority of Ruse Municipality, supported by better financing of European projects and other funding sources.

Strategic Goal 5: Increase the benefits for society and business through Tourism - new jobs and better income.

4 Conclusion

The main objective for the development of tourism for the period until 2019 is to increase competitiveness and efficiency of the tourism sector in Bulgaria by efficient use and conservation of available natural and anthropogenic resources in accordance with the needs for sustainable development of tourism. The main objective is planned to be achieved through:

1. Positioning of Bulgaria as a tourist destination in a higher class the global tourism market as quality and added value.

2. Improving the infrastructure of national, regional and municipal level.

3. Single application of international standards and best European practices and innovation in terms of products, technologies and human factors in the tourism sector in Bulgaria.

4. Preserving, protecting and improving the quality of tourism resources, including natural, cultural and architectural.

5. Development of tourism will bring real benefits to individual people and business. It can be achieved through awareness, dialogue and mutual collaboration between the municipality and public organizations.

References

[1] Стоянова Н 2014 Приложение На Информационни Системи В Маркетинговите Проучвания I-*Ва Годишна Научна Конференция На Висше Училище Колеж По Телекомуникации И Пощи 24*-26 *Окт. Благоевград*

[2] *Стратегия за развитие на туризма в община Русе до 2020 г.* Март 2013 Община Русе

[3] Stoyanova N 2014 Research On The Staff In The Marketing Mix Of E-Services' Field *Международная Научная Конференция "Электронное Правительство В Регионах: Проблемы И Перспективы" 18*-19.12.2014 Belovo

[4] Pidley C, Simon H 1938 Measuring Municipal Activities ISMA: Chicago 3

Social media technology deployment in B2C

O Fedorova*

ISMA University, 1 Lomonosova Str., Bld. 6, Riga, Latvia

**Corresponding author's* e-mail: jelena.fedorova@gmail.com

Abstract

The modern level of development of Web 2.0 technologies. The role and place of social media. The tools of the modern SMM manager and its systematization.

Keywords: Social networking; Internet; social media; competition

1 Introduction

Over the last few years, social media and social networks play increasingly popular role in society.

The actual topic for today is the systematization of social networking technologies, in building communication for B2C.

The key problem, as with any innovations, is undeveloped tools and approaches in promoting SMM. It is important to classify different possibilities of using the tools and its appliance to various communicative situations.

The opportunities of social networks attract attention of various researchers. For instance, the issues of its functioning and use is subject of work by L. Grossman (Grossman L. K) [11], G. Farrell (Farell H.) [10], D. Drezner (Drezner D. W.) [9], V. Gorovoy [1], L. Juror and many other researchers.

The first scientific studies of social networks date back to late 19th century, when new term "social fabric" or "web of relations" appeared in the works of European philosophers and social scientists. [3, C. 145]. The theoretical basis for the study processes of social networks was formed at the works of leading sociologists in the 30s of 20th century. Among them, the publications of the American psychologist J. Moreno, works on sociometry, devoted to interpersonal and intergroup communications [4]. The ideas of J. Moreno were supported and further developed in the 50s by J. Barnes and E. Botta, who began a systematic study of the social networks formation process. The term "social network", was, firstly, introduced by R. J. Barnes in 1954. [7]. In parallel with development of the theoretical aspects, the practical application studies took place. In 1969, S. and J. Miligram Travers proved the "theory of six handshakes".

At the end of 20th — beginning of 21st century, a new direction in field of social networks was formed — virtual social communities. The communication becomes operational, global and systematic. However, the changes affected only the form, whereas, the content, the basic communication laws – remained unchanged. [3, p. 146].

The main constituents are the following: user authorization through creation of its virtual "self"; communication tools; means of content search and distribution. The only difference is the target goal and quality of the software.

Tool selection matrix for digital-strategy

	Brand knowledge	Involvement	Sales growth	Formation of loyalty
★ Most relevant / ☆ Enough relevant / ☆ Least relevant				
Website	☆	★	☆	★
Direct Advertising	★	☆	★	☆
Sponsorship/ Spec. projects	☆	★	☆	★
Commercial	★	☆	☆	☆
SEO/SEM	☆	☆	★	☆
SMM	☆	★	☆	★
Games, Apps	☆	★	☆	☆
PR	☆	☆	☆	★
Mailing (e-mail, SMS)	☆	☆	☆	☆
Viral advertising	☆	☆	☆	★
Mobile Applications	☆	★	☆	★
	Brand knowledge	Involvement	Sales growth	Formation of loyalty
	Goals			

For SMM specialist, only two parameters are needed: which target groups are the most active users of the resource (+ its quantity) and which means of communication the social network has to offer.

Referring to the conclusions of analysts from prestigious American research and consulting company "Gartner", we can say, that failure to communicate with customers through social channels can be as destructive for business as if, today, the company abandoned the use of telephone or e-mail [2].

Most companies in the world, recognize that, nowadays, the driving force of communications, belongs to the consumers, who are becoming more social, communicating through online networks, forums and blogs, sharing photos, and links, creating professional communities, etc.

Considering the publications in social networks as a way to stimulate sales and enhance competitiveness, it is possible to allocate few basic markers, which reflect the effectiveness of the account:

- Attendance
- Time spent on the page
- Number of visitors who came on advertising
- Pages used, that serve as a link to your page
- Average growth values of the resource.

For proper evaluation, it is important to understand, clearly, what tasks are solved with the help of social media.

In the system of Web 2.0, the effectiveness of communication is determined by the rating of the account (number of likes, comments, shares).

2 Conclusion

In the future, the progress in the development of social networks may lead to automation of management; management costs reduction and decentralization of direct execution.

It is important to organize social networking opportunities; to classify them on the basis of the application with respect to communication tasks of the company.

References

[1] Горовий В М 2012 ІТ-субкультури в структурі сучасного суспільства /В. М. Горовий // Україна: події, факти, коментарі **5** 76–85
[2] Гош А 2013 Социальные медиа и бизнес: общение с пользой *Генеральный директор* **9**
[3] Курбан О В 2014 PR *у маркетингових комунікаціях: [навч. посібник]* / О. В. Курбан. — Київ: Кондор 246
[4] Морено Я Л 2004 *Социометрия: эксперементальный метод и наука об обществе* Москва: Акад. проект 320
[5] Рагимова С 2010 *Найди меня, если сможешь* Режим доступа: http://www.sostav.ru/articles/ 2010/06/16/ko1/
[6] Халилов Д *100 инструментов* SMM-*продвижения / Дамир Халилов // Маркетинг в социальных сетях: секреты и советы* Режим доступа: http://www.seowrite.ru/
[7] Barnes J A 1987 Class committees in a Norwegian island parish Eugene Garfields, Ph.D. — Mode of access: http:// garfield.library.upenn.edu/classics1987/A1987H444400001.pdf
[8] Suster M 2010 Social Networking: the past TechCrunst Mode of access: http//techcrunch.com/2010/12/03/social-networking-past
[9] Drezner D W 2007 Introduction: blogs, politics and power [Electronic resource]: a special issue of Public Choice /D. W. Drezner, H. Farrell/ Springer Science+Business Media Mode of access: http://www.henryfarrell.net/publicchoice.pdf
[10] Farell H 2007 The power and politics of blogs [Electronic resource] / H. Farell, D. W. Drezner // Springer Science+Business Media Mode of access: http://www.danieldrezner.com/research/blogpa- perfinal.pdf. – Title from the screen.
[11] Grossman L K 1995 The electronic republic: reshaping democracy in America New York 304

Web-site as an Internet-marketing tool for commercial health care organizations

V Teplyakov*, I Spica

ISMA University, 1 Lomonosova Str., Bld. 6, Riga, Latvia

**Corresponding author's* e-mail: teplyakov_v90@mail.ru

Abstract

As of today, a lot of companies face the necessity to put up a personal web-site so that to represent themselves to the users of other regions. Currently, one can find a variety of web-sites which subdivide into types and categories depending on a company's goal and activities. In the meantime, its worth to note that apart from presenting a company information, a web-site can also be a powerful marketing tool to market a product or a company's service.

Keywords: web-marketing, web-site, content-marketing, site conversion

1 Introduction

Presently, Kazakhstan market of the commercial health service is at the stage of a brisk growth: there are a lot of commercial clinics, most of which set up their regional branches, thus forming a well-developed network of health institutions all around the country.

Under such conditions a competitive struggle becomes obvious. For the purposes of holding a position on the market, companies working in the sphere of health service use various methods but most of them turn to be ineffective.

In the system of health service a web-site is highly perspective but not ac developed course. For example, according to the data of the Statistics Department of the Republic of Kazakhstan, there are only about 20% of web-users who use internet while seeking an info on health service issues (table 1) [3].

TABLE 1 Searches related to health service by regions in Kazakhstan

Region	Seeking information related to health service
North region	18%
Central region	26,8%
South region	15,7%
West region	18,9%
East region	21%

2 Overview

Currently we can consider issues on the use of the Internet resources by commercial health organizations:

- the analysis of the activities of private clinics promoting their services in the Internet via personal web-site.
- the analysis of the rating scale of private clinics' web-sites according to the date of the internet statistics;
- evaluation of private clinics' web-sites content quality
- estimating web-sites conversion parameters;
- assessment of efficiency of web-site's usage from the viewpoint of marketing.

3 Decision

About 10 full-range and single range private clinics of Kazakhstan were considered as an example. Basic parameters of web-sites were evaluated: thematic citation index, content quality, web counter availability, deep links leading to the web-site, web-site conversion index. As a result, it was established that commercial clinics do not use personal web-sites effectively in the capacity of the internet marketing due to the following:

- numeral proportion of unique and non-unique users is within 1,6.
- not updating the content for a long time, low quality of content
- low index of the web-site conversion (0,8% per 1000 users)
- no integration of the web-site with social accounts
- no direct e-mails
- low rates of the site in the regional segment.

4 Conclusion

Based on the research it is established that private clinics of Kazakhstan use their personal web-sites in order to give a general information only, not paying attention to the questions of the web-site updating and have no expenditures on internet advertisement, site promotion and its integration with social accounts.

All abovementioned demands the development of this course so that clinics could obtain a ready and effective tool to promote services in the Internet.

References

[1] Malakhova N G 2010 Marketing in Health Service: work book Rostov na Donu: Pheniks 222
[2] *Official site of «TNSGlobal» representation in Kazakhstan* [Electronic resource] http://www.tns-global.kz/ru/
[3] Official site of the Statistics Agency of the Republic of Kazakhstan [Electronic resource] http://www.stat.gov.kz/

The limits of employer's economic freedom in establishing the Amount of Wages & Salaries

O Lukashina[1], A Baikov[2*]

[1]ISMA University, Latvia

[2]Baltic International Academy, Latvia

**Corresponding author's* e-mail: aleks_baikov@inbox.lv

Abstract

Latvian tax authorities have been tackling illegal income of private individuals since 2000. Salaries paid "in envelopes" are an example of common illegal practices. Latvian legislation provides methods of calculating the amount of income hidden from tax authorities. It is based on finding the margin between an individual's actual expenses and their legal income. In 2013 Latvia introduced a 300% penalty on illegal salaries and wages. However, there is still no clear definition of the subject and object of penalization. The authors of this study show the drawbacks of Latvian tax legislation and to provide suggestions on its improvement.

Keywords: wages & salaries (payroll), profit, social contributions, penalties, tax avoidance.

1 Introduction

On 23 December, 2012, the Latvian Law "On State Social Insurance"was supplemented with a provision authorizing a 300% fine for such violations. This provision was included in Article 16.1, parts 5.1 and 5.2 of the said law [1]. In 2012 a similar provision was included in Article 31.2 of the Latvian Law "On Personal Income Tax "[2]. Salaries paid "in envelopes" are an example of common illegal practices. Latvian legislation provides methods of calculating the amount of income hidden from tax authorities. It is based on finding the margin between an individual's actual expenses and their legal income. In 2015 Latvian tax authorities have started auditing the companies whose staff salaries and wages are too low in relation to the company's revenue.

The aim of this study is to show drawbacks of these Latvian tax laws and to provide suggestions on its improvement.

2 Issues

Firstly, the provision that requires the employer to be fined for their employee's illegal income is not theoretically founded. Illegal income may not be related to work, and the source of such income may have nothing to do with the employer. Legislation should determine when it is the employer who is to be penalized for tax avoidance, and when it is the employee who should be punished for obtaining income illegally.

Secondly, the law provides a rather vague definition of the first and foremost prerequisite for punishment, namely, the availability "of an income of the employer from which it was possible to perform larger remuneration to the employees than it was determined in the accounting record". Figures like the turnover, the amount of added value, the amount of profit or available cash and suchlike can be used to show the company's revenue. As we know, high net turnover frequently exists side by side with losses. On the other hand, high undistributed profits can be recorded when free cash is unavailable.

3 Overview

Legislative provision that makes the employer responsible for their employee's illegal income is based on a false assumption of the employer's inherent guilt. It also implies that the government can order an employer how much they are to pay to their employees regardless of the employment agreement. This approach is inconsistent with one of the key tenets of private law, and namely, the principle of contractual freedom and the expectation of the parties that the contract will be fulfilled. A consistent implementation of the provisions under discussion runs contrary to the goals of the International Labour Organization, which aims to implement fair labour practices in Latvia. In particular, these provisions are in contradiction with the goal of implementing labour rights set forth in the Declaration of Labour Rights and the ways of implementation thereof [3].

International as well as national legislation provides for the right of an individual to work and to receive adequate remuneration of their labour that would ensure a dignified living standard for this individual and their family. This provides the lowest and the only boundary of employer's economic freedom in so far as payment for labour is concerned. A salary cannot go below the minimum established by the law.

The government should encourage the growth of wages and salaries, to equal or somewhat exceed the growth of production productivity. Latvian taxation system should be

considered as inadequate, because a heavy tax burden on wage and salary (49% as compared to EU average of 51%) and on consumption (38.4% vs. EU average of 26.5%) [4] does not encourage its legal growth.

Cost of payroll to profit ratio is one of the criteria for the calculation of a fair remuneration of labour in a given country. Carl Marx, who was the first to articulate this assertion, considered that 1:1 was a fair ratio. Nowadays, this figure is calculated as a ratio of the gross earnings of the workforce and net profit of all the employers in the given economy in a year. As an example, this figure was 3.5:1 in the USA in 2012 [5], which is significantly less than forty years ago when the ratio was 10:1 [6]. Contrary to that, in Latvia this ratio has an upward trend. Thus, in 2004 gross salary [7] to employers' net profit [8] ratio in Latvia was 3.7:1. In 2014, salary to employers' profit ratio increased and reached 5.8:1. This figure means that an employer has to pay their employees about €6 for each euro of profit. Assessment of the amount of labour costs should be based on this average index of relative fairness of remuneration.

4 Decisions

It would be worthwhile to make the following amendments to the existing laws:

- To revise the first condition that entails the obligation to pay tax. The law should say "availability of net profit secured by free cash" rather than "income of the employer";
- To introduce an additional condition which would make the law under discussion applicable, namely: the ratio of payroll of all employees to net profit in a specified period of time is lower than national (or industry, or regional) average;
- Above mentioned provisions of tax laws should specify the object of additional taxation and fine. Proved amount of illegal remuneration to an employee could be regarded as such object of taxation and fine.

5 Conclusions

The provisions of Latvian tax laws that are the subject of this analysis infringe on entrepreneurs' economic rights in a wrongful way and therefore need revising.

There are some drawbacks in these Latvian tax laws. The lack of criteria for the assessment of a fair remuneration of labour is bound to cause conflicts in which the State Revenue Service will be involved. "Payroll to profit" ratio could help to avoid such conflicts.

References

[1] The Law of Latvian Republic *"*On State Social Insurance*"* (01.10.1997 with amendments to 06.11.2013) http://www.vvc.gov.lv/advantagecms/LV/meklet/meklet_dokumentus.html?query=Law+on+State+Social+Insurance&Submit=Mekl%C4%93t&resultsPerPage=10

[2] The Law of Latvian Republic *"*On Personal Income Tax*"* (11.05.1993 with amendments to 06.03.2014) http://www.vvc.gov.lv/advantagecms/LV/meklet/meklet_dokumentus.html?query=On+Personal+Income+Tax++&Submit=Mekl%C4%93t&resultsPerPage=10

[3] ILO Declaration on Fundamental Principles and Rights at Work and the ways of implementation thereof 18.06.1998. http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_176149.pdf

[4] Taxation trends in the European Union. Eurostat, News release 92/2014- 16 June 2014 http://ec.europa.eu/taxation_customs/resources/documents/taxation/gen_info/economic_analysis/tax_structures/2014/pr_92-2014_en.pdf

[5] Norris F 2014 Corporate Profits Grow and Wages Slide. The New York Times. APRIL 5, 2014. http://www.nytimes.com/2014/04/05/business/economy/corporate-profits-grow-ever-larger-as-slice-of-economy-as-wages-slide.html?_r=0

[6] Burger A E 1973Relative Movements in Wages and Profits Federal Reserve Bank of St.Louis. https://research.stlouisfed.org/publications/review/73/02/Movements_Feb1973.pdf

[7] IKG10_04. GROSS DOMESTIC PRODUCT FROM THE INCOME APPROACH (at current prices; thsd. euro).Compensation of *emploees. Wages and salaries. Employers' social contributions.* Databases of Central Statistical Office http://data.csb.gov.lv/pxweb/en/ekfin/ekfin__ikgad__ikp/IK10_0040.px/?rxid=cdcb978c-22b0-4

[8] UFG01. Basic indicators of financial activity of merchants (Commercial Companies) (mln euro).Retained earnings of the current financial year. Databases of Central Statistical Office http://data.csb.gov.lv/pxweb/en/ekfin/ekfin__ikgad__uznemfin/UF0010_euro.px/?rxid=cdcb978c-22b0-416a-aacc-aa650d3e2ce0

The concept of shared value: enhancing the strategy of corporate social responsibility

D Dimitrova*

Konstantin Preslavski University of Shumen, Faculty of Mathematics and Computer Sciences, Department of Economics and modeling, Universitetska Str 1,Shumen, Bulgaria

**Corresponding author's e*-mail: deni_dmd@mail.bg

Abstract

Creating Shared Value gives a new direction to improve the concept of corporate social responsibility, but still has to prove its viability and superiority over other approach if it wants to get widespread use and recognition. The concept of shared value is a more sustainable approach to both business and society for integrating social responsibility into the company's operations without external pressure.

Keywords: Corporate Social Responsibility (CSR), Creating Shared Value (CSV), Business, Market

1 Introduction

Business is the motive power behind economic growth and international development. It can (and it should) play a substantial role alongside with the Government, society, and the local communities in dealing with complex, local, and global issues, i.e. famine, poverty, inequality, unemployment, climate change, etc. In a small-scale market such as that in Bulgaria it is highly unlikely that businesses might vest interest in incorporating practices to do with corporate social responsibility (CSR). A typical fault of Bulgarian business is that it would estimate CSR practices based on the expense involved, rather than the benefits of incorporating them. More often than not, Bulgarian industries initiate corporate practices erratically, and do not wish to fit such practices in their company agenda. The private sector should give up on short-term profits in favor of general CSR policies as part of their plan for long-term profits.

According to the definitions above CSR is the voluntary commitment of businesses to improve social and environmental conditions of life of local, national and global levels.

Archie Carroll came up with a pyramid of corporate social responsibility that indicates the links between each level where businesses can define their responsibilities.

- Economic responsibilities: Be profitable!

Economic responsibility is seen as a basic business responsibility and it has to do with maximizing profit. Each company that fails to meet its economic responsibilities is doomed to bankruptcy.

- Legal responsibilities: Obey the law!

The legal responsibilities of any firm have to do with obeying all rules that reflect the general opinions of what is right or wrong.

- Ethical responsibilities: Be ethical!

Each company's ethical responsibilities pertain to certain responsibilities that go beyond the basic economic and legal requirements for a business to operate. Ethical responsibilities (i.e. what is right and fair) are to be expected of all parties concerned, however, unless run by the Government or otherwise restricted by way of law, their appropriation is fairly subjective.

- Philanthropic responsibilities – Be a good corporate citizen!

Contribute resources to the community! Improve quality of life.

Fundraising may refer to gathering considerable amounts of money for various charities, local communities and general social contributions.

The Harvard Business Review magazine, Jan-Feb issue of 2011, published a fundamental article by Michael E. Porter and Mark R. Kramer titled Creating Shared Value. How to reinvent capitalism – and unleash the wave of innovations and growth? [1].

The concept of shared value promotes the notion that a successful market development depends on business need as well as social necessities. This means acknowledging social needs not simply as a burden to business that only leads to more expense, but as a way to enhance business efficiency while adding value to society. Corporate policies and practices that boost a business's competitiveness - while simultaneously improving the quality of social and economic conditions within their modus operandi – are a guarantee for long-term profits. A profit that includes shared value enables companies to thrive on new markets while at the same time it provides development of key public assets, favorable and stable environment, and the prosperity of all stakeholders. Shared value models strengthen the link between business and society, for society needs successful businesses just as much as business needs successful societies.

Creating shared value encompasses the inner field as well as the outer field of a company.

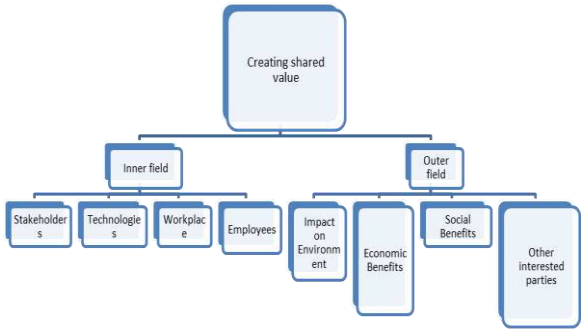


FIGURE 1 Directions in creating shared value

Directions in creating shared value in the inner field concern the following assets:

- Stakeholders: ability for personal involvement of stakeholders in various corporate social initiatives.
- Technologies: investing in new equipment will ultimately save on materials and resources, boost productivity, lower residue, improve quality of produce, etc.
- Workplace and organization culture: secures safe work environment, minimizes hazard at work, saves on company's expense in healthcare and insurance.

Organization culture shows for company etiquette that largely undermines employees' demeanor. Fair practices on behalf of managers and stakeholders may be a good lead to employees, and that may lead to savings.

- Employees: professional competencies, career development, health, and personal development. An example for a created shared value would be a company that has helped 2/3 of its employees to give up smoking in the past 15 years. In years to come that investment would save the company $ 250m in healthcare.

Directions for creating shared value in the outer field concern the following assets:

- Impact on environment: use of water and electrical power as well as pollution. A good example of creating value is WalMart in that they have reduced their hydrogen emissions to save up to $200m by receding their packaging and shortening routes by 100m miles.
- Economic benefits: development of infrastructure, creating more job opportunities and more business perspectives. For example, Exxon Mobile oftentimes contributes to the improvement of roads in developing countries where they operate.
- Social benefits: education and wellness. A good example of success in that field is Apple Computer that gives away computer systems to schools, thus they promote their products in the best possible way. The nutrition producer Nestle claim to take good care of cows in dairy farms from the Moga region in India. With Nestle's help animals' death rate has declined by 75 per cent, milking rates have risen 50 times, and the number of milk farms to deliver for the company has grown from 180 to over 75.000.
- Other interested parties: suppliers, clients, future generations. Improving suppliers' skills, knowledge, and performance. Creating local clusters for sustainability and improvements in the economic and social wellness of the community.

The concept of shared value provides a new direction for improving the concept of corporate social responsibility; however, it still needs to prove for its livability and superiority to be broadly accepted and applied. The concept of shared value is a more sustainable approach from a business perspective as well as society-wise, since it integrates social responsibility in company activities without any outer pressure: social and environmental goals are incorporated within the business strategy.

Corporate social responsibility as a key factor in business activities is still gaining momentum in Bulgaria. Corporate socially responsible are mainly international companies that operate in the national market. Small and midsize businesses that are active mainly on a local (regional) level in specific fields have yet to make their first steps toward corporate management.

Being voluntary by default, their scale of integration, development, and application make corporate practices in Bulgaria highly unlikely for companies to switch from corporate social responsibility to shared value. We might expect co-existence of the two approaches, where corporate social responsibility outweighs shared value in the long run.

References

[1] Porter M, Kramer M 2011 Creating Shared Value. How to Reinvent Capitalism – And Unleash the Wave for Innovations and Growth? Harvard Business Review
[2] UN Global Compact www.unglobalcompact.org
[3] CSR Bulgaria http://www.csr.bg/

Prospects for the development of innovative economy in Latvia

V Riashchenko, T Odinokova*

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019, Riga, Latvia

**Corresponding author's* e-mail: tatjana.odinokova@isma.lv

Abstract

Nowadays innovation is an active link in all spheres of society. Innovation - is the key to leadership, because they provide a competitive advantage of the enterprise. It is not only high-tech invention, product, device, apparatus, but also a special kind of project management, since in addition to the development of the most important aspect is the effective application of innovation and management.

Keywords: Innovation, business, innovative economy, competitive advantage, competitiveness, innovation policy.

1 Introduction

Innovation is the set of processes that permeate the entire activity of the company and implemented in the form of new products, technologies, services, organizational and technical and socio-economic management decisions of economic, administrative, industrial and other nature. Modern business is based on innovative business models. [1]

Innovation policy plays a central role for the development of both the economy of Latvia, and for most businesses, in particular.

Promoting innovation is one of the key elements of development plans and strategies, as well as a key factor in solving urgent social problems, such as pollution, health problems, unemployment and poverty, as well as the problems of long-term strategic competitive advantage in the field of business creation and development .

According to the National Development Plan of Latvia for the period from 2014 to 2020. One of the objectives for the development of innovation is the commercialization of knowledge and to stimulate the creation and introduction of innovative products that are competitive on the international level, with high added value, thus increasing the share of production volume these products in the economy [2].

In Latvia, an interest in innovation is the lowest in the Baltic States, but is growing, so if in 2015 only 39% of small and medium-sized enterprises of Latvia intended to innovate, then in 2016 - 59% (in 2014 - 48%) [3].

Low R&D activity in the Latvia with objective factors. Innovations are usually created by major international manufacturing companies but there are hardly any such companies. Moreover, main Latvian export products are timber, furniture, food and agricultural products, chemical products, and ingredients used in production in these sectors offer only limited soil for innovation. [4]

When comparing the data collected during the last three BBO research shows that goods and services are clearly the preferred sphere of innovation: in 2016 39% of Estonian and Lithuanian and Latvian 36% of SMEs are planning to focus on this. In the past three years, the intensity of the expected upgrade of goods and services increased in all Baltic countries. More significant in just the last year has increased interest in innovation in Latvia. [5]

FIGURE 1 The amount of innovation in the products and services of the Baltic States (2016)

The study showed that other areas of innovation for these companies are not as attractive.

Innovations that have been successfully commercialized, Latvia provide the ability to produce the exported products and provide services, competitive at the international level. Research and innovation can be useful for increasing productivity, not related to a decrease in labor costs. Therefore, carefully coordinated policy of Latvia in the field of innovation, based on clear objectives and appropriate institutional infrastructure is indisputable means to achieve success.

Implementation of the innovation and industrial policy in a single complex with the social policy allows you to combine economic and social progress.

2 Conclusions

For Latvia it is very important to find innovative ways to

overcome the challenges of energy, transport, sanitation and obtain higher profit margins for local craft and creative industries.

The role of innovation in the global competition is that they provide opportunities for companies engaged in innovative activities by means of their implementation to ensure technological dominance in the market and win the competition.

References

[1] Дудникова А В 2014 Сущность и условия применения инновационных бизнес-моделей *Молодой ученый* **14** 154-6
[2] National Development Plan of Latvia for 2014–2020
[3] http://bnn-news.com/economic-diary-latvia-small-innovative-country-126225
[4] http://www.baltic-course.com/eng/analytics/?doc=117590
[5] Prospects for business in the Baltic countries in 2016 (Baltic Business Outlook (BBO))

Development of the investment potential of enterprises in a dynamic environment

O Zerniuk*, A Glebova

Poltava National Technical Yurii Kondratuyk University, Poltava region, Ukraine

**Corresponding author's e*-mail: zernuki@mail.ru

Abstract

The paper deals with the conceptual framework of the implementation of investment potential of enterprises in a dynamic environment. The main incentive for continuous development of enterprises serving the variability of the environment, because according to the needs and priorities of which the enterprise is changing. Reserve development is its potential. The immediate resource component of which is investment potential. Understanding leverage and principles of development makes effective operation of the business in a strategic area. Given the cyclical nature of the investment process, the company needs to ensure the continuity of its development through the mechanism of organizational support.

Keywords: enterprise development, investment potential, investment process, organizational support

The current stage of economic development is characterized by significant changes in both the external and the internal environment of enterprises. Due to the accelerated pace of technological progress is exacerbated competition in the proposed new products and services and improving their quality. Accordingly, the economic situation of most undertakings is largely determined by the pace and scale of the investment activity. It just so enterprises have the ability to respond quickly to dynamic conditions of competition through the use of different types of innovation.

The tendencies highlight the need and priority of investment activity by companies. There is an urgent need to construct a reliable investment system capacity building and ensure its continuous development with various streams playing destination on innovative principles.

Study of the essence of the investment potential of individual companies allows noting that it should be considered only in conjunction with the system economic, market and production potential and total potential of the company.

In addition, investment as known, has a cyclical nature, so efficient and continuous operation of the investment potential is impossible without ensuring the processes of development.

It should be noted that the management of investment potential, focused on its development, provides:

- Identifying investment priorities and of the investment potential functioning within the strategic development of the company;
- the development of investment projects, taking into account opportunities and build value through the synergy of financial and managerial flexibility;
- building of management system that includes models, competencies that promote growth through the integration of production, investment and innovation potential.

We conclude that the research activities of enterprises ensure the development and growth of efficiency of investment potential in innovation activities, primarily depends on the adapted organizational structure of management and organizational support of the investment potential, which is a system of interrelated organizational and economic elements and specific management functions, to achieve the goals associated with the continuing development of the investment potential based on its setting optimal parameters, scope and structure of effective use of automation and providing motivation

Innovative drivers for modern economic growth

O Komelina, M Korsunska

Department of Management of Poltava National Technical University Yuriy Kondratiuk, Poltava, Ukraine

Abstract

Technologies are the main economic growth driver in the world. Government policies and programs that most effectively promote entrepreneurship, innovation, technology development, and job creation have to be rooted in market reality. While building on the existing core industries and technological advantages of Ukraine while having the foresight and wherewithal for pursuing opportunities in growing and emerging sectors. Building on and sustaining existing economic momentum remains a key means of responding to the challenges of fostering growth in an increasingly competitive global economy and guaranteeing success in the future.

Keywords: innovation, drivers, economic development, economic growth, technology, technology-based economy

Ukraine's hardworking for innovation and entrepreneurial drive is well known. Scientists have calculated that we can have approximately 20-30% of our GDP growth is attributed to increases in innovation.

The regions that lead the transformation to the knowledge- and technology-based economy currently have enormous advantages. Governments, public-private partnerships, and development organizations across the world have attempted to emulate Silicon Valley for decades. Some of those efforts have paid off, as science, technology, engineering, and math employment has dispersed to many regions. Although only a fraction of companies around the world may consider themselves to be in the technology business, the great majority increasingly rely on technology to operate and compete. Particularly as we look at the growth of both technology industry jobs and those occupations that require mentioned skills, the pattern of growth is far more dispersed. This pattern is best measured by tracking the trajectory of new jobs, which cover technical skills but are deployed across industrial sectors.

The future of Ukraine - and their ability to meet major economic, social, and environmental challenges- rests largely on how we adapt to and take advantage of changes in technology. There was a time when state economic development programs focused only on implementing tax incentives. In recent years, growing from within by supporting expanding young employers and assisting new startups has become a stronger focus of job-creation efforts.

Many regional strategies for business growth are now based on the assumption that innovation and technology development drive growth and competitiveness in a 21st-century global economy. Technology entrepreneurship is distinguished from other entrepreneurship types (such as social entrepreneurship, small business management, and self-employment) by collaborative experimentation and production of new products, assets, and their attributes, which can be intricately related to advances in scientific and technological knowledge and the firm's asset ownership rights. "Innovation-driven enterprises," which include a wider universe of entrepreneurial firms whose competitive advantage might be a process, service, or business model, are also an important piece of the puzzle for regions wanting to foster a more innovative economy.

Ukraine need to target high-tech companies/ Innovation-driven technology-intensive businesses are viewed favourably for their potential and disproportionate impact on competitiveness, future economic growth, and prosperity because they often:

- create jobs that command above-average salaries;
- pay a high percentage of their income to their employees, rather than out-of-state capital equipment or out-of-state raw materials;
- can be located almost anywhere because of the connective power of the Internet and improved transportation systems, particularly air travel;
- create additional quality jobs that are not technology focused, both inside and outside the companies themselves; and serve markets that are outside the state, thereby bringing new wealth into the state.

"Technology-based economic development" is the approach employed by governement to help create a business climate and to enable an environment where an economy based on innovation and technology can thrive. There is no single recipe for successful tech-based development, yet there are critical ingredients. Based on the experience of tech-based economy like Silicon Valley, the following elements are the essential, synergistic building blocks for building a tech-based economy:

- a research base that generates new knowledge,
- mechanisms for transferring knowledge to the marketplace,
- sources of risk capital,
- a technically skilled workforce, and
- an entrepreneurial culture.

Each region has its own portfolio of policies and programs to build a more innovative, tech-based economy; some regions are focused on a small number of initiatives targeted to a single stage of the business lifecycle or industry

sector while others have put in place a very comprehensive framework - an ecosystem approach - that aligns policies, programs, and resources in a highly integrated system that encompasses the entire research, development, demonstration, and commercialization process, that is, the five elements of a tech-based economy.

Government initiatives have to be implemented in cooperation with local or regional development organizations and businesses, including the following:

1. Accelerator and incubator initiatives that focus on starting and growing technology firms
2. Economic gardening initiatives that offer specialized services to expanding existing firms with strong growth potential
3. Business ecosystem initiatives, with a regional or industry-specific (cluster) focus, which take a comprehensive approach to creating an environment that is highly conducive to technology startups and mature firms in a particular industry
4. Investments in university research and in advanced research and technology facilities or specialized equipment
5. Co-working spaces, collaborative lab spaces, or maker space settings that encourage innovation through collaborative design and development and access to specialized equipment
6. Proof-of-concept funds to do early-stage evaluations of the commercial feasibility of a new or improved product, process, or service
7. Infrastructure investments that provide highspeed broadband service networking and collaboration initiatives that bring small businesses and entrepreneurs together with large companies and universities
8. Mentoring programs that connect entrepreneurs with experienced business professionals, including entrepreneur-in-residence programs International trade programs that help businesses reach out to new global export markets.
9. Incentive programs and tax abatements that target specific technology sectors Fostering an enterprise-friendly business environment by cleaning up the delays, uncertainty, regulations, and taxes, modernizing government, and fixing deficiencies in the market that inhibit private sector investment and entrepreneurial activity
10. Government-operated or region-funded seed and venture funds that focus on startups and expanding technology firms
11. Matching fund programs to leverage government or private sector funds
12. Crowdfunding laws that allow entrepreneurs to raise modest amounts of capital from informed investors
13. Education programs for investors about equity investment
14. Specialized training programs at technical universities for specific technology sectors and individual businesses
15. Workforce development initiatives that help technology companies connect with and train the talent they need to operate and compete, including the expansion of internship programs for students who want to work in technology careers

In the final analysis, state policies and programs that most effectively promote entrepreneurship, innovation, technology development, and job creation are rooted in market reality. This means building on the existing core industries and technological advantages of a state while having the foresight and wherewithal for pursuing opportunities in growing and emerging sectors. Building on and sustaining existing economic momentum remains a key means of responding to the challenges of fostering growth in an increasingly competitive global economy and guaranteeing success in the future.

Evolution of the concepts of social systems security

O Komelina

Department of Management of Poltava National Technical University Yuriy Kondratiuk, Poltava, Ukraine

Abstract

We studied term “security” and found that it is often treated as a property of social systems and of their elements (individuals, households, etc.). In economics science exists any set of universal properties, a kind of ‘core concept', which can be identified in all circumstances when the term ‘security’ is applied.

Keywords: security, social systems, concepts, elements

As in other areas of social sciences, in security studies theory follows the unfolding processes and provides descriptions and interpretations. Causal explanations are rare or superficial. Predictions or normative approaches are even more difficult to find. It may be claimed that in the contemporary discussion on security, analytical properties of that concept too often are either concealed in a broad ideological discourse, or are deriving from common sense reasoning. Attention is paid to the universalization of security, political, doctrinal, and even ideological issues and to critical approaches, with a lack of care for definitions. Too frequently the questions are asked what we think about this or that definition of security. Bearing in mind broader reflections on security, it is necessary to reflect upon more specific facets of security - the identification of threats and risks, the limits of prediction, actions taken to maintain or to restore security, consequences of securitization or desecuritization, validity of policy recommendations.

It is impossible to answer whether the broad idea of security can be refined to fulfil the needs of more rigorous theorizing. But it is possible to study the analytical properties of the broadened definitions of securing', i.e. to which extent they can be used for description, explanation of causal relationships, and prediction of phenomena in various social collectivises, not solely in international relations. Since security theory by definition has a normative character, thus expectations are going even further and analytical properties of the concept of security should facilitate normative applications.

Usually security is treated as an attribute of different social entities (collectivises) - states, groups of states, society (defined in different ways), or as in the case of human security, as a property of living conditions of individuals. It is then necessary to discuss securing’ not as a broad and fuzzy normative idea, but as a property of the status of social entities and of their elements (individuals). Security treated as a feature of social systems can be viewed both in terms of ‘objective’ properties, as well as a construct emerging in the discourse of the external observers and/or participants. Major questions are: How security treated as a property of social systems and of their elements (individuals) can be described and studied. Whether there exists any set of universal properties, a kind of ‘core concept', which can be identified in all circumstances when the term ‘security’ is applied.

In a kind of mirror approach, in identifying links between security-related issues and complex systems studies, Murray Gell-Mann, a Nobel Prize winner and specialist in complexity studies, saw an obstacle in a too broad definition of security. Systems thinking, systems approach, and complex systems studies can be used in security theory and policy as sources of analogies, metaphors, and mathematical models.

Using another approach, four of Wittgenstein’s ‘language games emerge including:

1) The meaning of security;
2) The meaning of system;
3) The meaning of ideas where the concepts of system and security arc jointly applied;
4) The meaning of complexity.

Security and politics have been important areas of applications of various ideas drawn from systems thinking. The newly emerging military and non-military threats such as low-intensity conflicts, regional conflicts, terrorism, environmental disturbances, etc. cannot be embraced without ideas taken from modern complex systems studies.

It is impossible to elaborate a comprehensive and unequivocal definition of the security concept. The approaches presented below reflect a twofold evolution of the applications of the term ‘security’. In the first group security is associated with international relations and either treated as an ’objective’ attribute of a situation of the state or as an outcome of social discourse, as an ‘act of speech’ - performative utterance, a result of ‘securitization’.

The second group includes a rank of ideas either deriving from the international security discourse, or developed independently: ‘internal security’ within a country, security in military considerations, security as a

public good, and security in an universal sense (of any individual and of any social entity) - societal security, and first and foremost, human security.

Etymological discussions on the origins of the English notion ‘security’ are twofold and reflect a discrepancy already existing in Latin interpretations of the term. In the first interpretation, the term security derives from Latin securus safe, secure, from se without + cum care - the quality' or state of being secure or as a freedom from danger (freedom from fear or anxiety). In the second interpretation, the English word ‘security’ originates from the Latin word ‘securus' but a different interpretation. ‘Se’ means ‘without’ and ‘citrus' meaning 'uneasiness’ or ‘full of cares or worries'.

The difference of interpretations stems from the absence of an unequivocal interpretation of the term cum (cums) - cares and/or worries. The Latin term cum can be also interpreted in French as ‘soin’ or ‘.The prefix se- occurs in the word securus ‘safe, free from worry', and appears to lx-formed from the word cums, ‘cares or worries’. I say ‘appears’ since the inflectional suffixes (-.as and -ms, here) are also changed; whether se- attaches to the noun cum or whether there was once an adjective citrus meaning something like “full of cares or worries" anti securus is the only adjective remaining." ‘Security’ originally meant liberation from uneasiness, or a peaceful situation without any risks or threats. The term ‘security’ has many meanings, including ‘to feel safe’ and ’to be protected’, and is used to describe a situation without risks or worries.

The traditional interpretation of security is deriving from foreign policy and international relations -‘objective’ or 'military security’. This sense of security can be extended by the concept of internal security, i.e. absence of threats to the state system and to the everyday life of its citizens caused by political and or military disturbances within the borders of a country. After it September 2001 a broadened concept of ‘homeland security’ embodying both external and internal threats was institutionalized in the US on 25 November 2002, when President George W. Bush signed the Homeland Security Act. The second term ‘military security’ can to a large extent be associated with both traditional meanings of security - external and internal. In numerous cases all combat-related military activities arc given a security context in its traditional sense as national (state) security.

References

[1] Czeslaw Mesjasz Security as Attributes of Social Systems; available online: http://link.springer.com/chapter/10.1007%2F978-3-540-75977-5_2#page-2

Formation of social responsibility rights of human, business, government and society as the basis of sustainable development of Ukraine

R I Bilovol

Poltava National Technical Yuri Kondratyuk University, Tourism and Administration Department, Pershotravneviy Str., 24, Poltava, Ukraine

Abstract

The publication focuses on the need to develop social responsibility of the person who is shown by the degree of social maturity; business which is responsible for social workers, citizens and society; state that a socially responsible direction for the sustainable development of the country.

Keywords: social responsibility, social responsibility types, people, business enterprises, government and society.

1 Introduction

Social responsibility serves an essential element in the macro-relations man-state, society. Subject person now, the state, society, principles of social responsibility might achieve sustainable development.

2 Main part

Social responsibility is multidimensional and multi-leveled, which should be realized by:

- personal (individual) level - manifested by the degree of civic maturity of the individual and is the base for other levels;
- group level of social responsibility is defined as corporate social responsibility;
- it provides for public social responsibility for the society a decent standard of life of present and future generations;
- state level of Social Responsibility determines the best way to achieve sustainable, social and human development;
- globally Social Responsibility outlines priorities of global development of human civilization through international agreements to implement sustainable development and the UN Global Compact [1].

Depending on the types of social norms of various expedient should be selected such kinds of social responsibility, moral, religious, disciplinary, political, legal.

Moral responsibility is in case of traditions, customs, norms, culture and aesthetic standards. She appears in public condemnation and separation from social entity that violates or avoiding the norms of behavior.

Political responsibility is in violation of regulations, compliance with which society relies on public policy.

Corporate responsibility is in case of violation of corporate policies adopted by certain social structure and have no legal value.

Religious liability based on the standards governing the worship and faith in God.

Legal liability arises in the case of violation of state-organized law provides active psychological impact on the offender until the compulsory use of physical restraint [2].

3 Conclusions

Thus, to achieve the realization of sustainable development in Ukraine the modernization of management of enterprises of all legal forms of ownership and public relations on the principles of social responsibility when they involve motivational mechanisms for socially responsible behavior in this area of the individual, society, business and state are needed.

References

[1] Verhun L I 2010 Social responsibility in the global financial crisis *Theoretical and applied economics question: Coll. Science. works* K, **23** 165-70

[2] Kolot A M 2011 *Social Responsibility as a factor of sustainable human social dynamics: the theoretical foundations* Ukraine: aspects of labor [electronic resource]: nauk.-economical. and susp.-flight. Journal type-in "Work"; Goal. Ed. A. Varetska **3** 3-9

[3] Pivnyak G G 2014 *Social responsibility of authority, business, citizens: monograph in 2 vols:* N-*of Education and Science of Ukraine* Nat. Hearne. Univ. - D.NHU **1** 629

Improvement of personnel system in telecommunications company JSC "Balticom"

I Boisina*

ISMA University, 1 Lomonosova Str., Bld. 6, Riga, Latvia

Corresponding author's e-mail: irinaboisina@gmail.com

Abstract

Linear-functional structure of JSC „Balticom" realizes the principle of democratic centralism, when preparation and discussion of decisions is performed collegially, but decision-taking and responsibility is only in competence of the first director solely. Structure of JSC "Balticom" synthesizes features of linear structure (connections of clear subordination, centralization of management in one hand) and functional structure (labour division, preparation of qualified decisions). Linear links of subordination are more specific for lower levels of the given structure, but the functional ones – for higher levels.

Keywords: personnel, manager, motivation, attestation, assessment, criteria, human resources, centralization.

1 Introduction

For successful and competitive cooperation of the enterprise in current market, it is necessary to provide yourself with qualified personnel, to give necessary skills to the workers, in order to have them apply these skills, and to motivate workers.

Currently dependence of enterprise flourishing is incresing due to effective personnel management. Aim of this work is to view functions of personnel forming process. Tasks to be solved in work could be these:

- to view process of personnel politics management in enterprise;
- to characterise personnel planning system;
- to characterise personnel involvement organising;
- to characterise personnel system education;
- to view carrier management system in the enterprise;
- to explore theoretically analysed personnel management function performance in practice.

2 View of information source

Worker forms own behaviour in the organization, trying for his or her growing and looking on others' position.

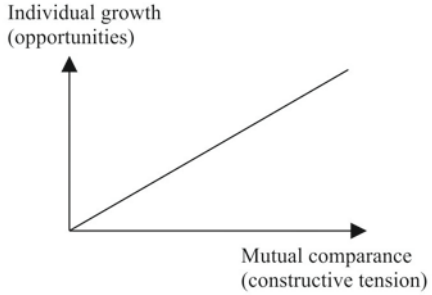
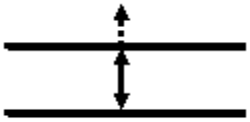


FIGURE 1 Motivation scheme

In other words, same needs encourage employees' individual achievements, but comparison with other achievements cause stress. This voltage can be constructive if the organization identifies the following opportunities for all. This tension becomes destructive when such opportunities organizations reveals only for some, but closes others.

Directorship can significantly activate organization's workers, forming growth opportunities in combination with comparison of priority parametres.

Any worker can perform his or her work on the highest or the lowest level. The lowest one means not violations, but only the minimum rate of return, which doesn't give justifications for directorship to make comments, in particular, to apply sanctions. Task for the directorship is to somehow motivate the worker to perform the work on the highest level or a little higher.



Constructive tension building, that is, some races, open opportunities' promotion realization, motivation to a number of staff, imposed on the highest level. What tools allow the directorship to realize the similar motivation mechanism on the level of every department and worker?

Diagnostics of JSC "Balticom" shows that the personnel and managers know well, what the organization wants from them: further aims, priorities, assessment criterias, and acceptable limits. Directors know well, what definitely to ask from their subordinates and how to present these requirements. This happens with a help of commands, orders, in oral or written forms, on the meetings, through

bonuses or penalties. But still, more precise methods of aims' coordination for directorship-subordination line is needed.

3 Original part

6 departments function in JSC „Balticom" company.

Directorship of the enterprise accepts main decisions and performs permanent monitoring of enterprise's activity, follows every department's activity more specifically, as well as interaction between other departments, set tasks for directors of every department and follow the performance results.

To the *Commercial department* belongs advertising manager, who „drives" the product, making it recognizable and attractive for potential customer, performs work with programmers of Commercial department, who can realize ideas in programming.

Group of sales consultants operate in Commercial department, in whose duties include attraction of new clients, as well as work with house managers, in order to receive access to objects, necessary for working, but the most improtant task is consulting of the potential client on the topic of possible connection options. There is also concentrated centre of advertising ideas' generation centre, forming of new tariffs and everything that can interest potential customer with new power.

Afterwards, when a client has decided and chosen service and type of contract, application for the connection is drawn up. Created application is forwarded to the Development department.

Development department is divided into two subdivisions. The first subdivision operates with building of opticle network, its modernization and formalization of new network projecting documents, but the second one – directly with providing of JSC „Balticom" services for new clients. JSC „Balticom" company has all necessary licenses for work performance in accordance with Law of Reublic of Latvia and Cabinet of Ministers Regulations.

After that, when new connection is finished, information about new client is given to Subscribers department and Technical department.

Subscribers department operates with invoicing, information input in data base about acquired payments from clients; consults them about matters of payment and questions, which are connected with moving to another subscriber price; accepts and registers requests from the clients; answers on them, likewise this is one of the components of work of Subscribers department. This also includes the work, preparing reports for Financial and economic department, as well as there is debtors' list for the „physical deactivation", which afterwards is forwarded to the Technical department.

Technical department operates with clients' service oon the topic of technical matters. Service happens by telephone and via e-mail. In case of technical damages, when technical master has to leave to the object, specialists of Technical department register and form technical master's call. Technical department's specialist's duties include: local network maintenance in working condition and its modernisation in tandem with Development department. Main task of the department is damage prevention in the shortest terms by telephone, or straightly on the object. Work of the Technical department is performed non-stop around the clock.

Financial-economic department is a „heart" of JSC „Balticom" enterprise, which performs necessary calculations, connected with a work of all company in common and with every subunit separately. Costs calculation of the enterprise is also in duties of accountancy.

Household department – its functions consist of:

- to control and permanently maintain work conditions according to requirements of the „Law of work safety" in Republic of Latvia;
- to maintaim in order workplaces of workers, as well as to perform everyday laundry on territory of the office;
- to accept in warehouse and to hand out from it materials and tools;
- to perform warehouse accounting.

After 16 years of successful work in telecommunicaitons market, JSC „Balticom" company has acquired big experience in sphere of local networks and plant constructions and in sphere of service. As in the enterprise staff there are high quality specialists, enterprise offers to clients new services to keep pace.

4 Conclusion

All personnel management functions in viewed analytical part are closely related. For successful enterprise operation personnel attraction has to be harmonized with personnel politics.

Balticom enterprise coordinated its strategjc aims with its personnel planning and training. Main personnel planning task is to expand and improve activity of personnel planning.

References

[1] Пригожин А И 2003 *Методы развития организаций* М.: МЦФЭР, 863 с.: ил. - ISBN 5-7709-0198-5 Шифр: У9(2Р)2-П.755 НО

[2] Медоуз Д Х 2011 *Азбука системного мышления* М.: БИНОМ. Лаборатория знаний 343

[3] Ulrich D 2012 *HR from the Outside In: Six Competencies for the Future of Human Resources*

[4] *Darba likums* http://likumi.lv/doc.php?id=2601

Professional competence in the public health education

M Elubayeva[1*], O Golub[2], G Kabduyeva[3]

[1]*Karaganda State Medical University, Gogolja Str. 40, 100000 Karaganda, Kazakhstan*

[2]*Moscow Business School, Voinov-Internazionalistov Str. 31, 100009, Karaganda, Kazakhstan*

[3]*Czech University of Life Sciences, Kamycka Str. 129, 165 21, Prague, Czech Republic*

**Corresponding euthor's e-mail: elubaeva_maral@mail.ru*

Abstract

At the present stage, a problem of humanitarian level "The Man and health" is dominated in the system of higher medical education. Hence, the problem of transition from the traditional model to a personality-oriented model in shaping the future of professional ability becomes more urgent in order to solve non-stereotyped professional problems, creative thinking, and the ability to manage.

Keywords: professional competence, public health, higher education, management, integration, medicine

1 Introduction

The modernization of higher education has become a necessary condition for taking out the higher education training system practice to a new level. In this regard, the particular relevance acquires training of specialists in the public health. Hence, the system of higher education sharply raises the question of content, structure and management of specialists in public health education of a new level that can meet the requirements of modern times and objectively evaluate the achievements of the Bologna process by linking together basic education and competence of chosen profession.

2 Professional training and formation of professional competence of public health specialists

The growing role of training public health specialists with the higher education requires the organization of higher education systems not only of fundamental knowledge but also the improvement of management of educational activities. Therefore, the content and organization of educational process aims the formation of a personality of the future specialist, his civil liability, legal culture and legal consciousness, spirituality, initiative, independence, tolerance, ability for successful socialization in society and professional maturity. These issues are the most urgent problems of higher education system, nowadays.

A special role in the development of the higher education system acquires the significance of the formation of students' professional competence. The main emphasis in the training of future professionals is transferred to the measurement of the results of education, the requirements for which are formulated in the form of competence. The concept of competence is defined as the ability to apply the knowledge and skills, and personal qualities in order to be successful in a certain area, and it is divided into two large groups: general and professional. The general group includes common scientific, socio-personal and communicative, organizational and managerial competences. The basic professional group containes general professional competence in a chosen field of activity and professionally-profiled (specialized) competences, which are appropriate for a specific graduate specialization.

3 Improvement of professional competences of a future specialist

Continuous improvement of the professional competences and education throughout the life is essential for the competitiveness of a public health specialist. The professional competence of the future specialist appears as a unique system of professionally significant qualities, knowledges and skills, which are combined with humanity and value attitude towards clients and co-workers. A client is guided, not only by professionalism in its conventional sense, but also on a purely human, personal qualities of a specialist. Perhaps in some cases, the psychological quality of the public health specialist is more important for the client than the professional knowledge and skills.

Almost all professions require skills that are necessary for the professional team building. At the same time, a university teacher should assess the results of pedagogical creativity in the application of knowledge of modern concepts of vocational training, innovative techniques and methods during the class works with the students. The public health specialist with the effective communication skills can determine the client's problem more precisely. It is important that the perspective of improving the quality of educational services depends on getting more of job satisfaction, which is tend to a specialist with effective communication skills.

Based on the needs of modern health care system, skills

training research is a prerequisite for graduate training system of the public health. Formation of scientific competence will enable graduates to teach him/her the skills of orientation in the information environment, to analyse the results of observations, prepare the articles and other forms of presentation of research, presentations and speeches, and to conduct a reasoned scientific discussions. Hence, the health system is knowledge-based sector of the economy.

Self – improvement is the goal of human life. The competitiveness of an individual manifests itself in the process of interpersonal interaction, competition, and struggles for aiming the highest benefits. The individual, who successfully competes in the labour market, is characterized by constant efforts to manage himself/herself and his/her activities. The individual constantly improves the level of his/her professional competence, and engages in self-education.

Terms of ensuring the high quality of higher education is characterized by the organization of teachers' and students' activities and their interaction in the educational process and the construction of an appropriate educational environment that is the main task of management in education.

4 Conclusion

From the above, it can be concluded, that the formation of a new model of a manager and entrepreneur in the medical field requires the organization of educational process in the public health higher education through the integration of knowledge in the field of medicine, economics, law, business, marketing and management with the mandatory application of competence-based approach.

References

[1] Bobryshov S V, Kolosov N V 1999 *Management of educational process as a social technology* Herald NCSTU **1** 73-8 Humble, Farley D 2010 Continuous Delivery

[2] Budanov V G, Zhuravlev V A, Kharitonov V A *Management of educational process in modern conditions: innovation and modeling problem* www.isps.com Defect Prevention: Reducing Costs and Enhancing Quality - http://www.isixsigma.com/industries/software-it/defect-prevention-reducing-costs-and-enhancing-quality

[3] Kosarev I I, Popkov A V 2003 *Pedagogical aspects of higher medical education* M.: Federal State Unitary Enterprise Experimental typography 6

[4] *The farm R V - Key competencies and educational standards: Report on the Department of Philosophy of Education and the theory of pedagogy RAO* April 23, 2002 - Center "Eidos". www.eidos.ru/news/compet/htm.

Innovative activity - key to successful operation of economics and security of Ukraine

V Riashchenko[1], I Markina[2*], M Somych[3]

[1]*ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019, Riga, Latvia*

[2]*Poltava State Agrarian Academy, Poltava region, Ukraine*

**Corresponding author's e-mail:iriska7@ukr.net*

Abstract

The article explored theoretical basis of innovation, analyzes the state innovation development, the problems of innovation Ukraine.

The basic internal and external threats to security innovation, create obstacles for the realization of national interests and objectives in the field of innovation

Keywords: Innovation, innovative economy, competitiveness, innovation policy. Economic growth must be linked mainly with the development of innovative economy, avoiding dependence on commodity sector development, which in turn reduces the risk of external and internal threats to economic security

1 Introduction

The current economy of Ukraine and analysis of the situation in the economic activities of economic entities of all sectors indicates that it is now the time when innovation becomes the main role in the economy as a whole. Corporations and companies show a growing interest in innovative investment as it allows you to create new products that satisfy the growing market demands and ensure a high level of return on invested capital.

Analysis of the current state of the economy of Ukraine shows that Ukraine lacks a motivational activation conditions and resources for innovation processes, the availability of powerful inertial factors (fig.1.).

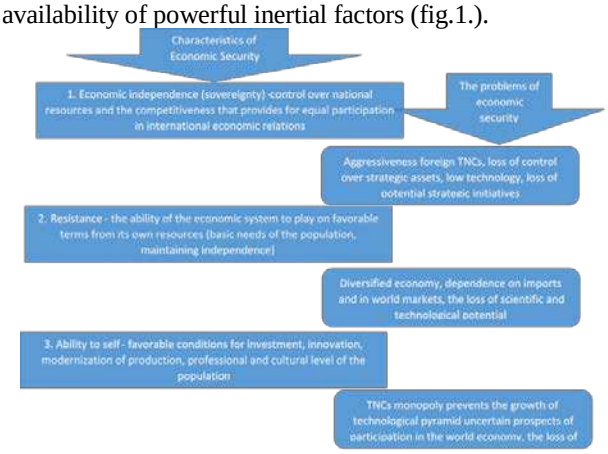


FIGURE 1 Characteristics and problems of economic security of Ukraine

The role of innovation in the modern world can not be overestimated. Innovation perform both economic and social function, covering all aspects of society, affecting personal matters. In the long term without innovation is not possible further economic and cultural growth of the intensive development path [1].

Providing innovative security now economically developed countries is regarded as one of the priorities of state policy.

It is significant that even in times of global crisis, the United States and other countries not only did not reduce, but also increase the financing of scientific and technical and innovative activity. For example, in the United States for basic research in 2012, it was allocated 32.9 billion USD., Which is 11.9% more than in the 2010 general appropriations for R & D as compared to 2010, though only slightly, but also increased (by 0.5%) [2].

Unfortunately, in Ukraine has not yet reached an understanding of the importance of innovation as a factor of security resources, competitiveness and economic growth. In domestic expenditure on research and development (% of GDP) of Ukraine today is 3-4 times lower than in leading countries (Israel, Finland, Sweden, Japan) [3].

2 Conclusions

In the context of the functioning of market relations in the economy of innovation is to provide a continuous update of technologies and manufactured products in order to maintain the competitiveness of macroeconomics and microeconomics of objects on the basis of scientific results. From the formation of the modern technological way, a close connection between science and production, undoubtedly, depends on how the rise of a whole industry of Russia, as well as the competitiveness of individual companies [4].

The viability of the state socio-economic system in the first place depends on the achieved level of economic and technological development, competitiveness, quality of life. Its key elements are now the level of education and science.

References

[1] Дудникова А В 2014 Сущность и условия применения инновационных бизнес-моделей *Молодой ученый* **14** 154-6
[2] *Research Infrastructure in the President's 2012 Budget. A Report to Congress on Federal Investments in Research Facilities Construction and Major Research Instrumentation* White House Office of Science and Technology Policy. Febr. 14, 2011 Office of Science and Technology Policy May 2011 [Electronic resource] http:// www.whitehouse.gov/administration/eop/ostp/ rdbudgets/2012 (time access 18.03.2012)
[3] http://statinfo.biz/HTML/M246F13309A6496L1.aspx
[4] Зимовец А В 2009 *Мезоинновационные риски как фактор развития региона. Монография* Таганрог: Издательство Ступина А.Н.

Creating value for the organization by organizing an effective human resource operation model

L Kalyta*

Training couch #HR, F. Sadovnikova17, LV-1006, Riga, Latvia

**Corresponding author's e-mail:info.hashtaghr@gmail.com*

Abstract

The human resources profession is at a crossroads. As the global economy grows and technology has made organisations highly interconnected and transparent, what HR does has to change. Over the last 30 years HR operation model has gone through several transformations, moving from an operational role (the 'personnel department') to one of 'HR as a service centre' to one focused on 'driving talent outcomes'. The core of high-impact HR today is creating model with focus on business value drivers and see itself as a strategic partner.

Keywords: human resources, business, operation model, value drivers.

1 Introduction

HR operation model and way how managers are evaluating performance in HR can tell to us if HR is playing strategic role and able to be a business partner in company. Many of HR managers understand high strategic value of their department or at list people management function. But problem is that CEO and other managers don't believe in high impact of HR unit in business success. The worse situation is that many of CEO's really believe that people is the most valuable assets in business but they just can't find out – how HR activity can turn this idea from statement to practical implementation.

The main issue is that it is difficult to evaluate HR impact on business result. Indicators, which usually company use for evaluating HR function give information about quality of service – cost for hiring, time to fill up position, number of employees successfully went through evaluation process, turnover of employees, amount of cost for salary. But if we will think about characteristics, which are critical for successful implementing competitive strategy of the company maybe it would be – engaged and skilled employees, ability to learn and adjust to the market, impact of the HR in value drivers of the business, in other words be strategic partner.

But to recognize this potential, HR managers should understand strategy of company and business operation model, recognize value drivers of the business. Such understanding will help them to realize the consequences for people management activity and priorities. HR managers should change their approach from "down to top" to the downward perspective. Also they need to have new system of evaluation, which help them to show their impact on the most important indicators for CEO's, as profitability, market value of the company.

It means that HR manager should change their paradigm about role of HR function and HR operation model, to be able to create and develop themselves as business partners.

On the x-axis Figure 1 displayed level of agreement HR operating model with the principles of the highly efficient system of working. Company was evaluated from 0 (the lowest level of development HR model) to 100.

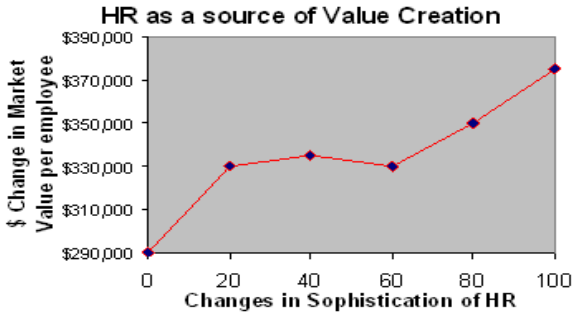


FIGURE 1 HR as a source value creation [2]

We can see that the return on investment in the HR model is not a linear function. Companies in this sample displayed by the three different situations as their HR model increasingly focused on efficiency. Companies that go from 0 to 20 percentile, noted a significant increase in efficiency. At this point, the model is transformed from a barrier to the implementation of the strategy in an asset with a neutral influence. HR here is creating value just because it is not any more a problem. Very often HR managers and CEO's are stopping on this stage, especially that further development doesn't give valuable feedback. It mean that company never will become something more than average on the market.

Finally, companies that have gone on, not only developed good practices of personnel management but also integrated HR model with business strategy.

2 Conclusions

HR operating model can become competitive advantage and bring company on another level of achievement and development. Task of HR managers and CEO's to change their paradigm of thinking about people management and on practice implement awareness of the crucial importance of people in business success. From the HR manager need not only the possession of human resource management technology but also expertise in the business environment. Ability to answer on question - how HR activity is driving company in implementing its strategy?

References

[1] Amit R, Shoemaker P J H 2010 Startegic Assets and Organizational Rents *Strategic Management Journal* **14** 33-46
[2] Becker B E, Huselid M A, Ulrich D 2007 *The HR Scorecard, Linking People, Strategy, and Performance* Harvard Business School Press, Boston p. 65 National Development Plan of Latvia for 2014–2020

Implementation of business activity in the sphere of organisation and holding of festivals and contests on the basis of ISMA

V Solodarenko, V Riashchenko

ISMA University, 1 Lomonosova Str., Bld. 6, Riga, Latvia

**Corresponding author's e-mail: lerasolodarenko@gmail.com*

Abstract

The main aspects of the implementation of business activity in the sphere of organization and holding of festivals and competitions on the basis of ISMA are reflected at the given abstract. The festival „Isma aicina talantus" is taken as an example. The author suggests a number of activities for improving and promoting the festival and calculates economic benefits from the project. This will contribute "ISMA aicina talantus" with an aim to occupy decent niche in the festival industry. To make full impression in the issue of organising and running, the festivals in Latvia were analysed and compared. The practice result of the research leads to the application of the new activities to promote and improve the festival which will help gaining economic benefits from the project. Current topic is fully relevant at the present time. Use of new activities to promote the organisation and holding of the festival "ISMA aicina talantus" is necessary to maintain the interest of the participants and expanding boundaries of intellectual entertainment.

Keywords: Organisation, festival, ISMA, analysis, promotion, activities

1 Introduction

Before analysing the implementation of business activity in the sphere of organisation and holding of festivals and contests on the basis of ISMA, it should be defined what the word «festival» or «contest» mean. The Cambridge vocabulary explain the word "festival", as "an organized series of concerts, plays, or films, typically one held annually in the same place." [1].

Firstly, uses of new technologies in the activities of preparation and organisation of festivals are revolutionary. Secondly, revolutions should not to destroy classical traditions of organising and running the festival. Finally, implementation of business activity in the sphere of organisation and holding of festivals and contests on the basis of ISMA should bring profit.

2 Overview of the research object

"ISMA aicina talantus" is a festival which has been created and implemented by ISMA students and ISMA administration in 2009. Since then it has been developing and popularizing throughout 8 years. Nowadays it is a project which has a strong ISMA support and popularity among Latvian and international participants.

3 The use of new activities for promoting the festival

After analysis of the competitiveness of the festival has led to creation of new improvements for the project. Thereby, for success and competitiveness is needed to develop additional services, such as drawing up a new organisational structure, where for each of the departments is provided a clear description of the commitments and deeds aimed for organising and running the project "ISMA aicina talantus".

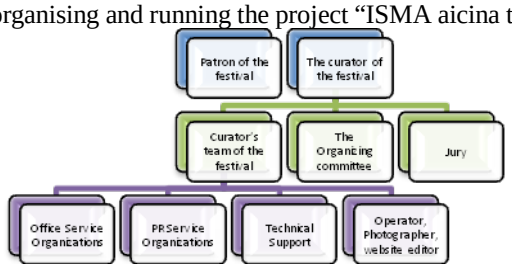


FIGURE 1 Organisational structure of the festival project "ISMA aicina talantus"

- Creating mobile application

Nowadays it is impossible to imagine modern society without the use of the Internet and electronic devices. That is why the development of the mobile application "ISMA aicina talantus" is an excellent opportunity to expand the audience and attract a group of people 10 - 25 years.

The application must be three-lingual (Latvian, Russian, English) and suitable for the Android system, Windows and IOS. and offer:

- Exclusive announcements on the official program of the festival, the jury, events, special guests;
- Chronicle Festival hour by hour, news and interviews that can be shared via Facebook, Vkontakte, Instagram and other social networks;
- Videos of performances, photos, press conferences, interviews;
- Digest of the most interesting moments at the end of the festival and the archive of past competitions;

FIGURE 2 Mobile application “ISMA aicina talantus”

- Producing souvenirs

In addition, the organization of the project «ISMA gathers talents" should consider souvenirs as a type of advertising. The souvenirs might differ:

- Printing souvenirs: calendars, wall, table, pocket; notepads, notebooks, paper records;
- Low-budget mass souvenirs: pens, key chains, pocket calendars, cheap notebooks, bags, etc.;
- Expensive souvenirs: stationery sets, sets of cups, notebooks, notepads, diaries and good quality etc.
- VIP-souvenirs: T-shirts, CDs, caps with the logo of the festival.

The sale of the certain production will help gaining some kind of fundraising help for the festival which will raise money for the improvement of technical equipment and prizes for the participants of the contest. Souvenir production, as well as any other type of advertising, should carry advertising information from the organizers of the festival to the one who owns the souvenir, where advertising – is the information about the festival, its product or idea for the potential consumer.

FIGURE 3 Souvenirs for “ISMA aicina talantus”

4 Conclusions

Festival industry is gaining popularity but constantly have to solve the problem of maintaining their place in the market. “ISMA aicina talantus’ is not an exception. It is necessary to make a painstaking and time-consuming work to stabilize their position in the market.

The aim of the research is the improvement and development of the activities for the organization and holding of festivals and competitions based on SIA "Informāsijas sistēmu menedžmenta augstskola" (ISMA) to maintain the competitive position of the university in the market of educational services of the Republic of Latvia.

The main obstacles of such innovative ideas are its realization and amount of expenses necessary for it. Software is one of the most expensive and time-consuming elements of introducing new technologies and activities for improving the organisation of the festival.

References

[1] *Definition of festival from the Cambridge Advanced Learner’s Dictionary & Thesaurus* © Cambridge University Press
[2] „*ISMA aicina talantus”* http://festivals.isma.lv/ (дата обращения: 29.03.2016)
[3] Vineet Gera 2012 *Event Management and Planning: A complete guide to plan and execute the event* M. 252
[4] Donald Getz 2012 *Event Studies, Second Edition: Theory, Research and Policy for Planned Events (Events Management)* M. 460

Entrepreneurship training dilemma in Kazakhstan

S Sabitova*

'Damu' Entrepreneurship Development Fund

**Corresponding author's e-mail: saga_ictc@mail.ru*

Abstract

In this article the entrepreneurial training sector is analysed within the implementation of basic competencies required for its development and successful inception. The western practices /works and its results are discussed to facilitate the evaluation. The study focuses on the gaps in knowledge and skills of prospective and young entrepreneurs.

Keywords: set of competencies, knowledge, business training, perspective and young entrepreneurs

1 Introduction

According to a prominent business theorist and the World for his contribution to entrepreneurial study, B. Johannisson, there are only five critical /essential skills (set of competencies) that address questions:

- why does an individual want to do it?
- how to approach it?
- who? (i.e. who to conduct a start-up with)
- when is appropriate to launch the business?
- what? (what kind of skills and knowledge an entrepreneur should possess?) [1].

As a result, a demand for entrepreneurship development arises in regards to the current trends. Importance and priority of entrepreneurship and small business development in Kazakhstan have been reflected in national strategic development programmes, in particular the presidential message to Kazakhstani people 'Kazakhstani way - 2050'. It therefore reinforces the relevance of this research study.

2 Overview

Business-training segment has been marked out of the general professional economic education as a result of structural changes and socio-economic transformations. The latter has been linked to such factors as: security of governmental sovereignty and economic autonomy; the move to a new type of economic relations; entrepreneurship development and private sector entity.

In conditions of shifting from planned economy to market economy, an imperative need for specialist training had arisen in the following subjects: market relations, management and marketing, business and entrepreneurship, accounting and audit, financial and credit mechanism, international relations etc.

In these years, the first MBA courses along with business-schools had emerged in Kazakhstan.

The four main subjects of entrepreneurial realisation are:

1) Potential entrepreneurs - those individuals considering entrepreneurship as a main occupation in the future (school children, students, workers, managers)
2) Potential entrepreneurs, career freshers (university and business-school graduates)
3) Young entrepreneurs - participants of small business with presence in market for no more than 3 years.
4) Experienced entrepreneurs - participants of small business with presence in market for more than 3 years [3].

At the same time, the assessment of future entrepreneurship training is not straight forward. For instance, in Kazakhstani practice, the understanding of entrepreneurship is scarcely covered if at all at the schooling age. While in business-schools students are given solely managerial skills to run an existing business. Thus, such educational approach deliberately leads to supply of 'mainstream' managers to hire. In such cases, future and potential entrepreneurs in the course of startups may experience significant systematic problems. In particular, it could be explained that entrepreneurial principles functioning within the education standard relate to management disciplines. This in turn causes inconsistency in knowledge of future /potential and young entrepreneurs.

3 Decision

In developed countries with established entrepreneurial body, for instance in Germany, the idea of entrepreneurship is covered from the middle school. The projects of an individual enterprise are being cultivated in many western states schools thereby rendering an opportunity to obtain the initial knowledge-apparatus as well as encourage entrepreneurship.

In high school of western nations, the education focuses on competencies enhancement, such as 'know how' and to some degree 'know who', as stated by Johannisson. That is a choice of the legal system, business-plan writing, principals of accountancy, etc.

American practice shows that with the systematic

approach in an institution, such as the University of Arizona in Tucson, 10-12 student startups launch each year as an aftereffect of the entrepreneurship electives. Accordingly, the university creates the relevant infrastructure - technological sites, technology transfer centres etc. Additionally, there is legal and patent support that are run to build the common intellectual basis.

By applying the methodology and practice discussed above, it is possible to unravel the issue of knowledge gaps persisting among future and existing entrepreneurs in Kazakhstan.

4 Conclusion

Entrepreneurship training could be tentatively divided into the following parts: training for future entrepreneurs, training solely for young entrepreneurs and training for existing ones (newcomers and business pioneers). The most pertinent means to solve the problem of knowledge and skills inconsistencies of prospective and young entrepreneurs is to apply best practices and educational technologies of entrepreneurs from developed states. Therefore, there is a need to establish compatible training system with implementation of adequate approaches, methods and foundation forming.

References

[1] Johannisson B 1991 University training for entrepreneurship: Swedish approaches *Entrepreneurship & Regional Development: An International Journal* **3** 67-82
[2] The message from the president of the Republic of Kazakhstan, N.A.Nazarbayev, to Kazakhstani people,'Kazakhstani way - 2050'
[3] Gluhih P L 2014 *The principles of entrepreneurship: a training manual* Ural, state ed.uni. – Yekaterinburg 140
[4] *The Address of the President of the Republic of Kazakhstan N.Nazarbayev "Kazakhstan's way - 2050" International Journal* **3** 67-82
[5] *Deaf PL Basics of Entrepreneurship: a tutorial* PL Deaf; Urals. state. ped. Univ., Ekaterinburg, 2014 140

Foreign experience in the development of entrepreneurial universities

Z Tutkusheva*

KEUK, Kazakhstan

**Corresponding author's e-mail: sortirovka.e@mail.ru*

Abstract

This article describes the experience of formation and development of entrepreneurial universities in different countries as one of the leading elements of the "triple helix" model. This issue is particularly relevant today, as it is connected with the reform of higher education in many countries, and also it is necessity to improve the competitiveness of universities and their role in the innovative development states.

Keywords: entrepreneurial university, higher education, the triple helix.

1 Introduction

Firstly to the scientific revolution the concept of "entrepreneurial university" was introduced by B. Clarke in 1998, while he formulated his basic characteristics: 1) strengthening the main functions of management at the University, 2) the expansion of ties with groups and organizations outside of the university, 3) diversification of funding sources 4) encouraging entrepreneurial activity units of the university, 5) the development of a comprehensive business culture [1].

The entrepreneurial university is seen as an organization with "entrepreneurial" management style that takes into account the internal capacity and forming internal and external communication for the implementation of statutory activities.

2 Overview of the study area

So the university management is based on the use of the world experience of universities; in entrepreneurial universities becomes an important innovation infrastructure; especially important to the university the opportunity to find new financial sources of funding; teaching staff is aware of the need to wage depending on the results of their activities, particularly in research sphere.

In the second half of the twentieth century saw a transformation in entrepreneurial universities with some caution on the socio-economic, political and cultural factors.

The first example is the emergence of Silicon Valley, which began with the need to overcome the negative impact of the Great Depression. Conversation was built between business and science, in which the Massachusetts Institute of Technology made efforts not only on the development of fundamental sciences, but also in the application of research results in the companies' activities. Subsequently, the relationship turned into the relationship according to the "triple helix" involving the state. This became possible because of the provisions of the Patent and Trademark Office. According to him, the universities have become the intellectual property rights to fundamental and applied research, financed by the state.

For these universities is characterized by the following features. They are a kind of generators and conductors of modern knowledge based on fundamental research; while using current trends in science and technology, universities are integrated into the global system of science and education. At the same time, the universities themselves sufficiently receptive to international experience in terms of new lines of research, teaching methods, selection of talented students. As a result, universities will be the center of regional and country research and economic space.

Thus, we can conclude that the creation of entrepreneurial universities in the US are not only intertwined with the history of the country, but also the result of the correct use of the activity of science, technology and education. Universities today are full participants in the research, educational and industrial complexes, working closely with them in the business community, government and industry.

The process of the emergence of entrepreneurial universities in Western Europe began relatively recently and differs to some extent depending on the characteristics, needs, traditions, economic, cultural and social development of each country. It can be argued that the reform of the classical European universities have not turned them into the same powerful research centers, both in the US, but include large research centers, laboratories, parks and other structures.

The process of the emergence and development of entrepreneurial universities in Europe, founded on the principles described in the works of G. Etskovitsa and B. Clark.

In Germany, the development of science and education is closely intertwined with the peculiarities of the development of regional innovation systems and territories.

In the UK, the National Council for Entrepreneurship in Education in conjunction with the Times Higher Education magazine holds an annual competition among universities to determine the best universities with an entrepreneurial culture, have an impact on the local, national and international levels.

No less interesting and unique experience in Sweden, which is marked by the development of universities as the support of the state and business. The state contributed through increased funding, and business structures, in turn,

have become major customers of research results. At the same time the universities offered entrepreneurship-training program, work was conducted on the commercialization of scientific developments.

Another way is converted into entrepreneurial universities in France. The main source of scientific development in the country engaged in involved national center of scientific research institutes and centers working in the areas of basic science, medicine, nuclear physics, astronomy, and others. Another innovative structure to provide financial support to small and medium-sized businesses has become the Agency (a government agency) to finance and support for small and medium-sized enterprises (OSEO). Sharing the risks, this structure assists small and medium-sized companies at the stage of creation, development and transfer of innovative projects with real commercial prospects [8].

3 Conclusions

As the result of this analysis can be argued that the formation and functioning of entrepreneurial universities connected with the solution of economic problems in each country, depending on its national, cultural features. That is, it cannot be any one, that the only correct method for all countries in the construction of entrepreneurial universities. However, you may notice that the "triple helix" in different countries in different ways dominated by the relationship of business universities go-state universities.

References

[1] Grudzinski A O 2003 University as an entrepreneurial organization *Sociological studies* **4** *(in Russian)*
[2] Etzkowitz G *DNA innovative development* OPEK.ru. Expert Portal Higher School of Economics www.opec.ru/1335337.html
[3] Divaeva E A, Mukhamedyarov A 2011 Foreign experience of formation of innovative systems in the regions *Economy and Management: scientific journal* **3**
[4] Pevsner M N, Petrov P A 2013 New public management "in German universities: the way to the loss of autonomy or academic traditions *Continuing Education:? XXI century* **3**
[5] Gentle G S 2012 The organization of scientific research in Germany *The Baltic Region* **3**
[6] Tarakanov V V 2007 *Modernization of university management system: foreign experience* Herald of Volgograd State University. Series 3: The Economy. Ecology. Release 11
[7] Gale E-P 2011 Each competitiveness cluster is a five-year plan *Innovative trends* **11**
[8] Chanson G 2011 Competitiveness centers - the most significant elements of the French innovation system *Innovative Trends* **11**
[9] Monson P 2011 Financial grants from research organizations gradually exhaust themselves *Innovative trends* **11**

External factors professional mobility of workers

A Shehda*

Institute of Demography and Social Studies of the National Academy of Sciences of Ukraine, Ukraine

**Corresponding author'se-mail e-mail: andrewrik@ukr.net*

Abstract

The rapid process of new knowledge in the modern world are making a radical change in economic relations and key factors of social development. The growth of the human factor as a generator and carrier of new knowledge is increasing along with the requirements for the employee as well - changing the contents and conditions of employment. Therefore, the objective necessity of serving the formation of human resources, adequate and modern type of production can not only adapt to the new changes, but also to become active leaders in the development, produce new knowledge and change.

Keywords: workers, labor, economy, professional mobility, human resources

1 Introduction

In the current system the necessary skills of workers is one of the major mobility, which broadly be defined as a willingness to change. With the establishment of Knowledge Economy issue of professional mobility takes on a new meaning and reveals a capacity for learning and development. The current labor market poses to young professionals who are very demanding both in terms of their training and on personal characteristics, learning ability, creativity, innovation and more. One of the key features of the modern worker is the ability and willingness to change, to continuous lifelong learning. Therefore, professional mobility becomes relevant in the study of patterns and trends of the modern labor market.

2 Overwiew

The current stage of social development characterized by the making of a qualitatively new type of economic system. Under the influence of pervasive spread of new technologies, including information and communication technology, fundamentally changing the structure and mechanisms of economic activity. The spread of new technologies changing the sectoral structure of the economy, increasing the share of high-tech industries and, therefore, reducing the share of industries with a low degree of processing. Fundamental changes are occurring in the manufacturing process, which is characterized by an increasing proportion of intellectual functions.

Professional mobility as mobility in general, can be understood as a process and as a phenomenon. As the mobility process finds expression in tendencies of changes in the structure of professional employment, changes in employment in some sectors and areas of industrial activity. Under the influence of continual and rapid technological progress is not only the classic relationship between industry, agriculture and services, which are known to be characterized by increasing the share of the latter. And singled out a growing share of high-tech, creative and environmental industries.

It is clear that these processes and determine the changes in the requirements for modern human resources in the labor market. In this aspect of professional mobility is already acting as a phenomenon that characterizes the quality of the modern worker, his willingness to change (professional, functional, geographically and so on.).

The ability and the ability of human lifelong learning and change activity, is caused by a number of reasons, internal and external. External causes determined by changes in the environment of his life, having objective and due process of socio-economic, political, and innovation. Under the influence of the latter there are constant changes in the economic structure, new and old die area, filled with new content process work in all areas. And in our time, these processes are extremely accelerated and cause permanent changes in the labor market, which, respectively, require changes in the vocational qualification structure of the employed population.

Influenced by the rapid spread of new technologies there are dramatic changes in the content of the labor process. The implementation process of work with the use of modern technology and advanced technology requires other qualities of employees. They must have not only specialized knowledge but also be capable of continuous learning, learning new techniques, technologies and skills. And - ready to learn, not only within their specialty, and in general - to get new skills. Because these processes occur inevitably moving workers to other professional groups.

Cyclical nature of the economy, in turn, causes a shift in the labor market. Unemployment, the level of which varies over the business cycle, forcing many people to change their

place of work, residence, qualifications and profession. Regularly occurring and demographic changes in the population, which may significantly change its age and sex structure of reducing or increasing the proportion of the most active mobility share of the workforce.

Unfortunately, the last active way political and even military-political factors. We can state a significant increase in professional mobility processes in our country as a result of military aggression, as more than a million people were forced to relocate, and many of them - his profession and sphere of activity. And not always these changes are carried horizontally or upward direction.

3 Conclusion

Among the external factors include and globalization. Formation of the global labor market that ended in the second half of the twentieth century, means the gradual liberalization of borders in the way of movement of human resources between countries. International migration is influenced by economic, political and other factors takes enormous proportions worldwide and is usually accompanied by a professional worker mobility, changes in the scope of their activities.

Social responsibility in market development of paint materials

M Shehda*

Kiev National University of Construction and Architecture, Ukraine,

**Corresponding author's e-mail e-mail: mariia.vasylieva@ukr.net*

Abstract

The modern market of paint materials are characterized by putting great deals and a wide range. The article analyzes the environmental aspects of production and use of paints. Proved that importance and relevance of compliance Ukrainian enterprises socially responsible production and sale of paint products.

Keywords: market, paint materials, economy, social responsibility, construction

1 Introduction

The building sector is one of the most important and promising areas of Ukrainian economy. Market development of paint materials are largely determined by the volume of construction and reconstruction of housing. High rates of growth lead to increased demand for construction materials, one of which is paint materials. However, in modern terms, the importance of such products, characterized by high quality and environmentally clean standards. The global market of paint materials formed certain requirements for quality and environmental, aspire as producers and consumers.

Production of paint materials is putting environmental priority component of the global economy. Today, to be competitive on the foreign and internal markets producers should be putting not only powerful and new equipment, but also possess advanced technologies.

2 Overwiew

In Ukraine, the sector of paint materials is rather young, but promising and attractive to investors. Attracting high-quality and competitive products of foreign production will contribute to further development of the paint materials. It is very important to attract foreign investment and to open businesses in Ukraine for the production of products based on new technologies.

Today in Ukraine ecological paints paint materials occupy only 25% of the market, while in Europe the ecological paint materials - 80 - 85%. Manufacture of paints based on organic solvents does not exceed 10 - 30% of the total. Among the three main groups of coatings (paints), namely water-soluble materials; paint materials based on organic solvents; oil, oil - waxes, in terms of social responsibility, preferred is a water-soluble materials. This is due, primarily, strengthening international restrictive requirements for the content of volatile organic compounds (VOCs). Thus, the EU adopted Directive 1999 and 2004, which limit VOC content in certain materials, including most paints. Secondly, in the water-soluble materials no organic solvents (toluene, xylene, mineral spirito, acetone), which affect the environment. Thirdly, the group of paint materials characterized by ease of use, ability polymerization at room temperature, high performance coating capabilities etc.

A characteristic trend in the market is the growing demand for eco - materials, such as water paints and primers, oil, oil - waxes. Significant benefits are conditioned by their absence in the composition of organic solvents (acetone, xylene, toluene), adversely affecting the environment and the health of consumers, high-performance coatings properties, ease of use, ability polymerization at room temperature, and more.

An important component of socially responsible marketing is appropriate emphasis advertising campaign on issues of environmental benefits and the least harmful to health products. Socially responsible advertising must necessarily be focused on transparent explanations to consumers the advantages and disadvantages of different products, in this case - putting. It serves the logical continuation of the responsible planning by the range of its products. Marketing is increasingly including in its scope of social aspect: the humanization of working conditions, monitoring service quality, environmental protection and others. The implementation of socially responsible marketing is a necessary part of becoming civilized business, driven not only get today's interest income, but also an important social indicators. In modern terms the idea of social responsibility has become an integral feature of systems management business. Social responsibility has an internal (responsibility to their employees to ensure their social rights and interests) and external (social responsibility for quality, environmental friendliness of production) aspects.

3 Conclusion

Demand for home paints is increasing every year, but foreign products win range and environmental performance. Competition of Ukrainian market with foreign producers putting too high. High-tech, high-quality imported products stimulates Ukrainian producers to improve production of paints. So for best results, enterprises - manufacturers of paints necessary to deliver competitive, high quality products and consideration of the possibility offers to foreign partners - the purchase of raw materials in Ukraine for the production of paints and varnishes in Europe, will expand exports, expand markets, which would to increase the number of consumers and stimulate national economic growth.

Management of energy-savings in aconstruction

M Klimchuk

Kiev National University of Construction and Architecture, Ukraine

**Corresponding author'se-mail e-mail: klimarinchuk@gmail.com*

Abstract

Topical research is new way of management, namely "green lease". The article analyzes the obligations between a lessor and building lessee and analyzes the international experience in energy saving measures.

Keywords: energy – savings, green lease enterprise, construction, lessee, lessor

1 Introduction

In the USA, Europe and Australia gets all greater distribution, as one of concepts of management the energy-savings of "Green Lease" that refers to strategy of enterprise that formalizes duties between lessees and lessors in relation to the measures of energy-savings in building.

Green lease - provides realization of obligations between a lessor and building lessee in the context of minimization of negative influence on an environment.

2 Overwiew

Barriers that prevent more wide introduction of green lease: absence of knowledge about potential possibilities of green lease; brokers and lawyers are not good in acquainted with practice of the green leasing; dividing (Split) barriers that arise up, when side, that advances on an account charges on an improvement energy differs efficiency from that, who extracts a benefit from the future economy of energy. For example, "common" tenancy provides for, that building services, as a rule, are included in the cost of lease. As a result habitants stimulated a little bit for an economy about the energies in the leased apartments, as charges on energy are paid by a proprietor.

However, at a "clean" lease, there is an opposite situation: habitants pay the communal accounts monthly, that is why proprietors of houses not about stimulated for investments in energy efficiency. Lessees are not ready to inlay money in energy efficiency, if the term of their lease less than, than project is from an energy-savings.

The successful program of financing must create stimulus for all parties concerned: habitants (economy), (investment economy/), building services (defense /of decision of problems is with a not in payment for the rendered services) and expansions of banks. Considerable transactions are the charges related to realization of investments in the "green" leasing stimulate lessors from modernization of their property that is why one of stimulus must become the programs of financing.

In some countries prohibition are lease out an accommodation that has a very low level energy gives clear reference-points to market of energy-savings development efficiency. In this foreshortening the accepted approach is in Great Britain in 2011, where is by legislation recognized illegal to lease out an accommodation the class of energy efficiency of that answers the level of F or below after 2018 at the same time, habitants have a right from 2016 to require realization of measures of energy-savings in the leased dwelling.

One of main reasons, that stipulate existence of Green Lease, is the certification of buildings in accordance with certain standards. Ecological descriptions of building and its influence on a man and environment it maybe to estimate the criteria of the "green" standards, called to provide a transition from the traditional planning and building to balanced (permanent), that preaches next principles: safety and favorable healthy terms of vital functions of man; a limit of negative influence is on an environment; taking into account of interests of future generations.

3 Conclusion

The presence of such certification in some countries gives possibility to the proprietors of buildings to get from the state of different sort of privilege. At the same time such building at the market will be quoted higher both from the point of view of possibility of lessor to set top leasings rates and from the point of view of prestige of building for a lessee. As a rule, the duty of passing of such certification an agreement relies on a lessor.

Except it, in some countries, for example in Australia, gradually formed corporate legislation that obligates the management of companies that is making decision to them on guidance by activity of company to take into account their influence on society and environment is gradually formed. Thus, Green Lease helps to attain not only the aims of energy-savings and power efficiency but also assists an effective management, in fact requirements of standards within the framework Green Lease some wider and often strict state norms in area of ecological safety.

Mechanisms accompaniment of product in the conditions of continuous suggestion on his improvement

A Kalyagin*

ISMA University, 1 Lomonosova Str., Bld. 6, LV-1019, Riga, Latvia

*Corresponding author e-mail: plus3@inbox.lv

Abstract

The key criteria of introduction of innovative technologies are examined in the process of production and accompaniment of product.

Keywords: marketing, innovation, support, quality, improvement.

1 Introduction

The priority task of modern enterprise is condition possibility of the operative reacting on all changes of conjunctures market with the purpose of satisfaction demand of consumers in the earliest possible dates. An enterprise must search possibility of advancement commodity at the market, of strengthening of competitive edges, by the improvement of quality of commodity etc. for an exit on leading positions and appreciations of value enterprise for shareholders.

2 Formulation of the problem

In the real work, the distinguished problem is presented in the most problematic aspect - scientifically innovative. Considered, key factors influencing on possibility of providing service support of continuously working difficult mechanisms in the conditions of dynamic changes of technical requirements of production on an enterprise are analyzed and investigational.

3 Overview

At a decision-making on determination of properties of product, we can define requirements to the hi-tech equipment by means of that we want to decide next tasks:

1. To give a qualitative product in the compressed terms in a necessary amount.
2. To minimize expenses on unit of producible products.
3. To eliminate / to take to the minimum marriage of products by the exception of operations with participation a man.
4. Possibility to produce a product 24 hours/7 days in a week.

In this connection necessary to notice that all processes are limited to the temporal, material and human resources in the conditions of continuous productive process of making product that is produced now. All of it becomes complicated that all expenses that is described in the above-mentioned process must be also stopped up in the prime price of new or modernized product.

In such terms, there is a necessity of providing of trouble-free production with possibility of planning organization of first-line technical support and maintenance of existent equipment.

On this basis, there is a necessity for development of methodology accompaniment of product in the conditions of continuous suggestion on his improvement and improvement of descriptions.

4 Decision

Within the framework of the real setting, it is required to organize the process of collection, treatment, notifications and requests for the change of properties of product on the stage of exploitation with the purpose of determination of level of satisfaction of consumer.

In this connection, a necessity becomes known for realization of estimation of expediency of the supposed conducted improvements. Such necessity is taken to determination of authenticity of the inculcated changes by calculations, researches and practical experiments on trial parties of product [1]. Developers must repose in that the inculcated improvements will not worsen description of product and will in future correspond to the norms of ISO [2].

The aim of this work is sent to development of the complex system of estimation efficiency of suggestion on the improvement of product taking into account interests of all stakeholders.

In accordance with the put aim, next basic tasks that coming to work out and find the ways of decision taking into account next key moments are distinguished:

1. Features support
2. Extractions of distinctive features of product and good

3. Organization of providing of current activity and maintenance of existent process
4. Collection and treatment of notifications
5. Collection, treatment of suggestions on improvements

The decision of the put tasks is conducted on the base of new for the investigated object approach - cost management of P.Doyle [3].

The real technology allows to co-ordinate interests of all stakeholders.

Besides it, the requirements of technology of thrifty production of Toyota TPS [4] are taken into account and BBRT [5].

The production system of "Toyota" (Toyota production system - TPS) - developed by "Toyota" methods used by an enterprise for the production of goods and services using a variety of resources, and aimed at ensuring production of defect-free with a velocity corresponding to the needs of consumers, by removing the losses.

On the website BBRT, various practical examples are available, demonstrating the successes achieved by the companies - members of the organization who undertake modifications based on the above principles

5 Conclusions

Management functioning of the system service accompaniment of product in the conditions of continuous suggestion on his improvement is an intricate multilevel problem, the key problem of that are determination and management by efficiency. Thus, the real economic task of grant of accompaniment to the products is maintenance of balance between revenue and advantages in competitive activity, got due to accompaniment, from one side, and by charges on the grant of accompaniment, with other.

References

[1] Фасхиев Х А 2010 *Маркетинг в России и за рубежом* **2**
[2] https://www.iso.org/obp/ui/#iso:std:iso:19011:ed-2:v1:en
[3] Дойль П Технология стоимости маркетинга
[4] Лайкер К Д 2007 *Дао* Toyota: *14 принципов менеджмента ведущей компании мира* Пер. с англ. Москва: Альпина Бизнес Букс 400
[5] Хоуп Д, Фрейзер Р 2005 *Бюджетирование, каким мы его не знаем Управление за рамками бюджетов*
[6] Haeckel S H 1999 Adaptive Enterprise: Creating and Leading Sense-And-Respond Organizations
[7] Johnson T H, Broms A, Senge P M 2001 Profit Beyond Measure: Extraordinary Results through Attention to Work and People
[8] Semler R 2004 The Seven-Day Weekend: Changing the Way Work Works
[9] Brandes D 2004 Bare Essentials: The ALDI Way of Retailing
[10] Пфлегинг Н 2006 *Управление на основе гибких целей вне бюджетирования: как превзойти конкурентов в* XXI *веке*
[11] Hope J 2006 Reinventing the CFO: How Financial Managers Can Transform Their Roles and Add Greater Value
[12] Bjarte Bogsnes 2008 Implementing Beyond Budgeting: Unlocking the Performance Potential
[13] Morlidge S, Player S 2009 Future Ready: How to master business forecasting

Preventive measures for the improving stability of an organization

A Aghamiryan*, R Kopitov

ISMA University, **1** Lomonosova Str., Bld. 6, Riga, Latvia, LV-1019

**Corresponding author's* e-mail: anna_aghamiryan@mail.ru

Abstract

The present study examines conceptual approach with the aim to prevent mistakes, which can lead to erosion of an organization.

Keywords: strategy, uncertainty, methodology, mistakes, system, maintenance

1 Introduction

The study found that the traditional means of diagnostics of the state of an enterprise, irrespective of their functional focus, exhibit low coverage of activity - less than 2% [1]. As a result the decisions are being made in the face of 99% uncertainty [2]. This entails permanent interference with a stable process [3]. Information technologies, which supply merely 2% of useful information, are of no help either [4]. As a result less than 7% of successful enter prises translate their strategies into action, thereby reducing the life cycle of an organization [5, 6].

2 Decision

The main reason of flimsy facts lies in the application of in appropriate, fragmentally oriented at solving typical tasks methodological support with the result that incorrect actions of management stem from the management mistakes. A new methodology of redemption of an organization on credit secured on its stability is being offered as an alternative. This is not about habitual ending under a certain scheme of financing in the context of resale of an enterprise, but about a possible devolution of powers to the team of potential successors, at whose disposal a well-functioning, free from major mistakes management system is being placed. The distinctive feature of such organization is the education of feeling of ownership nits participants, at which their individual behaviour should not contravene the established general rules of functioning of a stable enterprise.

3 Conclusion

Support of such compliance reduced to calculation of cost of there storable organization is built on the basis of unity of practice of successful management and of theory of strong governance. It should be noted that the notions 'governance' and 'management' havean essential conceptual difference. In the present context governance is aimed at the fulfilment and is connected with the activity maintenance. Management is oriented at the preparation and is characterized by the process servicing. At the same time, the preparative and executorial efforts are focused on strict adherence to the rules by which the management mistakes are removed until they emerge. There by resulting in the extension of the life cycle of an organization and in increasing the degree of responsibility of the decision makers.

References

[1] Senge P 2006 The Fifth Discipline: The Art and Practice of the Learning Organization New York: Doubleday
[2] Kopitov R A 2012 Reliable Organization's Axioms Issues of Business and Low **12** 94-105 http://dx.doi.org/10.5200/ibl.2012.09
[3] Neave H 1990 The Deming Demission Knoxville, Tennessee: SPC Press
[4] Cokins G 2004 Performance Management: Finding the Missing Pieces (To Close the Intelligence Gap) Hoboken, New Jersey: John Willey & Sons, Inc.
[5] Prigozhin A I 2007 Disorganisation: Causes, Types, Overcoming Moscow: Alpina Business Books (In Russian)
[6] Robert S 2004 Kaplan and David P. Norton Strategy Maps: Converting Intangible Assets into Tangible Outcomes Hardcover

Development of business value assessment procedures taking into account the dynamics of the organization's life cycle

M Antonova*

ISMA University, **1** Lomonosova Str., Bld. 6, Riga, Latvia, LV-1019

**Corresponding author's e*-mail: 4m.antonova@gmail.com

Abstract

Current article describes the main approaches to understanding of the organization's life cycle and its relationship to strategic planning.

Keywords: strategy, organization's life cycle, business-process, research, development

1 Introduction

The concept of the life cycle helps organization to highlight the stages through which it goes, and to formulate the problems which are typical during the transition from one stage to another. Thus, on the background of traditional assessment tools disclosed natural nature management.

Implementation of organization development projects without taking into account its natural processes usually leads to disruption of its functioning, and frequently to the liquidation of the organization.

As a result, as many consultants are working with particular aspects of the organization development.

From the other side key factors, such as : age, size of organization, the nature of its activities, technologies, location, environment, human factors, management style, organizational values are used as traditional valuation parameters, but difficult to back trace, because of the individual companies researched. The following question arises: how to cover these aspects and what development strategy should we choose, as each organization is unique.

The solution is based on an analysis of the historical background [9]. In the 60's of the last century, it was suggested to consider the organization in terms of "personality", and the development of organization have been compared with maturity of human being. There are at least ten organization development models set up in different times [9]. Each of these models offers various reasons for changes.

The research compares two models of organization life cycle:

- L. Greiner: "Leadership challenges in the stages of evolution and revolution" (1972).[2]
- I.Adizes: "Managing corporate lifecycles" (1979).[1]

At first model: life of the organization is to promote the company through particular stages, where every evolutional period creates its own revolution. Revolution – an impetuous period in development of the organization which requires serious revision of management methods. The way of organization from one stage of development to another is through overcoming the crisis of the appropriate transient period.

The second model: the process of organizational development is presented as a natural, gradual and programmed, providing the inevitable and gradual passage of the organization in the development of a number of mandatory phases (stages). The concept indicates the impossibility of jumping over these phases.

The problem is that the authors haven't developed a general consensus on the mechanisms of development, structure, sources. None of the authors of a full and long-term studies have not been conducted to confirm the validity of the proposed models. A strong influence on a rate "maturation" is by the sharpness of competition on the market.

The opinions of the authors agreed upon that each stage contains a unique structure, systems and leadership style. The change- over from one stage to another does not occur naturally and smoothly, regardless of the power and the wishes of management. Both of them emphasizes in their writings that the young company is more flexible than the mature, or in some stage of decay.

The main purpose of the business is to increase its potential value. This condition will be followed with the right choice of strategy, and clear its observance. The largest contribution to the creation of strategically oriented system made by R.Norton and R.Kaplan [3-8]. There has been developed Balanced Scorecard (hereinafter BSC). This mechanism of the relationship of strategic ideas and solutions with tasks, a way to direct company's operations to achieve business strategy. When you create the BSC by its authors (Norton and Kaplan) planned to transform the strategy into objectives and indicators, grouped in the following four areas:

- finanses;
- customers;
- internal business-process;
- training and raising the level of one's skill.

Next Norton and Kaplan have been consistently shown

to improve the way the strategically oriented organization. Within the framework of this work is an attempt to compare the stages of evolution with the creation of the strategic life-cycle stages.

2 Decision

Evolution of the strategically oriented system approaches proves that the strict adherence to the given strategy in understanding the organisation of the mission enhances shareholder value.

The usage of BSC allows you to see the real state of affairs at the enterprise in the course of its life cycle changes.

Thus it has been formed the basis for building an effective system of diagnosis financial condition that helps managers of enterprises to realistically assess their strength an decide on the follow-up strategies to achieve the organizations strategic goals.

Design, selection and BSC support within the established diagnostic systems help the organisation move from a given strategy, enabling it to cut unnecessary problems and challenges to the decision which takes time and money.

3 Conclusion

At the first stage of the research a number of important results. Firstly, the author of this work succeeded combine theory of organisational life cycle by I.Adizes and BSC by Norton and Kaplan. Secondly, it is established that the collection and processing of accounting information necessary to carry out a series of reforms, which are prepared on the basic of the financial information to assess the potential cost. That why the stage of organization life cycle nowadays should be specified in the annex to the annual report.

References

[1] Managing Corporate Lifecycles Dr. Ichak Adizes
[2] Larry E Greiner Evolution and Revolution as Organizations Grow
[3] Kaplan R S, Norton D P 2004 Strategy Maps: Converting Intangible Assets into Tangible Outcomes Hardcover
[4] Kaplan R S, Norton D P 2000 The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment Hardcover
[5] Cooper R, Kaplan R S 1999 The design of cost management systems: text and cases Prentice Hall
[6] Kaplan R S, Norton D P 1992 The Balanced Scorecard: Measures That Drive Performance Harvard Business Review
[7] Kaplan R S, Norton D P 1996 The balanced scorecard: translating strategy into action Harvard Business Press
[8] Kaplan R S, Norton D P 1996 Using the balanced scorecard as a strategic management system Harvard business review 74.1
[9] Lapko K, Muratova E Analysis and development of the organization's life cycle

Implementation of the newest tendencies in hospitality industry

D Balode-Samofala*

ISMA University, 1 Lomonosova Str., Bld. 6, LV – 1019, Riga, Latvia

**Corresponding author's* e-mail: danatabalode@inbox.lv

Abstract

The purpose and the aim of the article is to examine and discuss the newest tendencies and trends in hospitality service as well as to find out what kind of services are searching nowadays' clients in hospitality service and what kind of needs they meet. It is very difficult nowadays to compete on the market without the use of modern technologies. They are used everywhere and by everyone in the world. There are some new trends in hospitality industry which existence became essential part in modern business. It is even stated that they became very popular in the last few years and at least one of them should be adopted in hospitality area if the owners want their business to be successful and developing.

Hypothesis: do not know and do not use the modern tendencies and trends development in the hospitality industry does not allow managers to do their work professionally and to attract new clients.

Keywords: hospitality service, modern technologies, tourism, booking systems, communication with clients

Topicality: The hospitality industry is one of the broadest industries in the world. The usage of modern technologies became a part of our daily life in the 21st century. It is difficult to image people's life without using Internet and other gadgets, especially for young generation. This generation is grown up tightly with digital technologies and with different digital devices. They cannot imagine their life without computers, Internet, mobile phones and different application for them. 1.8 billion out of 7 billion people worldwide belong to the Millennial generation (age 18-34). This generation becomes the customers for tourism industry area. In order to catch their interest hotels and other hospitality services have to adopt their booking systems and inside policies for "new generation" clients and their needs.

Findings: In order to attract young generation clients and make a hospitality business successful and developing the following tendencies should be adopted by the owners: 1) mobile bookings - more guests are using their mobile devices to search and book hotels, travelers expect a more informed and collaborative travel experience, driven especially by the growing functionality of mobile devices; 2) distribution channel management - sophisticated distribution channel management gives opportunities to create a special and unique business plan for every specific property; 3) cloud-based systems – became very popular nowadays and it gives an opportunity to store all the data in the system which can be very easily accessed anytime and anyplace; 4) content and social marketing – plays a great part in hospitality, it is very crucial to have a high level reputation in order to get more clients and not to lose the old ones; 5) direct bookings – it is always better to have own property's online booking system in order not to lose incomes; 6) visual media – photos and videos are great marketing tool today which can be placed in different booking systems or social networks; 7) international visitors – the increase of international visitors expand the customers' base and brings more money rather than local visitors; 8) software integration - numerous applications are installed for different purposes in various computer working places and influence on the productivity of business process and software integration changes in the system; 9) offer of quality experience – nowadays' tourists want to explore something completely new for themselves, something what will make their vacation special and what they will remember for the rest of the life; 10) offer of high quality food - there is a growing demand for a healthy food while traveling and the most part of tourists will not appreciate anymore to receive unhealthy food full of calories and fats.

Conclusion: During the research on implementation of the newest tendencies and trends in hospitality industry it was found out that the use of modern technologies plays a big part is hospitality business development. They give great opportunity to the property owners to get more clients and make the management of their booking systems more easy and time saving.

References

[1] Jennings G, Lee Y L, Ayling A, Lunny B, Cater C, Ollenburg C 2009 Quality Tourism Experiences: Reviews, Reflections, Research Agendas Journal of Hospitality Marketing & Management **18**(2-3) 294-310

[2] Ravar A 2011 The importance of print and visual media in the promotion of hospitality enterprises Cactus Tourism Journal **2** Iowa 2/2011 93-8

[3] Top 10 Hotel Hospitality Industry Latest Trends of 2014 http://www.hotelogix.com/blog/2014/01/07/top-10-hotel-hospitality-industry-upcoming-trends-of-2014/ Maansi Sanghi (11/01/2016)

[4] Mobile Phones, Feature Phones and Smartphones: The Differences https://blogs.windows.com/devices/2012/07/24/mobile-phones-feature-phones-and-smartphones-the-differences/ Microsoft Devices Team (05/01/2016)

[5] How Hotels Can Direct Their Efforts Towards Direct Bookings http://www.tnooz.com/article/hotel-direct-bookings/, Brandon Dennis (04/01/2016)

[6] What is Cloud Based Technology http://www.littlehotelier.com/what-is-cloud-based-technology/, Little Hotelier (06/01/2016)

Capitalization rate calculation taking into account social capital

A Dmitrijevs*

ISMA University, 1 Lomonosova Str., Bld. 6, LV – 1019, Riga, Latvia

**Corresponding author's* e-mail: dmitrijev.andrej@gmail.com

Abstract

A research on assessment tools development opportunities associated with the capitalization rate calculation, under the social environment accounting terms, has been carried out.

Keywords: capitalization rate, project effectiveness, social capital, net operating income, test of procedure**Overview**

1 Introduction

The current work is set out in four parts.

In the first part capitalization rate calculation methods are systematized [1-3] and, offered non-standard project effectiveness in long-term tasks valuation technique with the amount of social capital taken into account [4-7], based on Glaeser theory [8, 9].

In the second part a comprehensive project implementation analysis, relating to the construction phase and gradual sales of residential buildings, during improvement and development of the project area has been carried out [10-13].

In the third part a nine-step procedure for investment project efficiency and sustainability assessment, which takes into account social capital impact on the capitalization rate, is developed. The operating capacity of procedures is tested on a sustainable project [14-17].

In final part of the research, study results are summarized and conclusions are drawn.

2 Conclusion

Distributed impact of the social capital on the pricing policy is distinguished. Procedures of atypical investment project sustainability and efficiency evaluation are developed; elaborated recommendations have become the justification for the project implementation process in a real project.

References

[1] *Оценка недвижимости: Учебник* Под ред. Грязновой А.Г., Федотовой М.А. М.: Финансы и статистика 2009 526
[2] Харрисон Г С 1994 *Оценка недвижимости. Учебное пособие*. Пер. с англ. Москва: РИО Мособлупрполирафиздата 230
[3] Кийосаки Р 2013 *Инвестиции в недвижимость*: Москва: Попурри 496
[4] Полищук Е А 2005 Социальный капитал и его роль в экономическом развитии *Вестн. С.-Петерб. ун-та. Сер. 5. Экономика* **1** 10-6
[5] Коулман Д 2001 Капитал социальный и человеческий *Общественные науки и современность* **3** 121-39
[6] Фукуяма Ф 2002 *Социальный капитал /Культура имеет значение. Каким образом ценности способствуютобщественному прогрессу* /Под ред. Л.Харрисона, С.Хантингтона. Москва
[7] Шихирев П Н 2003 Природа социального капитала: Социально-психологический подход *Общественныенауки и современность* **2** 17-32
[8] Glaser E 2001 The formation of Social Capital Canadian Journal of Policy Research **2**(1)
[9] Глейзер Э, Ла Порта Р, Лопес-де Силанес Ф, Шлейфер А 2006 Являются ли университеты предпосылкой экономического роста *Эковест* **5**(2) 248-87
[10] Ministrukabinetanoteikumi Nr.529 *Ēku būvnoteikumi*, 176.2 p.
[11] http://rus.db.lv/ekonomika/nedvizhimost/na-kliversale-realizujut-18-millionnyj-proekt-zhilogo-doma-68829
[12] *Квадратный метр, недвижимость Латвии* X 2015 222 22, 39
[13] Rīgasdomes 07.02.2006. saistošienoteikumi Nr.38 „Rīgasvēsturiskā centrauntā aizsardzības zonas teritorijas izmantošanas un apbūves noteikumi"
[14] *Оценка бизнеса*: Под ред. А.Г. Грязновой, М.А. Федотовой. – Москва: Финансы и статистика 2005 512
[15] Kopitov R 2012 Reliable Organization's Axioms Issues of Business and Low **12** 94-105 http://dx.doi.org/10.520/ibl.2012.09
[16] Коупленд Т, Долгофф А 2009 *Как достичь превосходства в управлении стоимостью компании* Москва: Эксмо 384
[17] Ивашковская И В 2012 *Моделирование стоимости компании. Стратегическая ответственность советов директоров* Москва: ИНФРА-М 430

The problem of the choice of methods for calculating transfer prices

M Grigorjeva*

ISMA University, 1 Lomonosova Str., Bld. 6, LV – 1019, Riga, Latvia

**Corresponding author's* e-mail: marina@repull.lv

Abstract

This paper is devoted to the sistematization of the factors influencing the selection of pricing methodology in a related transaction. The study deals with the fundamental basis for the development of financial policy of the enterprise taking into account the peculiarities of transfer prices formation.

Keywords: finance, politics, category, price, transaction, property, signs

1 Introduction

Transfer price is considered from the standpoint of basic economic category, in which key provisions - economics, management, business and society, as a whole, are intercrossed [1]. On the one hand, the transfer price is the price (cost) of goods or services, which is used in a transaction between the parties that in the interpretation of the law "On Corporate Income Tax" considered to be related companies, one of which is a foreign company.

On the other hand, the transfer price is the contract price in international transactions with related parties. It is used to optimize the income tax. In different countries of the European Union's income tax rate are not the same, are not subject to standardization, but are the prerogative of countries. In this regard the use of transfer prices rise to a number of administrative and accounting issues.

2 Overview

In the documents of the European Union and Latvia a hierarchy of methods of calculating the selection of a particular transaction has not established. The choice of method for calculating the transfer price is affected by many key factors. Their selection and the binding are focused on the development of special procedures to ensure an effective management of pricing policy of the enterprise. In accordance with the intended purpose the following tasks are:

- study methodology of pricing strategies;
- classification of problems related to the development of pricing strategies for Latvian companies;
- development of pricing management procedures;
- development of methods of decision-making process for the management of transfer pricing;
- development of criteria for the choice of approach for calculating transfer prices.

As the solution of these problems is decided property-related transactions which are classified by the following features are restored:

1) the type of the associated entity [2];
2) the amount of the transaction and the turnover of the enterprise (Latvia has a criterion) [3];
3) type of the transaction (selling, purchase at a price higher than the market , the provision of services, the purchase of services) [4];
4) the nature and content of the transaction cannot be a criterion for selecting the method of calculation of market price.

3 Decision

Traditional methods of transfer pricing, based on a comparison of information on earnings, prices or profitability, need to supplement the methods of cost management [5]. The first method uses the information obtained by the analyzed transaction with the same transaction from open sources. In the second case it is necessary to conduct a wide-ranging assessment of the company. The choice of method determines the benefits and limitations associated with each of the methods and their tax consequences.

4 Conclusion

Universal method for calculating the transfer price does not exist. The choice formation should be guided by the objectives of the enterprise and their consistency with its divisions. The correctness for the choice of calculation method determines the efficiency of transfer prices.

References

[1] Bayeux M 1999 Managerial Economics and Business Strategy Moscow: UNITY -DANA 744
[2] The Republic of Lithuania Law of 18.02.1995 (ed. Of 12.23.2015) *"On Taxes and Fees"*
[3] The Republic of Lithuania Law of 01.03.1995 (ed. From 02.15.2016) *"On Corporate Income Tax"*
[4] OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations OECD Committee on Fiscal Affair
[5] Shahson N 2012 Treasure Islands: tax havens and the men who stole *the world'* Moscow: Eksmo

Knowledge technologies: medical product in tourism

K Yakovleva*

ISMA University, 1 Lomonosova Str., Bld. 6, LV – 1019, Riga, Latvia

**Corresponding author's e*-meil: artdeks@inbox.lv

Abstract

The main aim of the present research is the implementation of a 'new medical tourist product' in the Spanish market. The fulfillment of the activity of the new medical tourist product is carried out in the grupopalas.com hotel network.

Keywords: tourists, hotel network, medical product, patient electronic card, insurance policy, Spanish market, enterprise's efficiency

1 Introduction

The medical tourist product is an additional medical policy for accidents not covered by the tourist insurance (dental treatment, sunburns, light injuries and bruises, body poisoning, alcohol overodose).

Topicality: the standard insurance does not cover accidents and extreme circumstances during tourists' leisure. The aim of the research is to analyse the necessity and possibility of implementing the new medical tourist product in the Spanish market.

Product positioning technology: a unique offer, a direct sale of the entire complex of medical services in one subscription by the tour operator.

Enterprise's positioning technology – a tour operator who takes care of his/her clients' health. [1, p.32-33]

2 Statement of the Problem (Objectives of the product implementation)

- sign contracts with the leading tour operators of Russia, Europe, CIS, Scandinavia and the Baltic states;
- sign contracts with hotels for the installation of equipment and the launch of a wellness programme from 15.04.2017.
- develop a regular system of consumption of the tourist medical product that will enable to increase the accuracy of the produced % of the income in the activity of the hotel in question before 15.04.2018, whilst the initial sum of the investment does not exceed 550.000 € in Spain.

3 Results of the Study

To determine the prospects for opening of this kind of business independent research was carried out in the form of a questionnaire for tourists residing on the territories of Hotel Palas Pineda 4* and Gran Palas 5*. The interviewed tourists from Europe and Russia, having a rest in the palasgroup.com network voted in favour of the availability of a medical tourist product in the hotel (95%).

In addition:

- 2,500 people (all respondents) - 100%;
- 2,375 people - 95% in favour of the availability of medical services at the hotel;
- 2,250 people - 89% in favour of the presence of a Russian-speaking specialist at the hotel;
- 125 - 5% against the medical services at the hotel.

It should be noted that the provision of services is not only limited to visiting tourists, but for the locals also – the Spaniards themselves. For many visitors it will be a unique opportunity to mix business with pleasure.

For most tourists, including former residents of Latvia, it will be a unique opportunity to get out on vacation to the sunny Spain from the UK, Ireland, Netherlands, Norway, Greenland, Wales; from any location in Europe and Russia. To have a rest in Spain and get an appointment with a highly qualified specialist through the customer database.

4 Adopting relevant technology

The development course of the organization can be viewed through the expanded model of the company's holistic picture. For this the following is to be analyzed:

1. external information (laws, taxes, social factors);
2. internal information (orders, sales, salary).

In the construction of the model, the following steps should be considered:

1. model;
2. the system layout;
3. scenarios of implementation;
4. options of implementation;
5. solutions;
6. action (implementation). [2, p.9]

Six steps of creating the service:

1) Selection of the staff. Requirements for employees, operating under the formula (knowledge + skills + experience) x motivation = the perfect employee. (productive work) a perfect team made of specific people.
2) The room is located in one of the 6 hotels in the resort

area where within a radius of 20 km there are more than 40 hotels and more than 100 apartments, purchased by Russian-speaking tourists.

3) Location of the hotel 4*, being part of the hotel chain grupopalas.com and located on the first line of the sea
4) Generation of a marketing program made to attract the maximum tourist demand for a medical tourist product with the help of Russia's and Europe's leading tour operators, as well as through existing popular social networks and enterprise homepage, accessible from anywhere in the world.
5) Calculation of financial costs.
6) Calculation programme ratio of vacancies to the demand of the product. [3, p.275]

By developing criteria of efficiency of this product's consumption, we can provide a personalized approach for each tourist, using the patient's electronic card.

5 Conclusions

The solution of set tasks will improve the situation on the Costa Dorada coast in Spain. It will increase the flow of tourists willing to have a vacation in said region. It will allow each person to travel safely, feel comfortable in an unfamiliar environment for a period from 1 week to 1 month, purchasing an unlimited amount of subscriptions: for themselves, their family members, relatives and friends at a fixed subscription price of 250 € per 7 days.

- The analysis of tourist profiles has showed that 95% voted in favor of the existence of the medical tourist product in the hotel. Consequently, the service will have a good demand on the market.
- This service will be advertised through popular social networks.
- A fixed price has been selected for a subscription for a definite number of days for all ages and each tourist.
- The external market has been determined – these are the tourists from Russia and Europe. The domestic market of the product's customers are the Spaniards.

The ultra-product designed by the author allows you to check the effectiveness of a medical tourist approach, where the leadership is working in a supportive team, has a deservedly high level of qualification and experience of over 30 years and is certified according to European standards of medicine and is ready for implementation of the product in Spain.

References

[1] Грачева О 2008 *Организация туристического бизнеса. Технология создания турпродукта* 32-3
[2] Копытов Р 2009 *Бизнес проектирование в предпринимательстве* 9
[3] Котлер Ф 2007 *Основы маркетинга. Краткий курс* Пер. с англ. - М.: Издательский дом «Вильямс» 275
Домашняя страница сети гостиниц grupopalas.com
[4] *Федеральное государственное бюджетное образовательное учреждение высшего профессионального образования «российский государственный университет туризма и сервиса» Конспект лекций «Маркетинг медицинских услуг»* 2011 300 p

Recovery of business stability features or business resumption plan

O Kamforina*, R Kopitov

ISMA University, 1 Lomonosova Str., Bld. 6, LV – 1019, Riga, Latvia

**Corresponding author's e*-meil: oljga2005@inbox.lv

Abstract

The developed management system at the stage of business support is not seen as a state of control mechanism, but as a means of improving the structure of the organization. This tool is developed in the course of identification of large-scale circumstances allowing causing significant damage to the business. Scheme enhancements are estimated on the basis of cost management principles described in terms of design of purposeful systems.The rating system is carried out in the long term, and is focused on maintaining a sustainable business in the interests of all stakeholders.

Keywords: performance management systems, paradox of innovation, purposeful system, quality, sustainability

1 Introduction

Nowadays, many enterprises at the stage of business planning face the question of choosing the right technology to work for further development of strategies in business management.Porter theory states that it is necessary to use the top-down processing, aimed at building a hierarchy of key factors on which the strategy of the company is developed [1]. In contrast, Norton's and Kaplan's theory leads to ascending technology aimed at building a strategically focused organization.In the first case one has to deal with external goal-setting mechanisms (vision, mission, strategy and objectives), whereas in the second case, a performance management systems are established (includes the development of internal synergetic process assessment tools, and also accounting the contribution of the various components in the cost of the organization) [2]. The use of both theories in practice demonstrates low degree of effectiveness of the strategies which is due to the high degree of uncertainty [3].

Taking into account the application of management aspects it was found that new business improvement is not always synchronized with the changes occurring in the environment. Moreover, it is worth of mentioning that the level of uncertainty increases according to the introduction of new assessment tools. This phenomenon which takes large-scale character is seen by authors of the paper as 'paradox of innovation'.

The resolution of the paradox of innovation is considered taking into account the principle of open systems and consistent patterns of communicativeness. At the same time the organization's management system must form a single whole with the environment surrounding it. To ensure the performance of management system it is required to analyze the factors from the perspective of the existence of a kind of super-system. Such analysis requires matching structuring characteristics defined in different spaces of initiation purposes.

2 Conceptual investigation scheme

A conceptual scheme for solving assigned task is illustrated on Figure 1 Management style, in this case, provides determination of the organization.

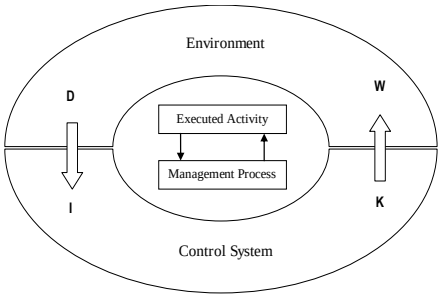


FIGURE 1 Conceptual scheme of purposeful management system response to the impact of the environment

The unity of an integrated leadership and overall management process is studied from the perspective of the impact of the external environment on the key variables of purposeful management system (DI transition), which, in turn, responds to the manifestation of all external influences (KW transition).Each of such impacts is estimated within a widespread modified circuit of strategic management, which includes a system consisting of seven interlinked tools [4]. A special feature of this circuit is the inclusion of approaches allowing timely detect and neutralize a manifestation of the external circumstances.

Figure 1.2 illustrates general procedure for diagnosing the state of the business, which includes step by step transitions, showing the sequence of the application of individual approaches.

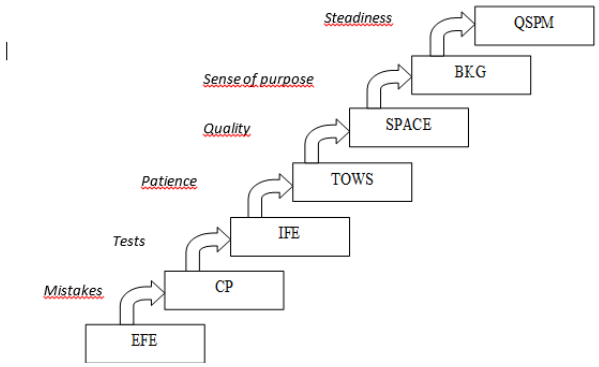


FIGURE 2 Diagnostic procedure of state of business as a part of a large-scale circuit of strategic management

The illustrated procedure (see Fig 2.) helps to develop the technology of designing a sustainable business that will assess the level and preparedness of management system to independently response and withdraw from the uncontrolled state. In case if one has faced management system which is not self-governing, it is necessary to identify the major fault, which negatively affects the operation of the enterprise as a whole. Further on, it is required to apply measures allowing localizing the errors identified, without affecting the stable parts of the system. In other words, each improvement made should not violate the requirements of the purposeful systems [5]. Thus, from the perspective of the theory of organizations it is established that the effectiveness of a particular element, including a specific party of the environment, should not contradict to the overall effectiveness of the control system [6]. In terms of systems theory the support for business stability is provided by taking into account the coincidence of signs of actions undertaken towards the control system before and after . Each of these reactions characterizes a specific factor. It should be noted that in a large-scale assessment of the state of business sustainability, in view of its commitment in the medium term, need to be taken into account more than 300 factors, of which less than three per cent (this is about key factors) provide more than 90% of the results [7]. As a result, the omission of the key factors and the absence of a detailed description of its manifestations are the main causes of the poor performance of practical implementation of the strategies [2, 3, 8].

3 Conclusion

It is necessary to develop an approach and a technique of designing a sustainable business that allows evaluating and identifying the main key factors that have a negative and destructive effect on the control system and that does not allow the system to respond quickly to external threats. It is also required to determine the means of "unstable diagnostics" on the basis of which it is impossible to draw conclusions. It is essential to choose the instruments for the system entering a strategically new and qualitative level allowing controlling business in conditions of uncertainty and its possible external threats. During the work it is necessary to apply recovery operation for features of destroyed organization which allows targeting the work in a purposeful system [9], based on the description of the DIKW model. The requirement of purposefulness is caused by that it is just about a new quality of the system, rather than the development of a new system, which has a completely new purpose. In the course of description the common elements are identified on the basis of which the phases of technologies for planning sustainable business are formed.

References

[1] Porter M E 1980 Competitive Strategy: Techniques for Analyzing Industries andCompetitors (New York: Free Press, 35–40
[2] Kaplan R, Norton D 2006 Alignment: Using the Balanced Scorecard to Create Corporate Synergies Boston: MA: Harvard Business School Press
[3] Neave H 1990 The Deming Demission Knoxville, Tennessee: SPC Press
[4] David F R, David F R 2015 Strategic Management Concepts and Cases
[5] Ackoff R, Emery F E 1972 On Purposeful Systems Aldine-Atherton, Chicago
[6] Barnard C I 1948 Organization and Management: Selected Papers Harvard, University Press, Cambridge, MA
[7] Kopitov R 2012 Reliable Organization's Axioms Issues of Business and Low **12** 94-105 http://dx.doi.org/10.520/ibl.2012.09
[8] Cokins G 2004 Performance Management: Finding the Missing Pieces (To Close the Intelligence Gap) Hoboken, New Jersey: John Willey & Sons, Inc.
[9] Ackoff R 1989 From Data to Wisdom Journal of Applied Systems Analysis **16**

Design-thinking technology

O Kuriats

ISMA University, 1 Lomonosova Str., Bld. 6, LV – 1019, Riga, Latvia

**Corresponding author's e*-mail: kuriats_olia@mail.ru

Abstract

The non-traditional approach of business projecting is under the review. Its peculiarity lies in the new technique of generating of innovative ideas.

Keywords: quality, idea, capital, future, development

1 Introduction

Design thinking – is the basis of truly innovative campaign and it is crucial quality of its leader. This theme is of great current interest for business people and for designers at heart. In addition, it is up-to-date for the leaders, project managers and all those who are ready to catch up new ideas on the fly and to turn away from writer's blocks in an artistic way, to be able to stay in-steps with the times.

The interest of this subject is generated by design becoming the mainstream of our lives. Even the words itself "design" in the context of business becomes a synonym to the effective and fruitful work [1].

In the course of research, dealing with the three wide spheres of person's activity – business, market and society, the emphasis in made on usage of the design-thinking as the means of creating new s, equal to the challenges we encounter [2]. Notwithstanding the functional direction, the design thinking helps to reconsider the essence of organized business. As an assistance to non-profit charitable organizations, design thinking allows to recognize the needs of people, who are need to be served. For venture capital persons design thinking is the objective means of projecting future [2].

2 Decision

In our days the most progressive companies to not attract designers only to make rape ideas look more attractive, but to let them work out those ideas right from the start [3]. The former role of designers was very tactical – just based on existing, and that would let to improve one, but just slightly.

The purpose of research is directed to develop the procedure that would allow to form new thinking during business project conception.

In the context of the object in view, there are following tasks to solve:

- Theoretical and methodological statements of thinking forming are being investigated.
- The distinctive features between design and projecting are being determined
- The procedure of design is being developed.
- Procedure approbation is being held in the context of specific project.
- The benefits of new approach are drawn forth.

3 Conclusion

The new role, by definition, is strategical: it takes out the design beyond the workshop and frees out its devastating, world-changing potential. It is no mere chance to meet designers at boards of management in the most developed companies. More than that, the principles of design-thinking are to be applied within different organizations, not only among the companies that make new products. The competent designer is always capable of improving new devices, but the cross-disciplinary team of experienced design-thinkers is able to solve more complicating problems.

References

[1] Schedrovitsky G P 1995 Selectas. Sch.Kult.Polit., Moscow (in Russian)
[2] Mintzberg H 2009 Managing Berrett-Koehler Publishers, San Francisco
[3] Kopitov R 2012 Formalization of a Reliable Enterprise Design Computer Modeling and New Technologies **16**(1) 15-29

Assessment of influence of intangible assets to create effective organizations

L Tihomirova

ISMA University, 1 Lomonosova Str., Bld. 6, LV – 1019, Riga, Latvia

**Corresponding author's e*-mail: ljubovj_tihomirova7@hotmail.com

Abstract

In the present study we assessed the viability of organizations, whereby in the process of the evolution of business management, intangible assets came to dominate to create an effective organization. Research happens in a way of creating a project, where the company's activities are considered from the perspective of living systems - a living organism. The term "organization's health" is introduced to assess its position and to control how intangible assets affect the cost of the enterprise. Creation of an effective organisation which would be successful in the market comes down to an understanding of it as a living system and a system as a whole, as well as in the investment in intangible assets.

Keywords: intangible assets, effective, value

1 Introduction

Currently, the primary task of management is to maximize shareholder value and improve the welfare of the owners, namely the increase of own capital and profits. Otherwise, the activity of the enterprises is under threat and it complicates the problem of identifying controls, including the attraction of capital from financial and strategic investors. At the same time, many managers mistakenly focus on the reduction of costs, personnel and increase the accounting profit. But the real increase in shareholder value is aimed at creating competitive advantage in the long run by using the resource, technological, cultural and innovative benefits. In this case, the traditional approaches to evaluation, which relate to the research activity of the enterprise on the basis of balance sheet results, fade into the background. This is due to the fact that the financial statements, which focus more on the past, hardly reflect assets that are critical to achieving enterprise performance to be competitive and profitable. Managers of effective organizations interested in the instruments which concentrate particularly on the future of the organization, including its growth and continuous development, intangible assets, investments and it high potential of development in the market. Practice of evaluating effective companies shows the gap between their carrying value and market capitalization, which indicates the predominance of the value of the companies' brands and intangible assets as intellectual property, knowledge and innovation. Thus, the creation and increase of intangible assets of the company is to increase income of shareholders.

2 The main problem

It is no coincidence that in the last few decades, the focus has changed from the traditional sources of financial values such as tangible assets, and transformed into intangibles such as innovation, knowledge and intellectual property in the form of know-how and a variety of the latest - scientific developments and the very reputation of enterprises. Intangible assets are assets that can not be touched, but they are vital assets to the company and the key to its success in the future. Modern methodology of valuation of intangible assets opens up in the direction of creating living systems. That is why the issue becomes complicated. It's needed to evaluate the effectiveness of the live's company in an environment where most of its components "are invisible and intangible." Understanding the value of a living company leads to an increase in the duration of its life cycle. This is a constant adaptation to the external environment and the involvement of people in the continuous development of the company. After all, as a living organism the company needs to grow, develop and achieve their full potential [1].

It should be understood that there has been evolution in the management, but the problem of adaptation to external influences remains the same. It is necessary to reevaluate the assessment methods of the organization [2].

It is essentially a question of an "organization's health ", which should be assessed from the standpoint of conventional methods of assessment of organisations, which are profit-oriented.

This contradiction reveals the following issue, which is the lack of universal mechanisms of assessment of viable organizations, including an organization's health.

This study attempts to search for such mechanisms, on the basis of which it would be possible to estimate the contribution of intangible assets to the value of an organization.

A solution to such an issue is carried out on the basis of cost management as part of which the business goals are supplemented by tasks of social purpose.

In other words, we answer the question "How do social factors affect the efficiency of the organization?".

3 Overview

The purpose of this study is to develop a set of measures aimed at improving the efficiency of an organization in terms of improving the capacity of intangible components.

To achieve this goal the following tasks have been put forward:

- a study of methodology for assessing the value of intangible assets, including an "organization's health";
- classification of problems related to the study and the creation of sustainable organizations;
- systematization of the factors affecting the "health of the living entities;
- classification of problems related to the study and the creation of effective institutions;
- development of activities to improve the investment attractiveness of the creation of effective organizations;
- assessment of organizational effectiveness by improving its "health."

At the moment, most of the market value of the company consists of intangible assets, mainly intellectual property. In the high-tech industry this kind of intangible assets is fundamental. But the study identified the activities that need to be changed in accordance with the requirements of the external environment in order to build sustainable organizations, among which such factors are highlighted as destruction of an organization, its recovery, prevention of destruction, etc..

In order to avoid the destruction of an organization such hazard warning technique such as misunderstanding is suggested. Restoration of an organization is reduced to several approaches: understanding and revealing of the scale of danger, development of measures to neutralise the danger and impacting the dangers of an already renewed organization.

4 Results

The results of the research reflect how and to what extent the conversion of intangible part of the organization affect its shareholder value. This study investigated the contribution of the individual components of the value of intangible assets in the organization. The study found that the use of intangible assets in business today is included in the process of value creation. Leaders of organizations must understand that sources of costs began to change. Land and property are beginning to lose its relevance to ideas. Organizations are aiming at knowledge [3]. Intangible assets include several factors of competitive superiority. These factors Rich Karlgaard presents in his book "In a healthy business there is a healthy spirit", such as confidence, intelligence, command, taste and history. The application of these factors contribute to the achievement of the efficiency of a business organization [4]. In addition, a study of a number of indices that are relevant to the intangible components, such as the happiness index, profitability factor index, nasdaq, and others.

All this allows us to identify the factors that allow to assess "an organization's health ".

The solving of this task is conducted on the example of the investment project relating to an establishment of a Wellness center.

5 Conclusion

Traditional methods of assessing a state of an organization today are not strong enough to give a full assessment of the company. Applied ttechniques are not in conformity with the nature and quality, which leads to incorrect actions of managers and prone to errors in management.

Heads of companies need to understand what intangible assets are, and how to use them to increase their company's value. And this should be done not at the level of general provisions in the course of application developments. Business needs a means of assessing the contribution of the individual components. Social value factors become of priority importance.

As the business world today is progressing at an incredible rate more attention should be paid to intangible assets and investing in them.

References

[1] Arie de Geus 2013 The living company Habits for Survival in a Turbulent Business Enviroment
[2] Beer S 2009 Brain of the firm Librokom
[3] Cokins G 2015 Performance Management Alpina publisher
[4] Karlgaard R 2015 In a healthy business there is a healthy spirit Moscow

Holographic model of the enterprise structure: goals and solutions

S Miscenko*

ISMA University, 1 Lomonosova Str., Bld. 6, LV – 1019, Riga, Latvia

**Corresponding author's e*-mail: miscenko.stanislav@gmail.com

Abstract

The main idea, revealed by the author through the prism of his investigation, is connected with the creation of the holographic organization. In this context, the holography is not only the visualization of the organization, itself, but, at the same time, the inclusion of the other sources of information in the given schematic model.

Keywords: mental activity, information, energy, result, system, innovation, hypothesis

1 Introduction

At present the notion of the organization has overcome the essential changer. At first, the organization was considered as a structure of any system. In the course of time, management started to be the separate field of science, but the organization was realized as the definite, foreseen structure of roles, functions, rights and responsibilities, adopted by the enterprise.

Taking into consideration the principles underlying the organization, we could divide the organization into different forms and types. The most known of them are the organization as a mechanism and the organization as a living organism. The organization as a living mechanism is supposed to be the foundation of the author's hypothesis.

2 General

The research is based on Gareth Morgan's work "Images of the organization" [1]. Using the main ideas of Gareth Morgan's work, the author puts forward the hypothesis on regarding the organization as some holographic model. The main principle of the holography [2, 8] affirms that each particle contains the whole information about the integrity. The author of research mentions the term "holographic brain", which is synonymous to the notion of the organization. The term "holographic brain" was widely used in the authoritative scientific investigations long ago and modern neurophysiologists often refer to this concept in their works [3-5].

Using these modern research works as the basis, the author points out the idea of the holography in the framework of the organization, where the organization and the "living organism" being the same [6, 7].

Taking into account the conception of the "holography" of all living organisms as well as the principles of similar constructing the organization, the author shows the chain of its building: what is about – that is below and vice versa.

The question is whether the modern organization can function as the "holographic brain"? Answering this question, the author emphasizes 6 principles to which the organization should correspond [1]:

1. building the integral in each part;
2. peculiarities of the "excess" or the energetic exchange inside organization;
3. sufficient internal complexity;
4. primary minimization of conditions and demands;
5. possibility of the creative realization;
6. stimulation of the reasonable self – learning.

All these 6 principles are based on the "triangle of the energetic connection" or TEC, consisting of Will, Senses and Reason.

Only TEC is able to accumulate all 6 principles and construct some "patterns – levels" for starting and developing the enterprise.

The holographic model of the organization, built on these principles and based on TEC, is capable of creating the material basis of the developer's plan, where on the primary stage the most important thing is not what the organization creator knows, but the ideas he keeps inside him [2, 8].

3 Conclusions

The vitality of the research is determined by the importance of the internal principles underlying TEC of the holographic enterprise model. But in any case, it is important to realize, that such research works are rather forecasting future than critically comprehending reality.

The author hopes that in the process of constructing the innovation economy TEC will become the leading and accelerating factor. We expect the ideas, built on the author's hypothesis, to become gradually a part of the surrounding reality. This self – organizing system, possessing both – structural variety and properties of the integrity in each part, can create the conditions for emerging and propagating the innovations and their reproduction.

In the author's opinion, the most significant and urgent thing is the right choice of the energetic source of the future organization and its holographic framework.

The author is convinced that the enterprise, as a holographic model, will become the indicator of the not far future, and the people, who will agree with this statement as soon as possible, will obtain indisputable advantages.

References

[1] Гарет М 2006 *Имиджи организации: восемь моделей организационного развития* Москва: Вершина. 416
[2] Пучко Л Г 2001 *Многомерная медицина* Москва: АНС. 432
[3] Талбот М 2004 *Голографическая Вселенная* Москва: София 368
[4] Nobill R 1985 Phys Rev Gen Phys **32**(6) 3618 – 26
[5] Nobill R 1987 Phys Rev A **15** 1901 - 22
[6] Beer S 1971 Management Science Moscow: Energy 112 (in Russian)
[7] Beer S 1963 Cybernetics and Production Management Moscow: Science 276 (in Russian)
[8] Miscenko S 2014 Modality of Managing the Generation of Resultant Ideas: Multidimensional Organization Structure The 12 International *Scientific Conference "Information Technologies and Management"* 2014, April 16-17.Riga. Latvia

Procedure of the full-scale effective business administration

A Tretyakov

ISMA University, Lomonosova Str. 1, LV-1019, Riga, Latvia

**Corresponding author's e*-mail: eiroartlv@inbox.lv

Abstract

Current abstract describes the question of business evaluation in terms of the impact of external and internal factors. At any stage of enterprise development there are a variety of events that determine the need of business administration. The abstract describes the procedure that allows to increase the stability of the company in the long term perspective.

Keywords: internal and external factors, management of the company, long term stability

1 Introduction

This work is dedicated to the development of effective business management procedures [1]. Competence of development is carried out in the frames of large-scale outline of strategic management [2] based on multilevel analysis of factors of the external environment on the controls system. This enables businesses executives to get clear procedure for evaluating the strengths and weaknesses, as well as internal and external factors affecting the company. This will help guide efforts to achieve good results in the future.

2 Mainproblem

Traditional methods of business evaluation focused on the emotional perception of the factors. Analysts enthusiastically perform the rules of the method, not taking into account the sources of information gathering and processing. For example, SWOT analysis requires further use 6 interrelated methods. It takes 2-4 months of interconnected work. Ignoring such work has a negative impact on the performance and quality assessment. There are many other methods of business valuation, forecasting its development, but there is no method to determine the strengthening weaknesses, development of promising directions in business.

3 Overview

At the heart of this work is used the approach of the external audit of the environment of tools to identify and rank key factors that influence the activity of the enterprise. These factors are derived from the analysis of case studies by industry, company, from personal interviews, evaluation reports, etc. In addition, you must use the available public sources of information, such as the business register, - home page of the company; reports on the industry; assessment reports on the financial activities of companies.

Collected factors of influence on the company are sorted by topics, for which the special procedures developed. This allows you to organize a variety of factors, and obtain a qualitative assessment of the impact of each factor on the activity of the enterprise, its management system. In the course of such an analysis is organized peer review by independent experts. Each expert will give his assessment of the impact of factors on the activity of the enterprise.

Next, has been stand out from each group only those factors that make the effect above the lower limit.

So we formed the factors of influence on the company and determined the degree of dependence on them that allows us to approach to the formation of the environment.

4 Decision

After identifying the main factors of influence on the company, the head of the company will be easier to make a decision, because they are available procedures for responding to manifestations of external factors. These solutions will be justified and will help the company or enter a new stage of development, or to strengthen the existing level and not allow competitors to gain market share.

5 Conclusions

This work has shown that for effective management of the enterprise, which is held within the framework of the full circuit of strategic management, takes on average to identify and analyze 200 to 300 Based on these factors formed a clear view of the control levers. These levers have, in turn, make it possible to receive the warping to assess the impact of internal and external exposure factors. With access to such evaluation mechanisms, the head of the company will not only be easier to make a decision in each situation, but also the successful and timely to develop his business and to keep stable its position on the market among the competitors.

References

[1] Kokinz G 2007 Effectivenessadministration: Howtoovercomethe gap between the strategy and real processes transl. from engl..- M., AlipinaBusiness books 185
[2] David F R, David F R 2015 Strategic Management, Concepts and Cases, Fifteenth edition Pearson Education Limited
[3] Skott M 2000 Valuefactors: Manual for the managers to identify the levels of the value creation Transl.from eng. M. ZAO «Olymp-Business» 432
[4] http://www.pfizer.com/investors/presentations

Realization of innovative ideas

D Zasuhina

ISMA University, Lomonosova Str. 1, LV-1019, Riga, Latvia

**Corresponding author's e*-mail: darja_21@inbox.lv

Abstract

This research is sanctified to development of mechanism, allowing to estimate the willingness of the developer to realize in practice new, valuable for society, project not having reasonable basis.

Keywords: mechanism, organization, value, adaptation, healthcare

1 Introduction

Research is devoted to the development of a mechanism which gives the possibility to assess the readiness of the developer to put into practice to the society a new and valuable project with no sound collateral. In the basis of the mechanism a well-known approach called "Pentagram value"[1] is used, which is adapted in the new conceptual scheme. The proposed addition enables to identify the reasons that prevent the realization of important ideas, on which basis are developed organized reasonable arrangements for supporting the project, including funding. Validation of the mechanism is considered within the healthcare industry.

2 Decision

The aim of the research is development of mechanism allowing to overcome resistance of non-acceptance of important suggestion of social orientation. The question is about the prophylaxis of abortions. High level of abortions, decline of motivation to the healthy way of life in a great deal assist that during pregnancy there is an increase of different diseases, the amount of luing-ins without complications rises. As a result the number of domestic pairs needing providing of medical care grows in total. All of it requires considerable investments. However, in spite of the importance and evidence of this task, it's realization in practice causes row of difficulties at the receipt of financing. One the reasons is the absence of objective mechanisms allowing to estimate the social capital. A forming model in society of safe and successful family requires opening of constituents of spiritually-moral orientation. Realization of such projects is accompanied with large complications, the point is that besides the idea, necessary resources and quality grounds to the willingness of people to realize this idea are required. In this connection the degree of such readiness is determined not only at the level of professional knowledge, skills and abilities but also by certain set of capabilities and aspirations, that is inherent to personality undertaking responsibility on a management and realization of project.

Offered approach oriented to development procedure of estimation of efficiency of atypical investment projects of social orientation. Its basis is made by the evaluation charts of estimation of social surroundings. Both the eleemosynary mechanisms of improvement of quality of life of patients with chronic diseases and the instruments of accompaniment of medical business are thus taken into account. The deposit of every constituent is estimated from position of cost management. In terms of realization of effective idea is in the context of life cycle G. Bainder [2].

3 Conclusion

For getting professional information, statistical data, as well as clarification of the demographic situation in a society at the moment, a practice has been passed in a medical institution. In this practice was analyzed, the dynamics of growth of abortion in Riga, age category, factors contributing this action. Many interviews were conducted with gynecologists and other specialists about the importance and need for a new project, as well as discussion of possible ways for providing useful knowledge. In practice, the proposed mechanism was put into action and started its life cycle.

References

[1] Copeland T, Dolgoff A 2006 Expectations-Based Management Journal of Applied Corporate Finance **18**(2) 82-97 DOI: 10.111/j.1745-66622, 2006.00089.x

[2] Байндер Г, Бэше Ф 2008 *Бизнес по науке. Чему менеджерам стоит научиться у биотехнологов* Москва: Манн, Иванов и Фербер 272

Diagnostics technology of business design

J Rutka

ISMA University, 1 Lomonosova Str., Bld. 6, Riga, LV-1019, Riga, Latvia

Abstract

Quality assessment of the enterprise activity is reduced in the course of implementation of new business technologies. This contradiction is a need for business consultants, whose activity is observed in the emergence of new technologies. In turn, the real need to push the issue, note the fact that poor quality methodological support of business valuation after the introduction of new technology due to technical unreadiness of companies evaluate their activities on their own. In order to prepare the company for evaluation of business on its own, it is necessary to hold a fundamental diagnosis of the introduction of new business technologies. This will require a lot of unforeseen circumstances into account, on the basis of which it would be possible to make objective conclusions.

Keywords: diagnostic, process, effectiveness, technologies

1 Introduction

In view of this research was formulated theme of research: "Diagnostics technology of business design."

Such opinions are held in conditions of resistance to new media design.

The organization of such a diagnosis is aimed at improving the management process by identifying and eliminating problems. To begin such an organization to be effective after the adoption of the principles of management. Based on these first need to systematize organizational pathology, and then proceed with the development of tools to assess the quality of diagnosed embedded technology. The result revealed the scope of business activity, within which will be used to resolve the identified problems. Above it it has been found that the problem is reduced to improve the quality of methodological support of assessing the financial condition of the enterprise and to the preparation to the evaluation of their activities on their own.

Therefore, the object of the study is to assess the effectiveness of implementation of the new enterprise technology in-house.

Highlight research object to determine its object, which allows to trace the disclosure of the organization's capacity in the implementation of the new technology.

The subject of research is the process of improvement of methodical maintenance associated with the assessment of business performance in the implementation of new technology business design.

2 Formulation of the problem

Solving the problem of improving the quality of evaluation, the problem is solved to obtain objective conclusions about the effectiveness of the introduced technology. Such opinions should be based on methodological foundations of lean production techniques. In other words, we are talking about the formation of a lean attitude to new technology design business.

The purpose of this study is focused on the development of procedures to ensure efficient implementation of the new organization of business technology.

This procedure allows you to find effective methods of building diagnostics mechanisms that would best fit to change the processes of strategic decisions.

In general, the solutions for the goal you want to achieve the following objectives:

1. Statement of the problem diagnosis implementation of business design.
2. Theoretical and methodological provisions of the new technology business engineering (Guide 24 steps).
3. The role of lean manufacturing techniques in the diagnosis of the introduction of new financial status.
4. Develop procedures for assessing the effectiveness of the organization implementing the new business technologies.
5. Testing the implementation of procedures in terms of the Master's program "Management of enterprise" in the ISMA.

3 Conclusions

Put forward the task allowed us to formulate the hypothesis of the study is based on the idea that the technology of lean manufacturing is an objective means of diagnosing the effectiveness of the introduction of new technology design business.

Evaluation of business planning technologies

A Amangeldiyev

ISMA University, Lomonosova Str. 1, LV-1019, Riga, Latvia

**Corresponding author's e*-mail: amanabil61@gmail.com

Abstract

The introduction of new information technologies in enterprises reduces the period of long-term planning [1]. In addition, every new version of the technology not only causes the change in the management system, but also requires a change of the strategic course shift of the organization [2].

Keywords: strategy, selection, mechanisms, effectiveness, procedure, testing

The main contradiction is found in the fact that the majority of decision-making methods are typical in nature and focused on the proof of the given strategic goal [3]. This raises the problem of strategic goal's dependency on the used technological means of business planning. The resolution of the problem is aimed at finding the appropriate means, which enable the introduction of new technologies without changing the existing strategy. [4] The object of the research is the expert activity in the framework of which it would be possible to recommend to enterprise managers to choose a particular technology of business planning. The subject of the research is efficient mechanisms of the above-mentioned choice. The fundament of the mechanisms is based on the hypothesis with the main point that at the particular cycle of development the enterprise is in need of the specific means of business planning. The aim of this study is to develop a procedure that ensures the examination of planned and controlled tools to assess the enterprise. According to the target goal the following problems are to be solved:

- Exploration of the business planning expertise features;
- Benchmarking of various business planning technologies;
- Identification of influencing factors on business technology choice;
- Procedure development of business technologies evaluation;
- Testing of the procedure effectiveness in terms of various business projects.

By solving the above-mentioned tasks the recommenddations on the use of effective mechanisms of business planning are given in each specific case. Table 1 shows the main results of the study, which reveal the main functions to characterize the expert activity in the field of business planning.

At the process of solving the first task, it is found, that the best results on the expertise were achieved by the enterprises that develop the carefully structured program of transformation of the financial service with the challenging aims [5-10].

TABLE 1 General study of the theoretical aspects of the expert activity in the field of business planning

№	Function	Essence	Measures
1	Facilitating the process of change	It is a tool of change management. It forms the structure of the future perception and a tool to identify new opportunities.	1. Objective assessment of current performance 2. Measurement of customer satisfaction. 3. Assessment of the creation of shareholder value. 4. Evaluation of gains competitive advantage. 5. Loyalty measurement
2	Encouraging managers to formulate the "right" questions	It forces formulation and search for answers to the questions that determine the success and failure. It ensures the correct response to unexpected events	1. Assessment of errors in the analysis of customers' 2. Assessment of the competition analysing. 3. Study of the needs of consumers. 4. Identification of competitive advantages.
3	Motivation and control	It creates the long-term value for shareholders. It builds the relationships with stakeholders in the business, based on the company's ability to meet their needs.	1. Creation of shareholder value. 2. Selection of potential development options. 3. Development of value proposition. 4. Evaluation of the impact of the proposals. 5. The implementation of the proposals.
4	Countering accounting traditions	No looping on costs and monthly budgets.	1. Evaluation of the long-term prospects 2. Search for the long-term competitive advantage 3. Identify the levers of value creation. 4. Methods of measuring loyalty

References

[1] Кристенсен Р 2012 *Стратегическое управление человеческими ресурсами. Дорожная карта* Москва: Олимп Бизнес 288
[2] Каммингс С 2010 *Реконструкция стратегии* Харьков: Гуманитарный центр 560
[3] Ивашковская И В 2012 *Моделирование стоимости компании. Стратегическая ответственность советов директоров*

Москва: ИНФРА-М 430
[4] Kopitov R 2013 Enhancing business sustainability: Improving business policy's methodology by managerial principles' development Procedia - Social and Behavioral Sciences **99** 133-42, 1877-0428 Published by Elsevier Ltd. Selection and peer-review under responsibility of the International Strategic Management Conference. doi: 10.1016/j.sbspro.2013.10.479
[5] *Пфлегинг* Н 2009 *Управление на основе гибких целей. Вне бюджетирования: Как превзойти конкурентов в* XXI *веке* Москва: Белый город 280
[6] Райхельд Ф, Тил Т 2005 *Эффект лояльности: движущие силы экономического роста, прибыли и непроходящей ценности* Москва: Вильямс 384
[7] Ковалев В В 2003 *Финансовый анализ: методы и процедуры* Москва: Финансы и статистика 560
[8] Дак Дж 2007 *Монстр перемен. Причины провала организационных преобразований* Москва: Альпина Бизнес Букс 320
[9] Коупленд Т, Долгофф А 2009 *Как достичь превосходства в управлении стоимостью компании* Москва: Эксмо 384
[10] Кокинз Г 2007 *Управление результативностью. Как преодолеть разрыв между объявленной стратегией и реальными процессами* Москва: Альпина Бизнес Букс 325

Formation of the leaders of a new type at the technical university

A Knysh

National Technical University "Kharkiv Polytechnic institute"

Abstract

Modern Ukraine faced the problem of crisis of management system. The idea of authoritarian control once again has shown its inefficiency and inability to meet the demands of today's dynamic world. At the same time, representatives of the command control still occupy high positions at various levels in public and private organizations. Our country is on the path of profound transformation in all areas ranging from the economy to education. The implementation of these changes need not only political reforms, but also significant changes in the personnel training of future managers who relying in their work not on strict rules and orders, but on improving the quality of interpersonal interaction with their subordinates.

Creating a system and choice of models and methods of management in our country today are related to continuous scientific research solving the optimal number of complex economic, social and political problems of radical renovation of all levels of management, the formation of a new style of management. Taking into account its actual quality composition it requires a significant improvement of management training of all professional areas.

The complexity of these new tasks leads to an urgent need for a fundamentally different management training of almost the entire working population. People must learn to live and work at a new level of interpersonal understanding. Managers also have to provide proper conditions for maximum realization of creative potential of each employee.

The need for staff support of deep transformation processes in Ukraine requires targeted training and sustainable use of highly qualified specialists with a deep knowledge of nature and patterns of interpersonal relationships, with the ability to organize people into effective implementation of joint activities, mobilizing and integrating their individual motives, aspirations and interests. Indeed, the new conditions of functioning of the national socio-political and economic system logically require a completely new management model. Practice has demonstrated the inability of the vast majority of professionals emerged as leaders of the administrative-command system to work effectively in a liberalized society. Therefore, we can state that the critical situation in the country today is largely caused by crisis of management.

One of the main conditions to overcome this crisis is the formation of the staff corps leaders of the new formation. The main way to solve this problem is to help talented young people in the development of individual psychological characteristics that would help them to become effective leaders. The ideal model of a leader, in our opinion, is a model of emotional leader who deeply understands the peculiarities of human relations, is able to inspire others to fruitful creative work, continuous development and improvement.

At the same time it is important to distinguish the emotional leader of unethical charismatic. The latter is also well versed in the specifics of interpersonal relationships between people, but unlike the emotional leader uses his abilities for his own psychological or material gain.

This problem is particularly relevant to technical universities. Graduates of technical universities are most active, thinking, rapidly growing elite of society, which can significantly change the order of things in the country. Future engineers have all necessary qualities to take up leadership positions in the state. At the same time technical education suffers from lack of human knowledge that can develop effective interpersonal skills of future leaders. That is why we consider it necessary to introduce in the educational process of engineers specialized training of development of leadership potential that will develop the skills of interpersonal interaction and significantly increase the level of emotional intelligence.

The importance of students professional socialization in higher educational establishments

Y Movchan

Abstract

In the process of living interaction under the influence of social dependences, various influences having pedagogical nature students obtain a conception of the world, skills activities form, principles of behaviour, develop person psychological qualities. It's favourable to their preparation for participation in public life.

The current state of society generates opposing trends: the negative one is associated with the destructive crisis impact on the individual, and the positive one is related to the social space improvement. This trends are oriented on the human resources activisation of the most promising graduate contingent.

Modern requirements for competitive specialists (future graduates of higher educational establishments) are connected with necessity to improve their professional knowledge, skills, personal qualities, and also to be psychologically prepared for different types of professional activity.

Higher education is an integral part of the socialization process. Student age is favorable to master a whole set of social roles of adults. A specific aspect of this process is expressed in the formation of the personality qualities that characterize him as a professional.

The higher education objectives is to prepare qualified specialist, who is competitive on the labor market, competent, responsible, capable for developing his professionalism, social and professional mobility.

The essence of professional socialization is concluded in personal joining to the certain professional role. The success of professional socialization is manifested in the human integration into the professional community, and through this into the society as a whole. Socializing result of education is stable system of students socio-valuable relation with the world, mastered profession, with himself.

Professional socialization of personality is characterized by personal development, which is influenced by many factors, and which is accompanied by psychological mechanisms of human and depends on professional orientation.

The process of professional socialization is a multifactorial process of personality mastering professional culture, its integration into the professional system through the transfer of professional values, traditions and norms of behavior. Dynamic conditions of professional socialization, which appear in the complication of professional activities, make increasingly high demands on the person of the modern young professionals. The complecation of professional socialization of the young specialist demands to demonstrate their ability and willingness to engage in a professional relationship.

The analysis of scientific papers allow us to consider the professional socialization of the students in higher educational establishments as a process of learning social skills, professional knowledge and skills, which are accompanied by the formation of motivational value systems to the professional activities and the transformation of the personal "self-concept" into the professional "self-concept".

The role of natural sciences vocational training psychology

I V Khavina

NTU «KHPI», Kharkov, Ukraine

Abstract

Today, put forward new requirements for increased training of the psychologist, due to the peculiarities of the present stage of history of human civilization, especially post-industrial nature of social development, globalization and information society, as well as the existing archetype prestige of higher education. Increased requirements also associated with high competitiveness in the labor market of graduates.

The high level of competence is an essential prerequisite for the proper efficiency of professional work of the psychologist. As noted by A. Romanovsky, "it helps graduates with high quality to perform their professional duties and responsibilities, to successfully apply their knowledge, and to use his experience of others. Today, professionalism and competence – these are two interrelated, interdependent concepts. Today, professionalism should be a prerequisite for competence, and competence – an indicator of the degree of compliance, the adequacy of the content of professionalism and competence of the psychologist"[4, p. 78].

During the last decade there is the idea of introducing a new educational system, the hallmark of which is aimed at the formation of future professionals not only knowledge and skills but also professional skills. Especially important it becomes for undergraduate psychology, as they take various links in the community. Modern psychology professional should have the following characteristics: the existence of a theoretical framework, relying on the method of scientific knowledge, the use of special tools – techniques inherent in the profession, the responsibility for themselves and for clients because the profession of psychologist is focused on the assistance of another person, continuous professional development and self-development, the ability to communicate. Also, a psychologist, a professional should be prepared for different difficulty of building relationships with clients, colleagues, to be kind, decent, honest person and have a love for people.

The psychologist must also have high personal characteristics: a desire and ability to help the customer, flexibility and tolerance empathetic, sensitivity, the ability to create an emotionally comfortable environment, the ability to demonstrate real emotions, optimism and enthusiasm, poise, faith in people, in their ability to change and development, self-confidence, self-esteem adequate, imaginative, high level of intelligence, awareness of their own areas of conflict. As noted by A. Romanovsky, "the psychologist professional should be formed personal style of work, interconnected system acquired, adapted and professionally important qualities"[4, p. 227-235].

According to V.A. Petruk, the content of vocational training should not be considered "as a system of academic subjects, as well as, respectively, the subject of learning, kvaziprofessionalnoy, educational and professional activities, puts the student in an effective position, provides a meaningful implementation of the principle of linking theory with practice" [3, p. 97]. V.A. Petruk highlights the basic forms of activity: training activities of academic type (lectures, seminars); kvaziprofessionalnoy activity – it is playing in the classroom conditions and dynamics, relationships and action specialists, for example, through role-playing, simulation of professional activity.

University training specialists in the field of psychology involves two stages: first a deep fundamental training, and then wide special training. Such an organization of educational process allows graduates to quickly adapt to the dynamic development of society and technology, keeping up with their achievements.

In the first year students are studying in depth the fundamental disciplines, which include natural-science cycle and discipline, which will continue to serve as the basis for the study of the general and special disciplines. Acquired in-depth study of the fundamental disciplines of knowledge and skills will determine the level of professional competence of the specialist.

References

[1] Gurevich R S 1999 Teoretichni ta metodichni osnovi organizatsiyi navchannya u profesiyno-tehnichnih zakladah: Dis. D-ra ped.nauk 13.00.04. 415

[2] Petruk V A 2006 Teoretiko-metodichni zasadi formuvannya profesiynoyi kompetentnosti maybutnih fahivtsiv tehnichnih spetsialnostey u protsesi vivchennya fundamentalnih distsiplin. Monografiya Vinnitsya: UNIVERSUM-Vinnitsya 292

[3] Romanovskiy O G, Ponomarov O S, Ignatyuk O A 2011 Formuvannya psihologichnoyi gotovnosti maybutnih fahivtsiv do profesiynoyi diyalnosti: monogr. / za red.. O.G. Romanovskogo, O.S. Ponomarova H.: Vidavets Savchuk O.O.; NTU «HPI» 336

[4] Tovazhnyanskii L L, Romanovskii O G 2013 Problemi ta perspektivi formuvannya natsionalnoyi gumanitarno-tehnichnoyi eliti [Tekst]: zb. nauk. prats **36**-**37**(40-41) Harkiv: NTU «HPI» 260

Public administration aspect in conjunction of labor potentials of higher educational establishments and its graduates

S A Moroz

The issue of the interaction between science and the economy, in the context of the complexity and diversity of manifestations of their contents, can be viewed through the prism of the place and role of higher education institutions in the development of the productive forces of society. It should be noted that higher education institutions should not be considered only at the level of the Institute of Education, which is involved in the formation of competitive professionals. The system of training of specialists are involved, including educational institutions and other forms of such organizations, but in our opinon, the universities are a kind of platform on which there are (and should be) meeting the interests of society, the state and society, science and the economy, education and business. Each of these institutions has its jurisdiction and, consequently, the forces influencing during the formation of future professional specialist. Each of these institutions not only can but also must be considered in the relationship of man as the carrier of employment opportunities, from the place of selling the existing potentials in him. It should be noted that regardless of the level of consideration of the proposed issues, the educational institution, and thus science, is positioned at the level of the main subject, the operation of which is aimed at developing employment opportunities of the future specialist. Thus, the university is not only an institution of education, and the institution of society, with responsibilities for the transfer of knowledge between generations. Here we have to make an important qualification with respect to the vector of the transfer of knowledge, which is not positioned solely in the context of the formula "college - student". There is a view that the student in relation to the university can also be positioned at the level of the subject of the learning process. This issue, in spite of its importance, will be put beyond this publication, but its content is largely a product of the refractive index represented in a practical thesis above. Returning to the subject of our research, we want to pay attention not towards the relationship between the quality of employment opportunities for the graduate (specialist) and the quality of the educational institution. Can we now talk about the possibility of training highly qualified specialists leaving aside the question of quality of the teaching staff? Of course, there are exceptions, the content of which, in many respects can serve as a basis for the formation of an answer to this question. For example, in the history of well-known far not isolated cases, when the subject of the learning process, in spite of the poor quality of the employment potential of the subject of study, was able to ensure the formation of their own labor potential at a high level. As a rule, the more common option of positioning the respective categories is becoming the format in which the high quality of the labor potential of the teacher does not provide employment development opportunities of the knowledge of the subject. This may be due as from the initially low quality of the object of study, its limitations in the perception of educational material, and with insufficient logistical and methodological support of educational process. It is this factor, as a rule, that refers to the majority of teachers, when, during a public examination, the students show poor results. Certainly, the impact factor of the logistics and scientifi-methodological support for the final product of the educational system can not be questioned, but at the same time, we should pay attention to the quality of the labor potential of universities. Can we always say that the quality of the teaching staff meet the requirements of society and the labor market? Most likely, the answer is not so optimistic for the educational system as a whole and for its main components. Summarizing the above, we can formulate the following main conclusions:

1) the level of development of labor potential of the university significantly affects the quality of the formation of labor ability of future professionals, and hence the competitiveness of the national economy largely depends on the competitiveness of universities who directly participated in the preparation of specialists for its development;

2) improving the competitiveness of experts should start, above all, with improvement of the competitiveness of the teaching staff which has been involved in shaping their employment opportunities (it is impossible to ensure the high quality of the object of educational activities at the low quality of its subject);

3) The state and the society must create an institutional environment for the development of universities, under which, employment potential, as subjects and objects of the educational process could be changed under the conditions of self-development (we should remember that one of the basic conditions for activation of self-development system is freedom, a phenomenon which, in relation to the issues of our publications can be viewed through the prism of academic freedom);

4) public administration development by labor potential of the university can not be achieved only within the framework of legal and administrative practices of public administration, which necessitates the use of the whole variety of governance mechanisms, among which are the most promising methods are the motivational mechanism of stimulation of work of the teaching staff;

5) the institutional environment within which the formation and development of labor potential of universities must not only provide high quality employment opportunities of the teaching staff, but also to ensure the competitiveness of educational services (keeping supply and demand in the labor market, the widest possible use educational process of experience of teachers and practitioners; to attract academic staff from abroad to take part in training specialists, etc.).

Stated above findings do not allow to establish the fact of the final address, the contents of which are related to public administration development by labor potential of universities, but only provide the basis for the emergence of scientific discussion and prioritization of research in relevant issues.

The future engineers' profession satisfaction due to its vision

N Pidbutska

The National Technical University "Kharkiv Polytechnic Institute", Kharkov, Ukraine

The research is devoted to the investigation of the features of an axiological component of a future engineer's personal professionalism to which personal and professional satisfaction and an image of the engineering profession are referred. Personal and professional satisfaction is understood as the integrative indicator of value judgment and the attitude to a profession forming an image of a profession and defining the success of professional and personal development. The complex of psychodiagnostic techniques is used in the research: the questionnaire on studying of satisfaction with the chosen profession by future engineers, semantic differential for an assessment of a profession by V.P. Serkin, a questionnaire of on activity self-organization by E. Mandrikova, the test "Index of life satisfaction" by N. V. Panina. It is revealed that in general the satisfaction with their own choice of profession dominates at future engineers, they realize its sense and value, but there is an uncertainty in successful employment. The dynamic of a profession satisfaction during the study in a higher educational institution is analyzed. So, the dynamic of the most students of technical specialties either raised or didn't change that is connected by them with teaching interesting disciplines, the increase of level of professional competence, having practical training on production. The decrease reasons of a profession satisfaction are disinterest to a profession, the lack of practical training and employment complication. The analysis of an image of the engineering profession shows that it is important for the graduate now and it is demanded by the society in the future. The semantic field of ideas of the engineering profession is formulated: qualified, complicated, wide, many-sided, intense, highly responsible, demanded, helping, difficult, prestigious, interesting, approved, developing, perspective, significant, individual, leading, and technical. By means of the factorial analysis three factors having the greatest effect are emphasized: "An idealized positive image of the engineering profession", "Image of important, but insufficiently perspective profession", "An inadequate image of the engineering profession", these factors open insufficiently adequate images of the engineering profession at graduate students. By means of the one-factorial dispersive analysis the ideas of a profession of respondents with the low level of personal and professional satisfaction are revealed. These representations are: dissatisfaction, lack of interest, stress instability, personal profession misunderstanding. The existence of such inadequate images of a profession and the presence of negative ideas assume psychological and pedagogical maintenance of the future engineers' vocational training.