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Nanotechnology and health nanodiagnostic tools

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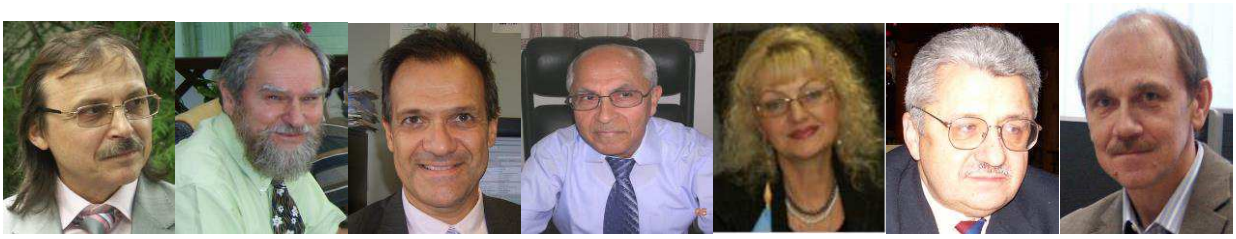

Abstract

Health nanodiagnostic tools include nanobiosensoring devices and their various interfaces which allow processing a continuous flux of medical information in a digital form. This information can be collected and processed in external data bases or intelligent expert systems providing the permanent health monitoring of biological systems. Possible nanosensoring health monitoring systems are discussed in connection with HORIZON202O EP strategies.

Keywords: ion tracks, microbeams, polymers, etching, cells, bacteria, biosensors, biomolecules, signaling molecules, quorum sensing, nanocarbon-based sensor systems

1 Introduction

There are a number of actual research directions of The EU Framework Programme for Research and Innovation HORIZON2020 (see also Figure 1) [1]:

- Agriculture & Forestry
- Aquatic Resources
- Bio-based Industries
- Biotechnology
- Energy
- Environment & Climate Action
- Food & Healthy Diet
- Funding Researchers
- **Health**
- ICT Research & Innovation
- Innovation
- International Cooperation
- Key Enabling Technologies
- Partnerships with Industry and Member States
- Raw Materials
- Research Infrastructures
- Security
- SMEs
- Social Sciences & Humanities
- Society
- Space
- Transport

FIGURE 1a **Horizon 2020 video - General overview**. Horizon 2020 in this three-minute animation clip. http://ec.europa.eu/programmes/horizon2020/en/news/horizon-2020-video-general-overview

FIGURE 2b Horizon 2020 video - How to apply? http://ec.europa.eu/programmes/horizon2020/en/news/horizon-2020-video-how-apply

FIGURE 1c **High-tech nano-science helps for cultural treasures**. Conservators use heat transfer for restoration – from paintings, works on paper and textiles to murals, 3-D objects and more. It has been developed a revolutionary heating system based on carbon nanotubes and silver nanoparticles. http://ec.europa.eu/programmes/horizon2020/en/news/high-tech-nano-science-help-cultural-treasures

FIGURE 1d **EU research shows need for action now on climate change**. Scenarios on climate change and its effects on society have found that taking action sooner rather than later will reduce the costs of mitigation. http://ec.europa.eu/programmes/horizon2020/en/news/eu-research-shows-need-action-now-climate-change

2 General Health topics of Horizon2020 EP

We pay attention to the Health division of Horizon2020 in our research: **'Health is wealth, as an old saying goes'.**

The key direction of Health Roadmap in Horizon2020 is **Personalising health and care.**

Research and Innovation which are supported by actual Horizon call in the mentioned respect are [1]:

- improve our understanding of the causes and mechanisms underlying health, healthy ageing and disease;
- **improve our ability to monitor health and to prevent, detect, treat and manage disease;**
- support older people to remain active and healthy;
- test and demonstrate new models and tools for health and care delivery.

Thus, diagnostics and continuous monitoring of human organism qualities and lacks are the key points of Horizon strategies. The current research topics of HORIZON2020 look as follows:

Topic 1:	PHC-21-2015: Advancing active and healthy ageing with ICT: Early risk detection and intervention
Topic 2:	PHC-25-2015: Advanced ICT systems and services for integrated care
Topic 3:	PHC-27-2015: Self-management of health and disease and patient empowerment supported by ICT
Topic 4:	PHC-28-2015: Self management of health and disease and decision support systems based on predictive computer modelling used by the patient him or herself
Topic 5:	PHC-29-2015: Public procurement of innovative eHealth services
Topic 6:	**PHC-30-2015: Digital representation of health data to improve disease diagnosis and treatment**

Topic 6 is the subject of our research activities.

HORIZON2020 formulated specific challenge [1]. Digital personalised models, tools and standards with application for some specific clinical targets are currently available. There is however, a need for greater integration of patient information, for example, of multi-scale and multi-level physiological models with current and historical patient specific data and population specific data, to generate new clinical information for patient management. Any such integrative digital representation (**Digital Patient**) must also allow meaningful knowledge extraction and decision support.

Requirements for research. Proposals should focus on new decision support systems (DSS) based on a complex integration of heterogeneous data sources and subject-specific computer models. This should enable an integrated data analysis, and should reveal a highly visual data representation, applying user-friendly interactive exploratory interfaces in order to assure usability and acceptability. Proposals should enable the application of DSS by health-care professionals for personalised prediction and decision making in prevention, diagnosis or treatment and should take into account data protection and ethical considerations, as well as those pertaining to the inherent uncertainties and limits of prediction. The models should be already available, multi-level and multi-scale ones and should be integrated with the individual and population data relevant to the targeted clinical situations, e.g. the required molecular and cellular data, including genomics and epi-genomics, **in vivo** and **in vitro** imaging data, or data on administration of therapeutics and on nutrition/exposure to environmental factors. These will be linked with relevant computer models of personalised physiology, functional disorders and other diseases. The proposed systems should take advantage of the personal medical data accumulated over time. Proposals should include the standardisation of data formats. The integration of data coming from other new technologies for e.g. key-enabling technologies should be considered. Gender and ethical issues should be duly considered.

Expected impact:

- Better coherent use of health data available for a subject in conjunction with the existing medical knowledge in clinical decision making
- Design of predictive and therapeutic interventions
- Better management of complex clinical situations.
- Enabling use of the same information by different medical services and the other relevant healthcare professionals.
- **Better control and inter-service coordination in the management of the patient health.**
- Providing a consistent view of a patient's care needs.

3 Research proposal 'Information Technologies for Bacterial Infections Theranostics'

New multifunctional ion irradiation-based 3-dimensional electronic structures are developed for biotechnological applications, specifically for sensing of biomaterials, bacteria and mammalian cells. This is accomplished by combined micrometric surface and nanometric bulk microstructuring of insulators (specifically of polymer foils and SiO_2/Si hybrid structures) by adequate ion beams. Our main goal is the producing of a cheap small universal generic working platform with multifunctional properties for biomedical analysis. Surface engineering of this platform enables cell bonding and its bulk engineering enables the extraction of cell secrets for the sake of intercepting and analyzing the biomolecules used in cell communication. The exact knowledge of the spectrum of these cell–secreted signaling molecules should enable the unambiguous identification of the cell type. This knowledge will help to develop strategies for preventive quorum sensing of bacteria with the aim of fighting bacterial infections in an ecologically secure way [2].

We intend to demonstrate the application of the digital representation of health data for the case of the development of new methods in medical practice for early-stage diagnosis of bacterial infectious diseases and novel therapeutic methods for their treatment. To achieve this goal we will solve three problems. First, it is the creation of sensor devices, which will allow simple enough and accurate measuring of the human health parameters. These devices should provide the wireless transmission of data to the Analytical Center. The next problem is the creation of an effective approach for mathematical treatment of the obtainned results. The results concerning the dynamics and characteristics of health parameters will be qualified as complex data, and the methods of the Theory of complex systems will be applied to their analysis. This approach will allow to prepare the obtained data for further analyses and to precisely extract knowledge from large complex data collections. Furthermore, the third and the main objective of the project is to develop a new generation of biosensors based on the recent advances of "track electronics" that allow monitoring and tracking primarily in such area as health. The ion track-based structures form a principally new foundation for interfacing conventional electronics and nanoelectronics with bio-active sensor compounds. These nanostructures can be used for the creation of novel electron devices with unique parameters hitherto unknown in electronics.

One of the fundamental goals of the project is nanofabrication of such state-of-the-art devices and to explore them for obtaining information about health parameters for their transferring and treatment.

The first fabricated prototypes of the ion track-based nanosensors provide high sensitivity, low power and low cost portable tools for in-situ chemical analysis in space and terrestrial applications. Our generic nanosensor platform allows creating devices suitable for the analysis and detection of gases and volatile organic compounds. Novel nanosensors will greatly increase science measurement capability for life support systems also in long duration missions, and planetary exploration. For biosensing applications the ion tracks will be functionalized either directly by attaching organic or bioactive compounds (such as enzymes) to their walls, or indirectly by the attachment of biosensing materials to metal oxide nanowires or tubules grown therein [2-4].

The next objective is to use the data integration approach to provide a data warehouse over different data sources using the ETL (Extract, Transform, and Load) process. We plan to use data description languages such as XML, RDF-RDF/S to take account of the structural and semantic data heterogeneity and to use a full generic data warehousing and online analysis process that include two broad axes: data warehousing with complex data integration and modeling and complex data analysis. And lastly, we envisage developping digital personalized models for bacterial infectious diseases and creating a model of Digital Patient. The model will be available to solve practical theranostic problems linked to real clinical situations. The opportunity will be provided to use the developed in the project methods by different medical services and other relevant healthcare professionals.

4 Conclusion

We expect to create a prototype of Health monitoring system based on unique nanosensoring systems with the abilities of functionalization. The developed digital processing of medical information should provide a continuous monitoring of biological objects and communications among medical data bases and intelligent expert systems.

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Models and simulations of CNTs- and GNRs-based electromagnetic and spintronic devices

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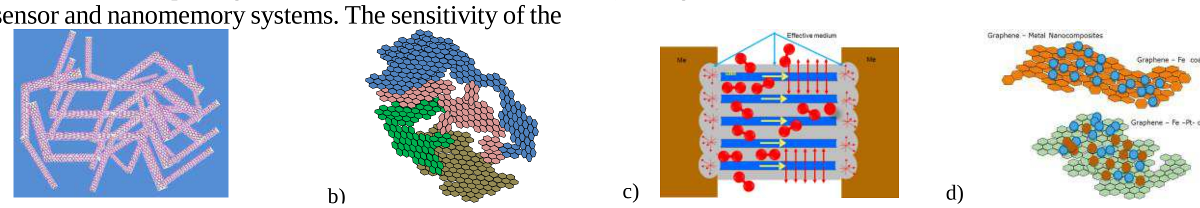
Abstract

Fundamental electromagnetic and electromechanical properties of CNTs, graphene nanoribbons (GNR) and nanofibers (GNF), CNT- and graphene-based aerogels (CNTBA, GBA), CNT- and graphene-based 3D-nanofoams and carbon-based polymer nanocomposites are essential for various nanotechnology applications, e.g. for the engineering of new classes of ultra-light, highly conductive nanomaterials with exceptional mechanical strength, flexibility, and elasticity. These nanomaterials provide the basis for unique nanoelectronic devices and nanosensors. Particular properties of carbon-based nanoporous systems in dependence on porosity extent, morphology and fractal dimension allow finding practically useful correlations between their mechanical and electrical properties. Electromagnetic properties of CNTs and GNRs nanostructures with functionalized atomic groups and their various interconnects with the essential concentration of ‘dangling bonds’ are very sensitive to local external perturbations. The induced changes of local electronic density of states lead to the correlated changes of current and spin states. Models of nanocarbon spintronic devices are developed as memory nanodevices, particularly, based on magneto-resistance phenomena. Models of nanocomposite carbon-based materials and nanodevices are proposed.

Keywords: CNT, GNR, CNTBA, GBA, nanoporous materials, nanocomposites

1 Introduction

The main objective of the current study is to demonstrate the implementation of advanced simulation models to ensure a proper description of the electronic properties, electrical conductivity, electromagnetic and electromechanical phenomena of functionalized CNT- and GNR-based nanostructures of different morphologies and their interconnects for nanosensor and nanomemory systems. The sensitivity of the local electronic density of states to external influences (mechanical, chemical, magnetic, etc) on the fundamental electromagnetic properties of CNTs, GNRs and their metal interconnects have been analyzed from the point of view of nanosensor applications [1, 2]. We develop a set of prospective models of nanocarbon-based nanomaterials and nanodevices based on the various interconnects and interfaces (see Figure 1).



a) b) c) d)

FIGURE 1 A set of simulation models: a) Structural model of CNTBA; b)Structural model of GBA; c) GNRs-based gas nanosensor device; d) Graphene-metal nanocomposites- Fe and Fe-Pt coatings.

Correlations between various external influences (mechanical, chemical, electromagnetic etc factors) and fundamental properties of nanocarbon materials are studied.

2 Memory nanodevices

Nanocarbon-magnetic metal interfaces open new possibilities for the creation of nanospintronic devices, e.g., nanomemory devices [1-3]. The model of CNTs growth with the predefined chiralities in a magnetically managed CVD process with the use of magnetically anisotropic Fe_xPt_{1-x} nanoparticles with various substitutional disorders has been developed (see Figure 2). The possibilities of the CNT forest growth based on FePt nanoparticles for magnetic nanomemory are also evaluated [1], (see Figure 2).

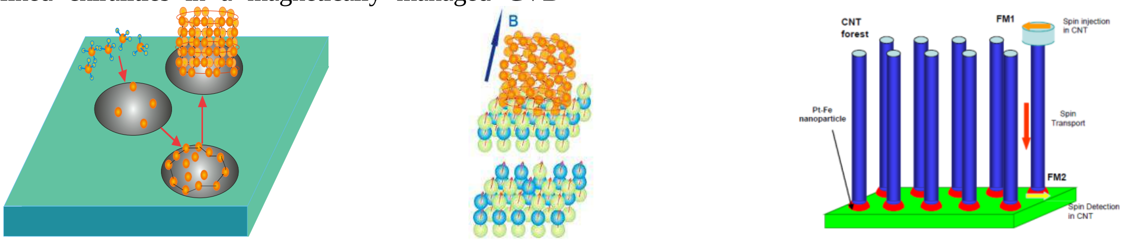


FIGURE 2 Model of CNTs growth in a magnetically controlled CVD process based on Fe-Pt nanodrops catalysts. CNTs forest is considered as a prototype of the magnetic memory, where ferromagnetic nanoparticles serve as cells of the magnetic memory.

Another possibility for the creation of magnetic memory devices is the magneto-resistance phenomenon [1] (giant magneto-resistance - GMR, tunnelling magneto-resistance TMR) consisting of sandwiches of two ferromagnetic metals separated by a thin spacer layer of **normal metal** (see, e.g., Figure 3) **or semiconductor.** They are of great industrial importance and are called spin-valves used as magnetic field sensors. The resistance of the device is dependent on the relative magnetization orientation of the ferromagnets. Our idea is to reach the same effect by introducing metal or semiconductor-like CNTs into the N space. The TMR signal operates in the same way as the GMR, where R_P and R_A are the resistances of the device for parallel and antiparallel orientations, respectively, of the ferromagnets magnetization (Figure 3).

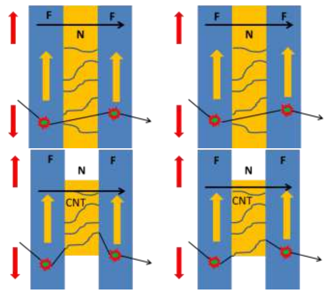


FIGURE 3a Giant magneto-resistance (GMR) device. Current perpendicular to the plane (CPP) spin-valve. A thin normal metal spacer (N-e.g., CNT metal-like:) separates two ferromagnets (F).

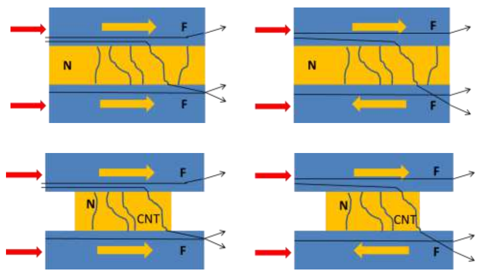


FIGURE 3b Current in the plane (CIP) spin-valve. Separate channels are for minority and majority spins. The electrons scatter from one F layer to the other on the way through the sandwich.

The next object of our interest and simulation is Fe-Pt-graphene nanocoatings for various Fe_xPt_{1-x} compounds where electrical and magnetic properties of Fe-Pt-graphene nanofilms (see Figure 1d) are essentially dependent on the morphology and composition of this nanosystem. Percolation thresholds are inverstigated. These nanosystems are also considered as prospective elements of spintronic nanodevices.

3 Nanoporous and nanocomposite material models

Nanoporous 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 (Fig.1a,1b,1c). 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 [1]. Particular properties of carbon-based nanoporous systems in dependence on the porosity extent, morphology and fractal dimension are practically studied to find useful correlations between their mechanical and electrical properties.

The model of nanocomposite materials based on carbon nanoclusters suspension (CNTs and GNRs) in dielectric polymer environments (e.g., epoxy resins) is considered as a disordered system of fragments of nanocarbon inclusions with different morphology (chirality and geometry) in relation to a high electrical conductivity in a continuous dialectric environment. Presumably, the electrical conductivity of a nanocomposite material will depend on the concentration of nanocarbon inclusions (in fact, carbon macromolecules). Isolated nanocarbon inclusions will provide conductivity due to the hopping conductivity mechanism through dangling bonds up to the percolation threshold, when at high concentrations (some mass %) a sustainable ballistic regime appears, which is characteristic of pure carbon systems. The hopping mechanism is regulated by the hopping of electron between 'nanocarbon macromolecules':

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

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. Added to this is the effect of intrinsic nanocarbon cluster conductivity, which is dependent on its morphology. The electric conductivity will also depend on the spatial orientation of nanocarbon inclusions. It will be greater for the longitudinal electric field orientations and lower for the transverse ones. Of course, any spatial orientations are technologically possible. The overall conductivity of a nanocomposite material is: $\Sigma \approx \Sigma_D + \sum_{k=1}^{L} R_k^{-1}$,

$$R_k = \sum_{j=1}^{M}\sum_{i=1}^{N}(\sigma^{-1}_{nano,i.j,k} + (N_{eff-in,i\,j,k}\sigma_{IC-in,i,j,k})^{-1} + (N_{eff-out,i,j,k}\sigma_{IC-out,i,j,k})^{-1}),$$

where M - is the number of conductivity channels, N – is the number of nanocarbon clusters in the conductivity channel, N_{eff} is the number of effective bonds of tunneling bonds, $\Sigma_D = (R_D)^{-1}$ is the conductance of dielectric medium, σ_{nano} is the conductivity nanocluster, σ_{IC} - the hopping conductivity of the in- and out-type effective bond, which for large nanocarbon inclusion concentrations create their intercomnect. The simulation of nanocomposite conductivity via the volume part of nanocarbon inclusions is presented in Figure 4.

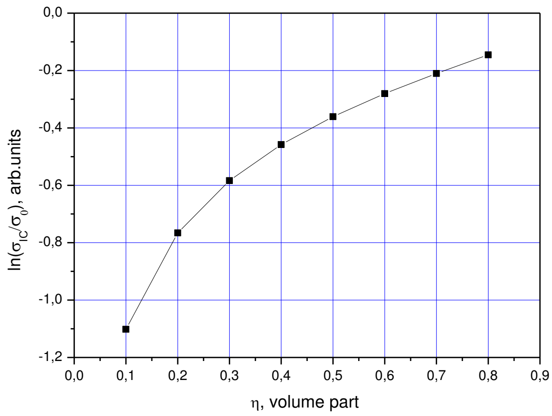


FIGURE 4 The hopping conductivity correlation via the average nanocarbon macromolecules volume part within continuous dielectric medium

Natural applications of this kind of nanocomposite materials can be found in nanosensors of pressure and temperature.

Acknowledgments

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Ab initio calculations of Y, O and V_{Fe} migration barriers inside *fcc*-Fe lattice

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Abstract

Using results of density functional theory (DFT) calculations the first attempt towards the understanding of Y_2O_3 particles formation in oxide dispersed strengthened (ODS) ferritic–martensitic steels has been performed. The present study includes modelling of single defects (O impurity atom, Fe vacancy, V_{Fe}, and Y substitute atom), interactions between Y-Y, Y–V_{Fe}, Y-O, V_{Fe}–V_{Fe} and O-O pairs inside the fcc-Fe matrix, as well as more complicated defect structures. Calculations of Y and O atom migration paths inside iron matrix have been performed using the Nudge Elastic Band method.

Keywords: ODS steels, O and Y precipitates, Fe vacancies, density functional theory

1 Introduction

Reduced activation ferritic-martensitic steels (RAFM) strengthened by oxides provide a growth of the operating temperature for the future fusion and advanced fission reactors by 100°C up to 650°C or even higher. Y_2O_3 is the most commonly used oxide for the strengthening of RAFM steels as it is one of the most stable oxides with melting temperature higher than that of the steels, which might play significant role in the formation of oxide nanoparticles in (ODS) steels. They are produced by mechanical alloying for several tens of hours, followed by a hot isostatic pressing (hipping) at temperature around 1000-1200°C and pressure ~100 MPa. Experimental evidences suggest that a significant part of yttrium and oxygen atoms were observed in steel matrix with concentrations above their equilibrium solubility. This might mean that precipitation of Y_2O_3 nanoparticles occurs already during the hipping stage.

2 General

A slow diffusion of large yttrium-substituted atoms is probably the major limiting factor for Y_2O_3 particle growth. The diffusion of interstitial oxygen is much faster and, therefore, cannot delay the growth of precipitates signifycantly. That is the reason why our calculations are focused on the study of the migration properties of Y–V_{Fe} complexes and the role of V_{Fe} vacancies as well as oxygen impurity atoms in yttrium-yttrium binding.

In this study, we have performed extensive DFT-PAW (Projected Augmented Wave) calculations of elementary yttrium and oxygen complexes inside the iron lattice containing also V_{Fe} vacancies in both 4×4×4 and 5×5×5 Fe supercell models using PW91 Hamiltonian as implemented within VASP code [1-3]. Both interaction energies between solute and matrix atoms and barriers for migration of different solute atoms are extracted from these calculations for further atomistic simulations.

Binding energies between the impurity atoms and vacancies as well as their migration barrier energies are important parameters for further LKMC modeling of the ODS particle formation.

3 Conclusions

To perform calculations on migration barriers of atms inside the lattice, the nudge elastic band (NEB) method have been used (as implemented within the VASP computer code). The calculations of different Y migration trajectories have been performed. The lowest calculated energy of the migration barrier has been found to be about 1.75 eV. The high values of migration energies prove that the increased concentration of vacancies is required for Y diffusion and the increased size of the supercell is required for this purpose.

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Photocatalytic efficiency of $SrTiO_3$ nanowires: *ab initio* modeling

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Abstract

First principles periodic calculations based on the density functional theory within the localized atomic orbital approach (DFT-LCAO) using the hybrid exchange-correlation potential PBE0 have been performed in order to simulate the structural and electronic properties of both non-stoichiometric and stoichiometric [001]-oriented four-faceted $SrTiO_3$ (STO) nanowires (NW) of cubic structure. Their diameters have been varied from 0.3 up to 2.4 nm with a correspondence to a consequent change of NW cross-section from 2×2 to 5×5 extension of the lattice constant in bulk. Energetic stability of STO NW (both non-stoichiometric and stoichiometric) has been found to be increased with the decrease of their formation energies together with the increase of NW diameter. The electronic structure calculations have shown that the width of band gap is changed in STO NWs of different structural types as compared to that in bulk being consequently reduced with the growth of NW diameter although character of such a decrease depends on morphology of nanowire. Analysis of these changes shows that non-stoichiometric TiO_2-terminated and stoichiometric strontium titanate nanowires can be quite promising candidates for further applications in photocatalytic processes under solar irradiation whereas SrO-terminated nanowires are rather not suitable for this purpose.

Keywords: strontium titanate, non-stoichiometric and stoichiometric nanowires, DFT method, electronic structure, photocatalysis.

1 Introduction

Ternary metal oxides are suitable for photocatalytic water splitting into H_2 and O_2 gas components under solar irradiation [1]. Materials with perovskite oxide cubic ($CaTiO_3$, $SrTiO_3$) and non-cubic, e.g., orthorhombic ($NaNbO_3$, $KNbO_3$) as well as hexoctahedral ($Bi_2Ti_2O_7$), equilibrium structures were found to be fitted for these applications. Recent advances in science and technology of perovskites (ABO_3) and other ternary metal oxides ($A_xB_yO_z$) have resulted in the marked decrease of their sizes down to nanoscale dimensions, which manifest essential deviation from the properties of 3D bulk and 2D film counterparts [2]. Perovskite nanowires [3] usually possess a higher efficiency in photocatalytic applications as compared to other 1D and 0D nanostructures.

2 General

We have simulated the structural and electronic properties of both non-stoichiometric (Fig. 1) and stoichiometric (Figs. 2 and 3) [001]-oriented four-faceted $SrTiO_3$ nanowires cut from cubic bulk structure of strontium titanate. Their diameters have been varied from 0.3 up to 2.4 nm with a correspondence to change of NW cross-sections from 1×1 to 5×5 extension of bulk lattice constant. They are considered as four-faceted [001]-oriented infinite prism, which unit cell with length a_o is terminated by lateral SrO- or TiO_2-containing square facets {1 0 0}, {010}, {10 0} and {0 1 0} imaged in Fig. 3, since they possess the smallest surface energy among any other cubic $SrTiO_3$ facets. Sr- or Ti-centered non-stoichiometric STO nanowires (Figs. 1a,b) can be described by D_{4h} point group, while in hollow-centered stoichiometric NWs (Fig. 2) a point group symmetry C_{2v} corresponds to the two mirror planes oriented along nanowire axis and cross-section diagonals (Fig. 3).

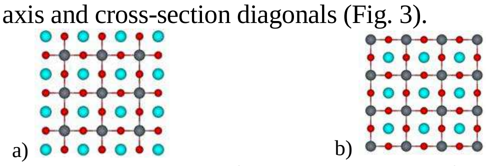

FIGURE 1 Cross sections of non-optimized structure for non-stoichiometric SrO- and TiO2-terminated STO NWs with 3×3 thickness (a and b, respectively). Sr and invisible O atoms (under Ti atoms) form a lower next-neighboring layer for each unit cell of nanowires.

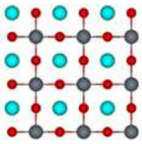

FIGURE 2 Cross section of non-optimized structure of stoichiometric STO NWs with 3×3 thickness. Sr and invisible O atoms (under Ti atoms) form a lower layer for each unit cell of nanowire

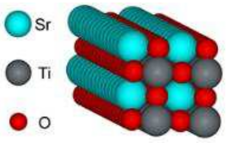

FIGURE 3 Axonometric image of stoichiometric [001]-oriented SrTiO3 NW terminated by both SrO {1 0 0} and {010} as well as TiO2 {1 0 0} and {0 1 0} facets with 2×2 extension of the thinnest possible 1×1 nanowire (5 atoms per UC). Left panel contains labels of constituent atoms

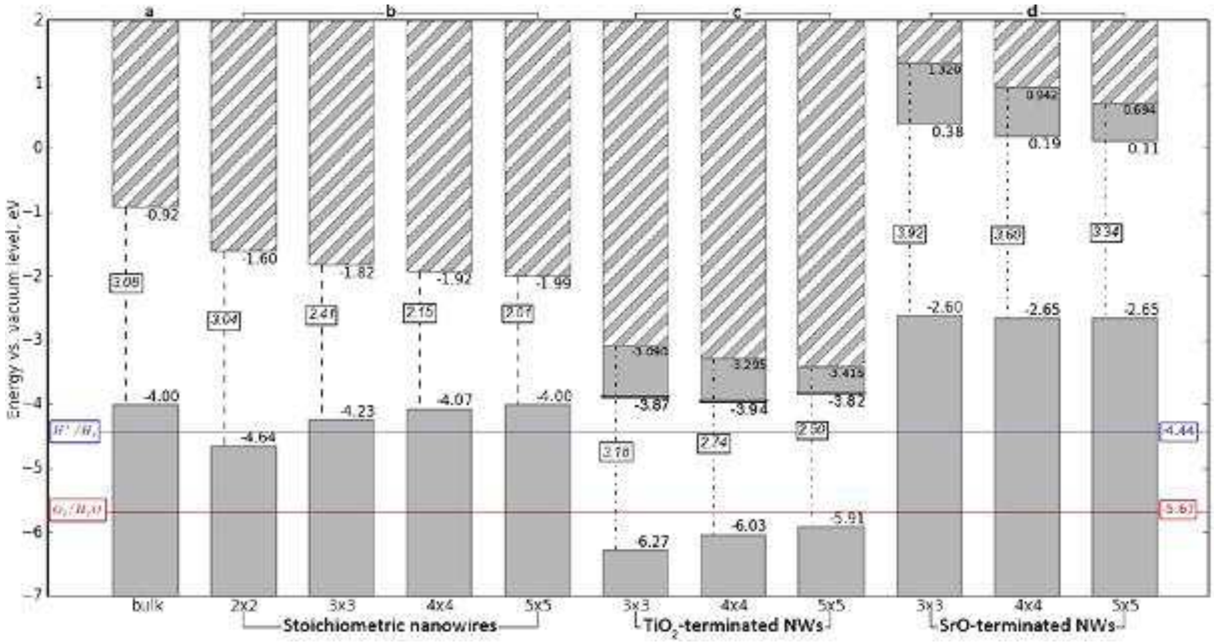

FIGURE 3 Energy diagram of the band structures of SrTiO3 bulk as well as [001]-oriented non-stoichiometric and stoichiometric nanowires (Figs. 1-3) in proximity of the inter-band gap edges and redox potentials for H2O molecule dissociation. Striped areas of columns consist of the virtual (non-populated) energy levels in the band structure unlike filled areas, the levels in which are populated

All DFT calculations, using CO LCAO method as implemented in the CRYSTAL code [4], have been performed within the hybrid PBE0 exchange-correlation functional with 16% contribution of Hartree-Fock (HF) exchange. As a result, the optimized lattice constant of cubic $SrTiO_3$ bulk has been found to be different from the experimental value by less than 1% [5].

We compare the band edge positions and Fermi levels of nanowires with those for perfect $SrTiO_3$ bulk as well as with levels of reduction H^+/H_2 and oxidation O_2/H_2O potentials. Figure 4 presents the energy diagram drawn using results of our calculations on strontium titanate nanowires (Figures. 1-3), which allows one to estimate eligibility of all the types of strontium titanate nanowires considered for photocatalytic applications. The main criterion for suitability of arbitrary material as photoelectrode is proper ratio between its band gap edges as well as the potentials of reduction and oxidetion for water splitting reaction under solar irradiation is: ε_{CB_bottom} (or ε_{Fermi}) > $\varepsilon_{H_2\_reduction}$ > $\varepsilon_{O_2\_oxidation}$ > ε_{VB_top} [5].

3 Conclusions

We show that both non-stoichiometric TiO_2-terminated and stoichiometric strontium titanate nanowires can be used as photoelectrodes, directly in the former case or after additional structural and chemical modification of the latter. At the same time, SrO-terminated STO nanowires are rather not suitable for this purpose.

The current study can be considered as the first step in development of nanowire models for photocatalytic applications, the next steps will include implementation of vacancies and dopants in nanowires as has been done for $SrTiO_3$ nanotubes [6].

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Theoretical modelling of nanodevices using embedded molecular cluster method

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Abstract

Applicability of cluster embedding method with non-orthogonal wave functions for theoretical study of processes in nanodevices is studied. Processes in nanodevices are treated in the frameworks of quantum transport theory. We demonstrate that our cluster embedding method is compatible with DFT Kohn-Sham method and quantum transport theory based on time-dependent DFT. We conclude that quantum transport theory methods for electric current calculation may be applied if we use one-electron approaches with orthogonal and non-orthogonal wave functions. Possibilities of 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 Conclusion

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. It may be done by configurations interaction (CI) and perturbation theory (PT) methods our cluster embedding scheme is compatible with. If we use PT or CI methods one-electron density may be constructed, too. But possibility to get continuity equation and expression for electric current in general form is still under question.

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Data presentation for neural network time series forecasting

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Time series forecasting is an important problem in many branches of knowledge, in particular, in the modern financial and economic sciences [1-2]. The forecasting we understood as a result of determination of future values, based on some mathematical model with the use of data present in the moment of forecasting.

Different forecasting methods consist of the study of accumulated data with the purpose of development of models that can be effectively used in the future. The suitable method can be determined by a kind and set of time series descriptions.

Some of forecasting methods are the statistical methods, for example, classic decomposition, regressive methods, exponential smoothing out, Box-Jenkins methods. Other shows the power of various artificial intelligence techniques, for example, neural networks that are especially effective, when basic data strongly correlate or the system is the high degree non-linearity. After teaching a network is able to predict the future values of the sequence on the basis of a few previous values or some existing presently factors.

The researches consider an input data representation of the sequence for time series forecasting using the multi-layer feed-forward neural network with supervised learning. The values of input sequence are chosen in three different ways: using standardization in some interval, transferring to binary code and transferring to Gray code. As a result it is possible to compare the rightness degree of forecasting for each variant of data presentation and to define the most preferable variant for this sequence.

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Nanotechnologies, ecological security and economic problems

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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 micro-fabricated sensors that could be integrated into a Smart Sensor System is a sensor based on a microhotplate. Micro-fabricated 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 10^6C/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, on the order of 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.

Acetonitrile associated with the ionic liquid containing imidazolium ring: equilibrium geometry and vibrational relaxation

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Abstract

Imidazolium ring containing ionic liquids (ILs) have become extremely attractive study material in spectroscopy and theoretical studies due to wide range of applications. In this work acetonitrile (AN) molecule was chosen as a "media sensitive" (thanks to its polarity) probe in ILs to carry out the investigation of AN vibrational relaxation using the [-C ≡ N] stretch (also known as υ_2). Ab initio density functional calculations were used as a primary methods for equilibrium geometry establishing and following vibrational spectra estimation. Vibrational relaxation times were established from mentioned stretch mode parameter HWHH received from polarized Raman spectra of AN/IL associates.

Keywords: Acetonitrile, imidazolium ring, ionic liquids, Raman spectra, ab initio calculations

1 General

Imidazolium ring containing several different ILs such as:
1-butyl-3-methylimidazolium chloride ([Bmim]Cl),
1-butyl-3-methylimidazolium bromide ([Bmim]Br),
1-butyl-3-methylimidazolium iodide ([Bmim]I), and
1-butyl-3-methylimidazolium tetrafluoroborate ([Bmim]BF_4) (Figure 1) were chosen for study of vibrational relaxation path. Furthermore, different temperatures (295K and 328K) were used to determine AN [-C≡N] stretch) vibrational relaxation dependence on temperature [1].

Quantum chemical calculations carried out in order to establish the equilibrium geometry of associates and following frequencies of AN vibrations due to different cation location. Density functional studies (B3LYP method, 6-31G(d,p) basis set) were provided using GAUSSIAN09 package. Different conformers dependent on the alkyl chain orientation (rotational isomer) were established like anti-gauche type conformers.

2 Conclusions

We have established the significant changes of acetonitrile vibrational relaxation time when anion of IL was replaced by a heavier molar mass M_r one (X=Cl^-, Br^-, I^-, BF_4^-) could be attributed to the change in local ionic structuring [1, 2]. We found that the heavier the anion of the IL, the more red shifted [-C ≡ N] stretch band of AN became (see Figure 2), although in the case of BF_4 anion, the [-C≡N] stretch band did not match the sugested scheme, beeing more red shifted than in the case of heavier iodine anion. Looking from the standpoint of quantum chemistry simulations, the location of AN molecule was found as an position above imidazolium ring plane surface in near surrounding of halogen cation.

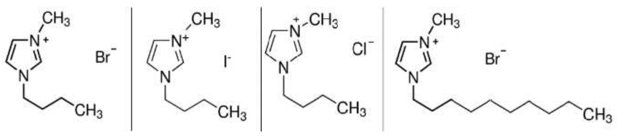

FIGURE 1 Imidazolium ring containing ionic liquids

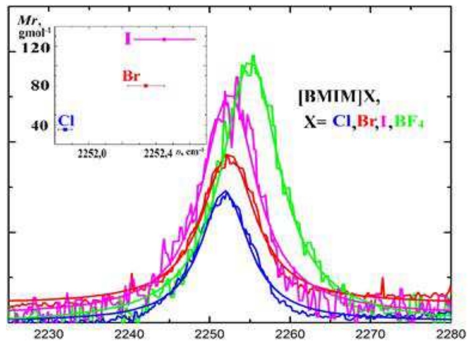

FIGURE 2 Stretch vibration region of [-C≡N] mode in Raman spectra of AN/ILs mixtures

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Correlation between morphology of TiO_2 nanotubes and their photocatalytic abilities: comparative *ab initio* study

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Abstract

In this theoretical study we compare atomic and electronic properties of titania nanotubes (NTs) with different morphology. Our first principles calculations have been performed using a modified B3LYP hybrid exchange-correlation functional within density functional theory (DFT). For periodic systems, we apply method of crystalline orbitals as linear combination of atomic orbitals (CO LCAO) implemented in the CRYSTAL code, while the NWChem code is used for MO LCAO calculations on non-periodic systems. In our study, 9-layered (001) anatase nanotube, an object of our earlier studies, is compared to various 6-layered (101) anatase nanotubes. Specifically, we compare their stability, formation energies, doping possibilities and dependence of band structure on types of dopant atoms (N and S as individual atoms or when introduced in pair). We also investigate how concentration of dopant atoms affects the band structure and discuss interactions between impurities. In order to reduce computational time and to be able to run more complex calculations in reasonable time, we investigate strategies for reducing size and dimensionality of our model, e.g., transition from a periodic model of a nanotube to its non-periodic cluster model as repeating NT fragment.

Keywords: titanium dioxide, ab initio, nanotubes, 1D periodic and 0D cluster models, photocatalysis

1 Introduction

TiO_2 is a promising photocatalyst for water splitting. However, 3D bulk titania's efficiency is too low for this task. It can be improved by transforming titania into stable 1D nanotubes (NTs) possessing large surface area. Further improvement of TiO_2 NT photocatalytic activity is possible through the band gap engineering.

Previously, we have performed simulations on 9-layered (001) TiO_2 anatase nanotubes with negative strain energy, mono-doped with S, C, N and Fe atoms. S produced quite promising results [1, 2] although (101) anatase nanolayers and slabs are known as energetically most favorable [3].

2 General

We have tried to reduce one-dimensional (periodical) model of a 9-layer (001) anatase NT (Figure 1) to a zero-dimensional non-periodic molecular cluster (Figure 2) that would be small enough to allow us to perform complex calculations in reasonable CPU time while keeping the original geometry and electronic structure [4]. However, we have encountered many problems with that approach many of which have been related to terminating atoms and other boundary effects that are neglected in a periodic model but are emphasized in a molecular cluster.

We have chosen a different model for this study. The choice is justified by several reasons: first, data indicates that catalytic properties of (101) surfaces are superior to those of (001) surfaces despite the fact that latter have lower formation energies [5]. Second, 6-layer (101) anatase nanotube has only marginally higher formation energy than 9-layer (001) nanotube and it also possesses fewer atoms in its unit cell, which corresponds to smaller CPU time.

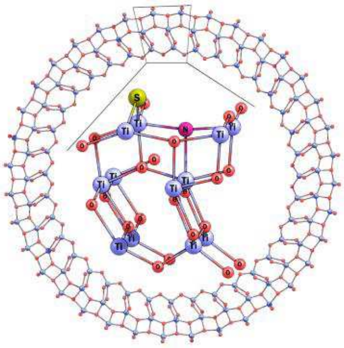

FIGURE 1 Isometric view of the 1D anatase (001) nanotube and location of N (purple) and S (yellow) dopants for the co-doped calculations (inset)

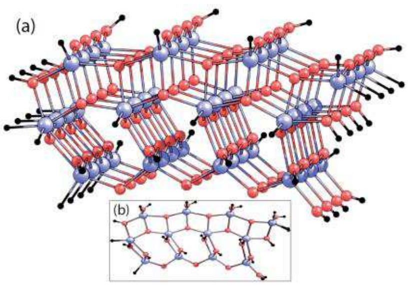

FIGURE 2 Schematic aside view of the 4×4 0D fragment of titania nanotube (a) with dangling bonds saturated by hydrogen atoms (black) and its front view (b)

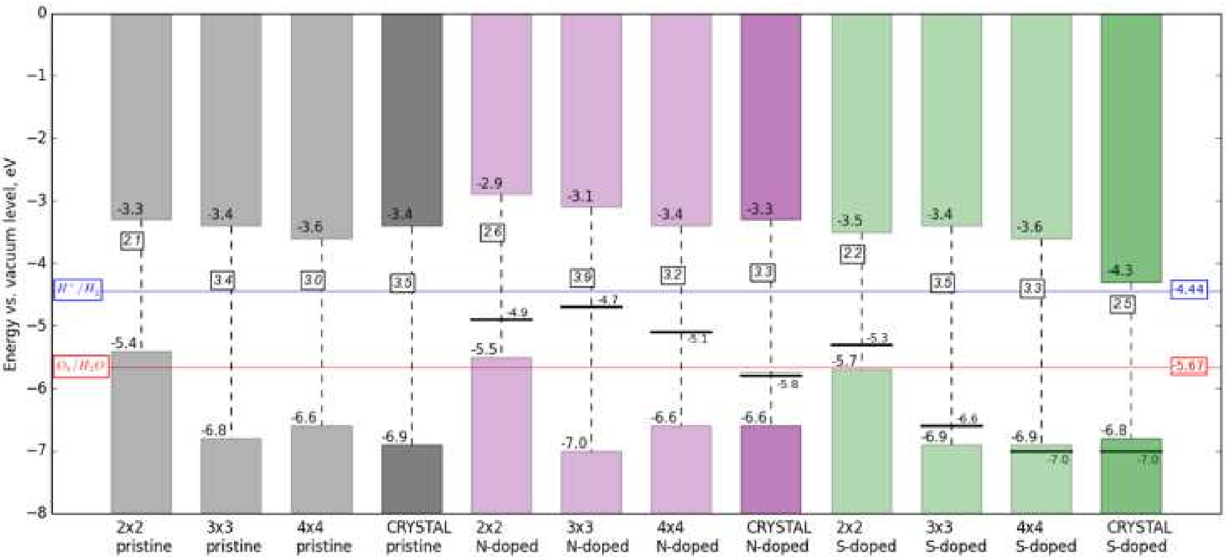

FIGURE 3 Comparison of band edges and band gaps for different models. All values are in eV versus vacuum level; potentials for hydrogen reduction and oxygen production are given for reference. CRYSTAL refers to periodic models; results for fragments are obtained using NWChem. Results obtained using CRYSTAL code are emphasized

For 0D cluster model, we reveal several possible sites for introducing dopants and observe some trends in the composition of the electronic structure regarding concentration of defects in nanotube's unit cell. Smaller model results in creating another type of molecular cluster, with less pronounced boundary effects without necessity of terminating atoms. Currently, we are studying this type of clusters.

All DFT calculations have been performed within B3LYP exchange-correlation functional. For periodic 1D systems, we have used CO LCAO method implemented in the CRYSTAL code [6, 7]. The NWChem computer code [8] has been used for MO LCAO calculations on non-periodic 0D systems.

3 Conclusions

A smaller model (6-layer (101) anatase nanotube) has a practical physical meaning and adequately represents a larger model (9-layer (001) anatase nanotube). Monoatomic defects do not depend on concentration of doping atoms: results show that transition from 1.39% to 2.78% (of doping atoms per unit cell) do not change observed trends in composition of electronic structure (Figure 3). However, effects produced by co-doping are depending on concentration of the dopants. And since S- doping yields apparently better results and depends on the concentration of dopants, it could be beneficial to increase S:N ratio.

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Interface structure in Al-Be system

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Al-Be alloys are crystallized in temperature interval 1553 - 918K and have valuable physical properties. At temperatures less then 915K these alloys form the fragile Beryllium phase and Al-Be eutectics with high ductility. There are different ways to increase a mechanical strength and a ductility of Al-Be alloys.

The Molecular Dynamics method [1] was applied to obtain the realistic picture of the interface structure in the Al-Be system. The calculation scheme allows to investigate both interface features and bulk properties.

The starting atom configuration was taken as a parallelepiped obtaining in different cases Al or Be cluster as substrate. In each of these cases accordingly Be or Al layers are being grown step by step on the substrate. Periodic boundary conditions were used in two dimensions. The lower layer of substrate was fixed. The substrates consisted of ten layers. First a modeling of pure surfaces was performed and it was found that the used potentials lead to the correct structural characteristics of Al and Be crystals.

It was established that at the first stages of Al (Be) layers formation on different substrates the boundary disordered phase arises. The mixing of Al and Be atoms in the boundary region was observed. The degree of boundary disorder depends on the temperature of Al-Be interface and on the nature of substrate. We obtained essentially different characteristics of microstructure of Al-Be interface for the deposition of Al layers on Be substrate and for the contrary case. These two cases correspond to low and high velocities of cooling in the process of solidification. The low temperature decay of Al-Be solid solution under the irradiation by fast heavy ions was also studied. In the last case the interface layers, as a rule, are more homogeneous. The clearly expressed island structure of Be layers in the Al – Be interface region was observed. In other cases the interface layers also were inhomogeneous. The calculations were performed for three cases corresponding to real conditions of Al-Be interface formation.

1. The liquid Al-Be mixture is slowly becoming cool from high temperatures (T>1560K).
2. The liquid Al-Be mixture is very quickly becoming cool from high temperatures (T>1560K) to low temperatures (T< 400K).
3. Low temperature decay of Al-Be solid solution in conditions of irradiation by fast particles (for example, in Nuclear reactor). These processes are similar to low temperature aging of metal alloys and solid solutions.

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Ab initio simulations on interstitial oxygen atom in corundum

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Abstract

First principles periodic calculations on single neutral defects have been performed for 2×2×1 and 3×3×1 α-Al_2O_3 supercells, to estimate defect-defect interactions, their formation energies and Mulliken charges. Interstitial O_i atom forms “dumbbell” with the adjacent regular atom in the oxygen sublattice. Obtained results will be used to simulate O_i migration paths in corundum crystal.

Keywords: density functional theory, corundum, point defects.

1 Introduction

Corundum (α-Al_2O_3) is an important radiation-resistant material with potential applications for components of diagnostics, breeder blanket and in future fusion reactors as coating to avoid permeation of the light gases, 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 interstitial O_i atoms removed from positions of O_{reg} atoms in their lattice sites, complementary Frenkel pairs (O_i+V_O) and H center (O_i+O_{reg}) [2]. Despite enhanced technological importance of corundum, these defects have not yet well theoretically studied. The main reasons for this study are relatively complicated atomic structure of α-Al_2O_3 lattice as well as the mixed semi-covalent and semi-ionic chemical bonding as experimentally observed earlier using X-ray scattering [3].

2 General

In this study, we have performed large-scale ab initio DFT-LCAO calculations on the electronic structure of perfect corundum and that containing neutral point defects using CRYSTAL14 code [4]. Both B3PW exchange-correlation functional and all-valence basis sets DURAND-21G* and 8-411d11G for Al and O atoms, respectively, have been applied. Periodic conventional 2×2×1 supercell (containing 120 atoms) as well as 3×3×1 supercell (270 atoms), have been used for calculations on point defects in α-Al_2O_3 crystal. Formation energies and charge distributions in both types of defective supercells have been compared in order to evaluate defect-defect interaction in periodic model of corundum.

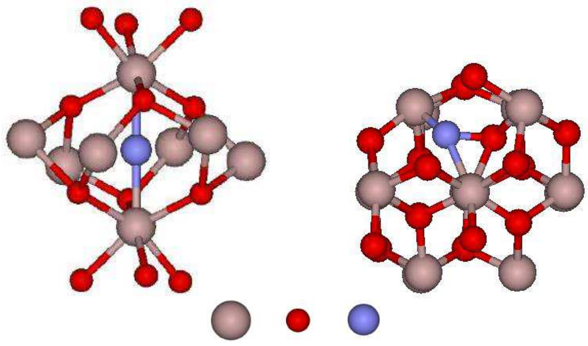

FIGURE 1 Aside view on initial position of interstitial Oi in the center of oxygen octahedron in lattice (left) and its top view after geometry optimization (right). Energy gain obtained as a result of structural relaxation is 3.8 eV

3 Conclusions

The interstitial O_i atom, both single and as a component of O_i+V_O pair, tends to form a dumbbell (Fig. 1) with the adjacent regular atom in the oxygen sublattice ($d_{O_i\text{-}O}$ = 1.404 Å accompanied by the induced charge -1.1 e per pair). Similar behavior of interstitial oxygen atom previously was found in MgO [5]. Formation energies for neutral single point defects in 2×2×1 supercell are equal to 4.21 eV for O_i and 7.60 eV for V_O, while in 3×3×1 it is 4.22 eV and 7.61 eV respectively. Based on results we will use 2×2×1 supercell for our further defect diffusion and energy barriers calculations.

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Questions of perfecting the Distance Learning

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Abstract

As technology evolves, the role of distance learning is increasing in the field of education. New trends have emerged in recent years. "Khan Academy" with high efficiency offers to master different fields free of charge through interactive tasks and easy-to-understand video. In its turn, "Coursera" allows acquiring free courses offered by the world's leading universities. By integrating these and other examples in their study programs, universities can significantly improve the quality of teaching and also their place in the global education market.

Keywords: Distance learning, "Khan Academy," "Coursera"

1 Introduction

Distance learning is occupying an increasingly larger share of the 4.4 trillion dollars' worth global education market. In Latvia it has started development in the nineties of the twentieth century and is now being seen as a form of distance education. Most often it is chosen by people with health or family problems, those who are busy at work, as well as those living abroad. However, recent trends show that distance learning has started to offer quality that is equivalent to the traditional education.

2 Key problems

Although the elements of distance learning are already present in the early 18th century, overall it is a relatively new industry that has not yet reached its full potential.

At present, many educational institutions are not yet ready to implement this form of knowledge acquisition in the same way in which the full-time studies are carried out. Although it is understandable that not all study programs can be mastered in distance learning, it can be assumed that in all or almost all fields the theoretical part can be studied in a remote manner.

3 "Khan Academy"

"Khan Academy" (www.khanacademy.org) is a non-profit educational organisation whose purpose is to provide free world-class education anywhere. In the website of this organisation math, natural sciences, economics, art, music, or computer sciences can be mastered by watching approximately 10 minutes long videos, interspersed with interactive tasks.

"Khan Academy" study courses have proven to be so effective that they have managed to help even children with autism. In addition, seven organisations, including Google and Bill and Melinda Gates Foundation have donated amounts not less than a million dollars.

Among the factors ensuring the success the possibility of adapting video viewing to one's needs (pausing, rewinding, watching several times) should be mentioned, as well as a phased approach, since the next study material is mastered only after the previous one does not create difficulties.

4 "Coursera"

"Coursera" (www.coursera.org) is one of the best examples of massive open online course. 11.9 million users can master 984 courses in various fields that are created by 116 cooperation partners, including part of the world's most influential universities as Stanford or Yale, free of charge.

Most of the courses are available within specific time limits and last four to ten weeks. Here too, the video clips are combined with interactive tasks. In addition, users are actively using the forums in which, though, the answers should not be shared.

Although these courses are free of charge, official certificates attesting to their completion can be obtained for a fee. In order to save resources, the majority of work evaluation is performed by computers, but in other cases - other students.

5 Risks and solutions

Students also would profit a lot from the inclusion of distance learning elements in full-time study programs. However, it should not be done mechanically and inconsiderately. It would be advisable to start with the integration of “Khan Academy,” “Coursera” and other good examples in university programs, and after that to consider the possibility of their own, similar course creation. In doing so, extra attention should be paid to students’ motivation and, possibly, also control. A successful outcome would significantly increase the competitiveness of these universities in world’s education market.

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GPS data bases in monitoring auto transport Latvia

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Abstract

This paper is the result of authors' activities in the field of research and implementation of global positioning system (GPS) technologies in the Latvian car industry. The subject of study is the characteristics of Latvian motor vehicle management. Topicality and importance of this issue are related with new GPS applications to motor vehicle monitoring. In order to solve this issue, the authors proposed an original mathematical model of satellite receivers' use in vehicles.

Keywords: management technologies, service efficiency, capacity, global positioning system, queuing system, monitoring.

1 Introduction

These guidelines, In submitted work variants of use of computer networks, used in modern navigating means, are considered. A major factor describing quality of work of means of navigation is speed. The modern means of navigation are built on the basis of computer networks. This most is explained actuality of a problem of an estimation of productivity of computer networks of navigation. The basic kind of navigating supervision is automatic dependent supervision. Such method of supervision is widely used in Japan, USA, in the countries of Western Europe (Sweden, Denmark, Northern part of Germany). In near future wide introduction of the given method of navigating supervision in Latvian is expected. In resulted materials have any of methods, allowing to make designing and optimum use of computer networks of navigating supervision in Latvian is considered.

2 New servicing standards

Regular research carried out in Riga Technical University [1-3] present gradual criteria changes according to which the GPS service is selected. Low price and high quality of goods are undoubtedly the most important ones on the list; however, those are not desired characteristics, but rather the mandatory standard of a competitive service instead. Nowadays consumers pay more attention to additional criteria, such as time of delivery, possibility of getting ordered goods in the determined period as well as high-quality information maintenance of order delivery process.

Nowadays not all companies are able to offer delivery of goods to their clients on the day of order receipt (common practice is delivery on the following day). However, it is evident that presently service standards tend to become stricter and a company's position in the market depends on the ability to meet these standards.

3 New opportunities

Dispatcher services using the abovementioned modern systems obtain the following options for managing motor vehicles:

- analyse information and take decisions based on the data shown on the scalable electronic map;
- store data on the movement and status of the objects under control and prepare reports based on this information, including the data visualised on an electronic map;
- receive detailed reports about non-routing and emergency situations requiring operative response.

Furthermore, in case of an incoming call from a client the dispatcher has complete information about the status of the order at the present moment and is able to answer any questions, including the estimated time of arrival (this information can also be shown online, thus clients can get free access to it).

As a consequence the efficiency of vehicle use increases, transport logistics improve; transport management is carried out, strict control is implemented over improper vehicle use and the number of failed deliveries decreases which enables the company to reduce the "order-delivery" cycle and improve the level of services provided to the clients accordingly.

4 Problems with evaluating efficiency of motor vehicle monitoring systems by using GPS.

One of the main problems in improving the efficiency of GPS use in the motor vehicles is the problem related to evaluation of efficiency of such systems. Efficiency of these systems can be evaluated by mathematical calculations using queuing systems. The vehicle GPS signal receivers as such can be interpreted as separate systems of queuing, which receive queries about their locations from the system dispatcher. GPS signal receivers can generate queries to the system dispatcher.

5 Statements of a Question

The closing system mentioned above, may have peak periods in which traffic is very heavy, so that queues build up which, however, are taken care of later in the system. We may then be interested in total throughput or in peak like maximum queue length. In all those examples the only way to interested in the steady state response of a on-line computers networks can we chose between replicating run and continuing one long run. We feel that in practical studies steady state, off-line computer networks are an exception, where as in theoretical studies such systems prevail

6 The measurement extractor

The goal of this tool is an on -line collect of information in the Operations Systems computer networks. A listing might be received with a monitoring in the computer networks. Statistics we can be gathered at three levels:

The user job level - here we can measure the programs called for job step: compilation, execution, lines printed etc., the run time option selected and called diagnostics;

The system level – here we measure job traffic, service time, resource allocation, job and task queue lengths;

The I/O level – here we measure channel and I/O equipment activities.

They are suggested from analytical and simulation models of the on-line and off-line computer networks and of workstations and console lights and from reflection on what parameters are likely to be important. The general approach is essentially that of a diagnostic there is a transfer of control to a routine, which collects data and stores it for later analysis. The sampling rate and amount of data collected must be low enough so that the overhead due to the monitoring is acceptable. We distinguish two types of monitoring computer networks: system accounting programs and periodically run or to obtain information off packages programs. The accounting programs and periodically run must be some special problem.

The normal accounting information which cam users and is collected in computer network for billing is an extremely rich source of data for monitoring process. But the information from billing source is not full. An accounting programs cam a very detailed profile of user job with rude precessions.

The software monitoring is not yet used regularly and it must be installations by loading important program modules. Several kinds of collect subroutines are considered, we give below the list collects programmed in the current version.

1. Evaluation of the load workstation: operator dialog; batch processing commands; primary and secondary commands; steps accounting; supervisor calls.
2. Evaluation of the files manipulation: logical input-output; opens and closes of files.
3. Evaluation of the task management: workstation queues; system task activity; utilities and command for workstation activity and queues in the system activity.
4. Evaluation of the computer utilization: CPU occupation; peripheral and channel occupation and core memory occupation.
5. Evaluation of the system reliability: system error; server's errors; user aborts and various value overly.

7 Conclusions

The organisation which is focused on the long-term business activity and the quality of its processes must follow development trends in the information technologies, make progress in this area and react timely to the changes in this area in order to optimize its processes and increase the overall work efficiency.

During the last few years, organisations have had huge amounts of unstructured content, including documents, e-mail messages, video clips, instant messages, web-sites and many others. This information is often in disorder, which prevents the organisation from using these valuable assets efficiently in order to share knowledge, improve relations with its clients and increase efficiency of processes.

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Solving difference stochastic equations using Monte - Carlo method

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Abstract

Simulation of random processes and fields used in many applied problems. In most cases, statistical modeling method is used as an alternative to the classical numerical methods.

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

Simulation of random processes and fields used in many applied problems. In most cases, statistical modeling method is used as an alternative to the classical numerical methods.

Let (T, Ξ, μ) - be some measurable space, $X(t),\ t \in T$ - strict sub-Gaussian random process.

Let $X(t) \in R^n$ – be a vector random process that is a solution of the stochastic equation

$$dX(t) = AX(t)dt + BX(t)dW(t), \tag{1}$$

$$X(t_0) = \zeta_0.$$

where A, B - a matrix with $n \times n$ dimensions, $W(t)$ – scalar Wiener process, ζ_0 – random variable that is independent of $W(t)$ i $E|\zeta_0|^2 < \infty$.

To find the solution implementations and check its properties we use the method statistical modeling. Let $0 \le t_1 < t_2 < ... < t_N \le T$ interval breaking point $[0,T]$ with step h, that is $t_n = nh$, $t_{k+1} - t_k = h$. . Put into line an equation with initial conditions (1) a difference equation

$$X(t_{k+1}) = X(t_k) + X(t_k) \times (Ah + B(W(t_{k+1}) - W(t_k)))$$

Consider the Wiener process on the interval $T = [0,T]$ and use their own representation of the correlation functions of the operator Brownian bridge [1]

$$\xi_1(t) = t\eta_0 + \sqrt{2}\sum_{i=1}^{\infty}\frac{\sin(i\pi t)}{i\pi}\eta_i$$, where $\{\eta_0, \eta_1, \eta_2, ...\}$ - independent standard Gaussian random variables, $\lambda_i = i\pi$ - eigenvalues of the correlation operator or expansion in a Fourier series in $t \in [0,1]$

$$\xi_2(t) = t\eta_0 + \sqrt{2} \times$$
$$\times \sum_{i=1}^{\infty}\left(\eta_{1i}\frac{\sin(2\pi i t)}{2\pi i} + \eta_{2i}\frac{1-\cos(2\pi i t)}{2\pi i}\right),$$

where $\{\eta_{1i}, \eta_{2i}\}$ - independent standard Gaussian random variables.

Number of terms is determined by the specified accuracy and reliability modeling in some functional space [2-3].

For given accuracy $\delta > 0$ and reliability $1-\varepsilon,\ 0 < \varepsilon < 1$ we made calculations for M and constructed and implementation of Wiener process..

For linear stochastic equations, we built its solution based on modeling Wiener process.

We also obtain an estimate mean value and dispersion solution for a large number of implementations.

Simulation results confirm the theoretical calculations.

Parallel algorithms can be used in constructing various implementation of random processes.

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Neurocomputer interface and the classification of the brain waves in the neural network

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Abstract

Human organism diagnostics based on the analysis of the signals generated by itself such as brain waves and voice signals in order to used them to control the objects, and the development of the intellectual systems that would be capable to do this currently is one of the most important tasks of the modern bioinformatics. To solve this problem it is necessary to relate the investigated part of the electroencephalogram to one of the possible classes – signals with significantly larger general statistical properties.

This task can be solved with the help of the neural networks that are able to compare their own output signal of the certain controlled actions with the given initial educational signal and to perform self-tuning – automatic fitting of the internal weight coefficients in order to minimize the discrepancies between the factual output signal and educational signal.

Keywords: electroencephalogram (EEG), neurocomputer interface, discrete Fourier transform, neural network, multi-layer perceptron

1 Introduction

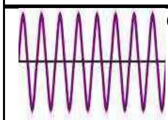
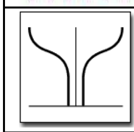
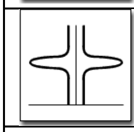
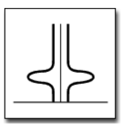
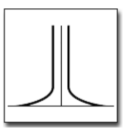
Classification of the brain activity EEG is considered as the basis of the neurocomputer interface (NCI) system creation. It is established that a person can arbitrarily modify the electrical activity of his/her brain by the mentally performed movements skipping any neuro-muscle channels, during this process the generation of the patterns occurs that allow to control the external devices. If the corresponding patterns of the EEG are found it is possible to classify the user's state of the mind in order to perform the consequent transfer of the registered brain activity in the message or by the means of the command to control the external device.

This work is a small part of the research devoted to the development of the neuro-network classificatory for NCI on the basis of the mental activity.

2 Description of the area under investigation

Empirical investigations performed during the last decades lead to the understanding of the function of the different brain parts [1], where the definition of the brain activity models is achieved by the combination of the different brain waves, which by turn are divided in to 5 values of the total power density in the frequency ranges (Table 1) [2,3].

TABLE 1 The frequencies of the brain activity waves

	Wave	Frequency	Characteristics
	Gamma	100 – 38 Гц	Strong focusing and concentration, high activity of the information processing
	Beta	38 – 15 Гц	Logical, mindful thinking. Internal concern, fear, stress During the internal active commentator or criticism
	Alpha	14 – 8 Гц	Relaxation. Thoughts about something peaceful. In the occipital and frontal parts of the hear (O1, O2)
	Theta	7 – 4 Гц	Subconscious waves. Paradoxical sleep phase state, deep meditation, during the peak moments – creativity and spirituality
	Delta	3 – 0,5 Гц	Unconscious waves. Deep sleep without dreams. In combination with other waves is typical for intuitive concentration (such as radar)

In order to create NCI system the analysis of the EEG and signal classification are required.

3 Conclusion

The creation and tuning of the scenarios in OpenViBE designer was created.

1. The initial capture of the digital EEG signal into the file was performed using the algorithm of the data retrieval from the network, where the signal is transferred earlier from the launched server based on the connection driver via USB Bluetooth device to Neurosky MindWave mobile the neuro-set while the task (instructions) are given to the test subject, which is necessary for the subsequent filter development and classifier training.

2. Determination of the optimal parameter, i.e. optimal frequencies of the brain activity waves using the statistical analysis of the measured readings. This allowed to educate the classifiers [4]. Several scenarios were required to do this. In the first scenario, it is necessary to calculate the flow that is recorded during the previous phase and to process it through the analytical module, which assess the best frequency range at the best power range. The received data is used later in the classifier training module, where the main option in the settings is the "Discriminant analysis" algorithm or "The method of the bearing vectors".

It is important to note that one or another EEG rhythm extraction is achieved using the electronic filter based on the Butterworth or Chebyshev projecton methods.

Later all the parameters are used during the next stage of the NCI performance.

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Trends of telecontrol development in electricity power distribution systems in Latvia

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Abstract

Modern electricity grids consist of a large number of interrelated objects (substations, energy transportation routes, points of production and consumption of electric energy). There is a number of topical issues related to insufficient effectiveness of electricity grids. The problems include: low level of reliability of electric power equipment, lack of timely, accurate information on the modes of work of power system, unacceptably high level of electricity losses. All the aforementioned problems are topical and are widely discussed in our country and abroad. These problems can be solved effectively by introducing an automated information system to control the modes of electricity grids in real time.

Keywords: electric distribution networks (EDN), telecontrol, teleautomatics, communication channels

1 General

The complexity and importance of the tasks which are being solved in power supply led to the development of centralized system of remote control and management based on SCADA (System Control And Data Acquisition) technology and modern solutions in the field of information technology.

The main functions of telecontrol systems can be formulated as follows [1, 2]:

- receiving and processing of information on the current state of the monitored objects, presentation of this information in user-friendly way;
- provision of effective centralized management and control of the complex modes of electric power distribution systems from a control unit (CU);
- ensuring the high reliability and accuracy of transmitted information;
- control of reliability and safety of remote management;
- automation of switching.

Teleautomation of the objects of an EDN requires the availability of remote control equipment at a control unit and a controlled object, as well as the availability of a communication channel. Today's market offers a wide variety of high-quality remote control equipment (various sensors and transducers of information, microprocessors, visual display products, etc.). Thus, the ways to ensure the requirements of high reliability of power supply should be sought in the development of reliable and cheap communication channels for telecontrol systems.

It is stated by experts that today in Baltic countries technically obsolete technologies are heavily used in the management of power systems (out-dated equipment of monitoring and control, communication channels with low bandwidth low noise immunity and high impact of weather conditions).

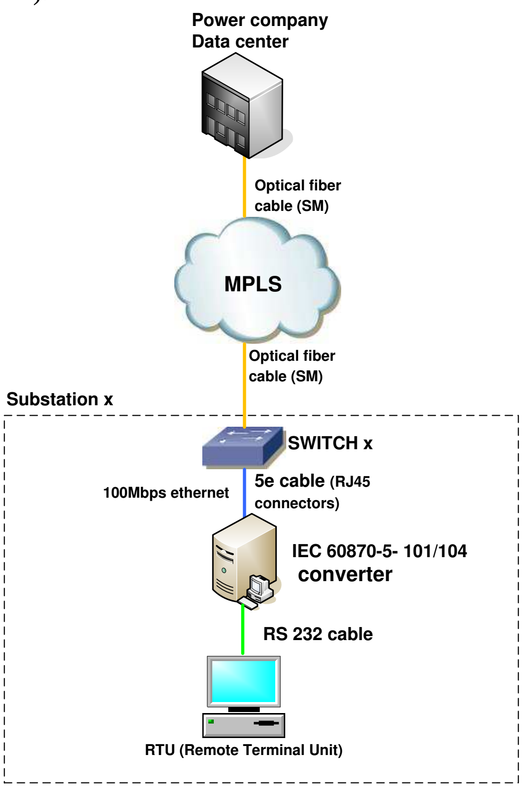

FIGURE 1 Wiring diagram of equipment in digital telecontrol networks

In Latvia, since the early 90-ies of the 20th century optical SM (Single Mode) cables, the total length of which is several thousand kilometres, have been widely used as communication lines of control units and main substations (HES, TEC).

Considering the experience of European power companies in the field of power systems modernization, the efforts of Latvian power companies must be directed on [2, 3]:

- the expanding and reconstruction of the existing electric power distribution networks;
- modernization of telecontrol equipment;
- development of Control and Automation systems on the base of optical communication networks and SCADA technology (Figure 1).

2 Conclusions

The aim of modernization is to connect each object (substations, supply centres, distribution points, etc.) to the reliable high-speed data transmission network using the new protocol of data exchange IEC 60870-5-104.

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Operating system security problem's solution by freezing the computer's kernel

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Abstract

The method to solve the task of maintaining the security of the computers under Windows XP operating system after Microsoft has ended the support of Windows XP was developed by installing a so-called freezing software. The analysis of the consequences of Windows XP operating system support discontinuation was performed for LDz company. The proposed solution is not only financially advantageous but also increases the product life of the used operating system. The unique work environment was created that satisfies both the management and the end users.

Keywords: Windows XP, Deep Freeze

1 Introduction

In the case when automatic updates for Windows XP, which have provided the security of the computer became no longer available the problems of the security and stability of the computers used by LDz have arisen as over 100,000 of its computers might become a suitable environment for the propagation of the viruses, spyware, and malware. There compatibility issues of the hardware and software at LDz. LDz widely uses Clipper type applications that require DOS operating. Windows XP is necessary to provide the correct performance of such software.

2 General

Several possible variants of the software were considered to solve this task: Faronics Deep Freeze, Shadow Defender, Horizon DataSys RollBack. Considering the correlation of functionality – price – quality Faronics Deep Freeze product was chosen. The comparative specifications were received from the developers of the given solutions.

Deep Freeze is an application of the operating system at the kernel level that protects the contents of the disk by freezing it or by saving the initial settings if the system on a specially created partition with the possibility to redirect or to resend all the changes of the working session from the frozen part into another storage, e.g. cloud, server, another HDD or unfrozen (Thawed) partition of the sane computer. The frozen system itself returns to the initial state after the restart. Application allows IT administrators to ensure the security of the operating system and software without limiting the functionality. All the changes in data or settings will be virtual, and actual only during the current session even if these were performed by local/domain administrator.

The main advantages of the Deep Freeze:

- 100% system restore after the restart;
- 100% security from the user or system error;
- 100% security from any external or internal threats (viruses etc.)
- 63% decrease if the load on the IT support staff.

All instruments of the Faronics Deep Freeze system are available free of charge. The only expenses that should be paid using Deep Freeze in the corporative network is lifetime licence. [2]

For the comfortable work of the user and keeping the ability to save data Data Igloo software usage jointly with Deep Freeze was proposed. The main objective of this application is to transfer the profile and user data into another storage. This application fulfils a so-called Data Redirection function [3]. This allows a user to save data in the unfrozen storage.

3 Conclusion

The implementation of the develop methodics has provided the following results:

- The solution of the hardware and compatibility issues until Clipper type applications requiring DOS environment are used;
- The solution of the security issues.

It was shown that Deep Freeze and Data Igllo solve the global task of the computer technologies' security not only for the outdated operating systems. The management already plans to use the possibilities of Deep Freeze ad Data Igloo for (24/7) work places under Windows 7 environment where the operational capability should be 100%.

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Testing automatisation in modern web-applications

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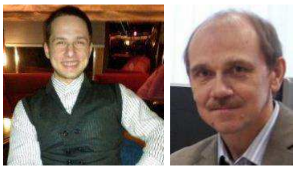

Abstract

At the present time software automation testing is actively developing field of software development industry. Since automation testing is relatively young field, there are no best practices and standards formulated till the end yet. Currently there are many approaches and tools in the market used by different companies. Some of them are useful and actually can save companies money on software development process. However some of the approaches and tools are just a waste of resources. In variety of tools and approaches it is hard to find the proper way of setting up automation testing solution. This work is an attempt to find the best way of doing it.

Keywords: automation testing, quality control, test automation tools

1 Introduction

These days testing software products is an integral part of the software development process. The faster the market is developing, the more processes become dependent on information systems – the more important becomes the smooth operations of developed products. Obviously, the fault tolerance of the system and the lack of critical errors are important in software that affects the health or the life of a person (aviation, medicine, military developments). Until recent times, extensive testing was characteristic only for the above mentioned applications. But with the development of the IT market, the smooth operation of information systems has become important for software products of mass use.

Modern user is accustomed to fast, reliable and easy to use product. And as the competition in the world of commercial software products is quite high, if the product does not work quickly, if it is not going to be convenient, and the errors will occur during the operation – this product is simply not going to be competitive.

In addition, the timely testing allows a company to save money as it allows finding bugs in the program before they get into the final product.

The relative cost of finding errors at different stages of the product life is shown in Figure 1 [4].

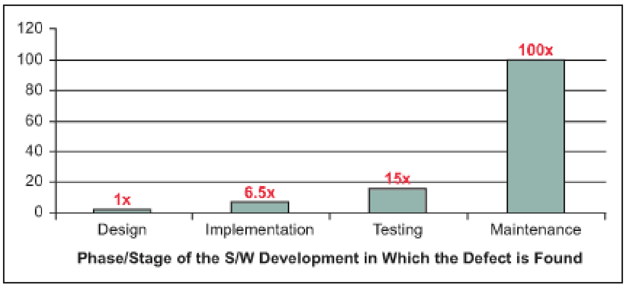

FIGURE 1 Relative cost of mistake

In order to detect errors in the system faster and at earlier stages of development test automation area is being actively developed during the recent years. As the name implies, test automation is the process of verification of the program being tested without human intervention (Figure 2 [1]). Usually it is a third-party program or script that simulates the work of a real user.

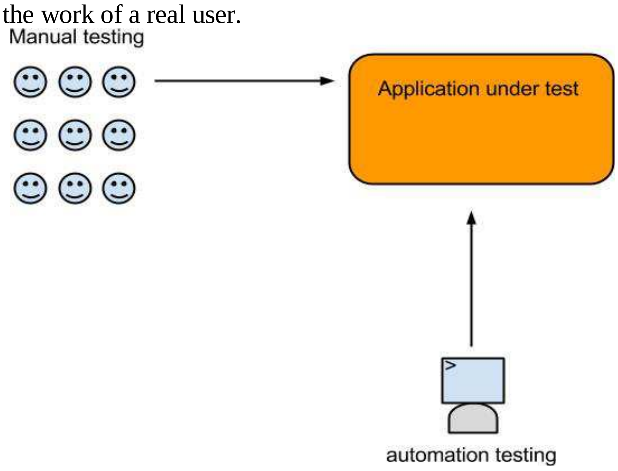

FIGURE 2 Automation testing

Virtually all modern companies developing software embed testing automation in the process of development. The question of how to do it correctly is the issue though.

2 Overview

This work discusses the advantages, disadvantages and conclusions on the following issues:

- Software testing without automation (only manual testing)
- Commercial software testing tools
- Open source solutions (open source software for testing automation)
- Tests as code (tests as a part of the tested application).

3 Decision

As an example of a project for testing automation the Siebel CRM testing automation system will be considered. Using a set of open-source software an automated testing system was created that are not inferior to the characteristics of the complete, large, and paid solutions. Technically, the created tests are http queries sent to the server, and test scenarios can be described using any programming language. This makes the solution more flexible and easily scalable. Rejecting the finished programs for automated testing, which requires significant hardware and software resources it was possible to significantly reduce the cost of testing automation and to achieve faster and more reliable tests.

4 Conclusion

Test automation using open source products is the most pronounced trend that is gaining popularity in both small companies and corporations. This is determined by resource conservation and high quality of existing solutions.

The market gets further away from the bulky commercial solutions towards open source products, and towards the automated testing as part of the tested application.

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Development of information system, in order to optimize the operation of sales agents in the company

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Abstract

To achieve maximum success, any company needs to accurately understand their costs, profit, resources, business processes, and more. Visual information about what is happening will further analyze the process and help you make the right conclusions, which ultimately lead to increased sales, higher production, improve the overall efficiency. It is no secret that the market leaders are the most effective enterprises with minimum cost, the highest level of productivity and fully controlled and well-established processes. One of the best ways to contribute to the monitoring and analysis of activities in the enterprise is the implementation of an integrated automated information system.

Keywords: information system, information technology, implementation, business processes, efficiency

1 Introduction

The information system is a set of technical, software and organizational support, as well as personnel, designed to provide timely appropriate people with adequate information. Software for half a century of its existence has undergone tremendous changes, having risen from programs that can perform only simple logic and arithmetic to complex enterprise management systems.

Implementation of information systems in the enterprise is a complex and often painful process. However, some problems arise when implementing the system, have been well studied, formalized and have effective methodology solutions. Early studies of these problems and preparation to them greatly facilitate the implementation process and further increase the efficiency of the system. Depending on the domain information systems can greatly vary considerably in their functions, architecture and implementation. However, one can identify a number of features that are common:

- Information systems are designed for the collection, storage and processing of information, so the basis of all of them is the storage environment and access to data.
- Information systems are focused on end-user does not have high qualifications in the field of computer science. Therefore, the client application information system should have a simple, convenient, easy to learn interface, which provides the end user with all the necessary features to work and at the same time does not give him the opportunity to perform any extra steps.

There are different types of of information systems. (Figure 1)

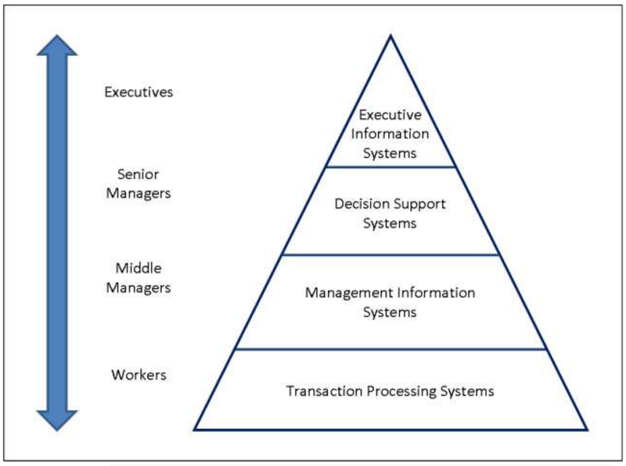

FIGURE 1 A four level pyramid model of different types of information systems based on the different levels of hierarchy in an organization

2 Overview

Key features to be solved by information systems:

- Providing necessary, comprehensive and understandable information to the manager
- A common information space for the control and communications in the enterprise
- Control, processing and distribution of information
- Protection against loss, errors and unauthorized access

3 Decision

Develop a system that meets the specific requirements of the company and the specifics in order to easily manage the sales agents work. It must be easy to understand that it can be conveniently used in everyday work. The system should have separate user roles and access to information should be limited so that employees can access only to the information they need. User roles are divided as follows - potential customers search engine, marketing agent and administrator.

4 Conclusion

It can be concluded that the overall strategic aim of creating a corporate information system is to improve the manageability, which allows to increase economic efficiency and improve quality production performance of the enterprise. By implementing an automated information system, the management of the company will receive full and clear picture of what is happening, this picture will help to make the right decisions.

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Application of theorems of elementary geometry in a mathematical analysis

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Among the theorems in elementary geometry there are some known very well, for example, Pythagorean Theorem. All students know it and know how to use it. In the meantime, there are theorems that raise some questions about how and where to use them. For example, if an altitude is dropped from the vertex with the right angle to the hypotenuse then the product of the catheti projections on the hypotenuse is equal to the length of the altitude squared. Another example would be – if a secant and a tangent are drawn from a point outside the circle, then the product of the lengths of the secant and its external segment equals the square of the length of the tangent segment. There are many similar theorems. We decided to use these theorems in mathematical analysis to draw functions using only a ruler and a compass. It turns out that it is possible to easily draw new functions based on graphically defined functions. We have proven and showed how to draw functions $y = \frac{1}{f(x)}$, $y = \sqrt{f(x)}$, $y = f^{2p}(x)$, $y = \frac{1}{f^{2p}(x)}$, $y = \frac{1}{\sqrt{f(x)}}$, if there is a function f(x) defined graphically. In addition, we used Ptolemy's theorem to draw function $y = f(x)g(x)$ if there are two functions – f(x) and g(x) – defined graphically. Using triangle angle bisector theorem (an angle bisector of an angle of a triangle divides the opposite side in two segments that are proportional to the other two sides of the triangle), it is possible to draw function $y = \frac{f(x)}{g(x)}$ if there are two functions – f(x) and g(x) – defined graphically.

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Linear and nonlinear projectors are in project space

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A long ago there was an idea about transformation of the systems of differential equations. An idea consisted in breaking up of the system on blocks, i.e. in transformation of the system to such kind, when she disintegrates on subsystems, in each of that is the system of unknown functions entering simultaneously and under the sign of derivatives, and in right parts. For the systems of linear equations this task decides simply. The decision of such task is equipotent to bringing a matrix over of the system to Jordan form. The block of split system corresponds every cage of Jordan. But this task can be decided differently. I suggest using the special singular matrices - projectors. Projectors for the systems of linear equations are such singular matrices of P_i , that submit to the terms $P_i^2 = P_{i,}$ $P_i\, P_j = 0,$ $\sum_i^n P_{i=} E,$ where E is a single matrix. In linear case finding such functional matrices and subordinating to their said terms, come to the system of equations on the coefficients of transformations. If to accept the unknown functions of the system of equations as coordinates of point in project space, then it will appear that the system of projectors builds in space the network of designing planes that appears the network of transfer. It is well-proven in flat case, that every designing network is determined by a bivalent tensor. For every such network there is the tensor qualificator the project breaking up.

The row of theorems just both for linear is well-proven and nonlinear breaking up of the systems. For the nonlinear systems of type $\frac{dy^i}{dt} = f^i(y^j)$ nonlinear transformation $y^i = \varphi_j^i(z^j),$ is entered, that in space determines some curvilinear network (in case of plane these equalities have the appearance $y^1 = z^1 + \varphi^1(z^1),$ $y^2 = z^2 + \varphi^2(z^2)$). This network will be the network of transfer.

Theorems are proved, being of interest both for geometry of degenerate transformations and for the theory of differential equations. Let $M(y^i)$ - the point of n - measure Euclidean spices $E_{n.}$ Let there are two projectors of P_1 and P_2 of grades of k and n - k. Through beginning of coordinates two planes of projections pass also dimensions to k and $n-k$. The projector of P_1 designs on the plane of projection of Π_1 of dimension of k not only the point of M but also plane of dimension of n - k passing through this point. Projection is some point of M^s. At the same time designing plane of dimension of n - k crosses the plane of projections in some point of M_1. Whatever matrices of P_1 and P_2 were, accordance between the points M^s and M_1 always is a project. It appears identical transformation only if, when P_1 and P_2 - projectors.

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The task of quality optimization of distribution in a teaching load (for example ALMU, chair of "Information technology")

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Abstract

The distribution of teaching load it is very important mechanism in education process. The general idea it has to increase the quality of teaching education courses. The general algorithm of distribution of teaching load was researched through the optimal algorithm distribution of teaching load. In the result was implemented the web-platform assistant for head of chair.

Keywords: Distribution teaching load, teaching load

1 Introduction

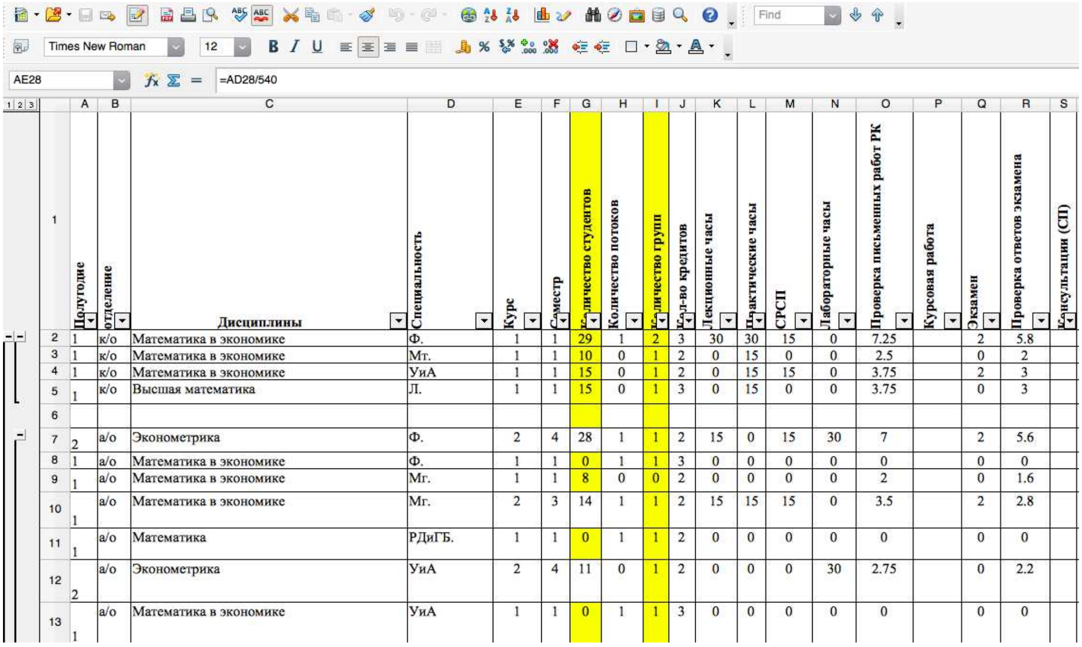
When the teachers arrived from vacation, the teachers think about teaching load. Which subject they will teach on the current year. How much hours will be? The head of chair should to distribute teaching load without lost and qualify for all teachers on the department. The general document for distribution teaching load it's – a General education curriculum (GEC) [1]. The GEC developed Ministry of Education and Science of the Republic of Kazakhstan. The GEC allows universities to establish any base; profiling courses should be included in the Programs at the course for a particular specialty. After that, the university should to generate a new important document called like a working curriculum. Based on working curriculum head of the Department must make a complete curriculum includes basic courses and profiling as well as a variety of elective courses proposed by teachers of the department. In this article, the distribution-teaching load will be demonstrated for example "Almaty Management Universities" in general chair of "Information technology".

2 Traditional process of distribution teaching load

The Almaty Management University is a modern university with effective and useful elective courses with rich experienced teachers and internal energy. For example, at the Department of "Information Technology" distribution of teaching load process is made through the office suite MS Excel. The MS Excel it is a very powerful tool with different embedded functions. However, the process of distribution teaching load its responsibilities and very difficult process. First of all the head of the chair should to analyze how much educational courses have on the first and second semester, how many teachers need to start to teach a student. The rules of teaching load have a minimum point and maximum point of teaching load. The range of teaching load is between 0.5 wager and 1.0 wager. In other words 0.5 – minimum wager and 1.0 – it's a maximum wager [2].

On the Figure 1 illustrates the traditional process of distribution teaching load through spreadsheet. In the spreadsheet the head of chair should to add some requirements fields, such as semester, mode of study, credits, education course, specialization, course, quantity of students, lectures hours, labs hours, seminars hours, IWS etc. On the each education course head of chair implement the number of data. For example, the chair of "Information technology" have approximate 30 courses with only 10 professional teachers.

The current process of distribution teaching load for example on the chair of "Information technology" implemented through standard process. On the chair has 10 teachers that wish to teach several courses from 30 courses on the different languages on the different student courses (1^{st}, 2^{nd}, 3^{rd} and 4^{th}). It is possible, because the full rate of teaching load will be 600 hours per year for a senior lecturer, 540 – for the docent and professors. On the first phase of distribution teaching load the head of chair should analyze all courses and then divide teaching load by the specialization. If the teacher has less than 1.0 wager the head of chair searching courses for the current teacher that to up to 1.0 wager. When on the teacher enough hours and wagers the head of chair checking another teacher who have less than 1.0 wager. If the all teachers have full wagers and hours, well distribution teaching load done, and then can to send by e-mail teaching load by the teachers.



	A Полугодие	B отделение	C Дисциплины	D Специальность	E Курс	F Семестр	G Количество студентов	H Количество потоков	I Количество групп	J Кол-во кредитов	K Лекционные часы	L Практические часы	M СРСП	N Лабораторные часы	O Проверка письменных работ РК	P Курсовая работа	Q Экзамен	R Проверка ответов экзамена	S Консультации (СП)
2	1	к/о	Математика в экономике	Ф.	1	1	29	1	2	3	30	30	15	0	7.25		2	5.8	
3	1	к/о	Математика в экономике	Мт.	1	1	10	0	1	2	0	15	0	0	2.5		0	2	
4	1	к/о	Математика в экономике	УиА	1	1	15	0	1	2	0	15	15	0	3.75		2	3	
5	1	к/о	Высшая математика	Л.	1	1	15	0	1	3	0	15	0	0	3.75		0	3	
6																			
7	2	а/о	Эконометрика	Ф.	2	4	28	1	1	2	15	0	15	30	7		2	5.6	
8	1	а/о	Математика в экономике	Ф.	1	1	0	1	1	3	0	0	0	0	0		0	0	
9	1	а/о	Математика в экономике	Мг.	1	1	8	0	0	2	0	0	0	0	2		0	1.6	
10	1	а/о	Математика в экономике	Мг.	2	3	14	1	1	2	15	15	15	0	3.5		2	2.8	
11	1	а/о	Математика	РДиГБ.	1	1	0	1	1	2	0	0	0	0	0		0	0	
12	2	а/о	Эконометрика	УиА	2	4	11	0	1	2	0	0	0	30	2.75		0	2.2	
13	1	а/о	Математика в экономике	УиА	1	1	0	1	1	3	0	0	0	0	0		0	0	

FIGURE 1 Teaching load (spreadsheet)

3 Limitations of traditional process of distribution teaching load.

But, in this current traditional process of distribution teaching load have a some negative moments. When the university or chair want to see on the forward qualify specialties, the head of chair should to thing about quality of teaching education courses. For example: one of the some teachers teaching education course "Physics" for bachelor student on the 1st year, and also teaching more different education courses for example "Computer science", "IT Management". Yes, it is a good for university and for teacher, but the quality each educational courses will be is not of high level.

4 Existing software for distribution teaching load

On the market has more effective software which help head of chair distribute teaching load. Existing software included more features to distribute teaching load, but how the computer system effective distribute teaching load? How the computer system solve the situation when on the one subject want be one or more teachers. Nowadays very important the concentrate the focus on the quality of distribution teaching load. The general process of distribution of academic load is known to all. After all researches now it is possible to create new quality model of distribution teaching load.

5 Conclusions

The teaching load it is a important step in the process of university. The teacher budget directly depended from teaching load. If the university want to increase quality of knowledge students, thus the head of chair should distribute of teaching load that to guarantee the quality of teaching course. The web-platform of teaching load for the head of department will be assistant help for automatically distribute teaching load without lost and with all quality parameters. In the result of researches was created the web-platform, which distribution of teaching load with the quality of teaching course.

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Comparison of measured by results of the test system used e-learning in Konstantin Preslavsky University of Shumen through practical tasks

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Abstract

In the work are discussed, analysed and compared acquired ratings from students trained in Shumen University used alongside the traditional way of teaching and platform implemented at the university e-learning. Compared the results obtained by assessing the practical task with those achieved in the electronic ultimate test.

Keywords: practical use of systems for e-learning, analysis of the results in the evaluation of practical tasks and solve computer test

1 Introduction

Changes taking place in higher education in the Republic of Bulgaria to improve the quality of training required than classical methods of training and use of information and communication technologies that transform traditional learning in electronic or remote. An example is the mass introduction of training based on the implementation of projects under the grant BG051PO001-4.3.04 "Development of electronic forms of distance learning in higher education" under the Operational Programme "Human Resources", funded the European Social Fund of the European Union.

This project[1] was also implemented in Shumen University, as a result of which was fully prepared technological, resource and methodological support of the training process. Were prepared trainers developed multimedia textbooks, electronic modules, presentations, tests to check the knowledge of different disciplines and comprehensive distance learning courses, which were used for e-learning supporting basic education students.

2 Basic information about the unit "word" included in different course

The module "word" is included in the various training programs for compulsory and optional subjects for student's specialists and non-specialists for students studying at the University of Shumen.

Electronic materials for the module I developed in detail it is provided with - an electronic textbook divided into chapters containing multiple slides, sample task and practical test.

Modern information technologies penetrate not only in all levels of information, but in any workplace. Appear software to automate various activities. They provide opportunities for all professionals to form the most diverse way their documents with text, tables and graphics. One of the most common applications of computer systems is the ability to process a text known as computerized text. It is actively used in small office in conducting business correspondence, in preparation of presentation documents, accounts, reports, flyers, and more. The main goal of the study module is enrichment already acquired knowledge, skills and competencies for fruitful and successful work, as well as developing specific professional word processing techniques.

The aim of the training course of this module is to help students acquire knowledge and practical skills for word.

[1] BG 051 PO 001-4.3.04-0020 Modernization of Distance Learning Centre in Shumen University "Konstantin of Preslavsky" by introducing modern electronic forms of learning"

These hours are a worthwhile investment in the future competitiveness of each employee whose employment is directly or indirectly linked to the preparation and operation of representative and official documents, reports, correspondence, etc. Increase the office culture and professional competence.

3 Scheme for assessing knowledge of trainees in module "word"

The evaluation of the acquired and strengthened the knowledge, skills and competencies in the use of a word processor is selected to be a two-component based on practical problem solving and test [4]. To use the fullest possible advantages offered by e-learning platform Moodle e-learning materials unless provided for practical training is also provided on the basis of this platform is to carry out the assessment of knowledge acquired through the test, and its detailed analysis [2, 3].

Practical assignment: practical task is related to the solution of various problems that students are engaged in training in the discipline. This is the way to show in practice what they have learned and you know how to apply their knowledge in practice.

Development of a practical task within no more than 2 hours, the student must base on the assigned model to be able to transform it into an electronic version, under the rules for entering information, editing, formatting and data insertion and setting specific word elements as specified in the original.

Test: The test is designed to assess the knowledge acquired and reinforced the students on issues and specifics of working with a word processing program [1].

The test used to check the acquired knowledge is gated - multiple choice, including 30 questions. Each question has five possible answers. Only one of the answers is correct. Its system is set each time the output responses of a matter should be arranged randomly five answers. The questions included in this test of the student selected at random from the database containing double issues with accompanying answers.

When solving specific test question, if answered correctly will be awarded 1 point, while incorrect answer 0 points. The test scores of the student is obtained as the sum of all true answered questions from the test. Maximum test score that can get a student deciding electronic test is 30.

The formation of final assessment on the module "word" of students is based on estimates obtained test and practical task, as an average.

The focus of this article is to compare the results of the tests using the system for e-learning at SU and evaluation through practical task raises interest method of assessment of the achievement test results and comparability of results.

Assessment "Average 3" The student knows the basic theoretical concepts, but allows inaccuracies in the performance of a specific task does not use the full capabilities of the program, make mistakes and omissions in performing practical tasks.

Evaluation "Good 4" The student knows the basic theoretical concepts, know-how and enjoy the possibilities of the program, but in the performance of a specific task does not use its full capacity. Prevents serious errors in solving practical problems.

Evaluation "Very good 5" The student knows the basic theoretical concepts, able to work and exploit the opportunities in the execution of a specific task. Do not make mistakes in carrying out practical tasks.

Assessment "Excellent 6" The student knows the basic theoretical concepts, able to work with the program and use its full potential in the performance of a specific task. Rational use and purpose capabilities of existing hardware, demonstrate responsible attitude and in the performance of specific tasks. Do not make mistakes in carrying out practical tasks.

4 Experimental results comparable results practical task

The aim of the experiment is to answer the questions:

1. How students learn academic material - theoretically?
2. Assessment of test and real commensurate is the assessment of the practical task?

5 Conclusions

Figure 1 shows that from the experiment over 60% of the students tested their results overlap completely, whether held or practical test. In the results, in which there are differrences between the resulting assessment of the practical task of making this test reveals that the results achieved in the test examination are lower than those of the practical task, which:

• on the one hand say that students experiencing difficulty to present their theoretical knowledge;

• on the other hand says that test used to check the acquired and learned knowledge is reliable and gives a realistic assessment of students' knowledge.

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Research of simulators for neural networks through the implementation of multilayer perseptron

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Abstract

This paper describes construction of multilayerperseptronby two different open source simulators for neural networks - Neuroph and NetMaker. Described multilayer perseptron solves logical function "or". The aim is to compare the capabilities of different simulators for neural networks, study of their learning opportunities, training and visualization of established networks.The results are used to determine the optimum subject areas and relevant tasks which can be used various simulators for educational and research purposes.

Keywords: neural networks, simulators, multilayer perceptron, logical function, logical or

1 Introduction

To conduct the experiment and were used as two open source simulator for neural networks that have intuitive interface combined with good functionality, suitable for research, scientific and educational purposes [4].

NetMaker allows to work with more than one neural network at the same time, there are opportunities for pre- and post - processing. Unlike most simulators for neural networks that are directed to the neural network itself, NetMaker is directed to a task, which needs to be solved [1]. Types of neurons networks simulator supports are multi perceptron with fixed weights, multi perceptron with error backpropagation, recursive multi perceptron, cascade correlation.

The second elected Neuroph The research simulator allows to work with the following types of neural networks - Adeline, Perceptron, Multi perceptron, Hopfield, Kohonen, wasting neural network learning without a teacher, wasting network with teacher network with competitive layers, OutStar, InStar. Neuroph is small, intuitive and easy to use, even for beginners in the field. Another advantage is its flexibility - it can be easily extended and supplemented with many new application possibilities [2].

For research is selected Logic function "or". Also will be created and neural networks decisivelogical "and".The classification of linearly separable data is relatively simple and can be implemented with any type of neural network. The inputs to this logic function are linearly separable and can be implemented by a single-layer perceptron with linear activation function. So it is suitable to display the capabilities of simulators to solve the problem of classification of data that are linearly separable. These data are presented in the neural network as input data in the form of vectors. Logical “or" ,"and" is presented as follows:

TABLE 1 Logical OR

A	B	AOR B
0	0	0
0	1	1
1	0	1
1	1	1

TABLE 2 Logical AND

A	B	A AND B
0	0	0
0	1	0
1	0	0
1	1	1

It was shown (Minsky Papert, 1969) that perceptron can not work with the data that are not linearly separable. An example of such a task, the task is to exclusive or.

A	B	A XOR B
0	0	0
0	1	1
1	0	1
1	1	0

In NetMaker it becomes relatively easy and intuitive through a choice of menu. Select from the menu bar simulator Edit -> Add Component -> Data Set. In consequence of the screen is a visual object (icon) labeled - Data Set. The input data can be inserted and submitted network of external or internal source.

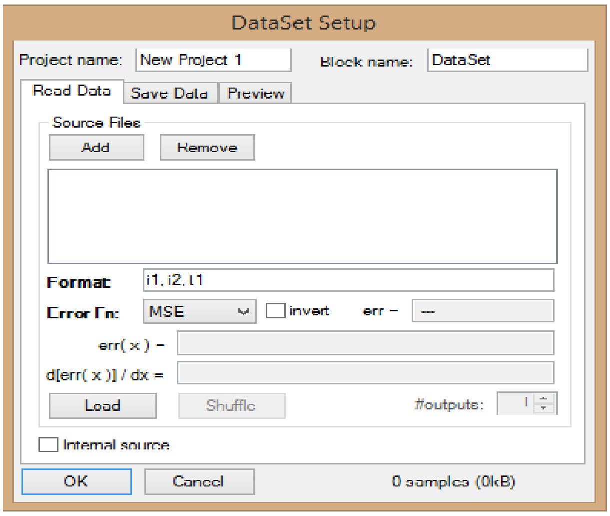

FIGURE 1 DataSet Window in NetMaker

With the second simulator that we have chosen to the survey Neuroph, input data is passed to the network again in several ways. We are able to submit input vector by selecting the icon Set Input from the menu of the simulator. On the screen appears the following dialog box, it is implemented input vector. For data separator is used interval.

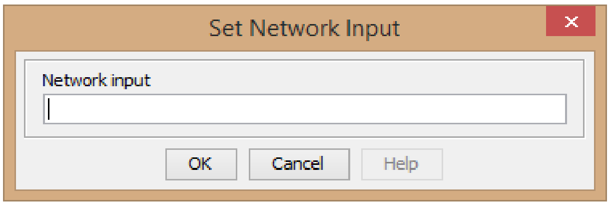

FIGURE 2 Set Network Window in Neuroph

Tobesubmittedmultiple training data shall be elected from the menu File -> New File. In the dialog box that appears on file type shall be elected Data Set. Here again we have the opportunity to be filed numerous external source or it can be implemented in the very simulator through rows of table

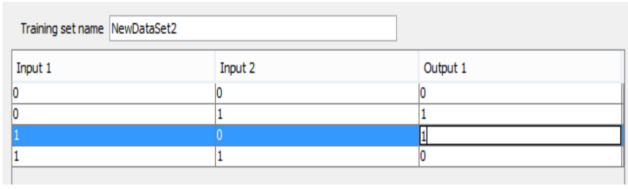

FIGURE 3 Input Table in Neuroph

The study will be implemented and tested all methods to set the input vectors and a learning set.

In the followingresearch of simulators will be introduced and defined specific benchmarks. They will define the differences, strengths and weaknesses of the tested simulators.

For research is selected neural network perseptron. Perseptrona as type neural network was proposed by Frank Rosenblatt in 1958. [1, 3] Input values of perceptron are bipolar, and weights are real numbers.The level of activation of the perceptroniscalculatedas a weightedsum of its inputs:

$$\sum_i x_i w_i . \quad (1)$$

Baseline perceptron is calculated using a strict threshold function: if the level of activation than or equal to the threshold value - the output of the perceptron is equal to **1**, otherwise - **-1**. Thuscalculationof theoutputvalue of perceptronis basedonitsinputvaluesx_i, weightsw_i and threshold t:

$$1, \text{ if } \sum_i x_i w_i \geq t, \quad (2)$$

$$-1, \text{ if } \sum_i x_i w_i \leq t. \quad (3)$$

Setting the weights of the perceptron usesimple training algorithm.

$$\Delta w_i = c(d - sign(\sum x_i w_i))x_i . \quad (4)$$

Perceptron is trying to solve the submitted task, then it displays the correct result. Then the weights of the perceptron be amended in such a way as to reduce the error output. In formula (4) coefficient **c**is a constant factor of speed training; $sign(\sum x_i w_i)$ -output value of the perceptron: 1 or -1.

For each input vector components perform the following actions: if the values of the real and expected output match, nothing changes; if the actual value of the output is 1, and expected is -1, the weighting factor fori- th input is reduced by $2cx_i$. If the actual value of the output is -1, and expected is -1, the weighting factor fori- th input is increases by $2cx_i$.

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Efficient approach to pattern recognition in the case of two classes based on minimization of misclassification probability

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Abstract

The approach adopted by Fisher for pattern recognition (classification) was to find a linear combination of the variables that separates the two classes as much as possible. That is, we seek the direction along which the two classes are best separated in some sense. It should be noted that this direction does not provide us with an allocation rule, merely a mapping to a reduced dimension (actually one dimension in the two-class situation) in which discrimination is in some sense easiest. Fisher's classification (allocation) rule based on distance is one of the most widely used classification rules for two sample multivariate normal data. A key assumption for the validity of its use is that the variance matrices of the two normal populations are equal. Since this assumption may often be violated, it is of interest to propose a classification rule when the variance matrices are not equal. Therefore, in this paper, the classification rule based on minimization of misclassification probability is proposed. A numerical example is given.

Keywords: Two classes, pattern recognition, misclassification, improvement percentage

1 Introduction

Pattern recognition aim is to classify data (patterns) based on either a priori knowledge or on statistical information extracted from the patterns. The patterns to be classified are usually groups of measurements or observations, defining points in an appropriate multidimensional space. Many pattern recognition methods can be decomposed into two stages: separation followed by classification. Discrimination and classification represent multivariate techniques concerned with separating distinct sets of objects (or observations) and allocating new objects (observations) to previously defined groups (classes) [1].

2 Pattern recognition in the case of two classes

Let $\mathbf{Y}_{11}, \ldots, \mathbf{Y}_{1n_1}$ and $\mathbf{Y}_{21}, \ldots, \mathbf{Y}_{2n_2}$ be samples of observed vectors of attributes of objects from two different classes C_1 and C_2, respectively. In this case, the proposed approach to pattern recognition (classification) is as follows:

Step 1 (Transition from high dimensional problem (dimension p≥2) to one dimensional problem (dimension p=1). At this step, transition from high dimensional problem to one dimensional problem is carried out by using a suitable transformation of the (p≥2) multivariate observations $\mathbf{Y} = (Y_1,\ldots,Y_p)'$ to univariate observations X. Then the separation threshold h, which minimizes the probability of misclassification of input observation X,

$$P_{miscl} = \int_{R_{C_1}} f_{C_2}(x)dx + \int_{R_{C_2}} f_{C_1}(x)dx, \quad (1)$$

is determined (see Figure 1), where $f_{C_j}(x)$ represents the probability density function of observation X from class C_j, $j \in \{1, 2\}$.

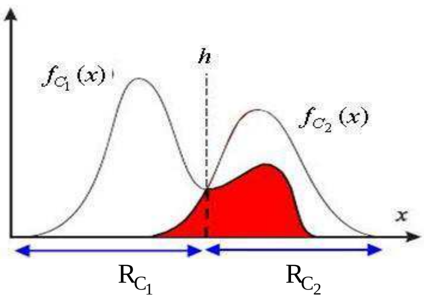

FIGURE 1 Misclassification probability

Theorem 1. If $f_{C_j}(x)$, j=1, 2, are the probability density functions of the normal distribution with the parameters (μ_1, σ_1^2) and (μ_2, σ_2^2), respectively, where $\mu_1 < \mu_2$, then the necessary and sufficient conditions for (1) to have a unique minimum are given as follows:

(i) A necessary condition for h to be a minimum point of (1) is that

$$f_{C_1}(h) = f_{C_2}(h), \quad (2)$$

(ii) A sufficient condition for h to be a minimum point of (1) is that

$$\mu_1 < h < \mu_2. \quad (3)$$

Proof. The proof being straightforward is omitted here.

Corollary 1.1. If $\sigma_1 = \sigma_2$, then the separation threshold h is determined as

$$h = (\mu_1 + \mu_2)/2, \quad (4)$$

i.e., in this case we deal with Fisher's separation threshold.

Step 2 (Pattern recognition (classification)). At this step, pattern recognition (classification) of a new observation X_0 is carried out as follows:

$$X_0 \begin{cases} \le h, & \text{then} \quad X_0 \in C_1, \\ > h, & \text{then} \quad X_0 \in C_2. \end{cases} \tag{5}$$

Remark 1. The recognition (classification) rule (5) can be rewritten as follows:

Assign X_0 to the class C_j for which $f_{C_j}(X_0)$, $j \in \{1, 2\}$, is largest.

3 Example

Suppose we wish to classify some product (input vector **Y**=(Y_1, Y_2)) to one of two classes of quality (C_1 and C_2) of this product. The data samples of observed vectors **Y** of attributes of product quality from two different classes C_1 and C_2, respectively, are given in Table 1.

TABLE 1 Product quality attribute data.

class C_1 of product quality attributes			**class C_2 of product quality attributes**		
quality attribute vector Y_1			quality attribute vector Y_2		
No.	y_{11}	y_{12}	No.	y_{21}	y_{22}
1.	6	6.8	1.	4.2	9.4
2.	5.8	6.8	2.	6.9	9
3.	6.3	7	3.	8.7	9
4.	7	6.3	4.	4.9	8.4
5.	6.4	5.9	5.	3.4	7.6
6.	7.7	5.9	6.	11.2	7.5
7.	5	5.7	7.	9.2	6.3
8.	6.1	5.2	8.	3.1	6
9.	7.5	5.3	9.	1.8	4.9
10.	6.8	5	10.	10.3	5
11.	5	4.4	11.	11.7	4.4
12.	5.7	4.6	12.	3.5	3.7
13.	7.1	4.1	13.	9.2	3.2
14.	7.8	4.3	14.	7.4	2.8
15.	6.1	3.9	15.	4.2	2.2
			16.	9	2.3
			17.	11	2
			18.	5.9	1.8

A pictorial representation of the above data is given on Figure 1.

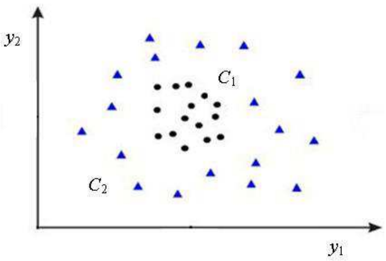

FIGURE 2 Pictorial representation of the data of Table 1 for which linear separation is inappropriate

For transition from high dimensional problem (p=2) to one dimensional problem (p=1), the following transformations are used:

(i) The map from **Y=(**Y_1, Y_2) to **Z**=(Z_1, Z_2, Z_3), where

$$Z_1 = (Y_1 - a)^2, \quad Z_2 = (Y_2 - b)^2, \quad Z_3 = (Y_1 - a)(Y_2 - b), \tag{6}$$

$$a = \sum_{i=1}^{n_2} y_{21} / n_2 = 6.98, \quad b = \sum_{i=1}^{n_2} y_{22} / n_2 = 5.31. \tag{7}$$

(ii) The map from **Z**=(Z_1, Z_2, Z_3) to X, where

$$X = \mathbf{U}'\mathbf{Z}, \tag{8}$$

$$\mathbf{U} = \mathbf{S}^{-1}(\overline{\mathbf{Z}}_2 - \overline{\mathbf{Z}}_1) = \left(\frac{\mathbf{S}_1}{n_1} + \frac{\mathbf{S}_2}{n_2} \right)^{-1} (\overline{\mathbf{Z}}_2 - \overline{\mathbf{Z}}_1), \tag{9}$$

$$\overline{\mathbf{Z}}_1 = \frac{1}{n_1} \sum_{i=1}^{n_1} \mathbf{Z}_{1i}, \quad \mathbf{S}_1 = \frac{1}{n_1 - 1} \sum_{i=1}^{n_1} (\mathbf{Z}_{1i} - \overline{\mathbf{Z}}_1)(\mathbf{Z}_{1i} - \overline{\mathbf{Z}}_1)', \tag{10}$$

$$\overline{\mathbf{Z}}_2 = \frac{1}{n_2} \sum_{i=1}^{n_2} \mathbf{Z}_{2i}, \quad \mathbf{S}_2 = \frac{1}{n_2 - 1} \sum_{i=1}^{n_2} (\mathbf{Z}_{2i} - \overline{\mathbf{Z}}_2)(\mathbf{Z}_{2i} - \overline{\mathbf{Z}}_2)', \tag{11}$$

$$f_{C_1}(x) = \frac{1}{\sqrt{2\pi}\sigma_1} \exp\left(-\frac{(x - \mu_1}{2\sigma_1^2} \right),$$

$$\mu_1 = 14.148, \quad \sigma_1 = 9.815, \tag{12}$$

$$f_{C_2}(x) = \frac{1}{\sqrt{2\pi}\sigma_2} \exp\left(-\frac{(x - \mu_2}{2\sigma_2^2} \right),$$

$$\mu_1 = 109.329, \quad \sigma_1 = 39.971; \tag{13}$$

$$h = 38.149, \quad P_{miscl} = 0.044706, \tag{14}$$

$$h_{Fisher} = (\mu_1 + \mu_2)/2 = 61.739, \quad P_{miscl} = 0.116899. \tag{15}$$

The index of relative efficiency of the Fisher approach as compared with the proposed approach is

$$I_{rel.eff.} = P_{miscl}(h) / P_{miscl}(h_{Fisher}) = \frac{0.044706}{0.116899} = 0.382. \tag{16}$$

The index of improvement percentage concerning the probability of misclassification for the proposed approach as compared with the Fisher approach is given by

$$I_{imp.per.} = (1 - I_{rel.eff.})100\% = 61.8\%. \tag{17}$$

Remark 2. To test for Normality of the data, the Anderson-Darling goodness-of-fit test was used. The Anderson-Darling statistic (A^2) is defined as

$$A^2 = -n - \frac{1}{n} \sum_{i=1}^{n} (2i - 1)[\ln \Phi(x_{(i)}) + \ln(1 - \Phi(x_{(n-i+1)}))]. \tag{18}$$

The chosen significance level α=0.05.

4 Conclusion

Since Fisher's distance-based classification rule is the most widely used classification rule, its behaviour under non-standard situations is of great interest. Here, it is investigated via comparison with the proposed approach.

References

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Efficient approach to pattern recognition in the case of several classes based on minimization of misclassification probability

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Abstract

In practice, we often are in need of analyzing input data samples, which are not adequate for Fisher's recognition (classification) rule (i.e., we deal with non-standard situations, such that the distributions of the groups are not multivariate normal or covariance matrices of those are different or there are strong multi-nonlinearities). This paper proposes a novel approach to pattern recognition (classification) based on minimization of misclassification probability. The approach does not require the arbitrary selection of priors as in the Bayesian classifier and represents the novel pattern recognition (classification) procedure that allows one to take into account the cases, which are not adequate for Fisher's classification rule. For the cases, which are adequate for Fisher's classification rule, the proposed approach gives the results similar to that of Fisher's recognition (classification) rule. For illustration, a numerical example is given.

Keywords: Several classes, pattern recognition, misclassification, improvement percentage

1 Introduction

Discriminant analysis is a widely applied technique in multivariate data analysis. In discriminant analysis for several classes, where linear discriminant functions are used, we are concerned with finding linear combinations of variables that best separate the m classes of multivariate observations. Discriminant analysis for several classes may serve any one of various purposes. For example, when there are more than two classes, it requires more than one discriminant function to describe class separation. If the points in the p-dimensional space are projected onto a two-dimensional space represented by the first two discriminant functions, we obtain the best possible view of how the classes are separated.

Given m (>2) groups, populations, or classes, $C_1, C_2, \ldots, C_m$, the problem consists of allocating an object to one of these groups on the basis of his measurements $\mathbf{y} = (y_1, \ldots, y_p)'$ that are considered as an observation from a population described by a random vector $\mathbf{Y} = (Y_1, \ldots, Y_p)$. The allocation should be "optimal" in the sense of minimizing, on average, the number of incorrect assignments.

2 Pattern recognition in the case of several classes

Let ($\mathbf{Y}_{11}, \ldots, \mathbf{Y}_{1n_1}$), …,($\mathbf{Y}_{m1}, \ldots, \mathbf{Y}_{mn_2}$) be samples of observed vectors of objects from several different classes $C_1, C_2, \ldots, C_m$, respectively. In this case, the proposed approach to pattern recognition (classification) is as follows:

Step 1 (Transition from high dimensional problem (dimension p>2) to one dimensional problem (dimension p=1). At this step, from the beginning, transition from p-dimensional problem to g-dimensional problem is carried out by using a suitable transformation of the (p>2) multivariate observations $\mathbf{Y} = (Y_1, \ldots, Y_p)'$ to the (g<p) multivariate observations $\mathbf{Z}= Z_1, \ldots, Z_g)'$, where

$$g = \min(m-1, p). \tag{1}$$

If g≥2, transition from g-dimensional problem to one dimensional problem is carried out by using a suitable transformation of the (g≥2) multivariate observations $\mathbf{Z}= Z_1, \ldots, Z_g)'$ to univariate observations X. Then the separation threshold h_{kl}, which minimizes the probability of misclassification of input observation X for classes C_k and C_l (pairwise),

$$P_{miscl}^{(kl)} = \int_{R_{C_k}} f_{C_l}^{(k)l}(x)dx + \int_{R_{C_l}} f_{C_k}^{k(l)}(x)dx, \quad k, l \in \{1, \ldots, m\}, k<l, \tag{2}$$

is determined, where $f_{C_k}^{(kl)}(x)$ represents the probability density function of observation X from class C_k, k∈{1, …, m–1}.

Step 2 (Pattern recognition (classification)). At this step, pattern recognition (classification) of a new observation X_0 is carried out as follows:

$$X_0 \in C_k \text{ if } \begin{cases} X_0 < h_{kl}, \forall k < l, \\ X_0 > h_{lk}, \forall k > l. \end{cases} \tag{3}$$

Remark 1. The recognition (classification) rule (3) can be rewritten as follows:

$$X_0 \in C_k \text{ if } f_{C_k}^{k(l)} > f_{C_l}^{(k)l}, \forall l \neq k. \tag{4}$$

3 Example

Gerrild and Lantz [1] chemically analyzed crude-oil samples from three zones (m=3): C_1 (Wilhelm sandstone), C_2 (Sub-Mulinia sandstone), C_3 (Upper sandstone). The values of the trace elements and two measures of hydrocarbons are presented for 56 cases in Table 1.

TABLE 1 Crude-oil data

vanadium	iron	beryllium	saturated hydrocarbons	aromatic hydrocarbons
		C_1 (Wilhelm sandstone)		
3.9	51	0.2	7.06	12.19
2.7	49	0.07	7.14	12.23
2.8	36	0.3	7	11.3
3.1	45	0.08	7.2	13.01
3.5	46	0.1	7.81	12.63
3.9	43	0.07	6.25	10.42
2.7	35	0	5.11	9
		C_2 (Sub-Mulinia sandstone)		
5	47	0.07	7.06	6.1
3.4	32	0.2	5.82	4.69
1.2	12	0	5.54	3.15
8.4	17	0.07	6.31	4.55
4.2	36	0.5	9.25	4.95
4.2	35	0.5	5.69	2.22
3.9	41	0.1	5.63	2.94
3.9	36	0.07	6.19	2.27
7.3	32	0.3	8.02	12.92
4.4	46	0.07	7.54	5.76
3	30	0	5.12	10.77
		C_3 (Upper sandstone)		
6.3	13	0.5	4.24	8.27
1.7	5.6	1	5.69	4.64
7.3	24	0	4.34	2.99
7.8	18	0.5	3.92	6.09
7.8	25	0.7	5.39	6.2
7.8	26	1	5.02	2.5
9.5	17	0.05	3.52	5.71
7.7	14	0.3	4.65	8.63
11	20	0.5	4.27	8.4
8	14	0.3	4.32	7.87
8.4	18	0.2	4.38	7.98
10	18	0.1	3.06	7.67
7.3	15	0.05	3.76	6.84
9.5	22	0.3	3.98	5.02
8.4	15	0.2	5.02	10.12
8.4	17	0.2	4.42	8.25
9.5	25	0.5	4.44	5.95
7.2	22	1	4.7	3.49
4	12	0.5	5.71	6.32
6.7	52	0.5	4.8	3.2
9	27	0.3	3.69	3.3
7.8	29	1.5	6.72	5.75
4.5	41	0.5	3.33	2.27
6.2	34	0.7	7.56	6.93
5.6	20	0.5	5.07	6.7
9	17	0.2	4.39	8.33
8.4	20	0.1	3.74	3.77
9.5	19	0.5	3.72	7.37
9	20	0.5	5.97	11.17
6.2	16	0.05	4.23	4.18
7.3	20	0.5	4.39	3.5
3.6	15	0.7	7	4.82
6.2	34	0.07	4.84	2.37
7.3	22	0	4.13	2.7
4.1	29	0.7	5.78	7.76
5.4	29	0.2	4.64	2.65
5	34	0.7	4.21	6.5
6.2	27	0.3	3.97	2.97

For illustrative purposes, we consider the five variables: Y_1 = vanadium (in percent ash), Y_2= [iron (in percent ash)]$^{1/2}$, Y_3= [beryllium (in percent ash)]$^{1/2}$, Y_4=1/[saturated hydrocarbons (in percent area)], Y_5= aromatic hydrocarbons (in percent area).

Step 1. For transition from high dimensional problem (p=5) to two dimensional problem $(g = \min(m-1, p) = 2)$, the following transformations are used:

(i) The map from **Y**=(Y_1, Y_2, Y_3, Y_4, Y_5) to **Z**=(Z_1, Z_2), where

$$Z_1 = \mathbf{V}_1'(\mathbf{Y} - \overline{\mathbf{Y}}), \quad Z_2 = \mathbf{V}_2'(\mathbf{Y} - \overline{\mathbf{Y}}). \tag{5}$$

The normalized eigenvectors $\mathbf{V}_1'$ and $\mathbf{V}_2'$ are obtained by solving

$$(\mathbf{W}^{-1}\mathbf{B} - \lambda_i \mathbf{I})\mathbf{V}_i = \mathbf{0}, \quad i = 1, 2, \tag{6}$$

and scaling the results such that $\mathbf{V}_i'\mathbf{S}_{pl}\mathbf{V}_i = 1$. The positive eigenvalues λ_1 and λ_2 of $\mathbf{W}^{-1}\mathbf{B}$ satisfy

$$\left|\mathbf{W}^{-1}\mathbf{B} - \lambda \mathbf{I}\right| = 0 \tag{7}$$

and they are 4.354 and 0.559, respectively;

$$\mathbf{V}_1 = (0.312,\ -0.710,\ 2.764,\ 11.809,\ -0.235)', \tag{8}$$

$$\mathbf{V}_2 = (0.169,\ -0.245,\ -2.046,\ -24.453,\ -0.378)'; \tag{9}$$

$$\mathbf{B} = \sum_{i=1}^{m} n_i (\overline{\mathbf{X}}_i - \overline{\mathbf{X}})(\overline{\mathbf{X}}_i - \overline{\mathbf{X}})', \tag{10}$$

$$\mathbf{W} = \sum_{i=1}^{m}\sum_{j=1}^{n_i} (\mathbf{Y}_{ij} - \overline{\mathbf{Y}}_i)(\mathbf{Y}_{ij} - \overline{\mathbf{Y}}_i)' = (n_1 + n_2 + n_3 - 3)\mathbf{S}_{pl}. \tag{11}$$

(ii) The map from **Z**=(Z_1, Z_2) to X for classes C_k and C_l (pairwise), k, l$\in${1, …, m}, k<l, is $X = \mathbf{U}_{kl}'\mathbf{Z}$,

$$\mathbf{U}_{kl} = \mathbf{S}_{kl}^{-1}(\overline{\mathbf{Z}}_l - \overline{\mathbf{Z}}_k) = \left(\frac{\mathbf{S}_k}{n_k} + \frac{\mathbf{S}_l}{n_l}\right)^{-1}(\overline{\mathbf{Z}}_l - \overline{\mathbf{Z}}_k), \tag{12}$$

$$\overline{\mathbf{Z}}_k = \frac{1}{n_k}\sum_{i=1}^{n_k}\mathbf{Z}_{ki}, \quad \mathbf{S}_k = \frac{1}{n_k - 1}\sum_{i=1}^{n_k}(\mathbf{Z}_{ki} - \overline{\mathbf{Z}}_k)(\mathbf{Z}_{ki} - \overline{\mathbf{Z}}_k)', \tag{13}$$

$$\overline{\mathbf{Z}}_l = \frac{1}{n_l}\sum_{i=1}^{n_l}\mathbf{Z}_{li}, \quad \mathbf{S}_l = \frac{1}{n_l - 1}\sum_{i=1}^{n_l}(\mathbf{Z}_{li} - \overline{\mathbf{Z}}_l)(\mathbf{Z}_{li} - \overline{\mathbf{Z}}_l)'; \tag{14}$$

$$f_{C_k}^{k(l)}(x) = \frac{1}{\sqrt{2\pi}\sigma_{k(l)}}\exp\left(-\frac{(x - \mu_{k(l)})}{2\sigma_{k(l)}^2}\right), \tag{15}$$

$$f_{C_l}^{(k)l}(x) = \frac{1}{\sqrt{2\pi}\sigma_{(k)l}}\exp\left(-\frac{(x - \mu_{(k)l})}{2\sigma_{(k)l}^2}\right), \tag{16}$$

Step 2. The separation thresholds are given by

$$h_{12} = -26.717, \quad P_{miscl} = 0.0698, \quad h_{12(Fisher)} = -18.295, \quad P_{miscl} = 0.1213; \tag{17}$$

$$h_{13} = -122.809, \quad P_{miscl} = 0.000195, \quad h_{13(Fisher)} = -99.129, \quad P_{miscl} = 0.000558; \tag{18}$$

$$h_{23} = -25.966, \quad P_{miscl} = 0.075831, \quad h_{23(Fisher)} = -18.994, \quad P_{miscl} = 0.08218; \tag{19}$$

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Novel approach to dose estimation in drug development

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Abstract

Identifying the 'right' dose is one of the most critical and difficult steps in the clinical development process of any medicinal drug. Its importance cannot be understated: selecting too high a dose can result in unacceptable toxicity and associated safety problems, while choosing too low a dose leads to smaller chances of showing sufficient efficacy in confirmatory trials, thus reducing the chance of approval for the drug. The optimal dose is the dose that gives the desired effect with minimum side effects. The dose of a drug is of course 'optimal' only for a given subject, but not necessarily for any other. In view of this the objective of a dose-finding trials is not to determine a single fixed dose for use in the early phases of clinical trials or in medical practice, but to determine an interval of doses within which there is a stated degree of confidence that the defined, acceptable therapeutic response and the frequency of adverse reactions will lie above and below, respectively, certain acceptable predetermined levels. If the subject samples used in the dose finding studies adequately represent the subject population for which the drug is intended, the interval of doses so defined can be applied to the subject population as a whole. In this paper, we propose the novel approach using the maximum likelihood principle in order to estimate the maximal tolerated dose (MTD) and minimal effective dose (MED) on the basis of k samples of subjects, which are grouped in a simplest way. The necessary and sufficient conditions for the existence and uniqueness of the maximum likelihood estimator are derived.

Keywords: Drug development, dose estimation, maximum likelihood

1 Introduction

A well-established approach to search for MED and MTD is based on the construction of a dose–toxicity curve. Robbins and Monro [1] and later Wu [2] try to estimate, through stochastic approximation, the MTD as the quantile of this curve. Eichhorn and Zacks [3] studied the sequential search problem through linear regression dose–toxicity models. Although some of these methods perform quite well in small sample dose–response study simulations, their main drawback is just requiring an explicit dose–toxicity curve, often nonparametric, that could be artificial and complicated. Gasparini and Eisele [4] proposed a curve-free method: modelling the probabilities of toxicity directly as the unknown parameter of interest, a product of beta prior distributions is considered.

In this paper, the parameters of interest are the probability distribution functions of a suitable dose in drug development (from the point of view of toxicity and from the point of view of efficacy, respectively), which are determined via the maximum likelihood approach.

2 Dose estimation for randomly selected subject

Let us assume that the random variable X, which represents a suitable dose level of a drug (from the point of view of toxicity) for randomly selected subject, has a continuous cumulative distribution function $F_t(x|\theta_t)$ (probability density function $f_t(x|\theta_t)$) with unknown parameter θ_t (in general, vector). We consider k ($k \geq$ the number of components of the unknown parameter θ_t) random samples of subjects of size N_i, i=1(1)k. The N_i subjects of the ith sample are randomly assigned to the dose X_i of a drug. It is assumed that $0 < X_1 < X_2 < \ldots < X_k$. Let n_i be the number of subjects in the ith sample, for which the suitable dose of a drug is less than X_i. The problem is to estimate the unknown parameter θ_t. For this purpose, it can be used the likelihood function of the data

$$L_{toxicity}(\theta_t) = \prod_{i=1}^{k} \binom{N_i}{n_i} F_t^{n_i}(X_i|\theta_t)[1-F_t(X_i|\theta_t)]^{N_i-n_i}. \qquad (1)$$

For example, consider a situation described by a location-scale family of probability distribution functions, indexed by the vector parameter $\theta_t = (\mu_t, \sigma_t)$, where μ_t and σ_t (>0) are respectively parameters of location and scale,

$$F_t(x|\theta_t) = F\left(\frac{x-\mu_t}{\sigma_t}\right),$$

$$-\infty < x < \infty, \quad -\infty < \mu_t < \infty, \quad \sigma_t > 0. \qquad (2)$$

The likelihood equations can be written as

$$\sum_{i=1}^{k} [(N_i - n_i)h_1(v_i) - n_i h_2(v_i)] = 0, \qquad (3)$$

$$\sum_{i=1}^{k} X_i[(N_i - n_i)h_1(v_i) - n_i h_2(v_i)] = 0, \qquad (4)$$

where

$$h_1(v_i) = \frac{F'(v_i)}{1-F(v_i)}, \quad h_2(v_i) = \frac{F'(v_i)}{F(v_i)}, \quad v_i = \frac{x_i - \mu_t}{\sigma_t}. \qquad (5)$$

Theorem 1. If the functions $F'(v_i)$ and $F''(v_i)$ are continuous for all $v_i \in (-\infty, \infty)$, then the unique maximum likelihood estimate $\hat{\theta}_t = (\hat{\mu}_t, \hat{\sigma}_t)$ of $\theta_t = (\mu_t, \sigma_t)$ exists then and only then, when

$$F(v_2) > F(v_1), \quad h_1(v_2) > h_1(v_1), \quad h_2(v_2) < h_2(v_1) \qquad (6)$$

for all $v_2 > v_1$,

$$\sum_{i=1}^{k} n_i X_i \Big/ \sum_{i=1}^{k} N_i X_i > \sum_{i=1}^{k} n_i \Big/ \sum_{j=1}^{k} N_i \qquad (7)$$

and

$$X_j > X_i, \quad N_j - n_j \neq 0, \quad n_i \neq 0 \qquad (8)$$

for at least one pair (i, j), where $i, j \in \{1, 2, \ldots, k\}$ and $j \neq i$.

Proof. The proof is omitted here and will appear elsewhere.

Numerical methods can be used to find the ML estimate $\hat{\theta}_t$. Then an estimate of a safe dose (maximal tolerated dose (MTD)) d_{MTD} for randomly selected subject that will not cause some undesirable effect (e.g., toxicity, carcinogenicity) is given by

$$d_{MTD} = \arg[\Pr\{X > d_{MTD}\} = 1 - \alpha], \qquad (9)$$

where

$$\Pr\{X > d_{MTD}\} = 1 - F_t(d_{MTD} \mid \hat{\theta}_t) = \bar{F}_t(d_{MTD} \mid \hat{\theta}_t), \qquad (10)$$

α is a significance level (say, $\alpha = 0.05$).

Now, let us assume also that the random variable X represents a suitable dose level of a drug (from the point of view of efficacy) for randomly selected subject and has a cumulative distribution function $F_e(x \mid \theta_e)$ (probability density function $f_e(x \mid \theta_e)$) with unknown parameter θ_e (in general, vector). We consider k (k ≥ the number of components of the unknown parameter θ_e) random samples of subjects of size N_i, i=1(1)k. The N_i subjects of the ith sample are randomly assigned to the dose X_i of a drug. It is assumed that $0 < X_1 < X_2 < \ldots < X_k$. Let m_i be the number of subjects in the ith sample, for which the suitable dose of a drug is more than X_i. The problem is to estimate the unknown parameter θ_e . For this purpose, it can be used the likelihood function of the data

$$L_{efficacy}(\theta_e) = \prod_{i=1}^{k} \binom{N_i}{m_i} F_e^{N_i - m_i}(x_i \mid \theta_e)\,[1 - F_e(x_i \mid \theta_e)]^{m_i}. \qquad (11)$$

For example, consider a situation described by a location-scale family of probability distribution functions, indexed by the vector parameter $\theta_e = (\mu_e, \sigma_e)$, where μ_e and σ_e (>0) are respectively parameters of location and scale,

$$F_e(x \mid \theta_e) = F\left(\frac{x - \mu_e}{\sigma_e}\right),$$

$$-\infty < x < \infty, \quad -\infty < \mu_e < \infty, \quad \sigma_e > 0. \qquad (12)$$

$$\sum_{i=1}^{k} [m_i h_1(v_i) - (N_i - m_i) h_2(v_i)] = 0, \qquad (13)$$

$$\sum_{i=1}^{k} X_i [m_i h_1(v_i) - (N_i - m_i) h_2(v_i)] = 0, \qquad (14)$$

where

$$h_1(v_i) = \frac{F'(v_i)}{1 - F(v_i)}, \quad h_2(v_i) = \frac{F'(v_i)}{F(v_i)}, \quad v_i = \frac{x_i - \mu_e}{\sigma_e}. \qquad (15)$$

Theorem 2. If the functions $F'(v_i)$ and $F''(v_i)$ are continuous for all $v_i \in (-\infty, \infty)$, then the unique maximum likelihood estimate $\hat{\theta}_e = (\hat{\mu}_e, \hat{\sigma}_e)$ of $\theta_e = (\mu_e, \sigma_e)$ exists then and only then, when

$$F(v_2) > F(v_1), \quad h_1(v_2) > h(v_1), \quad h_2(v_2) < h(v_1) \qquad (16)$$

for all $v_2 > v_1$,

$$\sum_{i=1}^{k} m_i X_i \Big/ \sum_{i=1}^{k} N_i X_i < \sum_{i=1}^{k} m_i \Big/ \sum_{i=1}^{k} N_i \qquad (17)$$

and

$$X_j > X_i, \quad m_j \neq 0, \quad N_i - m_i \neq 0 \qquad (18)$$

for at least one pair (i, j), where $i, j \in \{1, 2, \ldots, k\}$ and $j \neq i$.

Proof. The proof is omitted here and will appear elsewhere.

Numerical methods can be used to find the ML estimate $\hat{\theta}_e$. Then an estimate of the minimal effective dose (MED) for randomly selected subject, which elicits a prescribed lowest therapeutic response, d_{MED} is given by

$$d_{MED} = \arg[\Pr\{X < d_{MED}\} = 1 - \alpha], \qquad (19)$$

where

$$\Pr\{X > d_{MED}\} = 1 - F_e(d_{MED} \mid \hat{\theta}_e) = \bar{F}_e(d_{MED} \mid \hat{\theta}_e). \qquad (20)$$

It is clear that upper end of the interval is the maximal tolerated dose (MTD) d_{MTD} and the lower end of the interval is the minimal effective dose (MED) d_{MED}, i.e., $d_{MED} < d_{MTD}$.

3 Conclusions

The methodology described here can be extended in several different directions to handle various problems that arise in practice. We have illustrated the proposed methodology for location-scale distributions. Applications to other distributions could follow directly.

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Mobile technologies and electronic governance

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Abstract

This paper looks at some of the problems of electronic governance in the Republic of Bulgaria. It also provides a summary of the advantages and disadvantages of providing e-services in the e-health sector. An optimized algorithm is then drawn up, upon which a model with vein code biometric identification for web-based systems is applied in the process of providing e-services in the healthcare sector. This model provides a much higher level of authenticity in data processing in comparison with the traditional customer service procedure. A comparative analysis is built upon the various criteria of mobile websites and applications, where the choice of mobile application analysis is well-founded. The major stages of mobile application development are traced and a preliminary research on their precision and convenience is carried out.

Keywords: eGovernment, e-services, Biometric identification, Mobile applications.

1 Introduction

With the essential help of the electronic governance portal the administration will receive more and faster information electronically, since it is expected that both the citizens and all organizations will be facilitated in issuing this type of information by authenticating its content with an electronic certificate.

From a technological point of view, an important aspect in the development of electronic governance is the placement of the two properties of information, authenticity and protection, on an equal footing of importance. At this stage the problem with the provision of authentic information is to a great extent solved, however, the problems of providing reliable electronic identity are still pressing.

2 Special features and flaws of providing electronic services in the e-healthcare sector

The Healthcare sector has priority over other sectors in terms of the need for providing electronic services. What is special about the sector is that its work is related to the provision of a special type of electronic services called electronic attendance services. The presence of the certificate holder and the authentication of their identity at the institution providing the service are key features for the healthcare sector.

A main disadvantage of the instantaneous way of obtainning information is the lack of certainty in the identity validation of consumers.

3 Optimized model of a web-based system for e-service provision in the healthcare sector

A new version of the base algorithm for data processing of clinical pathways is presented. The application of the optimized model aims at making the process of clinical pathway data processing more objective, by integrating a biometric identification technology. The new version marks the possibility for biometric identification to be applied as factual evidence for attendance, as well as for confirmation of the actual clinical pathway implementation.

4 Advantages of mobile applications

Despite the obvious advantages of mobile websites, applications are quite popular due some special characteristics, making the use of a single application the better option:

– Interactivity – this index makes the use a single application the more suitable choice than the website.

– Power – as applications are directly linked to the operating system, they can use its available resources.

– Personalization – if the target consumers want to personalize a given service in accordance with their preferences, the contemporary applications provide a suitable method of doing so.

– Offline maintenance – if when a specific service is needed but there is no access to the internet, the mobile website becomes unreliable, while a single application can provide offline access whatever the circumstances.

5 Stages in the development and testing of mobile applications

This section looks at the creation and usage of two mobile applications for access to the centralized system. The functionality of the first application is realized by conventional access, with a consecutive pair: "name: password", and the "M-Zdrave.apk" mobile application is used to create a virtual channel that connects a biometric sensor, working with Windows XP operating system, with the mobile device of the consumer via QR code.

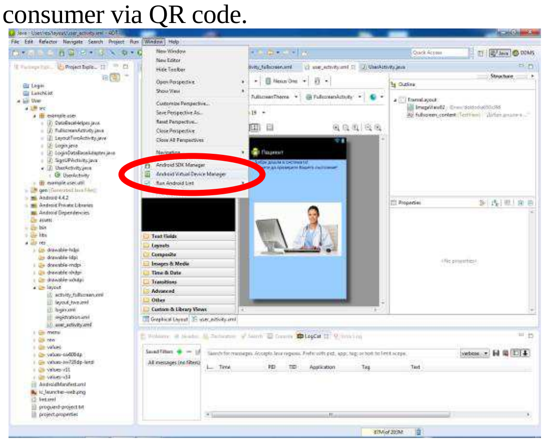

FIGURE 1 Menu for work with virtual device manager Android SDK

The applications are developed with Eclipse IDE (Integrated Development Environment) and Android SDK (Software Development Kit). Eclipse IDE is an open code programming environment [7]. Android SDK is a free-of-charge toolkit creating applications for Android mobile operating system [5]. The programming environment maintains the testing of developed applications with the help of a virtual device, simulated and adjusted in "Android Virtual Device Manager" mode (Fig. 1.).

The actual feel of comfort, applicability or difficulties on the part of the consumer when working with this application are impossible to define with the help of a virtual device, whose interface is managed from the keyboard and mouse of the computer system. What is important is the impression gained from the end result of the actual handling of the user interface by touching the screen of the device and by working with its main functional keys, rather than the choice of elements made by pointing with a mouse or using a keyboard, as is the management and user dialogue of a virtual devise.

6 Advantages and disadvantages of the identification model

The mobile applications are hereby compared so as to highlight the advantages of the identification model with M2SYS biometric reader [6]. After the testing and analysis of the precision of the personal mobile applications have been carried out, some of the main advantages and disadvantages of working with the biometric identification system for centralized database access of the e-healthcare sector and of mobile device control access have been summed up.

7 Conclusions

This paper provides a research of a model for biometric identification in the public informational system and a secondary control access from a mobile device. It traces the major stages in the development of mobile applications for a web-based system with centralized database, biometric control and mobile device access, as well as its compatibility when working and gaining access from various devices.

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A modified algorithm of digital signature

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Abstract

The paper describes the algorithm of forming digital signature scheme (DS) on the basis of nonpositional polynomial notations (NPNs). Application of NPNs can improve cryptographic strength of the cryptosystems.

Keywords: Cryptography, digital signature, nonpositional polynomial notations, cryptographic strength

1 Introduction

In the security systems of information exchange to protect data during transmission and data exchange between states the cryptographic encryption systems and digital signature (DS) are used. Due to the widespread use many aspects of the theory and practice of digital signatures with the public key in the class of RSA, ECDSA transformations currently extensively researched.

2 Overview of the study area

The basics of public-key cryptography have been nominated Whitfield Diffie, Martin Hellman and were first introduced in [1]. So the method of public-key cryptosystems has found application in the field of DS applications. In contrast to the asymmetric (public key cryptosystems) encryption algorithms, where encryption performed by using the public key and decryption - with a private, in the asymmetric digital signature scheme the signing performed by using the private key and the signature verification - using public key. The public key DS systems include three processes: the generation of the key pair for signature and verification, digital signature generation and verification of signatures.

With the appearance of new mathematical methods and a substantial increase in productivity of cryptographic systems, the question of cryptographic strength of these algorithms is appears. To improve cryptographic strength of cryptographic systems developers increase the size of the system-wide parameters for these algorithms. Therefore, an important problem is to find the cryptographic transformation that would increase the cryptographic strength of the algorithm.

Purpose of work is to develop and research the algorithms of asymmetric digital signature system based on nonpositional polynomial notations (NPNs). Synonyms of NPNs - residual number systems (RNS), polynomial RNS and modular arithmetic.

This paper considers the modified algorithm of DS scheme with the public key based on the DSA digital signature algorithm and NPNS [2-4]. Application NPNs can improve the cryptographic strength and efficiency of cryptographic algorithms and reduce the key length. Cryptographic algorithms and methods that are based on NPNs, called unconventional modular or nonpositional [3-4]. In the classical residual number systems (RNS) as base system positive integers are chosen, and the positive integer is represented by their residues by dividing by the system bases [5]. Building of RNS based on the using of "Chinese remainder theorem". According to this theorem, the representation of number as a sequence of residues is unique, if the bases are prime pairwise with each other. In contrast to the classical RNS, where the bases are the prime numbers in NPSS bases are irreducible polynomials over GF (2) [5-6].

3 Conclusions

The theoretical significance of the research is to develop a new model of asymmetric DS. As the Republic of Kazakhstan is actively integrating into the global information community, the works on the development of cryptographic protection of information are relevant. The digital signature scheme with the public key, the use of NPNs will improve the cryptographic strength of algorithm and increase the efficiency of computing in the developed algorithm. The application of NPNs allows creating effective cryptographic measures of increased reliability of the transmitted information.

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Advanced HCI through head and tongue micro motions for elderly and disabled

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Abstract

In this paper, we present the research in applying of human-computer interaction techniques to help people with some kind of disabilities (e.g. cerebral palsy or half-body paralysis) to use computers via head micro motions and tongue-based interaction. Our research includes the development and improvement of assistive technology, which was tested on specific patient-case. A brief review of current assistive technologies for severely physically impaired people and an explanation of the developed applications of such technologies are also presented. The final part of the paper describes the experimentation goals, process, and preliminary results.

Keywords: accessibility, palsy, physically disabled users, computer vision interaction, human-computer interaction, head motions, tongue motions

1 Introduction

This paper presents a research project applying computer-vision and human-computer interaction knowledge techniques, such as accessibility and usability, to help the elderly and disabled carry out specific tasks with a computer. As a first step, our main interest is focused on testing and developing new input techniques based on computer vision, and testing different interaction methods. The fundamental goal is to enable users with special needs to access computers easily.

2 Problem elaboration and possible solutions

We have two main problematic questions:

1) How to interact with the PC through head shakes and head rolls;

2) How to interact with the PC through tongue's motion.

Firstly, we will try to give an answer to the first question. Let's imagine a Z-axis with the arrow that is pointing directly to you in one direction, and towards the back of the monitor in the other direction. Kinect for Windows SDK has a great feature like HD Face. In this mode, sensor can track the eyes, eyebrows, mouth, nose, lips and other specific things related to face.

Kinect is able to calculate face's height, width, and depth. It can measure 3D-values and face feature's coordinates on various axes. Therefore, we can measure movements and rotations in connection with time. Humans twist and turn their head for various reasons (e.g. driving). They nod the head in agreement, and shake it in disagreement. Let us see the movement from a technical perspective. When a human moves his head, the head rotates around one of the following axes: X, Y, Z or in combination of these 3 axes. We can get this rotation from the point located on the head. The nose rotates around the X-axis when a person nods his head. When nodding we can get the coordinates of the nose point on the Y-axis. When a person shakes his head, the nose is rotated around the Y-axis in a small left and right manner. The nose coordinates for the head shake makes the X-coordinate values of the nose point go up and down. The next step is to get the Y, X and rotations from the head. We can get the 3D-coordinates of the human face, with the help of Kinect HD Face. We can also extract the rotational data from this with help of linear algebra and vector mathematics.

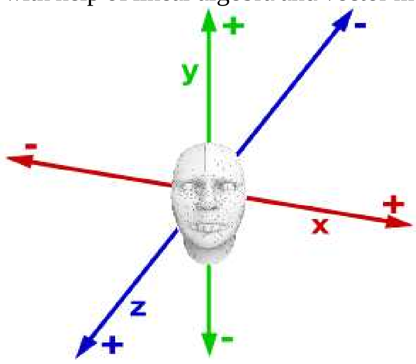

FIGURE 1 3D face in 3 axes

Moreover, we can an information about face orientation and head pivot data. The next question is how to calculate head nods, head shakes and head rolls with the Kinect sensor? Researchers from Japan [1] have derived the mathematical formula to extract the displacements of head position. The solution to the first question is based partly on this research paper. Instead of using "Between the eyes" technique, we decided to use the human nose as a basis, since the Kinect readily gives this information easily. According to Shinjiro Kawato and Jun Ohya a typical nod, shake or roll lasts about 1 to 1.4 seconds. Kinect sensor produces 30 frames per second. The human should look to the Kinect sensor as long as possible to get a good quality of final frame. Therefore, if we capture about 1-1.5 seconds of frames, we can determine head rotations, pixel coordinates (X, Y and Z), extract an angle of rotation and store this data in a state machine for each measured frame. After that, we can change states for each measured frame from "Unstable" to "Stable" and "Transient" based on the algorithms provided by Kawato and Ohya [1]. Then we use a delayed 3-7 frame buffer to evaluate a set of states for each buffered frame. Next thing we do are continue applying the algorithm described above to figure out when and how to check for head nods/shakes/rolls inside my buffered frame states. The mechanism to check is simple. If the current frame state changes from an "Unstable" state to "Stable" then we go and evaluate for nodding shaking and rolling of head. The evaluation is also simple. During the evaluation process, if the previous frame states have more than two adjacent "Unstable" states, then we check to see if all the adjacent states have nose rotation angles greater than a configurable threshold. By default, our threshold is about five degrees. Depending on which axis it is, we raise an event related to head action occurred.

Secondly, we will try to give an answer to the second question. Let us consider the input method through tongue's motions.

There are few stages to track tip of tongue:

1) Get the mouth area in the depth image by using face tracking.

2) Get the smallest depth value inside the mouth area.

3) Get the relative position according to the mouth area to know the tongue's direction.

4) Show the tracking results.

FIGURE 2 Tongue as a controller

3 Conclusions

Computer vision-based interaction is an emerging technology that is becoming more useful, effective, and affordable [2]. In our case, we put emphasis on the accessibility and usability aspects of such interaction methods to meet the special needs of people with disabilities, and specifically people with palsy.

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Application of computer graphics under natural and artificial lighting of object

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Abstract

This article describes the possibilities of computer graphics and software AutoCAD, used for graphic drawings. On the example of the rendering of the object in three-dimensional space is opened the use of AutoCAD for a wide consumer information resources. This article provides an example of a model of the 3D object with the creation of natural and artificial lighting details.

Keywords: computer graphics, 3D model, object space, AutoCAD, AutoCAD rendering, lighting.

1 General information

The main purpose of this paper is the development of spatial imagination of the students in the study of discipline "Descriptive geometry and computer graphics" computer graphics takes big role, since researchers are able to produce realistic images. Development of computer graphics is defined user needs and achievements in the field of software.

In the study of computer graphics, available for the students', perception method creates a geometric-graphic literacy, the ability to think logically, establishes the foundations of knowledge-aided design, improves ability to solve engineering problems. This knowledge makes it possible to implement further drawings and graphic model real-world objects. To achieve this goal an example of building a 3d model of the object is added.

Nowadays, there are variety of visualization algorithms. Considering the rendering process by creating a 3d model of the object. The challenge is to construct the details with the creation of a natural "sun" light and artificial light source. Figures 1, 2 shows the details of the natural "sun" light and artificial light source.

FIGURE 1 Details of natural "sun" light

To create the model with the artificial lighting is necessary to use two artificial light sources and to place them at some distance from the ground surface. Shown in figure 2. is visualization with an artificial light source.

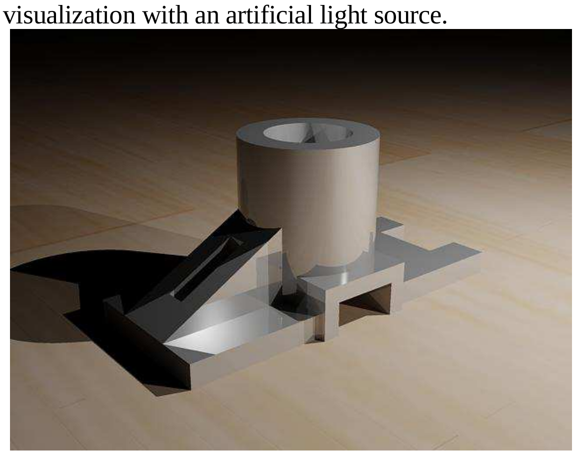

FIGURE 2 Details of artificial light sources

2 Conclusion

The construction of three-dimensional objects demonstrated the application of natural and artificial lighting. Examples reveal the whole spectrum possibilities of visualization in the program AutoCAD. AutoCAD eliminates routine and complexity of preparation of drawings, improves quality of the graphic works. Students have the opportunity for creative growth and implementation of individual projects.

Thus, we can say with confidence that today's students are experienced in modern computer technology, and know the basics of building complex geometrical forms, rules for the implementation of the drawings.

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Application of machine learning methods in medical problems

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Abstract

Machine learning methods are becoming more and more relevant and they are very widely used: business and finance, internet, biology, sociology and etc. However, this review focuses on machine learning research and its application in real-world medical problems. Considered already achieved results and possible directions for future works.

Keywords: machine learning, medicine, supervised learning algorithms, learning with large training sets, learning with many features, datasets, learning stochastic models, pattern recognition, data processing

1 Introduction

Machine learning explores algorithms that can learn from expierence. Widespread use of machine learning methods is primarily associated with a large number of directions with which they interact (for example, robotics, database, web development) and with plenty of real-world problems that can be solved by them. A review of applications for some of such problems is presented in the article [1].

This survey covers some application examples of machine learning in medicine and directions that are relevant for implementation of machine learning methods in the future. The purpose is to show the current results and future research directions. This is not complete coverage of all existing examples of using machine learning methods in medicine, but providing acquaintance with possibilities of application.

2 Overview of directions and problems

In the article [2] one of the main current research directions in machine learning is methods for scaling up supervised learning algorithms, which includes two significant topics: learning with large training sets and learning with many features. Practically every real-world problem, related to the data processing faces with one of them and even with both at once. In such cases practical application is always very individual and depends on the specific content of the problem and input data. In addition, there is always a huge space for future research. Different datasets in open access are presented for research and processing. For example, blood donation data - a subset of data from the blood donor database of the Blood Transfusion Service Center of Hsin-Chu City (Taiwan) [3]. The largest collection of such real-world and model data sets on problems of medicine and biology is contained in UCI Machine Learning Repository [4].

Also an important area of machine learning research is learning stochastic models. Studies in this field have a probabilistic base and focused on finding trends and capacity to predict the result. Common examples are classification of disease, selection of the most effective treatment, estimating a duration of a disease or a risk of complications, definition of a diagnosis by different criteria. For example, a diagnosis of diabetes with six variables: age, blood insulin level, blood glucose level, body mass and etc. [2].

Research field of pattern recognition should also be mentioned. Although the level of human abilities of recognition is still unachievable, existing methods already have working examples such as speech recognition with speech waveform or biometric recognition with face, iris, fingerprint [5]. Within medicine very promising the use of these methods can be for people with disabilities [6].

3 Conclusions

In conclusion, it is obvious that the methods of machine learning are relevant not only for current works, but also for further studies, including medicine. Each of the above directions represents wide opportunities for research and each of them already has successfully working examples.

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Application of NFC technology mobile devices for city transportation systems

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Abstract

The goal of the work is the analysis of methods and devices used for exchanging information using NFC (Near field communication) technology in mobile devices for payment system in public transport. The model of the device for payment system in public transport with NFC technology in mobile devices was realized.

Keywords: NFC technology, server side, mobile applications, payment terminal.

1 Introduction

Development of information technology has a significant impact on the economic life of society. Therefore, the introduction of contactless technology for faster commission payments is getting great importance. NFC is a high-frequency contactless technology based on radio frequency identification, intended to receive and pay for various services. One of the features of the transceiver modules NFC, designed to be embedded in mobile devices is the ability to work in three different modes: connection on a "point - point», RFID-scanner and emulate smart cards [1]. Depending on design features of the transceiver and external conditions NFC-bandwidth connections may range from 106 to 424 kbit/s. Short range interface greatly complicates the unauthorized interception of connection and data transmission [2].

Taking into account the above-mentioned advantages of this technology it is a great interest to study the methods and devices for exchanging information using technology NFC (near-contactless communication) for payment systems in public transport.

2 Overview of technologies

Realization of the project consists of 3 parts: the server side (handling and storage of personal data), mobile applications (for Android) and payment terminal (microcontroller Arduino YUN, memory card MicroSD, NFC reader). For data formats JSON and CSV were used. Four types of fare schemes were given. For analysis fare scheme using ready-balance cards was chosen. Fare scheme using ready-card balance is shown in Figure 1.

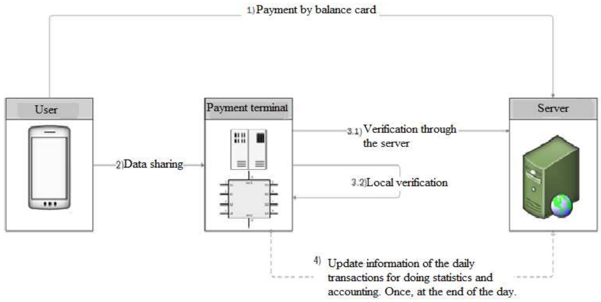

FIGURE 1 Fare scheme using ready-card balance

The use of technology and programs with open source software is an advantage that does not require separate purchase of additional software and financial licensing.

During testing, the generated test record about 10,000 and 300,000 passengers were used. According to test results, the system operates stably, all subsystems work steadily, while the data fast enough. Objectives and tasks during the preliminary complex tests were performed.

3 Conclusions

Based on these studies it can be concluded that the use of NFC technology in public transport will give certain advantages to the transport infrastructure of the Republic of Kazakhstan. When implementing a system based on NFC technology transport companies should reasonably choose a fare scheme, types and functions of payment terminal equipment, communication channels with server hardware.

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Automating the process of resetting the carrier phase of the mudflow to the downstream reach of Medeo dam

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Abstract

Analysis of catastrophic mudflow in Medeo shows several deficiency in mud dam construction. The absence of seal and other control rate characteristics of water flow release, can lead to river flooding. In addition, it became necessary to computation the time of deposition of hard mudflow phase and developing automation control system of spillway technological process. That is why the automation process of disposal carried phase to dam downstream is actual issue. The paper presents method of controlled overflow the cleaned from solid of the water phase which forecast the catastrophic mudflow via modernization spillway of Medeo mud dam.The offered approach allows protecting from flooding the social-culture Medeo constructions through optimal work of spillway that controlled using computer model of automation control and safety system.

Keywords: swirl shaft spillway, hard mudflow phase, hydro technical constructions (HTC), automation control and safety systems

1 General

Nowadays, there are several problems of Medeo dam, which can lead to distribution of spillway shaft. First, small bandwidth and “choking” the mudflow mass of underlying headwater tunnel spillway. The swirl water flow of dispose masses in spillway speed up the separation phase process. For swirl shaft spillway the hard phase in the form of sand and small stones deviate to concrete surface of spillway by influence of centrifugal forces. It can lead to quickly abrasion of concrete embedding and change of its geometrical parameters.

The process of mudslide in Medeo mountain area cannot be full-scale modelling. Therefore, most relevant is computer modelling with using mathematical tool of computational fluid dynamics of multiphase medium, also using 3D graphical simulation modeling methods [1]. Theoretical analysis of complex hydraulic processes in entrance channel, swirl circular spillway, cushion pool and discharge tunnel are need plotting theoretical models of moving heterogeneous mixture of multiphase medium mechanical science [2].

The purpose of this research is improve the level of controllability of hydro technical constructions (HTC) and spillway work optimization for safety water release of surface water of mudflow storage reservoir on down tail water dam.

This goal is achieve through development technology of safety clarified surface water overflow and automated control system of HTC with settle seals and appropriate sensors.

For carry out the control process manual mode of surface water release of mudflow storage reservoir developed hybrid control technological process scheme. It based on remote video monitoring of mudflow storage reservoir and inclined drop in downstream water. Using the SCADA-system helps engineer the hierarchy of control objects for developed automated control system of technological process named “Spillway” [3, 4].

2 Conclusion

So, the heterogeneous mudflow mass moving in Medeo dam spillway is a complex moving of multiphase medium, which consist from water, stones, clay, rocky soil and etc. Using the effective viscosity by Boussinesq coefficient allows reduce problem of moving mudflow to simplified Navier-Stokes equations. In this case, the concentration of hard phase where viscosity of carried phase considered on 10-30 percentage upper water viscosity.

It allows take into account the influence of hard phase to changing of waterflow in spillway shaft. Severe abrasion wear of shaft concrete surface related with presence in carried medium the split granite, stones, gravel and sand. All of this can lean to divergence geometrical parameters of HTC and initiation some of risks for spillway.

The proposed method of surface water release via Medeo dam spillway, allows continuous increasing the escape water quantity mass up 3-5m3/s. This will provide secure mode of surface water release of mudflow that stopped in mudflow storage reservoir for 3-4 days after mudflow avalanching.

Conducted research change the conceptual approach to Medeo dam spillway work. This requires regulated metal settle seals and updating existing guidance materials by exploitation intake portals of Medeo dam spillways.

The use of automated control system with regulated seals and appropriate sensor during surface water seals of carried medium of Medeo mudflow storage reservoir, allow increase security of Medeo dam and keep unique nature boundary.

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Comparative quality estimation of recognition algorithms

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Abstract

In this research were defined the best recognition algorithm, with aim to train system to recognize particular rocks. The data applied in the research was got from Inkai uranium deposits, Kazakhstan. The system was trained on 4 and on 8 boreholes using three machine learning algorithms: Neural Network, k-NN and Decision Tree. Learning algorithms were tested on 1 borehole. Using predicted data, we chose indicators to define the quality of recognition. This research may direct future research on machine learning, what could lead to replacement of experts by machines.

Keywords: machine learning, k-NN, Neural Network, Decision Tree, training, testing, recognition, logging data, borehole.

1 Introduction

This research was done with aim to define the best learning algorithm of machine learning, by estimation of the quality recognition and classification.

In this research was analyzed different machine learning algorithms by applying them into logging data from Inkai uranium deposits.

In section Methods of the research we describe how the experiment was done, used software and its operators. Discussion of the results part contains collected data and description of results. In Conclusion we define most promising algorithm of machine learning.

As the hypothesis we subjectively selected the Neural Net as best learning algorithm.

2 Methods of the research

Machine Learning - is a subsection of artificial intelligence, which studies methods for building models that can be taught, and algorithms for their construction and training. There are two types of training. Training on precedents and inductive training, based on identifying patterns in empirical data. Deductive learning involves the formalization of expert knowledge and transfers them to your computer in the form of a knowledge base. Deductive learning can be carried to domains of expert systems, therefore [1]. In this work was used deductive learning.

Data mining process was done on RapidMiner 5.3 application, applying its operators: Neural Network, k-Nearest Neighbors (k-NN), Decision Tree, Performance (for Classification purposes) and Apply model (for testing purposes).

Since, our aim is to find the best recognition algorithm, the system was trained on existing borehole's data, from uranium deposits **Inkai** and then tested its recognition ability on other boreholes, which were not used in training.

For training process, we applied machine learning algorithms: Neural Network, k-NN and Decision Tree.

Neural Network operator has parameters like hidden layers and number of neurons in each layer. Its values were changed from default values to 2 and 10, respectively, for training the system better.

K-NN operator's value of k was changed to 150, because that number of neighbors could be recognized more properly.

In Decision Tree algorithm all parameters left without any changes, by default.

Firstly, the system was checked how particular algorithm works. For training purpose was chosen 4 boreholes, and 1 for test. Boreholes for testing were replaced 5 times. Then we incremented amount of training boreholes by 4. The amount of testing boreholes was the same - 1. We just replaced them each time. Replacement operation was needed to get required error indicators and to calculate correlation properly.

Indicators which are calculated in the experiment: kappa, accuracy, Pr(expected), weighted mean recall, weighted mean precision, correlation.

Kappa – prediction of accuracy, which recognizes the correct prediction made at random.

Accuracy - relative number of correctly classified examples or in other words percentage of correct predictions [2, 3].

Pr(e) – hypothetical probability of accurate prediction done randomly [2, 3].

Weighted mean recall - the weighted mean of all per class recall measurements. It is calculated through class recalls for individual classes [2].

Weighted mean precision - the weighted mean of all per class precision measurements. It is calculated through class precisions for individual classes [2].

Correlation refers to any of a broad class of statistical relationships, in our case dependence of two indicators.

Data of each borehole was represented in 2 methods: pointwise and moving-point method.

In pointwise method, we get data for each 10 sm. We have approximately 750-1100 points in each borehole, which have values of КС (apparent resistance), ПС (spontaneous polarization potentials) and lithological type code. In our experiment we used third value as label type of attribute to train the system.

In moving-point method, the size of interval depends on the nature of the distribution and processing of geological features usually involves 3-5 nearby points of observation. In our experiment, we used 5 nearby points above and 5 points below, 11 points in one interval. It means we have in every interval 110 sm of borehole data, i.e. 11 points of КС values, 11 points of ПС values and lithological type code.

3 Discussion of methods

3.1 POINTWISE METHOD

Using pointwise method, the system was trained to classify the objects in the borehole correctly. From the results we got:

TABLE 1 Average value of each quality indicator derived from training on Neural Net algorithm

Number of training boreholes	kappa	Accu-racy	Pr(e)	Weighted mean recall	Weighted mean precision
4	0.370	0.573	0.360	0.319	0.304
8	0.285	0.466	0.255	0.245	0.223

TABLE 2 Average value of each quality indicator derived from training on k-NN algorithm

Number of training boreholes	kappa	Accu-racy	Pr(e)	Weighted mean recall	Weighted mean precision
4	0.315	0.533	0.323	0.327	0.339
8	0.286	0.581	0.364	0.323	0.357

TABLE 3 Average value of each quality indicator derived from training on Decision Tree algorithm

Number of training boreholes	kappa	Accu-racy	Pr(e)	Weighted mean recall	Weighted mean precision
4	0	0.370	0.369	0.175	0.059
8	0	0.370	0.369	0.175	0.059

As seen from results, average kappa for Neural Net and k-NN are quite same, and show results more than 0. In comparison with Decision Tree training operator, which shows kappa = 0 in all cases, and previous experiments, where kappa = 0 or kappa < 0, the values which we got from Neural Net and k-NN, allow us to suggest that, classification procedure passed relatively successfully. The difference between Neural Net and k-NN also is in time of processing, k-NN is much faster.

The correlation matrix, which we used in order to calculate how attributes affect each other showed, that:

TABLE 4 Correlation matrix between quality indicators derived from training on Neural Net algorithm on 4 boreholes

Correlation	kappa	Accu-racy	Pr(e)	WMR	WMP
kappa	1.0	0.986	0.518	0.517	0.669
Accuracy	0.986	1.0	0.570	0.464	0.627
Pr(e)	0.518	0.570	1.0	0.440	0.530
WMR	0.517	0.464	0.440	1.0	0.596
WMP	0.669	0.627	0.530	0.596	1.0

TABLE 5 Correlation matrix between quality indicators derived from training on k-NN algorithm on 4 boreholes

Correlation	kappa	Accu-racy	Pr(e)	WMR	WMP
kappa	1.0	0.981	0.729	0.515	-0.142
Accuracy	0.981	1.0	0.842	0.413	-0.301
Pr(e)	0.729	0.842	1.0	-0.006	-0.649
WMR	0.515	0.413	-0.006	1.0	0.585
WMP	-0.142	-0.301	-0.649	0.585	1.0

3.2 MOVING-POINT METHOD

These are results derived from classification of 3 algorithms applied on moving-point method, i.e. on divided into intervals data.

TABLE 6 Average value of each quality indicator derived from training on Neural Net algorithm

Number of training boreholes	kappa	Accu-racy	Pr(e)	Weighted mean recall	Weighted mean precision
4	-0.540	0.484	0.186	0.166	0.130
8	-0.029	0.467	0.037	0.165	0.136

TABLE 7 Correlation matrix between quality indicators derived from training on Neural Net algorithm on 4 boreholes

Correlation	kappa	Accu-racy	Pr(e)	WMR	WMP
kappa	1,000	0,621	0,574	0,651	0,348
Accuracy	0,621	1,000	0,050	0,997	0,522
Pr(e)	0,574	0,050	1,000	0,070	0,117
WMR	0,651	0,997	0,070	1,000	0,569
WMP	0,348	0,522	0,117	0,569	1,000

TABLE 8 Correlation matrix between quality indicators derived from training on Neural Net algorithm on 8 boreholes

Correlation	kappa	Accu-racy	Pr(e)	WMR	WMP
kappa	1,000	0,450	0,650	0,549	0,585
Accuracy	0,450	1,000	0,186	0,976	0,441
Pr(e)	0,650	0,186	1,000	0,311	0,870
WMR	0,549	0,976	0,311	1,000	0,576
WMP	0,585	0,441	0,870	0,576	1,000

TABLE 9 Average value of each quality indicator derived from training on k-NN algorithm

Number of training boreholes	kappa	Accu-racy	Pr(e)	Weighted mean recall	Weighted mean precision
4	0.022	0.452	0.059	0.175	0.154
8	0.016	0.461	0.194	0.169	0.176

TABLE 10 Average value of each quality indicator derived from training on Decision Tree algorithm

Number of training boreholes	kappa	Accu-racy	Pr(e)	Weighted mean recall	Weighted mean precision
4	0.005	0.500	0.806	0.168	0.136
8	0	0.503	0.503	0.167	0.084

As we can see from TABLE 6, the kappa values even negative values. This is a sign, that the two observers, expert and the system, agreed less than would be expected just by chance. The same we can say for TABLE 10, its kappa values are almost 0, which is also bad sign, despite high values of accuracy. K-NN algorithm has better results.

From the results above we can conclude that k-NN algorithm is better algorithm for using it on logging data divided into intervals, than 2 others.

Also there given correlation matrices for quality indicators. The correlation coefficient between kappa and WMR is almost 1, which means they are closely interconnected, they influence to each other. But indicators kappa and P(e) have lowest correlation coefficient, they cannot influence to each other's values. Other indicators have average level of interconnection.

5 Conclusions

In general, Neural Network recognized better in pointwise method. Its accuracy higher for 9%, when training on 4 boreholes in pointwise method, but it has the same values of accuracy when training on 8 boreholes in two interpretations of logging data. Despite high values of accuracy, kappa coefficient shows huge difference as shown in tables 1 and 4. This algorithm suitable to use in pointwise interpreted data.

K-NN algorithm's accuracy is bigger for 8-12%, what means that it recognized better in pointwise interpretation. Its kappa coefficients are better than in other algorithms, in both cases.

Decision Tree show worst results among others. This algorithm is not suitable to use for logging data.

From these suggestions, we can conclude that k-NN algorithm is the most appropriate algorithm to use for logging data. It could be used for divided data by points and by intervals. This algorithm shows best results in quality recognition.

Acknowledgement

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Computing with words for user-specific fuzzy retrievals

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Abstract

The aim of this paper is to demonstrate the necessity of using fuzzy sets and logic in the user-specific fuzzy retrievals processing. User-specific retrievals are widely used in plenty of web-applications such us online shops, search engines and others. Most of the user-specific retrievals now is realized by searching in limited conditions. This leads to lose of some portion of relevant results that was close but not in certain constraints. Also often users are not prepared or do not have precise requirements and need some tool to make request with blurred conditions. Fuzzy classification can be very appropriate in this case, because it is more likely to the way in which people think and form their thoughts. One of the advantages of discussing method is that it is compatible with relational databases. We illustrate proposed method on the example of appartment searching system. Opportunity to send a query to the system in a natural language, like show the list of not very expensive average size apartments near or not very far from the center, is a most significant benefit of using this approach and cannot be done by standard mechanisms.

Keywords: user-specific retrievals, fuzzy sets, fuzzy logic, fuzzy mathematics, natural query, computing with words

1 Introduction

From the very beginning computers were created and constantly improved with the goal to automate computations made by human and do it faster. Modern computers nowadays are able to do almost everything about processing and computations. However, in spite of all these achievements computers still cannot do some difficult conclusions and mental decisions that people do. It can be explained by the fact that human can manipulate with wide range of factors and make decisions based not only on them but also on his experience and feelings. Thus, we can say that humans perceive, while computers measure (compute). Now we should distinct perceptions and measurements – the former are imprecise (fuzzy), whereas the latter are crisp [1].

Regarding to user-specific fuzzy retrievals, they represent queries formed in natural language by using main rules of fuzzy logic. Examples are cheap, not expensive, more-or-less cheap, expensive and very expensive. In this situation fuzzy sets and logic becomes very useful, because it can operate with linguistic variables.

2 Methodology

2.1 FUZZY APPROACH (COMPUTING WITH WORDS)

Fuzzy logic operates with linguistic variables, "variables whose values are not numbers but words or sentences in a natural or artificial language" according to Zadeh. For example, Cost is a linguistic variable if its values are linguistic (not very low, average, more-or-less high).

Computing with words (CW) is the approach propsed by Zadeh, uses words as variables and fuzzy constraints on them (Fig.1). CW is a necessity when the available information is too imprecise to justify the use of numbers, and when there is a tolerance for imprecision which can be exploited to achieve tractability, robustness, low solution cost, and better rapport with reality [2].

We use the following formulas from fuzzy sets and logic theory [1]:

$$\mu A \cap \mu B(x) = \min[\mu A(x), \mu B(x)]$$

$$\mu A(x) \cup \mu B(x) = \max[\mu A(x), \mu B(x)]$$

The threshold used in the system serves as the α-cut (Alpha cut), which is a crisp set that includes all the members of the given fuzzy subset f whose values are not less than α for 0< α ≤ 1:

$$f_\alpha = \{x : \mu_f(x) \geq \alpha\}$$

$$(A \cup B)_\alpha = A_\alpha \cup B_\alpha,\ (A \cap B)_\alpha = A_\alpha \cap B_\alpha$$

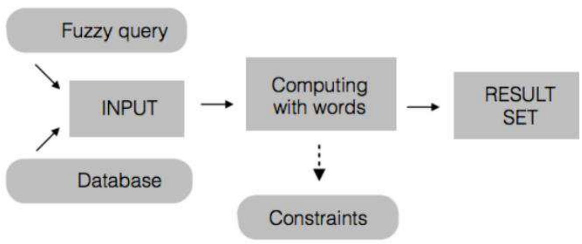

FIGURE 1 CW approach to user-specific queries

2.2 SYSTEM DESCRIPTION

First, let us select the apartments' features that we will use as explanatory variables. So, let us suppose we have a table "Apartments", consisting of 4 columns: id (primary key), cost, number of rooms and location.

TABLE 1 Structure of the sample table for the system

Field	Type	Fuzzy
id	int	
cost	Int	+
Number of rooms	Int	
location	varchar	+

The last step is to build certain membership functions belonging to each linguistic term – fuzzy set. Here the membership functions for the cheap, average cost, and expensive fuzzy sets with the following parameters [a,b,c] = [60 000,130 000, 180 000] for apartments with 1 room.

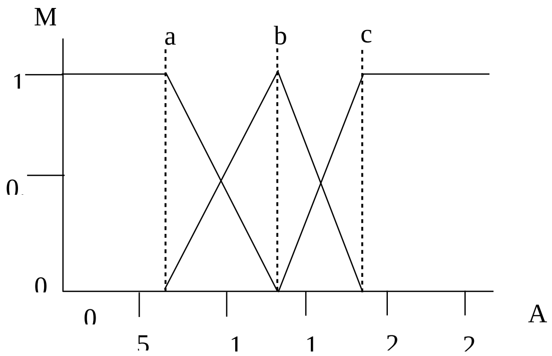

FIGURE 2 Fuzzy sets for cheap, average and expensive

«Cheap» =	**1**, $x \le a$
	1 - (x-a)/(b-a), $a \le x \le b$
	0, otherwise
«Average» =	**1 - (b-x)/(b-a)**, $a \le x \le b$
	1 - (x-b)/(c-b), $b \le x \le c$
	0, otherwise
«Expensive» =	**0**, $x \le b$
	1 - (c-x)/(c-b), $b \le x \le c$
	0, otherwise

FIGURE 3 Membership functions for young, middle- aged, and old

3 Examples

Example query 1. not very expensive apartments with small size near to center. [Threshold value: 0.5]

Here we have two fuzzy criteria – cost is not expensive and size is small. So, we have:

EXPENSIVE[Cost; not; very; μ_{Total} = 0.5] ∩ SMALL[Number of rooms;; μ_{Total} =0.5] ∩ = EXPENSIVE[Cost; very; μ_{Total} =1-0.5] ∩ SMALL[Number of rooms;; μ_{Total} =0.5] = EXPENSIVE[Cost;; μ_{Total} =0.7] ∩ SMALL[Number of rooms;; μ_{Total} =0.5]

Next our system finds the values of cost, size and location that satisfies to the given conditions. For the cost, the constraining relation will be " ≤ 180 000 ", for the rum number - " ≥1, ≤2".

So, 2 apartments found and system gives us following result:

id	cost	rooms	location
14	140 000	2	2 km from the center
73	125 000	1	3 km from the center

4 Conclusion

The main goal of the paper was to demonstrate the usefulness of fuzzy approach in natural query processing. In essense, it allows us to form queries in natural language, which is impossible using a standard query mechanism, thus simplifying the life for users.

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Data decomposition for formation aggregational values of hypercube in multiprocessor parallel computation systems

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Abstract

In this paper possibillites of aggregational values calculation is considered. Aggregational values are the main element of multidimensional operative analytical processing. The main reason of using parallel computation systems in data processing is to increase productivity level. Although, parallel computation systems cannot be used in processing all data types. Data processing algorithms and processing data should be gradually adapted to parallel computation systems' usage. In this regard, data decomposition for formation aggregational values in parallel computation systems in data operative analyzing is considered in this paper. In order to identify dependence between data during the process of decomposition Bernstein's conditions are used. At the same time implemented course calculation of n-dimension from 1-dimension and parallel computation of course interactions will also be considered.

Keywords: OLAP, multidimensional hypercube, aggregational values, parallel computation, decomposition

1 Introduction

Intensive development of information technologies and their wide range usage in all production spheres requires effective processing of large amounts of information. Accordingly, in order to increase productivity of large amounts of information processing effective multiprocessor parallel computation systems are suggested. Effective usage of high-performance parallel calculation systems requires to solve several important tasks. One of them is to make proved parallel algorithms and data that is being processed by parallel computation system.

Nowadays, one of the main branches of information technologies that requires processing large quantities of data with the help of high productive calculation system is operative data analyzing processing. OLAP (On-Line Analytical Processing) is created for operative data analyzing processing implementation. This technology organizes analytical data in the form of multidimensional hypercube and provide the user with required data in the form of hypercube lays. Opportunities of parallel calculation system which is used in operative data analyzing processing given by OLAP are shown in works [1-3]. Although, these works basically show decomposition run by calculation functions. In data parallel computation processing decomposition by calculation functions has to be performed as well as decomposition by data.

Aim of the given work is to perform data decomposition in order to form aggregational values, which are the main elements of large amounts of data operative analytical processing in high productive multiproseccor parallel computation system.

2 Decomposition of aggregational values computing operators by data

Aggregational values general summing - sum (sum), average value (avg), minimal value (min), maximum value (max) and etc. are considered. Summing values calculation algorithm and operations given in the source [5] are widely used in this work. Atomic group division of groups of values used independently in summing algorithm and operations performed independently are algorithmic decomposition. Each of the atomic group consists of the values and operation groups, which cannot be separately used and which are considered as internal groups depend upon each other. Interdependence between values and operations groups in atomic groups has to be identified in order to divide them.

Solution of any task consists of sequence of activities and group of actions. Any sequence of action may be divided into atomic group of actions. If activities require parallel performance, each atomic group will be performed separately in several performer in the same time. In that very case they are used two performers (processors) in calculation system. If outgoing data in parallel calculation is brought from the incoming data with the same performance at any moment, activities group will be considered as determinant. In opposite way, if similar outgoing data is brought from different incoming data at any moment in parallel computation activities, group will be considered as indeterminate. If activities groups are determinate, we can use parallel performance. Therefore, in order to identify whether activities are determinate or not Bernstein's conditions should be used.

S_1 , S_2 , S_3 ,..., S_n , S_{11} , S_{12} , S_{13} ,..., S_{1k_n} , ..., $S_{k_n-1k_n}$,..., $S_{all_{111..1}}$, $S_{all_{111..2}}$, $S_{all_{111..3}}$,..., $S_{all_{k_1k_2k_3...k_n}}$ - hypercube aggregational values calculation operators. If operators have similar indexes and volume (size) they can be dynamically performed by interchanging. See calculation operators' summing [5]:

$$S_1 = \sum_{i=1}^{j_1} x_i[1] \ , \ S_2 = \sum_{i=1}^{j_2} x_i[2] \ , \ S_3 = \sum_{i=1}^{j_3} x_i[3] \ , ...,$$

$$S_n = \sum_{i=1}^{j_n} x_i[n] \ ,..., \ S_{11} = \sum_{i=1}^{j_{11}} x_i[1][1] \ , \ S_{12} = \sum_{i=1}^{j_{12}} x_i[1][2] \ ,$$

$$S_{13} = \sum_{i=1}^{j_{13}} x_i[1][3] \quad ,..., \quad S_{k_1k_2} = \sum_{i=1}^{j_{k_1k_2}} x_i[k_1][k_2] \quad , \quad ...,$$

$$S_{k_n-1k_n} = \sum_{i=1}^{j_{k_n-1k_n}} x_i[k_n-1][k_n] \ ,..., \ S_{all_{111...1}} = \sum_{i=1}^{j_{111...1}} x_i[1][1][1]...[1] \ ,$$

$$S_{all_{111..2}} = \sum_{i=1}^{j_{111..2}} x_i[1][1][1]\ldots[2] \ ,$$

$$S_{all_{111...3}} = \sum_{i=1}^{j_{111...3}} x_i[1][1][1]...[3] \ ,...,$$

$$S_{all_{k_1k_2k_3...k_n}} = \sum_{i=1}^{j_{k_1k_2k_3...k_n}} x_i[k_1][k_2][k_3]...[k_n] \ .$$

Lower indexes of operators' summing give aggregational values size from 1 to n dimension. Dimensions are equal to dimensions, which are used in the lays. Incoming and outgoing data interceptor of value calculation operators might be identified by Bernstein's conditions. Bernstein's conditions would be formed through value calculation operators.

Bernstein's conditions disturbing consequences will be revised for dynamically alternate performed atomic activities group set in hypercube possible aggregational values calculation after Bernstein's conditions formulation. Output dependence, flow dependence and antidependence cases will be identified through each of disturbing case. Parallel possibility agregational values calculation operators identified in any case of dependence would be tested. In addition, dependence distance between one dimensional course, which used in hypercube agregational calculation and embedded complex n – dimensional course would also be determinated. Data decomposition would be completed when dependence conditions of hypercube aggregational values calculation operators are over. When decomposition ends algorithm will introduce groups consisted of operations (activities), which are performed by several processors. Group operations brought via decomposition might be performed independently through certain processor.

3 Conclusions

In this paper, data decomposition formulation for aggregational values in high-performance parallel computing systems is suggested. Aggregational values are based on data operative analytical analyzing. When decomposition ends algorithm will introduce groups consisted of operations (activities), which are performed by several processors. Group operations brought via decomposition might be performed independently through certain processor. Different operations might be held in each of the group and they can be performed by different user. Parallel performance of implemented courses iteration, which is used in program performance of multidimensional data processing is also considered.

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Developing automated workstation “Spillways” for Medeo dam

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Abstract

Creation Automated Workstation such hydro technical constructions as mud Medeo dam, which allows do monitoring the “online” status of basic dam parameters and take necessary steps of population protection of Almaty town by emergency situations. The paper considers the developing application program packages for solving theoretical tasks of swirl shift spillways. There are basic requirements of application program package “Spillways”. In addition, there is shows the scheme of program module interaction of Automated Workstation “Spillways”.

There is give an example of determination kinematic characteristics of spiral motion of true fluid and program module specifications, which based on Bessel function value measurements. There is determine the influence of twisting parameter on axis component of velocity classification. The calculation of this parameter is important for determination the limited speed of safety flow, which should be less than 4m/s. Otherwise, wall distraction of discharge tunnel spillway is possible. This program module is important component of automated system and admonishment of emergency situations of shift spillway Medeo dam. Similar software modules in work with regulated metal seals intake portals of spillway allows provide safety social-culture constructions in Medeo, when admonishment of catastrophic mudflow.

Keywords: Automated Workstation (AWS), shift spillway, application programs package, mudflow storage reservoir

1 General

One of the actual tasks of modern technical hydrodynamics is to create innovative software calculation products and control parameters in the swirl shaft spillways, which used in Medeo dam. Automated workstation (AWS) "Spillways" is a multi-file system of software modules, which consist of a set of ring and tree-type data structures, and roots of which can be located on this ring [1, 2].

In the design of the application programs package (APP) were taken source requirements, such as technical specifications, image data parameters, effectiveness of the use of technical resources (choice of color, text layout), design of technical tasks, scripts, user guides and others.

Performance specification of the APP describes the structural components of software process, principles of input and output data organization. This information about exchange information types between machine and user, working pattern description, complexity of tasks, and others. It also describes ways to save, store, and use of getting results.

In this scientific work done with creating (AWS) «Spillways» following:

- Main swirl shaft parameters determination by using spreadsheets;
- Storage, computing and use of graphic images of swirl shaft spillways elements with graphic program using;
- Storage, processing, archiving and use of textual information with design principles description, calculation and their use in practicing;
- Graphical elaboration of text information with programs, calculation methods, recommended practices and tutorials
- Paperless technology of research works with future preparation of results to scientific publication;
- using object-oriented programming language Flow Vision, that allows to visualize 3D version of swirl flow and toe basin of Medeo dam spillway.
- using MySQL database system for controlling SCADA-systems data [3-5].

For the purpose of rationalize the style of presentation programs and their readability, as the main high-level programming languages are taken structured object-oriented programming Delphi 7 and C ++. Except them, there are used programs such as the widespread use of comments and mnemonics variables that achieve greater clarity and readability of programs.

To carry out manual mode of control the process of surface water spillway developed hybrid technological process control scheme. It is based on remote video from mudflow storage reservoir and downstream reach of the dam. With help of SCADA-system is designed scheme of interaction, program modules AWS "Spillways".

2 Conclusion

So, there are determine input requirements for creating AWS “Spillways”. Ring-type data structures of AWS programming modules multi-phase system are whole software program. They have common roots of tree-type data structures, such as "a model of true fluid - Poisson equation", "the boundary conditions for a cylindrical tube", "boundary conditions for the vortex formation case" etc.

There is developed scheme of interaction, AWS “Spilways” program modules. Also there are provides detailed steps of creating a software of mathematical models of true fluid motion. In the result, data allow to provide important practical conclusions concerning the water stream and methods of controlling the boundary layer of swirling flow.

Automated workstation using in control system of Medeo dam spillway, allows increase safety of dam.

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Development of a system for the improvement of the efficiency of distribution and retail interaction

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Abstract

The main idea of this article is to develop a system for the improvement the efficiency of distribution and retail interaction. Basic theoretical and practical information for structuring and presentation were obtained. The system was developed and based on the basis of Microsoft Framework ASP.NET. The programming language C # (C Sharp) was used.

Keywords: retail interaction, Microsoft Framework ASP.NET, C# (C Sharp)

1 General

Today, all outlets are in need of a system that controls the trade [1, 2]. The aim is to develop a system to improve the efficiency of interaction between distribution and retail through automation and provide the following benefits to participants in the process:

RETAIL
- Increasing the profitability of the outlet and reducing fault;
- Reduction of working capital;
- Acceleration cycle, "the need for the product - delivery";
- Automation of the procurement process;
- Saving time pharmacists;
- Support for scalable business.

DISTRIBUTOR
- Increase sales;
- Formation of a "descending";
- Automation of the sales process;
- Saving time pharmacists.

FIGURE 1 Structure of Relationships between distributor and retail

THE SYSTEM:
- centralized, all the data is in a central location;
- has a multi-tier architecture having multiple levels: first - data sources (accounting system at the point of sale), the second - the repository (DB MS SQL), the third - User interface (UI).

The System is proposed to allocate the following functional subsystems:
- Control Service (CS) - a coordinating role subsystems;
- Access Point Service (APS) - Service interactions with external sources protocol SOAP;
- Planning Service (PS) - pre-treatment and analysis of data;
- Export Service (ES) - clearance and shipping orders;
- Email Notification Service (NS) - to send notification to users;
- Web UI system operators and customers;
- Administrator Console;
- Logging Service (LS) - logging of system events (user actions, events, services, errors, etc.).

2 Conclusions

In a result of the work, the system is designed and developed on the basis of the Framework ASP.NET. The system satisfies all the modern requirements stated to the applications of such type. It has simple but efficient design, user-friendly interface, and ability to implement the large number of complex processes.

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Development of qsar methods based on artificial intelligence approaches

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Abstract

New methods of analysis of biological activity of the substance on its structure dependence with the use of modern computer technologies have been actively developing lately. Therefore, the development of new nonconventional approaches which would consider all factors influencing on the properties of new medicines, including the influence on a human body and safety is extremely actual. The artificial intelligence approaches such as neural networks, genetic algorithms, artificial immune systems, evolutionary algorithms, etc. have been widely adopted.

Keywords: Quantitative Structure-Activity-Relationships, artificial intelligence, computer molecular design

1 Introduction

The QSAR method (Quantitative Structure-Activity-Relationships) is now the most intensively developing computing approach for studying of the interrelation "structure – activity (property)". It is widely applied for the search and design of new medicines with the set properties.

The active research in this area is conducted all over the world. Paper [1] is devoted to QSAR model to reduce the volume of data and to increase the prediction ability, without eliminating any of the descriptors. In paper [2] the concept of applicability domain is described, which is one of the most important aspects that determine the quality and reliability of the quantitative structure–activity relationship (QSAR) models. Work [3] presents a GPU-accelerated OpenCL implementation of a back-propagation artificial neural network for the creation of QSAR models for drug discovery and virtual high-throughput screening.

The statement of the problem definition is the development of the intellectual technology, computing algorithms and software for computer molecular design of medicines with in-advance-set properties with use of the artificial intelligence approaches [4].

2 Conclusions

Studying of the interrelation "structure – activity (property)" of drug compounds, the development of new nonconventional intellectual approaches, computing algorithms and software is one of the actual problems.

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Development of the electronic textbook of new generation

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Abstract

The development of the electronic textbook of new generation on the "Physics" discipline is introduced. Basic theoretical and practical information for types, program interface and functionalities are shown. The system was developed and based on IntelliJ IDEA. The Adobe Photoshop and Autodesk 3ds Max were used.

Keywords: electronic textbook, IntelliJ IDEA, Adobe Photoshop, Autodesk 3ds Max

1 General

Today, the most wide application in education sphere was gained by such computer training products as electronic textbooks [1]. They promote the most efficient perception of a training material by students [2].

The electronic (digital) textbook is an interactive set of training materials and tools access to which can be got via the portable computer, the tablet computer or other modern device [3].

Basic types of electronic textbooks are:

- textbook in form of electronic book;
- hybrid electronic textbook;
- standard interactive multimedia electronic textbook;
- hi-tech interactive multimedia electronic textbook
- The functions that electronic textbooks must have:
- to carry out all functions inherent in the paper textbook;
- to provide the wide opportunities of computer visualization of educational information;
- to form a basis of creation of the fissile and active cognitive environment;
- to carry out the function of the navigator on electronic materials UMC
- to support the possibility of realization of individual educational ways by student
- to provide comfortable, intuitively understandable conditions to student for interaction with educational content.

The structure of the electronic textbook usually consists of an original material, padding material, explanatory texts, the tool of the organization of assimilation and the navigation device.

At the International University of Informational Technologies on CSSE department the works on development of the computer training products are conducted. One of examples is development of the electronic textbook on discipline of "Physics". This electronic textbook conforms to all requirements imposed to such software products.

The interface of the program is developed with the maximal convenience to work with the user. Material of the textbook is provided in a look, convenient for comprehension, namely in the form of the list of subjects. Besides, in the project there is a Glossary, which allows facilitating comprehension of material by viewing of the terms and definitions, which are found in lectures interesting you. Also there are laboratory works, for fixing of theoretical material. Also, function of online consultation with the teacher which will give to the student the widely explained answer on the asked question is provided in the program. All subjects presented in this electronic textbook are accompanied by video lessons.

The main functional of the program is written in the Java language with use of the environment of development of IntelliJ IDEA. Also such software as Adobe Photoshop and Autodesk 3ds Max were applied to development of a photo and animation material for the developing electronic textbook.

2 Conclusions

The current trends of computer technologies of tutoring allow to draw a conclusion that today and in the future the value of use of multimedia technologies for tutoring will increase as the knowledge providing a high level of professional qualification is always subject to fast changes. Introduction of informational technologies in tutoring, for example such computer training products as electronic textbooks, changes a traditional view of education, allows to increase interest of students in a subject, to give the material more.

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Development of the interactive graphical model of the real scanning electron microscope

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Abstract

The main idea of this article is development of the interactive graphical model of the real scanning electron microscope. Basic theoretical and practical information for structuring and presentation were obtained. The system was developed and based on the modelling programm 3D Max Studio and Unity Game Engine. The programming language C# was used.

Keywords: graphical model, scanning electron microscope, C#, 3D Max Studio, Unity

1 General

Nanoscience is a growing field with manifold applications [1]. Nanoscience equipment, for examples microscopes are very expensive and only some of organizations and universities can allow its installation. The effective integration of information technologies and new learning strategies can play the important role in the modernization of education [2]. In particular, the creation of such automatic education systems as virtual computer laboratory [3]. It is an information system, which models the real technical object and its essential characteristics interactively using two-dimension or three-dimension computer visualization. The given work is devoted to development of the interactive graphical model of the real scanning electron microscope. The visualization of the outer parts of real scanning electron microscope and its all main elements, investigation of the processes of preparation to the experiments.

The goals of using virtual laboratory demands certain requirements to their design algorithm, such as: consistency of the material structure, its competent presentation, reasonable using of animation, references availability. In such a way, each laboratory session must have its own features. However, the sessions grouped by certain topics must be presented as a whole according to the requirements mentioned above.

The interactive graphical model of the real scanning electron microscope was developed in International Information Technologies University on Computer science and software engineering department, Almaty, Kazakhstan.

For each part a separate 3D model has been developed and physics engine has been implemented which computes the interaction between the objects of the model (Figure 1, a, b).

a)

b)

FIGURE 1 The interactive graphical model of the scanning electron microscope (a) the real microscope, b) developed virtual model of the microscope)

All this has shown quite good performance of the simulation of the real world objects. In addition, to create an accurate laboratory, were created 3D models for 2 computers, 2 pumps, generators, bedside table for materials, power supply, a sink, watch. The models has been created using 3D Max Studio, and the main code has been written in C# (.NET). To make the animation the Unity Game Engine was used.

2 Conclusions

As a result of the work the interactive 3D graphical model of the real scanning electron microscope on the basis of 3D max was designed and created. It was designed to train students, investigators and any interested users by scanning electron microscopy. The system satisfies all the modern requirements stated to the applications of such type. It has simple but efficient design, user-friendly interface, and ability to implement the large number of complex processes.

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Development of the interactive interface of the virtual simulator of the scanning electron microscope

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Abstract

The main idea of this article is development of the interactive interface of the real scanning electron microscope. Basic theoretical and practical information for structuring and presentation were obtained. The programming language C# was used.

Keywords: interactive interface, scanning electron microscope, C#, 3D Max Studio, Unity

1 General

Appeared recently nanotechnology are increasingly introduces in the area of research, and from it to our daily lives [1]. Development of nanotechnology leads to use the differrent types of equipment for nanoresearches [2]. However, the high cost of equipment narrows the range of organizations having an opportunity to purchase it. In addition to work on such equipment the appropriate training is necessary. One of the solution of this situation is to develop a virtual simulator that would allow researchers to learn as much as possible really work methods and equipment specifically taken for the investigations of nanomaterials.

In International University of Information Technology at the Department of CSSE the development of computer-based training systems are designed. One example is the development of an interactive interface of a virtual scanning electron microscope's simulator. This software is designed to emulate the execution of all phases of the experiment (the sample inlet to the probe, scanning, visualization and analysis of the results of the experiment), the visualization of the processes occurring in the course of the measurement, as well as the generation of virtual data.

The program interface is designed with maximum comfort for the user.

The main functionality of the program is written in C # using the development environment Microsoft Visual Studio 2010.Emulator window of electron microscope is shown in Figure 1.

The simulator has an interface similar to the real part of the software interface of the microscope. To start stages of emulation was used GIF image that shows the connection of the individual units of the microscope.

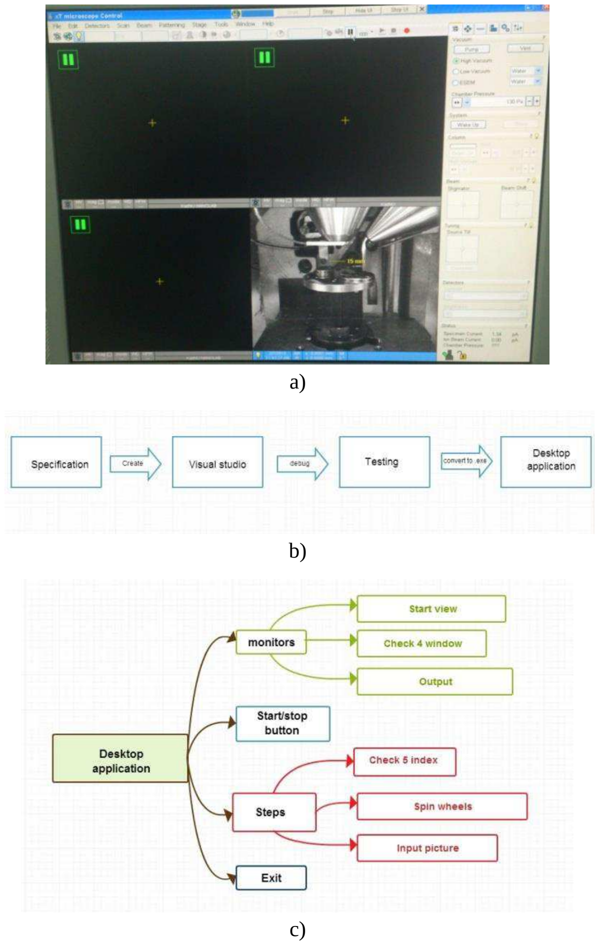

FIGURE 1 The interactive interface of the scanning electron microscope a) the real microscope interface, b) architecture of development, c) structural scheme

The simulator operates entirely on the client side. When designing the windows using Windows form application and link libraries .NET Framework. The simulator is equipped with tool tips and interactive animated content for the ingredients to become familiar with the microscope.

With this, before you start scanning electron scanning, the simulator offers familiar with the process of loading and unloading the sample to / from the ultra-high vacuum chamber.

2 Conclusions

Thus, with the help of the developed virtual simulator we can acquire basic skills in work with a scanning electron microscope to measure the samples.

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FSL (fuzzy sets and logic) library development

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Abstract

The article is about Fuzzy theory and where it is used. The article describes all ways in which fuzzy system can be developed and which mathematical formulas and theories will be used for developing fuzzy sets and logic library. In addition, how can we construct a library, which can be used by all programmers, who use fuzzy logic in their programs for solving some problems.

Keywords: fuzzy sets and logic, library, image processing, algorithm, approximation, clustering.

1 Introduction

To create a truly intelligent systems able to adequately communicate with the person needed a new mathematical tool that translates controversial lifestyle statement in clear language and formal mathematical formulas. The first major step in this direction was the theory of fuzzy sets, developed by Zadeh [1, 3].

Fuzzy logic begins and is based on a set of user-supplied rules of human language. The fuzzy systems make the job of the system designer and the computer easier, and results in much more accurate representations of the way systems behave in the real world. The benefits of fuzzy logic include simplicity and flexibility [2].

2 The fields of implementation of fuzzy logic

Apparent field of implementation of fuzzy logic algorithms are all kinds of expert systems, which include nonlinear control processes, self-learning, the study of risk and critical situations, pattern recognition, financial analysis, study data, improvement of management strategies and coordination, such as complex industrial production [1-3].

3 The mathematical apparatus

To create a universal library for fuzzy logic, we need to collect all the mathematical formulas and label them meaningfully. That is, in the same library will be all the algorithms based on fuzzy math. Characteristic of the fuzzy set acts membership function (MF). The most standard forms of curves to MF widely used: triangular, trapezoidal and Gaussian membership function [1, 4].

The basis for the operation of fuzzy inference is a rule base containing fuzzy statements in the form of "if-then" and the membership functions for the respective linguistic terms. In general, the inference engine includes four stages: introduction of fuzziness (fuzzification), fuzzy inference, composition and leading to clarity, or defuzzification. The models of fuzzy inference Mamdani, Sugeno, Larsen, Tsukamoto [3, 4].

4 System description

At this time, there is no such system, which would be common to all programs that include fuzzy logic and mathematics. The optimal solution for quick and easy programming based on fuzzy mathematics is to build a library for fuzzy sets and logic. That is, there will be an opportunity not to write code, which include the entire formula of fuzzy logic, and instead writing code programmers could simply call the desired function of the prepared library.

Such library will contain three main classes: GenericFuzzySystem, MamdaniFuzzySystem, SugenoFuzzySystem, where GenericFuzzySystem is common functionality of Mamdani and Sugeno fuzzy systems. Other classes such InferenceMethod class containig functionaly of methods: And, Or, Implication, Aggregation, Defyzzyfication, and MembershipFunction class describing types of membership functions' composition and ParserClass, which responsible for parsing.

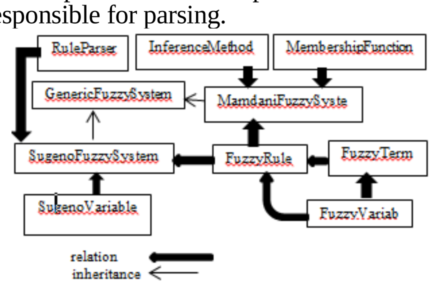

FIGURE 1 Simple scheme of Fuzzy Library

5 Conclusion

Today, fuzzy mathematics is used very extensively, especially in programming. The creation of a library that will contain all the necessary formulas and algorithms of fuzzy logic and sets will be very convinient, also this library will be added to or changed at the request of the author of a program. Development library for fuzzy sets and logic will optimize and structure the code for any expert systems.

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Spatial data consolidation for decision support in the field of green energy

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Abstract

The review of modern approaches to collection and consolidation of geospatial data has been made; main requirements for the data consolidation system have been acquired and analysed; technologies stack and system architecture have been built; the system was given an ability to use crowdsourced tools and data sources; data consolidation mechanism has been implemented on top of widespread and easily maintainable technologies.

Keywords: data consolidation, decision support, spatial data, green energy

1 Introduction

Spatial data is a data that has geographic coordinates as one of its attributes. Nowadays more and more services collect spatial data and many of them can be used to gather environmental information such as climate data, noise and air pollution levels. All this raw data can be consolidated, analyzed and used in decision making process in the field of green energy. It's worthy of mention that one of the most recent green energy trends is decentralization [1]. It means that collected data will be spread across a number of nodes but in order to analyze it we need to consolidate this data. Here is where the research topic arises. The most appropriate technologies for spatial data consolidation and analysis will be reviewed in this work and the prototype of the data consolidation and analysis system will be presented.

2 Overview of the study area and system requirements

The term "green energy" is broad and spatial decision support in this field requires different kinds of data. First of all it is climate data (temperature, pressure, wind, solar radiation maps) then water resources, existing power plants, power lines and power consumers. This data must be tied to a map (each unit must have geographic coordinates).

In order to analyze all this data the concept of spatial decision support system (SDSS) have emerged [2]. This system consists of geographic information system (GIS) part and DSS part. There is a number of implementations of GIS such as ArcGIS, QGIS and Web-based CloudGIS (with basic support for DSS) and even more implementations of variable decision making algorithms. The aim is to combine these tools and make them work for spatial and non-spatial data and make users be able to add data sources and implement their own analysis methods, as crowdsourcing is one of the trends [3] in development of future GIS.

Both parts operate with layers – abstractions for different kinds of mapped geographic data. If GIS part can use multiple data sources even in different formats, DSS part requires all the data to be resided in one data warehouse to be accessible quickly.

The data is present on the Internet, but the formats are different as well as data source types and availability. For example, National Climatic Data Center's (NCDC) worldwide climatic data is provided in fixed-length files, power plants are stored in spatial database and water resources are present in the form of shapefiles. Along with already existing datasets SDSS should be able to handle real-time data from a network of variable sensors [3].

In order to handle this data in parallel and perform data mining operations on it we need to consolidate it.

3 Relevant technologies

Analysis of various articles has shown that in most cases usual relational databases are used to store geospatial data [5, 6]. Almost all GIS can use PostGIS as a data source, it has a big community and is actively developed. Hence, PostGIS is a good candidate for storing spatial data and performing basic analysis operations like aggregation. There is another reason to use PostGIS – it is based on PostgreSQL, which has a number of foreign data wrappers (FDW) – implementation of SQL Management of External Data (SQL/MED) specification. It allows to easily connect data sources of practically any type for which corresponding FDW had been implemented. As for today there are FDW's for JDBC, ODBC, a number of relational and NoSQL DBMSs, text files, web services and even Big Data storages. The system's data source layer uses FDWs in order to consolidate data from different data sources (Figure 1).

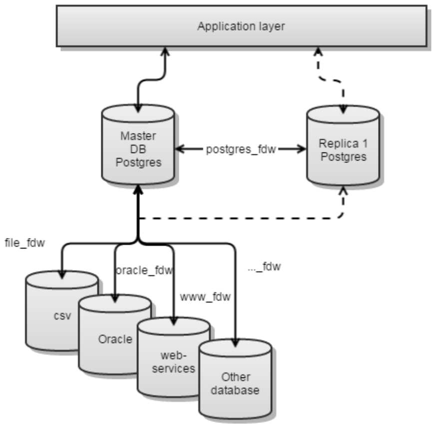

FIGURE 1 Using FDWs for data consolidation

One of the parts of the system is collecting data from environmental sensors. It gives real-time information about temperature, pressure, humidity, air pollution level and also makes it possible to apply the system in ecological monitoring. Data from sensors will be saved to PostGIS database with the help of web service via GPRS, text files will be first read through FDW and copied to consolidated database. The good thing about PostgreSQL FDW is that its addition can be automated using stored procedures. It means that user can choose data sources type, enter its parameters and easily integrate his data to the system.

Decision making tools also can be chosen and created by user. For this purpose, the system provides ability to execute SQL queries or upload custom Groovy script with implemented analysis logic to server where analysis is performed and results will be rendered to the user. The advantage of Groovy is an ability to use Java data mining tools like Weka. One or more data sources along with Groovy scripts and visualization tools, which are used for some user's purpose constitute user-defined layer. As an example, the system can be used to find territories with suitable conditions for building solar power plants. Multicriteria analysis can be made across several layers [4, 5] and overlapping the results will give us a map of the areas suitable for our needs.

4 Suggestions

When dealing with large amounts of data knowledge management (KM) problem usually arises. Current implementation does not support KM. At the same time spatial data has a lot of metadata which can be extended with ontologies and thus make it possible to easily store and share knowledge. Making use of RDF-based ontologies will enable the system to use Open Geospatial Consortium's GeoSPARQL query language [6], which will make it easier to implement decision support tasks.

5 Conclusions

As a result of the work a prototype of SDSS has been implemented which makes use of heterogeneous data sources and environmental sensors. Data is consolidated for decision support tasks. The system also has an ability to add crowdsourced data and analysis tools. As a result, great variety of data mining algorithms can be applied directly to spatial data.

Acknowledgement

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Identification of the users' goals in system of monitoring renewable energy

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Abstract

The aim of this thesis is to identify the users' goals and correct those by interviewing and contextual inquire with users. The data collected from first time interview and brainstorming are given.

Keywords: intellectual information systems, USE CASE, renewable energy, monitoring systems

1 Introduction

Development of the sector of renewable energy sources (RES) is a necessity for any country. Actuality and perspective of this sector of energy is dictated by two main factors: the plight of the environment and necessity of searching new sources of energy. According to scientists assumption at the current pace of scientific and technological progress the traditional resources of energy (coal, oil, gas and etc.) runs out in the next 100-150 years [1]. Identification of priority types of renewable energy for the country depends on its geographic location and existing technologies. The transition to renewable energy is a long-term process, including its risks, as each type of renewable energy is projected potentials, which are continually updated [1]. This is why extremely necessary to develop national information systems for collecting, analyzing, forecasting data for RES. According to expert estimates, the potential of renewable energy resources in Kazakhstan is very significant and is estimated at 1 trillion kWh [1].

2 Problem elaboration and possible solutions

The project "Development of methods and algorithms for data collection, analysis and interpretation of heterogeneous data models multilayered spatially distributed monitoring systems of renewable energy" aims to create a GIS for renewable energy in Kazakhstan. At the inception phase the main tasks also include the goal-oriented modeling of the users' needs. Accurately identified users goal will be the good foundation for next phases. Based on the fact that GIS will produce the collection, analysis, monitoring and mapping of renewable natural resources [2], the users hierarchy was identified, shown in Figure 1.

The primary potential users of the GIS is the State Committee, whose expertise includes:

- Data collection and analysis to all of the country's renewable energy targets for the formation of the general picture of the state of renewable energy in the country with the ability to use data to drive the development of renewable energy.
- Control of the organization on the distribution and development of both traditional and VI of energy;
- Assessment of the risks of failures, accidents in the energy sector;
- Assessment of current economic aspects of the transition to renewable energy sources;
- Assessment of the current state of the transition to renewable energy.

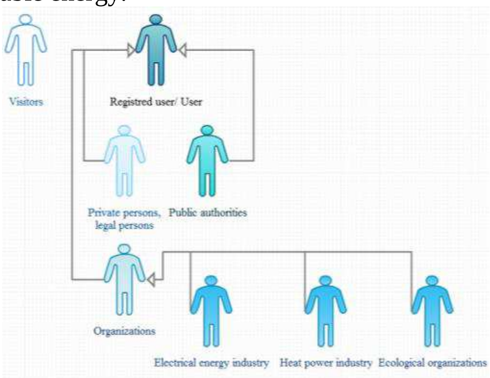

FIGURE 1 Users hierarchy

Organizations concern on generation and delivery of electricity and thermal energy to the end user, are potential users of the GIS. This group also includes organizations engaged in environmental issues. There are a number of individuals and legal persons wishing to move to renewable energy sources, whose interests must also be taken into account.

Based on interviews with potential users and to the world practice on renewable energy monitoring systems, in GIS users will be provide with following functionality, figure 2.

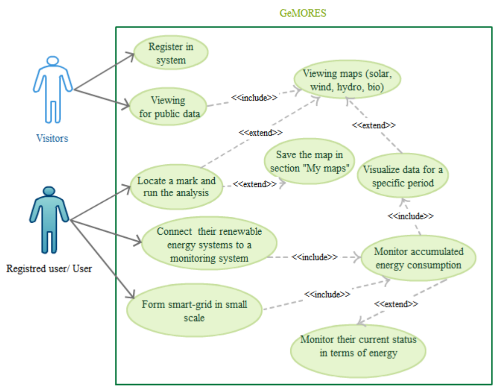

FIGURE 2 Use Case Diagrams for registered users

These functions will have all registered users in the system.

With more specific functions will provide a group of users as a State. Committees, agencies, and organizations of the development and delivery of energy to the population, Figure 3.

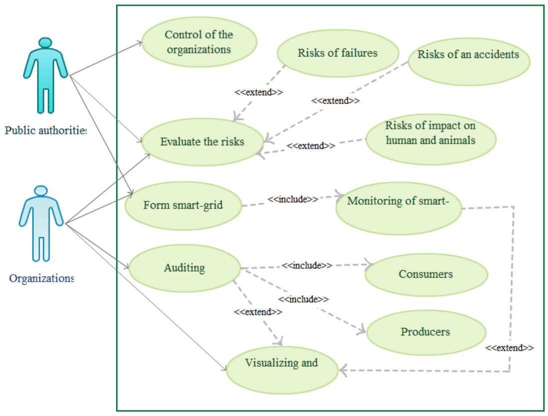

FIGURE 3 Use Case Diagrams for advanced users

3 Conclusions

The proposed use cases of GIS based on the results of the first iteration of a user survey. Further research in this area will reveal more opportunities GIS.

Acknowledgement

The work was funded by grant No. 0168/GF4 of the Ministry of Education and Science of the Republic of Kazakhstan.

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Increasing a speed of data exchange in the processes using the protocol FIX

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Abstract

The main goal of this project is to make transactions faster between stock exchange and traders. Financial Information Exchange (FIX) is a dominant standard for data link between the participants of exchange trades in real time around the world. To get a faster trading platform and comply with the international standards of the stock market, this project combines FIX with a developed approaches.

Keywords: Stock exchange, FIX

1 Introduction

Many applications spend a lot of time to parsing and transforming FIX or XML than executing business logic. By following the international standards of the stock market this project decided to get faster trading platform. To do this server and client applications are written.

2 Overview of the of the study area

Over the past few years the list of Stock Exchange investors has been actively growing. As we know, trading on the stock market in the 21st century is an extremely high-tech process. For instance, for the investors to get high returns, developed a variety of trading platforms, brokerage systems that can cope with a heavy load, implemented API to him, laid high-speed communication channels, etc. According to the rules of the stock exchanges only members of the market can send trading orders directly to the exchange, bypassing the broker system. However, direct access costs money that not everyone can afford, but everyone wants to make transactions with maximum speed. This is not surprising, because between success and failure, gain or loss in the stock market is often only a fraction of a second. Therefore, it should work like clockwork and very fast.

FIX protocol - data transfer protocol, an international standard for data exchange between the participants of exchange trades in real-time. It is now widely used trading system for the exchange of financial data and making transactions. FIX protocol is supported by most major banks and electronic trading systems, as well as the major exchanges.

3 Problem Solution

Many applications spend a lot of time to parsing and transforming FIX or XML than executing business logic. By following the international standards of the stock market this project decided to to get faster trading platform. To do this server client application is written. Server side of the program gets market data from Stock Exchange by FIX API and propagates it to clients and store to local storage [1]. Clients are connected with server using FIX engine. For connection between client and server libraries as Apache MINA Core and QuickFIX are used. There are a few steps to receive a high speed of processing data

1. Defining Message. A message schema compiled to generate stubs in programming languages.
2. Encoding.The generated stubs contain Market data incremental refresh message and the structure of message based on FIX Specification. When a listener of Stock Exchange API handles the message, server side of program should convert this message, encode it, then convert encoded binary data to HEX and propagate this hexadecimal message to client.
3. Decoding. In client side of the program, when the message is received, firstly, it is necessary to convert hexadecimal message to byte array and decode.

4 Conclusions

According to the tests application of presented approach with the FIX protocol allows to increase transactions speed between stock exchange and traders.

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Microprocessor control system based on microcontroller for sports equipment weight bench for bench press

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Abstract

This report examines the automation of sports equipment weight bench for bench press barbell using microcontrollers. The construction of proper training bench press is carried out.

Keywords: Weight bench, sensors, scales, microcontroller, individual plan for training, database, monitor, counter.

1 Introduction

Nowadays the question of preserving human health of the nation and of all humanity is actual. Health is one of the main parameters of assessing the quality of a person; views on the health of the whole person are also changing and different ways of attracting human into sports facilities are considered. One of these methods that are currently popular are gyms. Despite its area inferior to sports halls and grounds, these gyms can provide much useful result for the rehabilitation and health promotion.

2 Overview of the study area

In our country, gyms where built from XX century to promote bodybuilding. The main difference of gyms from usual sport centers – they are equipped with special stationary training units that are designed to train specific part of muscles. Because of the limited area, these centers are not intended for team sports. Despite this, because of individual convenience, near placement and usually, because of seven days a week schedule it becomes popular. Each complex have their own training instructor. Without instructors' supervising the training sometimes may be harmful than useful. But instructors cannot be near you any time. Then there rises the question: Is it possible to help the instructor by using technological advances? The main theme of this work is to find the answers and give possible solutions for the question above.

For our country, gym centers are not unusual, yet the popularity of them rises in last years. Because of this, many foreign industries offer their training equipment. And most of the equipment in our gyms are imported from different countries.

3 Significance and problems taken into account

The significance of production of such an equipment in local industries and the practical implementation are the main themes of the given work.

The first question that arises during the implementation of work: what type of microcontrollers to use in barbell pushing equipment? If such an equipment will be produced, what will be the market demand? Moreover, will the demand be?

The main target of the work is to held practical experiments with barbell pushing unit, and on the basis of the experiments create a control system by using microcontroller as the controlling unit.

For this purpose, the following actions will take place:

1. Investigation of workout process made by using barbell-pushing unit. To create a special training program with the help and advice of qualified personal coaches that will take into account specific parameters of every individual person. Creation of a training program will be made by dividing individuals into categories and dividing the training program into parameters. The program should be reconfigurable for every person.

2. To create a microcontroller controlled system with sensors and other components, and to mount the device on the training equipment. As the controlled units we take:

- scales that measure the weight of the barbell;
- sensors that locate the position of the person;
- during the investigation we will use the gyroscope to ensure the right trajectory of the unit, and other needed sensors.

3. To create a database on the basis of the developed system and to connect it with the devices controlled by microcontroller.

4. Upload the needed working properties of the system. The device should identify every indiviual user. It is planned to be done by using magnetic cards. Moreover, after defining the individual, the system should load the data and training information of the user, and all this information should appear on the digital display. The unit will block the barbell if user gets out of training program – the barbell will be blocked so the user cannot lift it.

5. The practical experiments will be held in gym centers. Tests will also take place.

4 Conclusions

The main objective of this work - to equip the weight bench with special sensors and sensors to coordinate training in this sport equipment. Under the coordination, we are meaning the schedule of attendance for training on the equipment, weight control of the barbell for a specific user, the correct position during exercise. This task is carried out by means of Arduino hardware and software, to hardware will be connected encoders and sensors for contact with the equipment and the user.

The idea described in this work is unique – there are different programs made for mobile devices, desktops, but we did not have an example of implementing such a systems in connection with training equipment.

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Models and algorithms of testing software

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Abstract

This article discusses the study of software reliability. Define the concept of software reliability. Examines existing software reliability models and their classification. The main stages of the software life cycle.

Keywords: method of proving the correctness of programs, test method for diagnosis, methods of structured programming, reliability of software

1 Introduction

Software reliability issues typically involved only after the completion of software development. This leads to a chronic imbalance in the operation of applications. The survey revealed that most of the errors made during the design phase. Research in the field of software development have formed a set of methods, processes, technologies, models, the use of which allows to achieve specified performance reliability and quality of software. Research on how to improve the reliability of software, showed that the quality assurance and reliability should be given consideration at all stages of the development process. To improve the reliability of software research include methods such as - a method of proving the correctness of programs, methods of test for diagnosis, as well as methods of structured programming [1].

2 Overview of the study area

The main component of the quality of the software is its reliability. Software reliability is defined as the ability of the program to operate smoothly certain period of time under certain conditions. Model of software reliability - a detailed, formalized definition of reliability. Nowadays developed hundreds of models of software reliability, taking into account the different types of programs and their applications, but there is no common, universal model, applicable to any program. In general, software reliability models are divided into the following groups: **predicting, measuring and evaluation**. These differences are determined at what stage of the life cycle of the program they are used and for what purposes serve. In its turn, predictive models include the following [2]:

- model of Halstead,
- model of Motley-Brooks.

Measuring models include the following:

- model without calculation errors,
- model with calculation errors.

Estimated models are:

- Moussa model (selection of the data area),
- model of error's seeding

Most of the developed models of software reliability are based on various assumptions, which seriously limit the scope of their application. In such a situation, model of based on a probabilistic approach more broadly applicable, but the practical value of their use is not great.

3 Conclusions

Based on the experience of technical diagnostics, developping a model of software reliability, consisting of the basic model, which is the result of the study of a software system, and the diagnostic model, which is constructed on the basis of the base and focused on the the process of ensuring software reliability.

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New tendencies in a solving problems of geriatric care in the Republic of Kazakhstan

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Abstract

In recent years, the measures to improve geriatric care of the population are taken in the Republic of Kazakhstan. Relevance of this issue is determined by a population aging on the one hand, and by RK humanization policy on the other hand. Consideration of these issues is impossible without corresponding data support, which is necessary for organizational tasks and for the entire cycle of medical data processing, starting from data collection, through a comprehensive analysis and issue of recommendation. Using modern software, communication and intelligent technologies promises not only improving of geriatric care quality but reducing the cost and obtain social-economic benefits.

Keywords: Geriatric care, ICT, Ambient Assisted Living, machine learning, broadband network, Machine-to-Machine, big data

1 Introduction

Importance of gerontological research in the world is associated with accelerated aging of the population in developed countries [1, 2, 3, 4] and with corresponding increase in health care costs [4] (Figure 1).

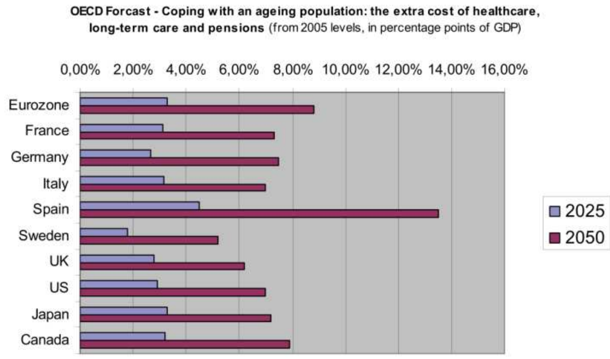

FIGURE 1 Forecast of costs' growth for health care, pensions and social services in percents of gross domestic product (GDP) (http://www.capsil.org/files/Ageing%20Well%20Background.pdf)

Major portion of the elderly people is in need of intensive medical care, single elderly people require special attention from medical and social services. In this regard, the developed countries have taken measures to prevent social isolation of elderly people; conditions for active lifestyle maintenance and participation of elderly people in the labor market are created. These are both appropriate measures of health maintenance, and initiatives in the field of business, employment, and reduction of health care and elderly patients care spending [8, 9, 10].

Modern ICT's provide a set of tools and techniques that reduce the costs and improve geriatric care quality, and also implement proactive medical and social measures to reduce the costs and improve geriatric care quality. Implementation of the system geriatric care includes use of modern ICTs in a heterogeneous distributed system that provides not only heterogeneous data collection, but also its intellectual analysis. The complexity of processes require special researches with the aim to find the appropriate models, methods and solutions that provide of intelligent support not only older persons but also geriatric system as whole.

2 General

World Health Organization (WHO) predicts that the share of people aged 60 and older in Kazakhstan from 11% in 2014 will reach 25% in 2050. With increase of duration of life health care expenses inevitably rise (Figure 2) [13]. Therefore, improvement of medical assistance for elderly people, complex solution of biomedical, social and psychological problems defined by one of the priorities of the State program "Salamatty Kazakhstan" 2011-2015, approved by the Presidential Decree №1113 from 29.11.2010. In recent years, the formation of the gerontology service is taken place in the Republic of Kazakhstan [11], laws and policies aimed to improvement of geriatric care to the population were adopted [12]. In the President's message it is stated: "According to international estimates, about 5 percent of the population with basic types of diseases use about 70 percent of all health care services. Well-organized prevention activities could prevent diseases at early stages"

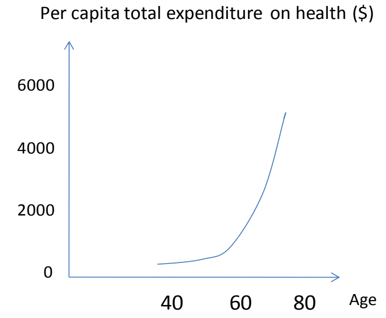

FIGURE 2 The average cost of "healthy" life maintenance at different ages [13]

Timely diagnostics and disease prevention will significantly reduce the costs of out-patient treatment and in-patient treatment, and also will help to preserve mental and physical performance of elderly people. Initiatives in this area are associated with use of information and communication technologies (ICT) [4-7]. It is time to bring into scientific discourse the term "data-based (electronic) gerontology and to consider aspects of ICT use in science and practical applications associated with aging within its scope. In this domain a large number of international programs, projects, communities and academic institutions [33-42] are working, particularly the consolidated program on creation of living support environment of - AAL (Ambient Assisted Living Joint program) (http: //www.aal-europe .eu /), bringing together 123 projects with the total fund of 700 million euro.

However, up to now there are no electronic data systems that can address comprehensively the problem of medical and social services for elderly population. It is necessary to search for new ways and technologies that could reduce the costs during with rise of the services quality standard.

In the Republic of Kazakhstan in the earlier study related to this topic, there was developed the web-portal "Active Longevity" (http://100let.kz/), which provides information, data collection and preliminary analysis of screening information about the elderly population of Kazakhstan [14, 15].

ICT development trends offer the possibility for solving the problem of efficiency of RK gerontology services. The key aspect is the use of new generation of ICT for screening of the medical and social situation, needs assessment and provision of timely assistance especially with a view of the large territory and low population density of RK.

Combining wireless sensor network, inter-machine communication systems (Machine-to-Machine (M2M)) [16, 17], the broadband network access based on the new communication protocols [18] and other technologies [19-23] are the development basis of the effective medical information systems. These technologies provide a high level of reliability and small delays in remote monitoring and data transfer of different volumes [24, 15].

The functioning of the new communication and screening systems on the basis of new communication protocols involves generation of large amount of data [25], or Big Data, with special processing requirements [26, 27].

In the health monitoring systems the focus is shifted to the development of intelligent algorithms for identification of consistency patterns with the use of machine learning methods [28]. At the same time there are resolved such problems as identification of abnormal conditions, diagnostics, forecasting, recommendations and visualization of big data for human decision-making [23, 30]. The general scheme of machine learning methods application is shown in the Figure 3 [29].

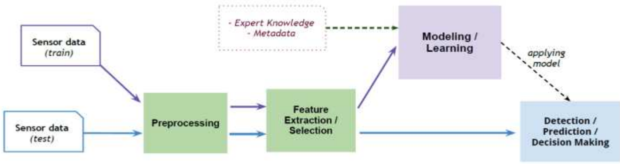

FIGURE 3 Generic architecture of the main data mining approach for sensor data

The functional of the electronic system predicts existence of Training and Qualification section that will improve the quality of service operations and of the related to its units [31, 32].

The mentioned above information gives ground to state that ICT development trends have clearly expressed technological and scientific background to support the gerontological service and to organize its work on a new level.

3 Offered solution

Based on a new ICT development trends a multi-level distributed personified electronic system is offered. The system will provide support, monitoring, detection and prediction, and support for comprehensive geriatric services for the population. Multi-layer architecture of the system is illustrated in the Figure 4.

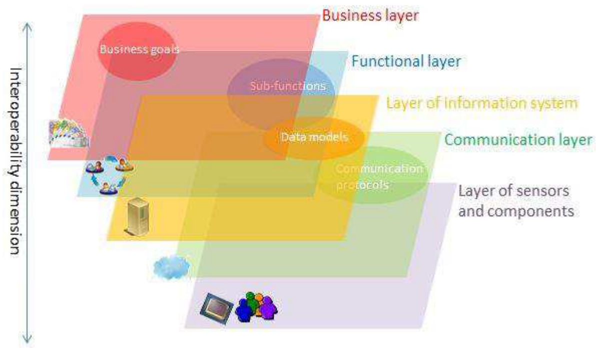

FIGURE 4 Main system layers

To reach the goal it is necessary to solve a number of technological and systemic issues related to selection of necessary technologies, algorithms and software in the core domains of the system.

The main efforts should be focused on research in the field of communications (Network Domain), information systems (IS Domain), user interaction with the system (User Domain). The sensory level (M2M domain) need to be partially affected. This choice is due to the fact that, firstly, in other areas could be used the achieved significant results, partly brought to the technology level, and secondly, exactly in the development field of the appropriate IS applications of machine learning methods, and the processing of large amounts of data today are the most relevant [28].

4 Economic benefits

Solution of this task will bring a social effect expressed in improvement of the quality of medical services and slowdown in growth of their costs, and totally, in improvement of the quality of life for older persons.

Economic benefits will consist of three aspects.

Firstly, the project will contribute to emerging of a new market of services, with the estimated volume of 3-5 mlrd. Euro (similarly to European markets of services for elderly people (300 milliards) and with consideration of a lower level of life and less (approximately by 30 times) population of the Republic of Kazakhstan)

Secondly, the system will aid to extend the healthy period of life that will bring both economic and social benefits. For instance, in conditions of Kazakhstan increase of the number of working people for 85 thousand people can lead to growth of gross domestic product for 1% or for 102 milliards of USD.

Thirdly, the system will contribute to increase of the state healthcare spending for older persons (till 70% of all healthcare spendings).

5 Conclusion

New communications and computational technologies offer good opportunities into the solving one of the greatest World problem - the problem of accelerated aging of the population. This problem concerns not only developed countries but developing countries. In RK the special portal was developed as the first step on the way. The next step is design and develop complex of geriatric services based on modern concepts and technologies.

The complexity and diversity of the processes require appropriate research, development and approval of the system model that requires to: 1) Analyze data acquisition systems, human-machine interfaces and machine-to-machine interaction, intelligent methods applied in the health care system; 2) Develop a system model for elderly patients' services with help of modern ICT's and in view of the health care system development; 3) Develop models, methods and algorithms of data consistency patterns retrieval system for intelligent system of gerontology services' maintenance.

Realization such project will bring a social effect for every senior person as well as economic benefits in the scale of country.

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OLAP technologies - the concept and main advantages. OLAP technology usage in GIS - SOLAP

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Abstract

GIS technology provides collection, storage, analysis and geographic visualization of the spatial data. GIS are designed for decision-making using the map data in areas such as transportation management and land, resources and retail trade, the use of spatial objects, and so on. GIS technologies are divided into: GIS for general purpose and specialized. GIS for the general purpose include the following tasks: input, manipulation, management, query and analysis, data visualization. The tasks of "query and analysis" can be resolved with the use of OLAP and BI-technologies. Consider the solution of these problems in development of a multi-layered intelligent GIS in the field of "green energy". OLAP technology can to resolve such questions as: "Monitoring of the current status in terms of energy consumption in the GIS, (consider and analyze the energy consumption at some address on the map), to create the audit of consumers and producers, to assess the current state of the transition to renewable energy."

Keywords: GIS technologies, OLAP, SOLAP systems, OLAP cubes.

1 General

OLAP systems can work with any kind of data, regardless of the features of the information infrastructure. OLAP systems provide almost immediate response to most requests, include the multiuser mode (the system enables simultaneous multi-user) and the data are presented in the form of multidimensional cubes. The main reason for using OLAP cubes, relational databases do not provide efficiency of aggregation and search in large amounts of data. The cubes provide to users a data structure that provides quick response to requests large amounts of aggregation. Reporting and charting in the OLAP allows accurate, quickly and clearly assess the current state and predict future actions. [1]

The main problem of connection technologies OLAP and GIS [2] is the inability OLAP work with spatial data in contrast to the GIS systems. OLAP systems include three modes of storage:

- ROLAP, the source data is stored in a relational database, based on these information will generate the OLAP cubes, reports and can made various transactions;
- MOLAP, the source data is stored in multidimensional structures;
- HOLAP is a hybrid architecture that includes ROLAP and MOLAP. In that case, relational tables are used to store basic data and multidimensional tables for aggregates [3].

Not one of these modes does not include work with spatial data in OLAP. Therefore, Bédard, Proulx and Rivest (2005) presented a new solution, called SOLAP technology. (Commercially available as "JMap® Spatial OLAP Extension"). [2] The leading manufacturers of SOLAP technologies are GeoMondrian - Pentaho, ESRI, Oracle, IBM, Microsoft Analysis Services. [4].

Solution that was represented above has its own advantages and disadvantages, below is a table of the characteristics of each SOLAP technologies in the creation of GIS - "Green Energy".

TABLE 1 Overview of SOLAP technologies

Name of the server	Producer	License	OS (compatibility)	Maps (Access to overlays)
Microsoft Analysis Services	Microsoft	Proprietary commercial software	Windows	Power Map for 3D visualization add-in for Excel for mapping, exploring, and interacting with geographical [5]
TM1	IBM	Proprietary commercial software	Windows,Linux, UNIX, z/OS	Google map – without additional layers, Esri maps
Oracle OLAP Option	Oracle	Proprietary commercial software	Windows,Linux, UNIX	Google Maps
ArcGIS	ESRI	Proprietary commercial software	Windows,Linux	Esri Maps, SAS functionality for SOLAP [6]
GeoMondrian	Pentaho	EPL	Windows,Linux, UNIX, z/OS	Google map, CDE plugin for overlays [7]

GIS system that will be created include the maps with the following layers: wind energy, solar energy, geothermal energy and hydropower. Layers of the GIS system consists of information that necessary to analyze. Maps in the prototype of system will be created using Google Maps.

Pentaho tools does not concede to IBM OLAP, Oracle, and provide an opportunity to work with the maps, spatial data. Pentaho include the following tools:

- Pentaho Reporting - to create reports;

- Pentaho Data Integration Kettle ETL - for the integration of source systems and storage of Pentaho;
- Pentaho Dashboards - a tool for creating dashboards;
- Mondrian OLAP Server - for online data analysis (support language MDX);
- Pentaho Workbench - to create OLAP cubes.

2 Conclusion

The most suitable technology for the initial development phase of the GIS system is GeoMondrian (Pentaho) (see. Table 1). Geomodrian is distributed under a license free, that does not limit the functionality in contrast of the trial versions systems that provided by other manufacturers. One of the main advantages of the GeoMondrian is the server works with Google Map, and using of plug-CDE it is possible overlay layers to Google Maps.

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Potential of renewable energy sources in Kazakhstan

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Abstract

Global Energy Development should harmonize energy needs and environmentally safe state of the planet, provided the continuous improvement of living standards of every person on the planet [1].

Keywords: renewable energy sources, "Green energy".

1 General

Broad understanding of economic issues related to mining, has recently become apparent to a growing number of individuals. Diversification of the economy is an important issue in the development of Kazakhstan. It is necessary to understand that reducing dependence on hydrocarbon exports is a complex task facing the government of our country, the solution of which consists of a number of factors, and not the least role in this process plays the development of renewable "Green" energy in Kazakhstan (RES). The course indicated by the President of Kazakhstan Nursultan Nazarbayev in his message "Kazakhstan's Way - 2050" clearly underlines the importance of this trend. The proof is also the fact that now the attention of many countries focused on finding and active use of renewable energy sources, which often include solar, wind, hydropower, geothermal and biomass energy.

		2010	2011	2012
Investment in new renewable capacity (annual)	billion USD	227	279	244
Renewable power capacity (total, not including hydro)	GW	315	395	480
Renewable power capacity (total, including hydro)	GW	1,250	1,355	1,470
Hydropower capacity (total)	GW	935	960	990
Bio-power generation	TWh	313	335	350
Solar PV capacity (total)	GW	40	71	100
Concentrating solar thermal power (total)	GW	1,1	1,6	2,5
Wind power capacity (total)	GW	198	238	283
Solar hot water capacity (total)	GW_{th}	195	223	255
Ethanol production (annual)	billion liters	85,0	84,2	93,1
Biodiesel production (annual)	billion liters	18,5	22,4	22,5
Countries with policy targets	#	109	118	138
States/provinces/countries with feed-in policies	#	88	94	99
States/provinces/countries with RPS/quota policies	#	72	74	76
States/provinces/countries with biofuels mandates	#	71	72	76

FIGURE 1 Statistical data on key indicators of the market of RES in the world

According to the report of experts Renewable Energy Policy Network, the global demand for renewable energy continues to grow, providing 19% of global final energy consumption in 2011. In 2012, their total capacity has exceeded 1,470 GWh, which corresponds to market growth of 8.5% for the year. At the beginning of 2013, the policy of supporting renewable energy was found in 127 countries, more than two-thirds of which are developing countries or countries with emerging economies. Also in 2012, continued to increase investment in renewable energy in developing countries. $ 112 billion, representing 46% of global investments in the sector, were in developing countries in 2012, which is 12% higher than a year ago. It should also be noted that this trend has continued for the past 8 years [2]. According to experts, in 2020-2025, the market for renewable energy will reach $ 500 billion [3]. The data presented in Figure 1 and 2 illustrate the annual increase in the quality of the market in almost all key indicators.

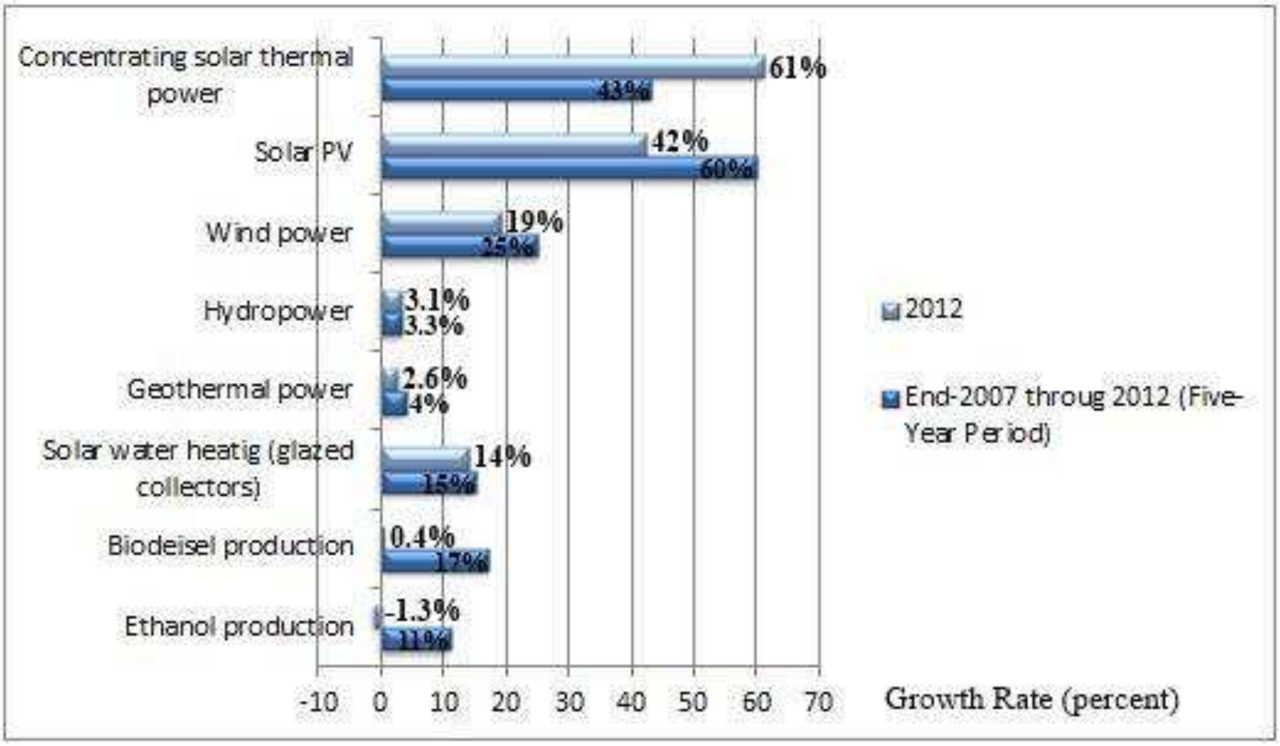

FIGURE 2 Average annual growth in renewable energy capacity and biofuels, 2007-2012

Kazakhstan is exceptionally rich in wind resources. About 50% of the territory of Kazakhstan has an average annual wind speed of 4-5 m / s, and a number of areas the wind speed is 6 m / s or more, which determines the very good prospects for the use of wind energy [4].

2 Conclusion

According to the assessment of the resources held in the framework of the development of wind energy market in Kazakhstan under the name "Project of Kazakhstan", the potential wind resources in Kazakhstan are 929 billion kWh / year, or 354 GW of installed capacity. This is 18 times the installed capacity of power plants in Kazakhstan at present. Project have been identified and presented potential benefits for Kazakhstan on the successful development of wind energy sector. They are:

- benefit to the economy of Kazakhstan can be up to $ 18 billion (2.6 trillion tenge).
- reducing emissions amount to 4.2 million tons of CO2 / year, or about 84 million tonnes of CO2 over 20 years of potential life cycle. Based on the fact that the current international carbon price is about US $ 21, the value of the expected reduction in carbon could be assessed more than 88 million US dollars per year, or US $ 1.7 billion over the life cycle of projects [5].

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Relationship of semantic concepts of ICT domains

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Abstract

In this paper, we consider development of ICT domains and semantic connection between them, countries, which have been leading in particular sphere of science. The investigation was held with help of Google Scholar and EBSCO research databases and SCImago Journal. By analyzing the amount of publications each year between 2005 and 2014, we assessed perspectives of development of ICT domains, and connection between them. The research domains are: Big Data, Augmented Reality, Machine Learning, Neural Networks, Visualization, Software Defined Networking, 5G, e-Governance, Cyber-Physical Systems, Cloud Computing, Computational biology, Embedded systems.

Keywords: ICT domain, Big Data, Augmented Reality, Machine Learning, Neural Networks, Visualization

1 Introduction

In this paper, we attempt to analyze and give an assessment to the perspectives of different domains of research.

Our investigation consists of three steps that considered in the second part in detail.

As a working hypothesis we subjectively selected the modern concepts and put forward the thesis of interconnection (convergence) of leading domains and research directions, Then, using the scientometric databases SCImago Journal, EBSCO (Information Science & Technology Abstracts, Academic Search Complete) and Google Scholar, we analyze the number of publications from 2005 to 2014. Analysis of the results showed the "rise" and "fall" of research domains that allow us to suggest some promising research directions for realizing them in the RK.

Note that the first attempt on this way was made in [1] where we introduced the semantic network of ICT domain and briefly discussed the perspective fields of research in the Kazakhstan Republic.

2 Methods and results

Modern high-level systems are designed based on several technologies and systems: machine learning, the multi-agent systems, systems of data collecting and processing, including big data, systems of grid and cloud computing etc.

On the first step of investigation, were chosen 20 relatively new ICT domains, which we used in order to search for publications.

The choice of these areas is relatively subjective. These domains are Big Data, Bioinformatics, Cloud computing, Cyber-Physical systems, Embedded systems, Information Security, Internet of Things, Human-machine systems, Mobile computing, Machine Learning, Machine to Machine, Multi agent systems, Neural Networks, Robotics, Visualization etc. Some of these concepts is related to the scientific research, the other part are the applications.

First of all, we searched for keywords in Google Scholar's and EBSCO databases by year of publication. This way we got data about development of given ICT domain. High numbers can be described as high interest in this domain and its rapid development. Low numbers show that the theme is relatively new or there is low interest in it.

The Figures 1-4 illustrate the domains of research that demonstrate rapid dynamic of development. The number of publications quickly increases in the last years.

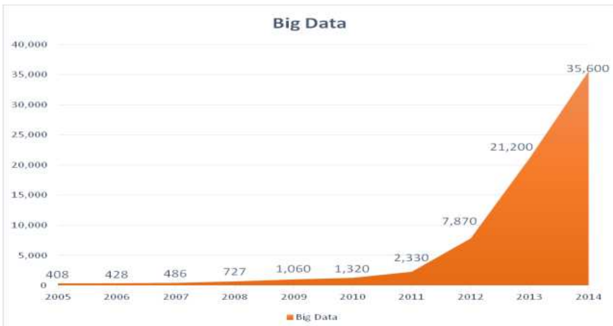

FIGURE 1 Number of publications in the field of Big Data

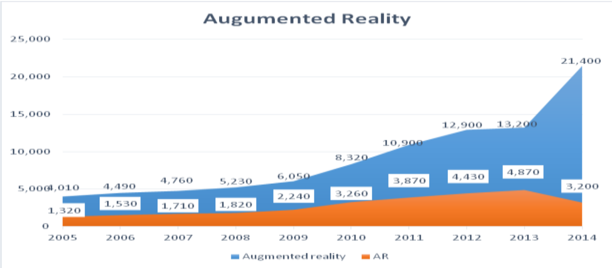

FIGURE 2 Number of publications in the Augmented Reality domain

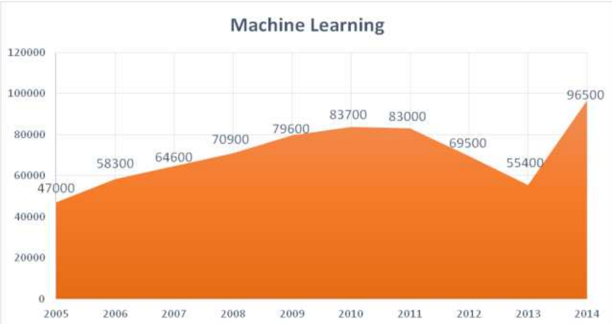

FIGURE 3 Number of publications in the Machine Learning domain

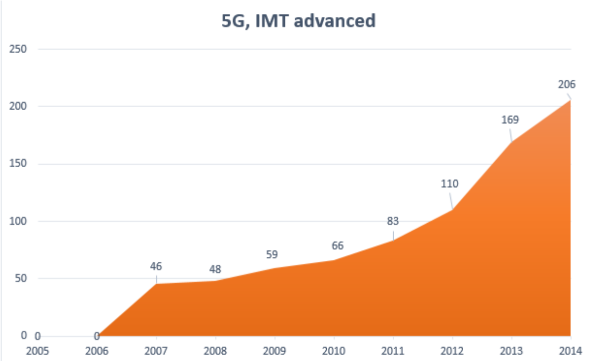

FIGURE 4 Number of publications in the 5G domain

In the second part of research, to determine domain cross-reference, we used two keywords in the searching engine. The search engine processes the request, and outputs certain amount of publications, where both of requested keywords were met. High numbers show strong connection between domains, low numbers, inversely can mean that the relationship is weak, or one of the domains has not been developed enough yet.

The figures 5-8 show these interconnections. The result was obtained by using EBSCO database.

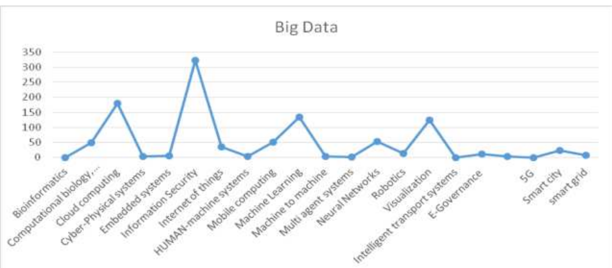

FIGURE 5 Interconnections of Big Data with other domains of research

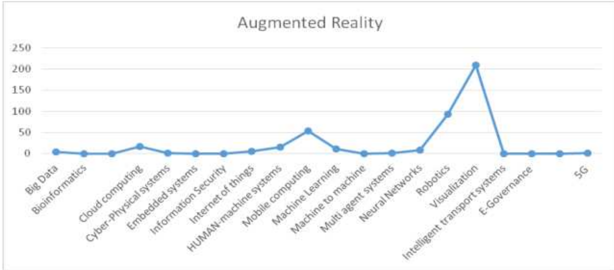

FIGURE 6 Interconnections of Augmented Reality with other domains of research

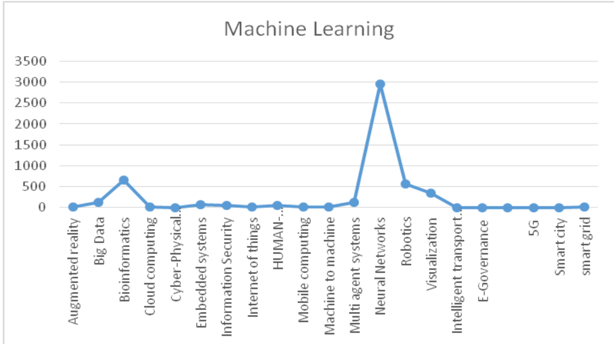

FIGURE 7 Interconnections of Machine Learning with other domains of research

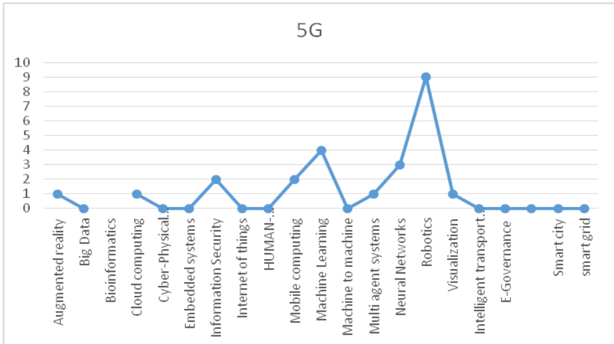

FIGURE 8 Interconnections of 5G with other domains of research

By using this approach, we selected semantically closely related domains of research. For example, Neural networks and Machine learning, Augmented reality and Visualization, Big data and Information Security etc. are relatively similar.

Thirdly, we considered leading countries, and amount of publications in certain field by "Quality of scientific research institutions and The Global Competitiveness Report" [2]. We took each country and traced its amount of publications in: Computer Science, Medicine, Physics & Astronomy, Engineering, Agricultural & Biological Sciences, Biochemistry, Genetics & Molecular Biology, Chemistry, Materials Science, Maths, Social Science and Earth Science. Also, was considered the year of publication: 2004-2005 years, 2007-2008 years, 2011-2012 years. For us, it was important to determine the rating of Computer Science for leading countries, Kazakhstan and other countries.

3 Discussion of results

As results of the first research step we see, that almost all domains show gradual upward trend, what can be considered as stable development of particular domain. Best results represent: Machine Learning, Big Data, Cloud Computing, Neural Networks, Robotics, Information Security and Visualization domains. Most of them are related to Artificial Intelligence sphere, so that it is worth noting, that AI sphere is going to get higher priority among other spheres.

Results of the second step: assessment of convergence. Domains, which have strong connection with others are: Machine Learning, Cloud Computing, Robotics, Visualization, Augmented Reality, Big Data.

Concretely, for the pairs of domains Machine Learning – Neural Network (78.13% publications Google, 73.45% EBSCO); Augmented Reality – Visualization (75.34% publications Google, 27% EBSCO), Robotics (22% EBSCO); Big Data – Cloud Computing (47.72% Google, 17.45% EBSCO), Visualization (23.8% Google, 11.95% EBSCO); Bioinformatics – Machine Learning (16.38% EBSCO, 13.71% Google) are shown the good interconnections.

Results of the third step: Leading countries. The results show, that between 2004 y. and 2005 y., for “Leading Countries”, the average rating of publications in the Computer Science (CS) domain is 6.75, between 2007-2008 years It was increased to 5, and between 2011-2012 year to 4.75. 1st place during all this years belongs to Medicine domain. As to Kazakhstan Republic, the rating of CS was 10, 13, 12 accordingly. 1st place in the rating belongs to Physics and Astronomy, during all period from 2004 to 2012 years.

4 Conclusions

Analysis of the number of publications in the field of ICT allows us to select some promising areas of research: Big Data, Augmented Reality, Machine Learning, Neural Networks, Visualization, Software Defined Networking, 5G, e-Governance, Cyber-Physical Systems, Cloud Computing, Computational biology, Embedded systems. For all of them software plays significant role. Implementation of such software in the Republic of Kazakhstan, is quite an attractive prospect both for business and science.

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Simulating an image based presentation by real-time ROI detection

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Abstract

In the past few years, multimedia in education takes special and a huge role in providing lectures. For instance, for allowing computer images to display onto a board, an interactive whiteboards, IP boards, and other smart boards used during the lectures. They are a powerful tool in the classroom adding interactivity and collaboration, allowing the integration of media content into the lecture and supporting collaborative learning [1]. However, many organizations cannot allow them because of high cost. That is why, demanding for cheap whiteboards with smart board's functionalities increasing day by day.

For this purpose, we develop methods creating interactive white board functionalities using pattern detection, recognition and synthesis. As a device, we used white board and camera, as additional device, projector can be used.

In this paper, we propose a method that used for generating a lecture video to set of HD pictures by keeping speech. The lecture images from a whiteboard are cropped in real time and send to the server to create a presentation. In real time, using cropped images, a lecture presentation will be generated.

Keywords: lecture, smart board, patter detection, camera

1 Introduction

The main goal of this exploring is creating a system with interactive white board's functionality using detection and recognition.

Research consists of 4 parts.

In the first part, ROI detects. For detect ROI we use four labels as little squares in the corners of a whiteboard.

After detecting the whiteboard we used noise removal from detected region.

In the next part of the research, we used transformation and rotation of matrix into normal form. It needs to convert the images that shoot by some angle less than 90 deg.

Then all the collected data are send to server were creates the presentation.

FIGURE 1 Detecting ROI using predefined labels

2 Conclusion

In conclusion, we can say that the developed system can be used by schools, universities and brainstorming. During the research, real-time video and image based detection and recognition methods were used. In the paper we proposed only, ROI detection methods. In the next papers, we plan describe each methods that used in this system.

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Streamlined time tracking system for task management

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Abstract

This article describes an approach to problem solving of management and control of own time, how to effectively organize your time and avoid unnecessary things that waste time. Moreover there are concepts of technology that will be used to implement this system as solution, also advantages and disadvantages of the system, applying in practice. Program that will be a simple tool to keep track of time spent on various tasks in work, education, etc.

Keywords: time management, time tracking system, task, deficiency of working time, .NET technology

1 Introduction

Time Management - the technology of literate timing of resources and increase of efficiency of their use, which is a specific set of techniques and methods aimed at reducing the time spent on the performance of any cases without loss of quality. The main goal of time management is prioritizing among the tasks facing the person and performing in the place the most important ones [1,4]. Time management is a new direction in the field of management, a way to make the organization a competitive, creating at the same time employees more comfortable working conditions, which in turn increases their motivation.

Deficiency of working time - time resource shortages caused by the improper human organization of their activities, resulting in a hurry, delaying execution of works, jobs, poor performance, etc. that eventually significantly affect the performance of the entire enterprise [3, 4].

2 Deficiency of working time and effective time management

To effectively use the working time, first you need to know for what it is spent and why it is not enough. Reasons for not enough time closely interrelated:

permanent hurry; the absence of a clear distribution of work according to their importance; persistent improvements at home; "thieves of time"; fussiness; weak labor motivation [3].

There are many recommendations for effective time management and the ability to control it: organize the plans of the day by the method of "Alps"; establishing priorities by analyzing the ABC; accelerated analysis on the principle of Eisenhower.

Effective time management principles: determine what is urgent; do not over commit; have a plan for your time; allow time for the unexpected; handle things once; create realistic deadlines; set goals for yourself and for your time; develop routines; focus on the one thing at a time; eliminate or minimize distractions; outsource tasks or delegate; leave time for fun and play.

3 Time tracking system

As a result of my research for solving time management problem I develop the system that will be a simple tool to keep track of time spent on various tasks in work, education, etc. This tool allows you to create a list of tasks with time goals in hours, and keep track of the amount of time that you spend in each task.

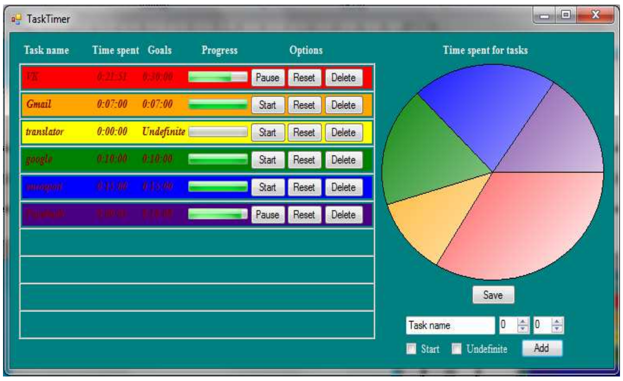

FIGURE 1 Prototype of the program

To realize the project used .NET technology, C# programming language. In this system at the same time user can do several tasks, and when he start doing a task, then the time tracking system records this process automatically at once. Also there are not limitations on the number of tasks. If user wants to add task, which is not performed on computer he can add it to system manually as well with goals or undefined goals. The user can analyze his time spending by pie chart diagram of processes which are made by him. Moreover, the user can clarify about tasks by their description. Farther, the user can control task, which is not performing on computer by using start, pause, restart, stop operation commands. Progress bars allows seeing a level of readiness of the task with goal. Advantage of the system is possibility to see statistics and detailed analysis for some period of time. Detailed analysis based on usefulness of task. User can label any task as a not useful, else the task automatically considered as a useful.

Apart from the fact that a person can use the program to control own time, the heads of companies can use the system as an observations of office workers, it would be very convenient way to control the working hours of their employees. So, using this system the employer will pay for only active working time and it will be like a force, which will move employees to work effectively.

4 Conclusion

It's important that you develop effective strategies for managing your time to balance the conflicting demands of time for study, leisure, earning money and job hunting. Making efficient use of your time is important regardless of what type of job or career you have.

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Technological preconditions for monitoring renewable energy

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Abstract

Wireless sensor networks, inter-machine communication system (Machine-to-Machine - M2M) and broadband networks based on new communication protocols that provide high speed and reliability of inter-machine connections will become the technological basis for big scale monitoring. Combining such disparate technologies within smart grids and using GIS for visualization presents strong interest for researchers both in terms of system architecture, economic indicators and security. Paper focused on the discussion of the elements of new technologies that could be used to develop system of monitoring renewable sources. We also briefly considered examples of monitoring systems and technology aspects that lies at the basis of such systems.

Keywords: Green and renewable energy, resource monitoring, GIS, visualization, smart-government, big and heterogeneous data, 5G

1 Introduction

Today, according to experts, there is no reasonable alternative to the development of renewable energy sources and energy efficiency, as decarbonization of the energy sector will allow to avoid the catastrophic consequences of global warming. In the best case scenario of development it is planned to reduce the demand for oil (30%), coal and gas with the overall growth of energy supply by 60%. By the year 2050 the share of use of fossil fuels will be slightly more than 40% of the total energy [1].

Country resources status control provides reasonable decision making both in the field of state regulations, and for the benefit of sustainable and safe development of the territory. Construction of such a system requires integrated application of a number of modern concepts and infor=mation technologies (Cloud computing, Big Data, Data Mining, machine learning, etc.).

It is feasible to make the system design based on geographic information systems (GIS) technologies, by supplementing it with the corresponding functionality, allowing to analyse the opportunity of using one or another energy generation technology for a particular area, relevant risks, economic costs, environmental impacts, etc. Such an intelligent system can become the basis the next generation of electronic government system (the intellectual electronic government – smart-government), where, along with provision of information services to the population, multidimensional data analysis and visualization systems and decision-making support systems will appear.

2 Technological basis of monitoring systems

The system of monitoring and decision-making support at different levels is necessary for decision-making on the use of various mechanisms of state regulation in the transition to renewable energy sources and taking into account other types of energy and non-energy resources. Modern systems of such level are constructed on application of several mutually supplementing technologies and systems: technologies of artificial intelligence and machine learning, the multi-agent systems, systems of data collecting and processing, including big data, systems of grid and cloud computing, geo information systems (GIS), communication subsystems etc.

2.1 COMMUNICATION SUBSYSTEM

Communication subsystems can be built on the basis of broadband access technologies that are actively developed at the moment to meet the needs of monitoring systems by providing a very small time delays in the network (remote sensing, traffic control, process control, etc.), high levels of reliability of the network (monitoring critical infrastructure: electricity transmission grid, industrial control, management and smart home or town, telemedicine) and fast data transmission of varying size - standard network 5G [2].

By experts estimates the 5G networks should provide [3]

- the possibility of growth of the transmitted data more than 1000 times in each service area by increasing the spectral efficiency using new RF bands and heterogeneous networks (specific bandwidth per unit area of the coating ASE = 1,5 ... 60 Gbit / s / km ^{2})
- an increase from 10 to 100 times the amount of connected subscriber devices (up to 300 thousand on the access node); currently, the LTE technology provides up to 200 subscribers per cell with velocities 100/50 kbit / sec;
- An increasing from 10 to 100 times the standard

speed of transmission on the client side;
- An increase to 10 times the battery life for low-power client devices;
- An decrease to 10 times the delay in the net «end-to-end» (less than 1 ms compared to 10 ms in LTE).

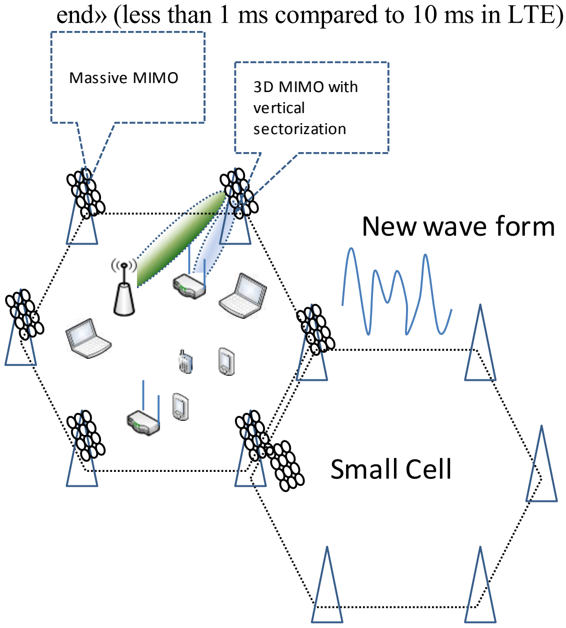

FIGURE 1 Key technologies of ITM Advanced

These parameters are planned to be achieved by the introduction of a number of modern technology and improve the quality of radio frequency resource (Figure 1):
- New radio interface with small cells (New Air Interface (Small Cells)) relying on new forms of oscillations (new wave form), new forms of duplexing, lightweight link-layer protocols (Light MAC), higher order modulation, effective methods of compensation-interference (Interference cancellation / utilization), multidimensional antenna systems (Massive MIMO - Multi-user Multiple-Input Multiple-Output [4]).
- New architecture of radio network (New NW Architecture) - distribution and management in a heterogeneous architecture HetNet, reconfigurable radio and network elements
- Radiofrequency resource - the use of high frequency bands including millimeter-wave, the new regime of licensing, spectrum sharing, the combined use of the spectrum inside and outside the premises.
- Intelligent and adaptive networks - the stochastic and adaptive using of network resources, the detection of the available spectrum and its use on the principles of cognitive radio, self-managed and automated network (SDN - software defined network)

2.2. GEO-INFORMATION SYSTEMS

Another important task is to visualize large data for decision making by humans [23].

For data analysis by a human, its (data's) convenient representation is in the form of spatial system, often tied to geographic coordinates, that is the use of GIS [5].

Currently developed and used are several multifunctional GIS, including web-based (MapServer, MapFish, GeoMixer, ArcGIS, Google Maps API). Each system has some advantages and specific characteristics (Table 1).

For example, one of the most popular paid GIS (ArcGIS) provides an opportunity to develop custom applications that work with spatial data and support client-server technology [6]. GEOMixer contains an application programming interface (API) that allows you to represent data from different sources [7].

In turn, MapFish is an open source product. MapFish uses the popular Python web framework Pylons [8]. MapServer is positioned as a development environment. It supports programming in different languages (Perl, PHP, Java, C, Python, etc.) and works in an environment of different operating systems [9].

3 Examples of monitoring and integration systems

Note that the idea of renewable energy source monitoring using geographic information systems is not new. Such systems have a social and industrial demand. These systems are developed in Russia [5, 10], the United States and other countries. The systems include data for resource assessment of RES technical specifications of installations, economic and social preconditions and nature preservation aspects [11] and are divided into local, regional, national and global.

In [11] presents an approach to the creation of web-based system based on cloud platform for the integration of heterogeneous spatial information for solving environmental monitoring coal mines. It is noted that due to the large extent on the territories, point forms of measurements, a significant delay of event registration and the lack of a unified picture of the environment, the work on the assessment of the environmental status do not give satisfactory results. It is proposed to use cloud technology to meet the challenges of distributed data processing. Components that are involved in the system: cloud service Google App Engine, authentication service Google Users API, the mapping service Google Map API, database management system PostgreSQL. Data are collected by using crowdsourcing methods. Authors suppose to collect technological data, spatial ecological data, continuously updated by remote sensing data (radar and hyperspectral pictures). Analytical processing can be built using the data from other sources (a meta descriptions and cloud services are used). Computational module is formed as a tree. The "movement" on the tree initiates computing activities.

Perhaps the most powerful system to date is the "Renewable resources map and data" by the National Renewable Energy Laboratory U.S. (NREL) [12]. The presence of such a laboratory reflects the increasing social demand and the economic interest in the availability of resources describing portals.

In Kazakhstan, there are currently no analogs for foreign Renewable Energy GIS. Unlike Russia, where there are GIS.

TABLE 1 GIS Comparison table

Parameters	MapServer	MapFish	GeoMixer	ArcGIS	Googe Maps API
License type	Freeware	Freeware (GNU GPL v3)	Shareware	Proprietary	Freeware
Country of origin	USA	France, Switzerland	Russian Federation	USA	USA
Developer	University of Minnesota	Camptocamp SA	RDC ScanEx	ESRI	Google
Documentation	English: user and developer level	English, French: user and developer level	Russian: user and developer level	English, Russian: user and developer level	English, Russian: user and developer level
Comments	Basic scaling and navigation functions, map legend. Supports SDL. Extends using HTML-templates and MapScript. Supports symbols (dots, lines) and labels. No AJAX.	Framework. Targeted on creation of RIA. Based on Pylons. Client part uses extended versions of OpenLayers, GeoExt and ExtJS. Has the “Studio” interface for control over web-applications.	Requires a flash enabled browser. API – interface for custom application development, allows to integrate projects created in Web-GIS into third party websites and connect additional modules and services.	ArcGIS consists of main components such as ArcGIS for Desktop (ArcView, ArcReader, ArcInfo, ArcEditor), ArcGIS for Server, ArcGIS Engine, ArcPad, ArcObjects. ArcGIS provides to the developers all the required tools to create custom applications for different platforms.	Using of APIs provides possibilities of access to position of user, routing on the map, visualization of hyper space data, adding three dimensional images into application and etc. The Google map API could used in the Internet exclusively
Development language	C/C++	Javascript; Python	.NET, Flash	C#, Visual Basic, Python	JavaScript; Python
API language	Java, .NET, Perl, PHP, Python, Ruby	Java; JavaScript; PHP; Python; Ruby	JavaScript	JavaScript; Flex; Silverlight	JavaScript
Available OGC services	WMS; WFS	WMS; WFS	WMS	WMS, WCS, WFS, WPS и WMTS	OGC KML, WMS, WFS
Work with tiles	No	Yes	Yes	Yes	Yes
Current version	6.4.1 from 02.01.2014	2.2 from 09.03.2012	2.0 from 16.03.2014	10.2 from 30.07.2013	Version 3 from 01.02.2013
Official address	http://www.mapserver.or g	http://www.mapfish.org	http://geomixer.ru/	http://www.esri.com	https://developers.google.com /maps/

Projects on hydro resources for individual areas, an atlas of solar energy resources and a climatic database, as well as a portal for Renewable Energy sources [13], the information base of Kazakhstan presented poorly. There is a wind atlas [14], but other sources of renewable energy are apparently not represented in the form of web resources

Large-scale monitoring systems are built using remote sensing technologies on Earth’s surface. Examples include, in particular, environmental monitoring systems [15], the wind and solar energy monitoring system [16, 17], as well as the above-mentioned NREL. In Kazakhstan the issue has received considerable attention [18].

In particular, much attention is paid to environmental issues in the mining industry. In [18] discussed the task of developing of the GIS for space monitoring farming operations, the productivity estimation of arable land, geoinformation modeling of air pollution in the city and the system architecture. System is based on two types of GIS – monitoring and engineering simulation.

However, many of these systems consider only some aspects of monitoring and direction as separate, often unrelated systems. The task of combining heterogeneous information resources is one of the important scientific problems and actively discussed in the scientific community. One of the approaches in building a platform for the implementation of access to heterogeneous information resources implemented in the SB RAS [19].

In work [19] was described a technique for the integration of distributed heterogeneous data sources based on loosely coupled distributed subsystems. The platform, named authors ZooSPACE, designed for virtual integration of heterogeneous databases. Infrastructure of system is implemented on an arbitrary number of loosely-coupled components. Interaction is based on network-layer protocols TCP / IP-based technology SRW / SRU and Z39.50 that have the significant potential for integration of data from different databases.

The system functioning is provided by set of LDAP servers that store the configuration information in the form of a single hierarchical database. All LDAP server are replicated. Server systems are based on the previous results of the authors. They provide interfaces to access data by protocols SRW / SRU and Z39.50 and provide interaction with the database server. Supports the ability to redirect requests to other servers, including outside the system. In addition to these servers, the system includes monitoring subsystem, gathering statistics, and providing administrative and custom web interfaces. Components of the system are implemented by PHP language in the Apache server environment. A pilot project consists of four nodes (ICT SB RAS, NSU, SPSTL, Tomsk Scientific Center, Russian Academy of Sciences) and provides access to 60 data sources containing more than 40 millions of records.

4 Conclusion

Monitoring of the country's resources status allows the making of informed decisions in the field of government regulation and the sustainable and safe development of the territory. To develop such a system a complex application of some modern concepts and information technologies is required (Cloud computing, Big and heterogeneous Data, machine learning, next generation of communication protocols and other).

For decisions on the use of various mechanisms of state regulation in the transition to renewable energy sources and the use of other useful resources a decision support system at national and regional levels is necessary.

Such an intelligent system can become the basis of the next generation of electronic government (intellectual e-government - smart-government) where, along with the provision of information services to the public, systems for the analysis and visualization of multidimensional data and decision support will appear.

For the implementation of the system is necessary to solve some important problems related to the detailed system architecture, services, data collection and processing, functionality provided to users, aggregation of heterogeneous data and methods of their storing.

Some successful examples of monitoring systems are discussed above. These realizations show us the several ways to construct of system architecture and integration different technologies.

Acknowledgement

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The advantages of "thin clients" in information security

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Abstract

Reviewed administrative and economic benefits by using "thin client" in the electronic document management system; reviewed some aspects of information security.

Keywords: thin client, electronic document management system, information security

1 Introduction

A **document management system** (**DMS**) is a system (based on computer programs in the case of the management of digital documents) used to track, manage and store documents. [1]

With the development of information technologies for document management opened great opportunities, such as the use of thin client.

2 Overview of the "thin client" in the electronic document management system

Using “thin client” in electronic document management system allows the use of any operating system, because access to the system is available through a browser. Unlimited time access from any computer and mobile device.

From a financial point using a thin client saves money on licensing and maintenance of software. And also reduced support costs, growth of labor productivity of employees.

All this makes the electronic document management system high priority system for any company.

3 The advantages of "thin clients" in information security

Remote access is always important issue of information security. Consider the advantages of "thin clients" through the prism of the following basic aspects of information security: availability, integrity, confidentiality.

Centralized data storage and execution of all tasks and processes on a remote server allow to exclude the following factors affecting on the availability: Local hardware failures, theft, power failures.

The centralized architecture also has advantages, while maintaining data integrity. It can be used to eliminate or reduce the effects of factors such as local storage system’s data, Local processing of tasks and processes.

Despite all the pros and usability of thin client there minuses and risks of information security. For the correct operation of the system needs a large amount of hardware resources and fast data channels. Any failure on server side will lead to the total collapse. There is also a risk of hacking the system with browser exploits, which is used to access the electronic document management system.

4 Conclusions

IT industry is growing rapidly in the direction of mobility. Thin clients are one of the directions of this flow. On the one hand electronic document management system using a thin client is a fast and easy way to get access to documents, and on the other hand the risk of losing the confidentially information.

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The analysis of future 5G mobile standard radio technologies

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Abstract

The main focus and aim of this research work is to analyse of radio technologies for future standards of mobile communication. There are some perspective technologies, which will be able to perform the increasing demand on the data transfer, as well as will facilitate introduction of new technologies in the field.

Keywords: radio technologies, 5G mobile standard, millimetre radio waves, Massive MIMO, D2D technologies.

1 Introduction

Mobile communication systems occupy dominant position in the telecommunication industry. Due to the rapid growth of the popularity of modern mobile communication devices the amount of mobile data traffic is also on the rise. Thus, growing amount of data transferred requires development of new radio technologies.

2 Overview of technologies

Inaccessible centimeter range of radio waves, which are deployed in existing wireless broadband networks, impose greater restrictions on the width of the frequency band and hence, on the rate of information transfer. Therefore, special attention is now paid to the use of millimeter radio waves, where a vast part of the spectrum remains mostly unused. Thus, it is necessary to activate the development of new radio interfaces, means for transmitting and receiving signals, a network architecture, principles and conditions for use of the spectrum, as well as solutions for interaction with existing technologies.

Potential solutions include Massive MIMO technology, a feature of which is the usage of multiple antennas at the transceivers, which increases the data transfer rate is almost proportional to the number of antennas for improved signal quality due to the reception by several antennas. The next generation networks are planning extensive use of technology D2D (Device-to-device), which allows devices located close to each other exchanging data directly, without involvement of the network, through which only signaling traffic will be held. The advantage of this technology is the ability to transfer data in the unlicensed portion of the spectrum that will further offload network. One of the key directions to increase throughput technology is the full integration of small cells (Small Cell). In this context, it becomes an important problem to reduce self-interference between the macro and small cells.

Increasing spectral efficiency of the networks of the future standard can also be achieved using a multiple access technique NOMA (Non-orthogonal multiple access), which reduces the self-interference as a consequence of multiplexing user channels when account differences in the path loss propagation of each user. Also there is a need to research and develop new methods for multi-frequency modulation, giving the win to existing technologies.

3 Conclusions

Thus, the use of new technologies will improve the performance of mobile networks and systems of existing solutions, and will facilitate development in the near future.

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The application of virtual instrumentation to study physics

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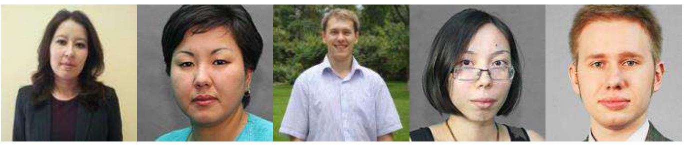

Abstract

Application of virtual instruments to study physics is presented. The competitive analysis of virtual instruments vs real laboratories is given. Shown, that implementation of virtual computing technologies to study physics can attract the attention of students to explore difficult questions and become a good methodological support in the educational process.

Keywords: information technologies, virtual instruments, physics

1 General

At present time, a lot of work is devoted to the use and implementation of information and communication technologies, as well as educational software development in the educational process [1]. One such example is the use of virtual laboratories. The Virtual Laboratory (VL) is a computer program or set of related programs carried out the computer simulations of certain processes [2]. The use of such software developments in the study of science and engineering disciplines, such as physics plays a special role. The modern physics program included a huge number of difficult-to-understand questions. The most convincing way to explore such questions is to demonstrate the physical phenomena in the real physical devices.

Compared with real laboratory works virtual labs have several advantages. First of all, in order to study in detail different physical processes it is not necessarily to buy quite expensive equipment and dangerous radioactive materials. Thus, for instance, specially equipped laboratories are required to conduct the laboratory works on quantum, atomic or nuclear physics.

Secondly, using the virtual physical laboratory it is possible to simulate the processes, which are impossible to reproduce in the lab. In particular, the majority of the classical laboratory works on molecular physics and thermodynamics are the close systems. At their output a set of electrical quantities is measured; then they are used to calculate unknown quantities, applying electrodynamics and thermodynamics equations. And all the molecular-kinetic and thermodynamic processes, which take place during the experiment, are inaccessible to observation. While conducting the virtual laboratory works on these branches of physics, students can observe dynamical simulations of studied physical phenomena and processes, which cannot be seen during a real experiment. Moreover, it is possible at the time of the virtual experiment to observe graphical construction of the corresponding dependences of physical quantities.

Thirdly, the virtual laboratory works can provide more descriptive visualization of physical and chemical processes, than it can be seen during the usual laboratory works. For example, with the virtual laboratory it is possible to examine the physical processes, such as motion of charged particles, or p-n-transition principle, in more detail and clearly. Besides, computer modeling of physical phenomena allows to penetrate insight the processes, which last fractions of a second or several year, for instance, planetary motion.

Another important factor is safety. Applying the virtual laboratory to study physical processes is undoubtedly much safer way of studying rather than using the real laboratory equipment. In particular, the virtual laboratory works are more than justified in the cases of operations with high voltage or hazardous chemical substances.

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The virtual laboratories on “Physics” subject were developed in International Information Technologies University on Computer science and software engineering department, Almaty, Kazakhstan.

Development performed on the platform Microsoft .XNA C #, which makes it possible to create realistic 3D scenes. To develop a prototype of virtual 3D scene Physical Laboratory primarily, carefully analyzed the simulated physical process, then it creates a scenario simulation - detailed knowledge and behavior change process and the texture is drawn scenes.

2 Conclusions

Thus, today's global trend in higher education is the widespread use of virtual computing technologies. Modeled on the computer screen virtual experiments in physics allow to attract the attention of students to explore difficult questions and become a good methodological support in the educational process.

Acknowledgement

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Computer component of professional competence of teachers of mathematics and its formation

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Abstract

This paper describes construction of multilayer perseptronby two different open source simulators for neural networks - Neuroph and NetMaker. Described multilayer perseptron solves logical function "or". The aim is to compare the capabilities of different simulators for neural networks, study of their learning opportunities, training and visualization of established networks.The results are used to determine the optimum subject areas and relevant tasks, which can be used various simulators for educational and research purposes.

Keywords: networks, NetMaker, Neuroph

1 General

The present level of development of informatization of education is characterized by the fact that, although different kinds of software products already well able to provide the entire range of needs of educational practice, and in many methodological studies have shown the possibility of such support, direct attempts to implement them in a broad pedagogical practices are often limited not always rational using demonstration programs, such as "Power point", or "closed on itself" periodic involvement in learning favorite software without sufficient motivation of such involvement and appropriate correlation of different types of software products with some common general positions.

Accordingly, very typical for today's practice of teaching mathematics application software as an end in itself, designed only "blooming" appearance boring course lesson by abstract slogan "development of informative interest", often not only at odds with the logic flow of cognitive processes, but also has a negative impact the attitude of a large part of students in mathematics, which is reflected in the predominance of their external motivational factors of internal motivation, leads to the existence of deep interest to examine the contents.

However, many important types of mathematical activity, as shown by our observations are actually "locked" in the semantic field of the students that substantially hinders the effective implementation of goal formation and acts of meaning underlying the manifestation of their creativity and initiative.

One of the main reasons for this is the unwillingness of teachers of mathematics to organizations focused, motivational and instrumentally conditioned process of teaching mathematics on the basis of rational attraction capabilities of modern software tools, in turn, stems from the existence of a kind of methodical "vacuum" in the training of students of mathematical specialties of teacher training Universities to use such funds in real educational process. This fact has a negative impact on the effectiveness of training for all school subjects, teaching math in this same vein is the most "vulnerable".

It is the mathematical structure is known - is the native language of the computer. And that mathematics could be for students now really promising tool for studying the real processes and phenomena, she initially "doomed" on the need to mainstream ideological and instrumentally "related" in relation to a particular section of mathematical software tools that are able to not only provide deliverance from the students perform their routine functions (computations transformations elementary constructions), but also catalyze the manifestation of their search activity and creativity through visualization and dormant initially hidden in the studied mathematical content of backbone connections and relationships. For example, the standard graphics routines, easily implemented in a virtual environment, allow the natural way to visualize strategies for solving various mathematical methods, thereby initiating the updating of the search process in schoolchildren.

Said reveal more detail. Currently, as part of the training are the following potentially important from the point of view of the problem the following disciplines: mathematics (algebra, analysis, geometry and higher, etc.); own computer and methodical (theory and methods of teaching mathematics, teaching practice, methodical elective courses). In the study of each of these cycles, the computer is designed to perform its specific role, contributing to the formation of a "computer-methodical" competence of the future teachers of mathematics. For example, in the study of mathematical disciplines future teacher can get acquainted with the peculiarities of using a computer to solve problems from various mathematical disciplines (induction phase); in the classroom for informatics specific examples can be propedeutic examination of teaching and developing capabilities of the computer even when the disclosure of selected issues of school mathematics (instrumental-propedeutic phase). Finally, in the process of proper methodological training (main stage) it is advisable to have come from a coherent and internally consistent system of formation of readiness of mathematics teachers to use computers in school practice.In real high school practice, as shown by our observations, the role of each of the selected stages significantly infringed. In particular, the first stage of the limited time and lack of special training for teachers often can not even occasionally involve computer means to intensify the educational process (besides specialized packages of software packages and applications, such as Excel, Visual Basic, Fyzzy Cale, Lotus, Super Cale, Mathematica, MathLab, Mathcad, FUZZYtech et al., in accordance with past practice, we study a little later). The study of said software dedicated to the second of the above steps, in contrast, almost no school math oriented to material substantially remaining under the university mathematical sections using numerical methods.

Such spontaneous, as a rule, not decorated single "ideological platform" training in the use of computer tools educational purpose in mathematics lessons in the school pushes the leading methodological problems of the problem of continuity of such training, as throughout the professional and pedagogical training of mathematics teachers in pedagogical high school, so and within its purely methodological component. In this case, under the succession, in accordance with the Pedagogical dictionary means existence of a logical connection and the right balance between the parts of a computer-methodical preparation of students of clear requirements for their knowledge and skills at each stage of the training, rational correlation logic supply and receptions organization Learning material. The result of the implementation of such continuity is a purposeful formation of computer-methodical competence of the student, the underlying systemic thinking of the future teacher of mathematics.

Let us open in this way some of the features mentioned above components of professional pedagogical preparation of the teacher of mathematics. Among the core competence of the teacher of mathematics appropriate to consider its ability and willingness to use software for educational purpose at different stages of learning mathematics. This competence involves the mastery of a number of actions, the characteristics of which are presented in the following table (Table 1).

Components of computer-methodological component of professional and pedagogical competence of the teacher of mathematics:

Activities	Activities Composition actions related to this activity
Analysis of the learning task at the possibility of applying the software in its solution	Determine the type of lesson, in which the learning task is solved; 2. Determine the phase of the lesson; 3. Determine the type of learning task
The choice of specific software tools for solving this learning task	After mastering the previous step we have a set of software tools educational purposes, from which the final selection based on the following parameters: 1.Individual and age pupils opportunities; 2. The subject and content of the lesson; 3.Preferences teacher; 4.Equipped classrooms; 5.Possibility of double lesson
Identification of software that can be used for solving a specific learning task	Species selection software in accordance with the above classification
Effective integration of software tools in a methodical line tutorial problem solution	Determination possibility of combining software tools with traditional methods, forms and means of education (conversation, individual self-study, lecture, discussion groups, etc.)
Reflection of the conduct or outcome of the related software tools	During the joint discussion clarified the advantages and disadvantages of the proposed pedagogical decisions. Formulate conclusions and recommendations for further work in this direction

When introducing computer-methodological component in the content of the basic methodical preparation of the mathematics teacher can use different approaches to its structuring (presented in the diagrams), each of which has its own advantages and disadvantages.

1. Integrated use of software tools throughout the learning process.
2. The use of software tools for the most "winning" in terms of the use of certain topics of the course.
3. The use of software tools for the most "winning" in terms of the use of individual lessons theme. Study of new material. Lessons on the absorption of new material. Lessons repetition and systematization. Lessons monitoring.
4. The use of software tools for the most "winning" in terms of the use of the individual stages of a lesson. Checking homework. Study of new material. Securing material. Control during the lesson.
5. The use of software tools for the most "winning" in terms of the use of certain types of learning tasks on: introduction (studying, anchoring) concepts; training proving theorems, elimination of properties, the use of the theorem for the solution of other problems; training exercises solving word problems; training solution geometric construction problems (using constructions); Learning the challenges associated with the construction of the model (modeling).
6. The use of software tools for the most "winning" in terms of the use in solving problems through teaching, we represent a relevant didactic lines.

2 Conclusions

In actual practice, the training should be used rational combination of the proposed approaches under the leadership of the fifth approach, as best suits the specifics of the course.

The results indicate the feasibility of the proposed pedagogical decisions and their effectiveness within the claimed function space, as reflected in the results of special examinations.

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The computer modeling of the level of the user's doubts in electronic testing for e-learning

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Abstract

First, let's denote the object of our study. What is the test? And how can we measure the level of doubt test during testing?

Testing in general scientific sense is a brief standardized test aimed at obtaining a compressed period of time the most essential information about the symptoms of this particular object in order to establish his presence or severity of a particular property or quality. Testing is now used in various fields: medicine, psychology, and programming. But more often the word "test" is associated with the method of testing students' knowledge. Traditional pedagogical tests are a list of questions and tasks of different difficulty levels. The following types of jobs:
- With a choice of one correct answer (closed);
- With a choice of several correct answers;
- With a choice of wrong answer;
- The establishment of conformity;
- The establishment of the sequence;
- Tasks that require their own write response (open).

Depending on the complexity of the issue, the answers are assessed at different points.

Testing puts all participants on an equal footing. In one side this method of examination more equitable than the traditional test of knowledge. On the other hand, there is an element of chance, where the student can just guess the answer. And this is the purpose of the study, that is, to minimize the degree of doubt, and improve the quality of education [2].

Keywords: testing, distance learning, doubt

1 Introduction

The level of doubt the user is latent parameter measurements, i.e. not directly measured. Level doubt plays an important role in the assessment of knowledge, because it takes into account the psychological characteristics of human behavior. At the level of latent doubt includes the following parameters: length of time the decision-making; periodicity; intensity; response to the outrage; reaction to the decision-making; artificially created situation; questionable actions of the user and others. For the measurement of these parameters are necessary quantitative characteristics: number of missed transactions; number of unconfirmed information; interrupts logical chain et al. To account for the level of doubt, the user is offered the following method [1].

The essence of the method is to confirm the doubts of the decision, by comparing it with the decision of this type. Defined latency parameter of this model uses the following quantitative characteristics: themes, complexity, and decision.

One of the biggest challenges is the problem of accounting doubt test depending on the complexity of the issue. For example, if the question is easy, then the test should be no doubt on the answer of this question. Some cases, when the average level of complexity of the issue or complex. At this stage, you can avoid doubts. To keep records of doubt, depending on the complexity of the issue requires that the program was a response to the pre-selection, and later his confirmation. Hence, it all comes down to the number of pre-poll options, ie to the number of doubts [3].

As questions are divided into levels of complexity, the ratio of ratios is doubt about: a: b: c = 0.5: 0.3: 0.2, respectively, using the formula:

$$K = 1 - \left(\frac{1}{2}\frac{S_a}{S_{a\max}} + \frac{1}{3}\frac{S_b}{S_{b\max}} + \frac{1}{5}\frac{S_c}{S_{c\max}}\right), \quad (1)$$

where K – coefficient characterizing the degree of certainty;

$\frac{1}{2}\frac{S_a}{S_{a\max}} + \frac{1}{3}\frac{S_b}{S_{b\max}} + \frac{1}{5}\frac{S_c}{S_{c\max}}$ - coefficient of doubt;

$\frac{1}{2}\frac{S_a}{S_{a\max}}$ - coefficient characterizing the doubt of a level questions;

$\frac{1}{3}\frac{S_b}{S_{b\max}}$ - coefficient characterizing the doubt of b level questions;

$\frac{1}{5}\frac{S_c}{S_{c\max}}$ - coefficient characterizing the doubt of c level questions;

S_a, S_b, Sc – number of doubts (number of pre-poll options -1), respectively, in matters levels and, b, c;

S_{amax}, S_{bmax}, S_{cmax} – the maximum number of doubts in matters of level a, b, c.

If we have the greater the number of doubt and coefficient of doubt will be more. Consequently, the tester doubts in their responses.

2 Conclusions

The proposed method of measuring the level of doubt the user gives a clearer and more "transparent situational picture" for a more objective decision-making. Also, the method makes it possible to reduce the probability of guessing the correct answer, which increases the objectivity of knowledge in diagnostic systems for process control training on remote technology.

The results obtained in this study can be used for decision-making in the learning management information and training distance learning system.

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The synthesis of multivariate control systems by inexact data objects

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Abstract

For the decision of the analysis and synthesis tasks, research of quality indicators of control systems by interval and indistinct methods [1] are used. Application of the given methods is caused by that discrepancies of the data in parameters of object of management or, otherwise, uncertainty have a statistical property.

Keywords: inexact data, methods of the interval analysis, multivariate 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

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] and methods of the interval analysis. The computing algorithm in C ++ is developed.

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The study logical methods of modelling the behaviour of hybrid systems

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Abstract

A hybrid system is a dynamic system that exhibits both continuous and discrete dynamic behavior – a system that can both flow (described by a differential equation) and jump (described by a difference equation or control graph). A hybrid system has the benefit of encompassing a larger class of systems within its structure, allowing for more flexibility in modelling dynamic phenomena. In general, the state of a hybrid system is defined by the values of the continuous variables and a discrete control mode. The state changes either continuously, according to a flow condition, or discretely according to a control graph. Continuous flow is permitted as long as so-called invariants hold, while discrete transitions can occur as soon as given jump conditions are satisfied. Discrete transition may be associated with events.

Keywords: computer modelling

1 Introduction

Hybrid systems - mathematical models of control systems in which the continuous dynamics generated at each time one of the preceding given set of continuous systems, replaced with discrete operations, signaled or a quick switch from one system to another, or hopping on a given current coordinate with other coordinates, or a combination of both. Hybrid system property is combination of continuous dynamics with discrete. Continuous and discrete components of the system property sometimes include other parameters that change the overall system performance. Hybrid dynamic systems can sometimes be also occur when a piecewise linear approximation of a complex nonlinear system of differential equations. The decision of different management objectives for complex nonlinear system can be solving similar problems for the hybrid system.

2 Overview of the study area

Important concepts to issues of research for solving algorithms verification of hybrid systems is the construction of bisimulation. Bisimulation - a factor space with a finite number of states where the properties of the reachability is equivalent to the same property in the original hybrid system with an infinite number of positions. Previously [1] were introduced on the minimum-hybrid system is a hybrid system in which the characteristic sets and streams are definable in o-minimal theory. Currently, this system is an active subject of research.

The theory of formal verification is an important approach in the analysis of the properties of hybrid systems [3]. The system, which will analyze, initially modeled as a hybrid machine, and the desired property of the system is expressed by the formula of a temporal logic. Then a model checking deductive or algorithms are used in order to ensure that this complex model functions actually satisfies the desired property.

Bisimulation - a system that preserves reachability in the sense of the verification of a property on the quotient system is equivalent to checking this property on the original system. Although even feature of this study are the properties of attainability, bisimulation retain many other complex properties that can be expressed in branching time. The main aspect for the use of the algorithm is bisimulations thinning initial partition of the state space as long as it will not calculable by the dynamics of the system and this property should remain.

Bisimulation equivalence is also thin on the set of states, showing the properties of the system in branching time semantics. However, for most systems with an infinite number of states bisimulation unsolvable, ie there is no algorithm to recognize whether two data bisimulation state [2]. So some may be of interesting method of obtaining certain families bisimulation relations with the auto morphisms of the system.

Hibrid system algorithms are essentially reachability algorithm that checks whether the trajectory of the hybrid system to achieve some unwanted regions of the state space.

3 Conclusion

Verification algorithms are essentially reachability algorithm that checks whether the trajectory of the hybrid system to achieve some unwanted regions of the state space. Because hybrid systems have the space with an infinite number of states, the solubility of verification algorithm is very important. The theory of formal verification is an important approach in the analysis of the properties of hybrid systems.

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Application of machine learning to the monitoring of renewable energy sources

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Abstract

The paper covers opportunities for application of Machine Learning and other mathematical/statistical models and artificial intelligence algorithms in a geographic information system developed for monitoring of renewable energy sources. The system adopts concepts of crowdsourcing and heterogeneous data in order to provide the most complete set of necessary data possible to be used for analysis, research and decision making by individuals, companies and state entities of Kazakhstan.

Keywords: Machine learning, GIS, renewable energy, machine learning, heterogeneous data, monitoring of energy sources

1 Introduction

Geographic Information Systems (GIS) are becoming increasingly popular in many areas of industry, governance and administration [1-4]. GIS represent not only systems for data acquisition, storage and representation, but also tools for analysis of the data, extracting information and insights from it using machine learning and other mathematical/statistical models.

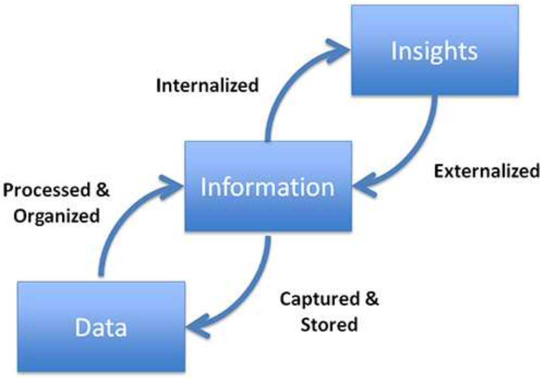

FIGURE 1 Data-Information-Insights model [5]

Raw data is usually easy to obtain and in many cases freely accessible. However extracting knowledge from the data is a much more complicated problem. What can be considered knowledge in GIS for monitoring energy sources? In this case, knowledge is something that can be used for decision-making and practical applications, unlike raw data or information, which cannot be directly used in real-life activities. For example, wind maps of Kazakhstan during different seasons and statistical data regarding climate in the area during past decades is just data/information. However, from this data it is possible to extract actual knowledge with actual practical utility – for example, the most optimal location for wind turbine electricity generators, recognize critical areas, in which energy issues are possible due to seasonal climate changes, etc.

The aim of the paper is to elaborate on possible applications of Machine Learning and other models for data extraction in Energy Source Monitoring GIS [6], as well as outline problems related with crowdsourced data and heterogeneous data and suggest solutions.

2 Machine Learning models application to analysis and decision making

Machine learning is a vast branch of Artificial Intelligence, which studies different algorithms and models capable of gathering experience from existing data (learning) and which can then be applied to solving a number of practical problems, such as recognition, predictions, clustering, etc.

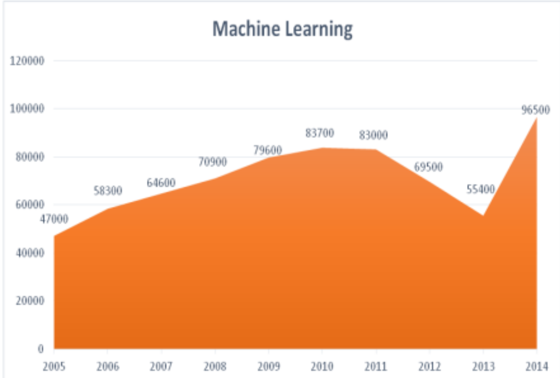

FIGURE 2 The changes of the number of publications in the Machine Learning domain (Obtained by using Google scholar - https://scholar.google.com/)

One of the most profound ML models is Artificial Neural Network (Figure 3).

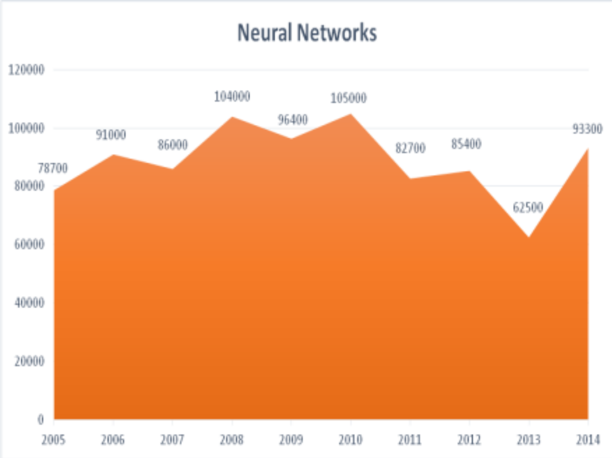

FIGURE 3 The number of publications in the Neural Networks domain (by Google scholar - https://scholar.google.com/)

At the last time ML research domain has obtained "a new breath". The numbers of publication is essentially increased (Figure 2). Researches apply ML methods to solve wide class of problem from robotics and to augmented reality and cyber-physical systems.

This mathematical model was developed as an attempt to simulate behavior of a human brain and neural system. Given a set of data Artificial Neural Networks are capable of searching for correlations, dependencies and patterns in the data during a process called training. After successful training ANN is able to generalize the experience obtained from the data and be able to recognize (or predict) unknown objects/data. In contrast with other algorithms, for example linear regression, neural networks are capable of easily solving multi classification problems.

However, Machine Learning includes a number of other algorithms and models, which can be more fitting for specific problems, such as: k-nearest neighbors algorithm, linear regression, decision trees, support vector machines, etc.

As mentioned earlier, the Energy Source Monitoring GIS is aimed not only as a tool to store and represent data, but also as a tool for decision-making. Let us consider the problems, which can be solved using Machine Learning algorithms and models.

One of the problems, which can be solved by the GIS system is recognizing the best locations for a certain type of electric generator (wind turbine, hydro-electro station, thermal power plant, etc.). There are a lot of factors to consider and it can be difficult to build a formal deterministic model to solve this problem. Some of the factors are: economic feasibility, availability and sustainability of the utilized natural resource, ecological considerations, existing infrastructure, legal issues. Some Machine Learning models, such as Artificial Neural Networks can be developed to be capable of evaluating decisions based on past experience and propose optimal solutions with given restrictions.

Another thing to take into account when making decisions regarding energy resource is future estimations. Each power plant and power line has some margin of safety, all infrastructure and industry tends to deteriorate over time, which first leads to decrease in power output and degradation of currency quality (stability, compliance with technical standards, etc.), and at some point the plants/infrastructure either need to be significantly renovated or closed. In addition, most of the ecological-friendly sources of power (winds, rivers, etc.) can vary strongly from season to season and even during a particular season serious fluctuations of weather a possible.

In order to make decision in such ever-changing and unpredictable environment, prediction is a very important factor. It needs to be taken account in order to better estimate economic feasibility and to create a sustainable, fault-free infrastructure even in critical situations: such as long-term negative weather conditions and lowered power output due to deterioration of certain power plants.

Overall, machine learning algorithms are a great tool for informed decision-making in such complex environment, as energetic infrastructure.

3 Problems of crowdsourcing and heterogeneous data

One of the main features of the project is using crowdsourcing for gathering information. Although this method allows collecting vast amounts of information with low expenses and overhead, there are some problems related to it, which have to be addressed.

Crowdsourcing is used to solve big amount of relatively simple problems such as collecting and processing of data. Everywhere where we can divide the task onto the simple elements and collect them together after processing that crowdsourcing allows obtaining good results.

The significant applications of crowdsourcing are Galaxy Zoo project of NASA (www.galaxyzoo.org), games Foldit, Spectrals devoted to system biology (fold.it, http://lxsrv7.oru.edu/~alang/) and so on. For example, the Galaxy Zoo project transforms a potentially mundane, but difficult computer vision task (classifying images of galaxies) into a challenge. Foldit presents protein folding as a sort of three-dimensional puzzle, where players are invited to shake and wiggle the three-dimensional structure of proteins in order to and the most stable conformations.

One of the problems is deliberately or accidently invalid data. Since everything and everyone can become source of information, there is always big probability of mistakes due to human factor, data format issues or deliberate providing of knowingly incorrect data.

This can also be addressed using machine learning models, such as K-NN, which allow recognizing anomalies. If some of the parameters of crowdsourced data differs substantially from the data present in database, such object can be recognized as anomaly and be excluded from the database.

Another problem is duplicates. Due to different reasons, same object (power plant) can appear in two or more different sources, but due to data heterogeneity, different data format and errors the two object in database will not be completely the same, although they would both represent the same real-life object (power plant). Therefore, it is not possible to just check for duplicates by column-to-column comparison.

The proposed solution is using clustering methods, such as K-NN, which allow recognizing groups of similar objects (clusters). If such model is properly configured, it can allow recognizing duplicated in the DB, although the two (or more) objects might be not 100% equal.

Another issue with the system is heterogeneous data. Most of the Machine Learning algorithms are well developed to work with homogeneous data – when every object has the same list of parameters. However when we work with crowdsourcing and heterogeneous data, some information may be missing or be in different format for different objects. This issue has to be addressed by either interpolating the data or creating models, which are capable of working with incomplete parameter set. There are developments in this direction: for example, C4.5 Decision Tree algorithm [7] is capable of working with incomplete data.

4 Suggestions

Although the discussed Machine Learning models are capable of solving the problems, in such complicated environment a pure Machine Learning algorithms, without any mathematical model describing fundamental processes in the system may not be able to provide the desired quality of decision-making assistance.

The solution is mixing formal mathematical model for calculation of fundamental processes in the system (interpolation of weather data, economic feasibility calculations, electric currency analysis, etc.) with Machine Learning for analysis and decision making.

5 Conclusions

The paper covers the issues, which came up during development of Energy Source Monitoring GIS and proposes Machine Learning models as a solution for some of them.

One of the goals of the GIS is providing tool for decision making and extracting real practical knowledge from crowdsourced heterogeneous raw data. It includes problems of recognition and prediction, which can be addressed using Machine Learning algorithms.

Another issue is invalid data from crowdsourcing and incomplete data or different data format due to heterogeneity. This problems are also possible to be addressed using Machine Learning models.

Acknowledgement

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Use of electronic resources in the study of the interaction of pulsed plasma surface materials

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Abstract

The aim of the work is to study the interaction of pulsed plasma with the surface of materials using electronic resources. The programming language Adobe Flash Player was used at the creating of electronic textbook.

Keywords: electronic textbooks, plasma, plasma technology, surface, treatment

1 General

At the present time actively developed computer tools for conducting training courses. In almost all areas of academic disciplines are electronic textbooks and virtual labs. However, the creation and organization of training courses using e-learning tools is a challenge.

Electronic textbook - a tool for teaching and learning, and its structure and contents depend on the purpose of its use. Unlike the classic "paper" version of the textbook, electronic textbook is designed for a different style of learning in which there is a consistent focus on linear learning material. Knowledge text electronic textbook should be clearly hierarchically constructed content.

Nowaday, the creation of electronic textbooks (Figure 1) and virtual laboratory (Figure 2 a, 2 b) to study the interaction of pulsed plasma with surface of materials is actual in the field of training of qualified scientific personnel in this field of investigation.

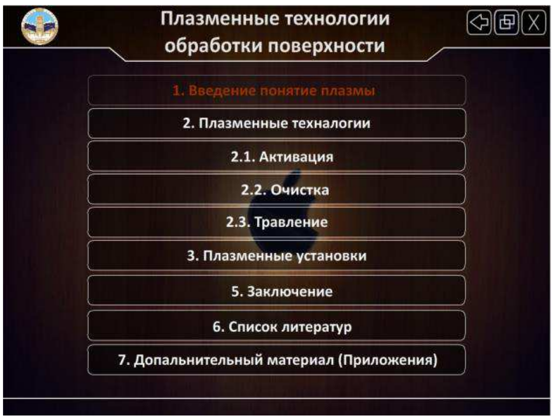
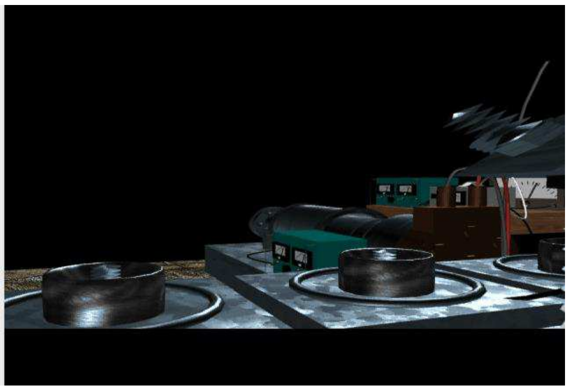
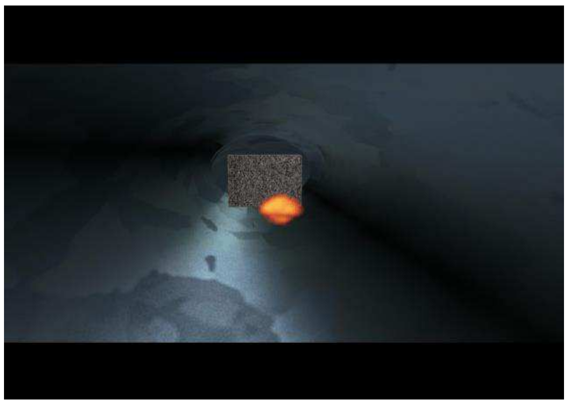


FIGURE 1 Example of electronic textbooks



a)



b)

FIGURE 2 Virtual laboratory for study the interaction of pulsed plasma with surface of materials

Investigation of the effect of exposure to high-temperature pulsed plasma flow (VTIP) material is of considerable interest in connection with the two directions of research carried out at the moment:

- Development of physical and chemical principles of environmentally sound technologies in the processing of modification of materials concentrated flows of energy (KPI);
- using threads VTIP to simulate plasma disruptions expected in fusion Tokamak reactors [1].

Made in the past two decades, research has shown that non-traditional methods of processing metal materials for purposeful change their structural-phase state (the formation of new phases, grain structure, defects) and physico-mechanical properties (microhardness, corrosion resistance, wear resistance) is a very effective application flow of high-temperature gas plasma pulse, is a type of concentrated energy flows [2].

2 Conclusions

Investigations of the plasma in the two directions are carried out in the laboratories of the Department of Plasma Physics Research Institute of the Kazakh National University. The experimental results are used in the learning process. In this paper, based on the experimental data and the results of studies of the physical processes occurring in the interaction of pulsed plasma with the material developed electronic textbooks and virtual laboratory. Our research and experience convinces us that the maximum effect of the introduction of new information technologies in the learning process, you can use electronic textbooks and virtual labs.

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Using ComSol software modules for calculating three-dimensional turbulent flows of air in the presence of suspended particles

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Abstract

Using ComSol software modules for calculating three-dimensional turbulent flows of air in the presence of suspended particles is presented. Shown, that the suggested approach lets fill the gap in the construction of suitable models of the hydrodynamic description of the dust storms with the use of spatial information technologies.

Keywords: ComSol software modules, turbulent flow, mathematical models, hydrodynamics equations, suspended particles

1 General

The system of hydrodynamic equations describing the motion of suspended particles in a turbulent flow [1] based on the ideas of A. Kolmogorov on the balance of power flow fluctuation, published with respect to a homogeneous incompressible fluid in 1942 and received the development and application to problems of the turbulent motion of a homogeneous and thermally non-homogeneous fluid in the works A.M. Obuhov and A.S. Monin [2, 3].

For values of K (Richardson number), that are small compared with unity, the motion can be described by the so-called diffusion theory based on the assumption that the suspended particles do not affect the dynamics of the rotor flux. For values of K, is comparable to the unit account the impact of suspended particles in the flow dynamics of the carrier stream, and is determined to uplift the work of suspended particles in the energy balance equation for the fluctuating flow.

ComSol software modules package is designed for calculations of atmospheric and climatic processes, which is closely associated with a set of land surface characteristics, among which is taken into account topography, soil organic and mineral composition of soils, vegetation, water balance. The mathematical model underlying the ComSol package, allows determining the temperature, pressure, humidity and movement of air masses of arbitrary regions of the Earth. A mathematical model is scaled to a wide range - from the local areas to large regions, stretching thousands of kilometers. In the latter case, take into account the curvature of the earth's surface.

The package of ComSol software modules lets to model the status and development of processes and phenomena in the lower part of the earth's atmosphere. It calculates the wind speed and direction, temperature, pressure and humidity for a researcher's geographic area of interest. Area calculations can be quite extensive, so that it is necessary to take into account the sphericity of the earth's surface. Moreover, the ComSol system may include additional features, in particular clouds and dust concentration, which allows its use not only for weather forecasting, and modeling the dynamics of the emergence and development of dust storms.

2 Conclusions

Thus, using ComSol software modules for calculating three-dimensional turbulent flows of air in the presence of suspended particles lets to get the theoretical estimations of the removal and loss of mass of sand and salt spray from the dried bottom of the Aral Sea, explore the direction of transport of sand in the 200-mile zone of the Aral Sea and obtain statistically valid direction of moving sands in this region.

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Modelling of technology transfer process. Case of Latvia

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Abstract

The aim of the research paper is to create technology transfer process management model, visual modeling tool in Vensim environment, to demonstrate the basic operation of dynamic models, as well as to prove the practical use of this tool usefulness. In this work there was considered the principles of systems thinking approach to technology, transfer processes and channels, there was discussed technology transfer raising role in the competitiveness of the company, there was made an analysis of the situation in Latvia, in the result the activity of Vensim environment was set up technology transfer management of a dynamic model. After compiling and analyzing the information, were inferred conclusions and proposals. Successful management of technology transfer model is needed to achieve a balanced interaction of three components: basic science, management and technology transfer industry, where one of the prerequisites is immediate fundamental science support increase (rather than the national budget of the EU funds). Results of this research can be used for Latvian technology transferring and innovation system (model) creation and delivery. Also this work might be helpful for innovation specialists, organizations dealing with transformation of technologies, as well as for everybody interested in technological absorption capacities and technology transfer.

Keywords: technology transfer, modelling of processes, innovation system

1 Introduction

In recent years technology transfer has become a buzzword in the context of higher education, it is not a new practice. Technology transfer is the process of developing practical applications for the results of scientific research. While conceptually the activity has been practised for many, the present-day term technology transfer is used to describe various practices in which a relationship between at least two entities is formed with the intent of capitalizing on research for commercial purposes. In the case of universities, the research or invention is usually provided by the academic research, while the mechanism of commercialisation is provided by for-profit entity and eventualy commercialcilisation organization.

Traditional approach assesses technology transfer as a knowledge transfer between research laboratories and industry and is influenced by four main components: (a) level of collectivisation or / and globalisation; (b) availability of new facts (knowledge); (c) personnel skills and abilities to adapt, use, improve and innovate and (d) availability of advanced machines and equipment.

Innovation is a driver of companies' competitiveness and is crucial to increase productivity and efficiency of production. The role of knowledge creators like universities is consistently growing and obtaining new forms of operation. Several authors have outlined that since 1990s university-industry partnership was guided by interaction with government in a systematic way to promote economic and social benefits and outputs for society.

Creation of environment for (active support of) knowledge exploitation happens both inside and outside university. Inside it is university policy regards to its intellectual property, spins out companies and sets conditions for university – industry interactions. It also includes uptake of an entrepreneurial curriculum in the regular curriculum of university students (as minor program or part of major programs). External environment includes incubator, science parks, even venture fund. All university involvement should have as objective the improvement and the optimisation of instruments to better exploit university knowledge and technology.

The aim of the paper is to create technology transfer process management model, as well as to prove the practical use of this tool usefulness.

In this work there was considered the principles of systems thinking approach to technology, transfer processes and channels, there was discussed technology transfer raising role in the competitiveness of the company, there was made an analysis of the situation in Latvia, in the result the activity of Vensim environment was set up technology transfer management of a dynamic model. After compiling and analyzing the information, were inferred conclusions and proposals.

Successful management of technology transfer model is needed to achieve a balanced interaction of three components: basic science, management and technology transfer industry, where one of the prerequisites is immediate fundamental science support increase (rather than the national budget of the EU funds).

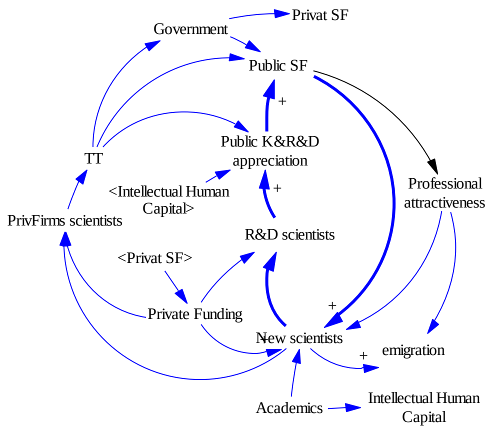

FIGURE 1 Technology Transfer Processes in a System (SF – Sciencific Firms; K&R&D – Knowledge, Research and Development; PrivFirms – Private Firms)

2 Conclusions

Papers results can be used for Latvian technology transferring and innovation system (model) creation and delivery. As this paper will identified the key factors for success in technology transfer, these are clearly defined institutional, organizational and individual factors to be considered simultaneously when trying to understand why technology transfer works or does not work and the “outputs” of university technology transfer depend on the quantity and quality of discoveries. The main feedback loops are recognized and corresponding vicious cycles are analyzed. The decisive role of public science foundation is stressed.

Acknowledgments

This paper was supported by the Ventspils University College (the Centre for Entrepreneurship, Innovation and Regional Development).

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Implementation of a course in "artificial intelligence and expert systems" on top of a distance-learning platform

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Abstract

In the current paper, presented is an implementation of a distance-learning course on the subject of "Artificial Intelligence and Expert Systems" for students pursuing bachelor's degree in the field of "Informatics and Information Technologies". The distance-learning platform used by the university is based on Moodle. The teaching materials are in the form of lectures, promoting discussions. For verification of the knowledge gained by the students, tests and analysis of the results are performed.

Keywords: distance learning platform, distance learning, course, test, discipline

1 Introduction

Distance-learning is becoming one of the most popular ways for offering courses in higher education institutions today [2].This is an introductory course in the field of artificial intelligence systems which is thought under the "Informatics and Information Technologies" major in the university [1, 3]. For its implementation, a platform is used based on a Learning Management System (LMS)–Moodle.

2 Distance-learning course internals

The course content is divided into two modules. In the first one are included: basic terminology in artificial intelligence, intelligent agents, algorithms for solving tasks using unsupervised and heuristic search, tasks for satisfying limitations, modeling of games and planning.

The second module describes the models for representing knowledge, expert systems, methods of communication, social models: neural networks and genetic algorithms and tools for creating artificial intelligence systems.

The content is in line with the standards set by the top education institutions in the field of artificial intelligence [3]. Some of the study materials used are the books [4, 5] and etc. The home page of the course presents its structure (Figure 1) and contains a brief introduction of the content along with the keywords and terms.

The course can be found on the university's distance-learning center's page [1] and is delivered to both full-time and part-time students.

FIGURE 1 Introduction to the course "Artificial Intelligence and expert systems"

It is worthy to note the importance of carefully choosing the keywords, thus allowing the students to quickly get into the terminology of the subject and clearly understand the content of the course. This is a guarantee for getting their attention and successfully adopting new knowledge. Lectures are constructed in a way that they contain the information in a clear and concise manner. The test for assessing student's knowledge consists of 50 questions related to various parts of the course content. The platform allows randomizing the order of appearance of the questions. This provides relatively objective assessment of the student's knowledge. Below are shown some of the results from a test that has been conducted.

12 students have participated in the test, each having 51 answer attempts and maximum time of 60 minutes.

The system provides possibilities for detailed analysis of the answers: from each participant and from the group as a whole, thus allowing to identify common mistakes and weaknesses in the teaching process. In the table below is shown an example of analytical data for one of the test questions for a group that has taken it.

On the next figure-5, statistics is shown for the correct answers of 12 students that have taken the test.

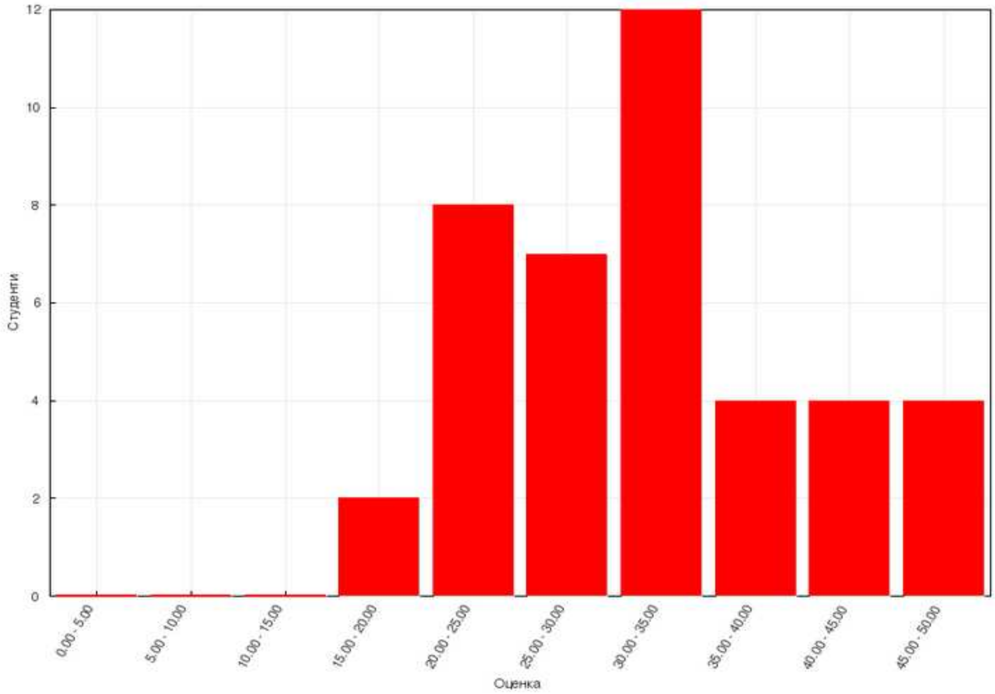

FIGURE 5 Analytical data on the results of the final test

The analysis allows assessing the results of the teaching process for a given subject and identifying ways for improvement, related both to the content and to the way it is taught. The capabilities of the distance-learning platform are standard and allow importing and exporting data from external files as well as using graphics, sound and animations for most appropriate representation of key indicators used when teaching and examination.

3 Conclusion

The presented realization of a course for distance-learning does not pretend for uniqueness. The results prove the effectiveness of the chosen methodology of teaching and can be used for the development of a more complex distance learning system in the university. The course can be of use for full-time or part-time students with various majors, pursuing a degree in a related field. It can be of interest to any specialty that need to provide fundamentals in the field of artificial intelligence.

Acknowledgments

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Education software on robotics programming

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Abstract

This article discusses the issue of selection of suitable software environment for programming the robots needed for university studies. Educational robots are two types of Lego Mindstorms NTX2 and Lego Mindstorms EV3.

Keywords: robot, software environment, programming languages, Lego Mindstorms, sensors.

1 Introduction

The practical applications of AI, like robots, are becoming more and more popular because of the various aspects of life they can be used in. The increased interest is due to the possibilities to make more efficient or to substitute people in routine or dangerous activities.

The topic in this paper is about selecting an appropriate software environment for education in the field of "Artificial Intelligence". Abundant hardware platforms are known – robots for education and software platforms for their usage

2 Background

2.1 HARDWARE SPECIFICATION OF THE ROBOTS FOR EDUCATION

In table 1 are presented the hardware specifications of the robots used in the class of "Artificial Intelligence".

TABLE 1 Hardware characteristics of the robots from the LEGO series

Charac-teristic	**ROBOTS**	
	EV3	NXT
Display	Monochrome LCD 178 x 128 pixels	Monochrome LCD 100 x 64 pixels
CPUp	300 MHz Texas Instruments Sitara AM1808 (ARM9 core)	48 MHz Atmel AT91SAM7S256 (ARM7TDMI core)
Memory	64 MB RAM 16 MB Flash microSDHC Slot	64 KB RAM 256 KB Flash
USB порт	YES	NO
WiFi	Optional dongle via the USB port	NO
Bluetooth	YES	YES
Link Apple Div.	YES	НЕ

Lego Mindstorms NXT 2.0 is the second from the LEGO Mindstorms series from year 2009 [2, 4]. The set consists of multiple parts, among which is a new sensor that can differentiate between colors. Lego Mindstorms EV3 is from the 3rd generation robots of LEGO Mindstorms series. "EV" relates to the evolution of the NXT series. 3 comes from the fact that this is the 3rd generation of LEGO Brick. As seen from table1, it has much better characteristics that the NXT 2.0.

FIGURE 1 Lego NTX

FIGURE 2 Lego Mindstorms EV3

2.2 ROBOTS PROGRAMMING SOFTWARE

A program designed in NXT-G for making the robot follow a line [3, 6] is shown on fig. 3.

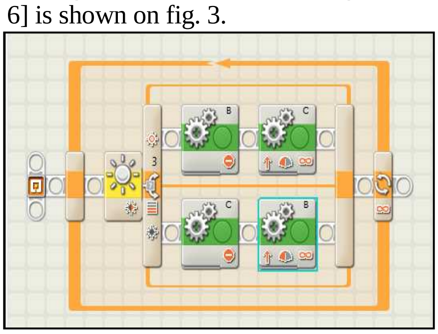

FIGURE 3 Program of NXT-G

A program designed in NXT-G for making the robot follow a line is shown on fig. 3. The preferred platform for development is Microsoft Robotics Developer Studio (MRDS), which provides integrated .NET (Microsoft .Net Framework is a platform developed that provides a programming mode, class library and a runtime for executing code targeting it) environment for development, design, execution and debugging of programs and robotics. A central place is taken by Visual Programming Language (VPL), which uses a programming model based on the management of a data stream in a visual environment. VPL is appropriate for parallel programming and distributed processing.

Fig. 4 shows a window from VPL: the menu bar, the tool bar and the central part of the scheme, as well as several windows with toolboxes, showing a list of integrated data and services available (a written in advance code to perform the tasks), which can be used in the project; current project content (diagrams and configuration files), as well as tools for editing the properties of the selected elements. During development, drag-and-drop approach can be used.

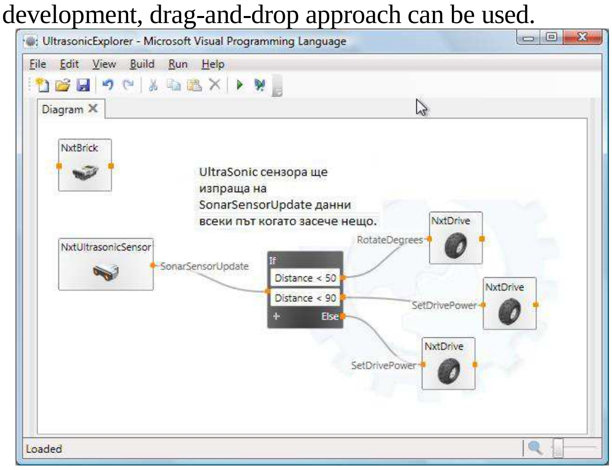

FIGURE 4 Example project in VPL

It is possible to add a new function through double clicking an element in the menu. Hovering an element from the toolbar shows a brief information related to it.

If the element includes the “I” icon, it also provides additional information.

The robots from the LEGO MINDSTORMS series are equipped with Bluetooth and USB for communication between a computer and NXT. Robots can build different configurations. MRDS supports the available hardware as well as simulating it. The included in the package Microsoft Visual Language makes it really easy to develop complex programs. Fig. 4 shows an example of a program.

3 Conclusion

From the analysis it can be confirmed that the environment NTX-G is suitable for introduction to the programming of robots in the course "Artificial Intelligence". It has built-in intelligent block of the series robots Lego. A very useful instrument for further examining the process of programming of robots is Microsoft Robotics Developer Studio. In line with the possibility for easy adopting and usability, friendly interface, MRDS has capabilities of integration with .NET Framework using the languages: C/C++, C#, etc. This would provide students with the tools for developing and modeling more complex and practically applicable projects. This environment can be used not only with robots from LEGO MINDSTORMS NXT and EV3 series but for many others models as well.

Acknowledgments

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Simulations of the implementation of primary copy two-phase locking in distributed database systems

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Abstract

This paper considers algorithms for concurrency control in Distributed database (DDB) systems. Below are the simulating models of the implementation of two-phase locking (2PL) in DDB. From four types 2PL in DDB (Centralized 2PL, Primary copy 2PL, Distributed 2PL and Voting 2PL) is viewed Primary copy 2PL, as this protocol is a "transitional" protocol of Centralized 2PL to the Distributed 2PL. The paper describes specifically the simulations of two-version 2PL and 2PL with integrated timestamp ordering mechanism. In concurrency control method 2PL may take place deadlocks of the transactions. Therefore, in the modelling algorithms described here are integrated algorithms for deadlock avoiding: two-version architecture of database and timestamp ordering strategy "wait-die". There are also presented, the results of the simulations of these two variants of the 2PL method at different scales of the networks for the transmission of data and at different intensities of inflow transactions. Modelling algorithms are developed by means of the system for simulation modelling GPSS World Personal Version.

Keywords: Simulation models, concurrency control, distributed transactions, 2PL, distributed database

1 Introduction

Concurrency control techniques are generally divided into: Locking, Timestamp ordering and Optimistic strategies – Validation check up. [1] In the last two methods were obtained a better retention of transactions in the system when it is saturated with conflicts (due to frequent rollbacks of transactions). Therefore, it is desirable to use the method of Two-phase locking (2PL). But emerging problems in its application require testing. One effective and inexpensive method for testing the operation of the various systems is the method of simulation. The basis of design are used presented and examined in [2] and [3] simulation algorithms, primary copy two-version 2PL and primary copy 2PL with built mechanism of Timestamping (TS) strategy "wait-die". The models were developed by means of the "classical" system modeling - GPSS World.

Since pessimistic protocols can arise deadlocks transactions, the problems arise to detect and resolve deadlocks. One way to avoid deadlocks is the use of a data architecture with many versions in Distributed Database Management Systems (DDBMS). In [4] are presented and discussed algorithms with many versions for concurrency control in database management systems (DBMS), and in particular: Multi-version 2PL and Two-version 2PL. Since in the Multi-version 2PL there are problems with the management and conservation of the versions, to benefit of its advantages is desirable to limit the number of versions. So look Two-version Two-phase locking (2V2PL). Besides algorithms with versions, were developed and protocols for concurrency control, which combine advantages of 2PL and Timestamping method. In the paper, we consider the model of such an algorithm - Model of Primary copy 2PL with integrated mechanism of Timestamping (TS) - strategy "wait-die" (This method is described in [5] and some others).

2 Primary Copy 2V2PL Model

A protocol with two versions for 2PL is first proposed by Bayer in [6]. In 2V2PL protocol are only two versions of elements: 1 current version of the item and not more than one incomplete version. We use 3 types of locks, each lock is released at the end of the transaction: rl - (read lock) - established on the current version of the data item shortly before reading it; wl - (write lock) - sets before creating the new (incomplete) version of the item; cl - (commit lock) - established before the implementation of the last transaction of the transaction (usually before surgery commit) on each data item that it has recorded.

Advantages of the protocol: limit the number of older versions leads to reduction of volume of database (DB); does not require special storage structure versions; simple enough to implement a protocol. The structural scheme of a modelling algorithm for Primary copy 2V2PL of distributed transactions is shown in fig. 1.

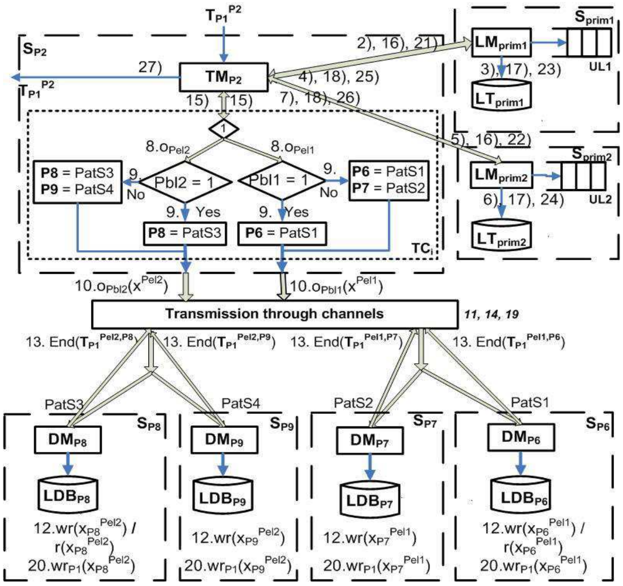

FIGURE 1 Scheme of Primary copy 2V2PL

3 Model of Primary copy 2PL with TS "wait-die

The method uses the so called timestamps of the transactions. The TS strategy "wait-die" algorithm when transaction Ti wants to receive a lock of an element [5]: If Ti is older (with smaller value of timestamp) than Tj, which has blocked the element then Ti waits for the release of the element in order to put the lock. If Ti has a greater timestamp than Tj, then Ti restarts. In the TS „wait–die" method the number of "superfluous" rollbacks is much smaller. And the method is not very difficult to be realized.

4 Simulation Results

Our researches has been made for 2 replicas of the element, number of the incoming streams - 6 and number of the data elements in the global database - 50. The results are received in 6 streams of concurrent transactions with different intensity. The copies of the data elements are distributed evenly and random by 6 sites in the system. The results of Primary copy 2V2PL model and Primary copy 2PL with TS model simulations for equal intensity of 6 input flows for 2 element copies are summarized and presented graphically in figure 2. (The results for Primary copy 2PL with TS are similar to those for 2V2PL, but in lower values). This approach may be useful in developing an information system for mobile learning [7].

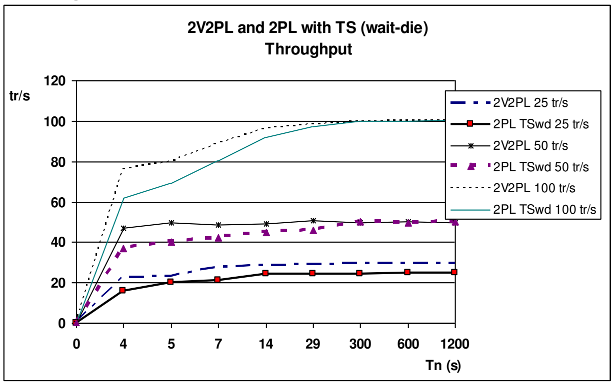

FIGURE 2 Throughput of the Primary copy 2PL models

5 Conclusions

Conducted simulations and the results confirm functionality of the modelling algorithms.

Simulation models allow definition the throughput ability of the distributed systems, the average service time of distributed transactions and other parameters, on the basis of which the efficiency of the suggested algorithms could be defined.

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Balanced geometric model and common scenarios for uplink power control in industrial wireless networks

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Abstract

Industrial networks now are trying to implement wireless technologies, following the tendencies in communication networks. This task is complicated because of the nature of the industrial environment. Wireless connections can hardly achieve the same stable quality of service (QoS) parameters as traditional cable ones. Interference is one of the reasons for that and should be developed effective solutions for its reducing in order to maximize the throughput of the wireless media. Balanced geometric model, which reduces interferences between end-users and access points, is proposed. It is based on Nash Equilibrium Theory and gives opportunity to control the output power of wireless devices in optimal way. The use of vectors in the model helps to analyse in details, impacts between the neighbour points – their power and direction. At the end, there is a sample for using balanced geometric model in industrial network.

Keywords: interference, uplink power, signal amplitude, industrial networks

1 Introduction

The information translated into modern industrial networks is characterised by its multimedia nature.Unlike the industrial traffic in the past, today not only sensor data and commands into a symbol form are transmitted to the actuators. The transfer of entire files, sound, voice and video requires new approaches and policies for network management. The ultimate goals of such management aim maximum benefits from the transmission medium, providing a high level of security when transfering critical workflow data, adequate scaling of services in the terms of variable load and mobility endpoints.

Besides the multimedia nature of transmission, new challenges arise from the tendency to replace cable connections with wireless in the terminal segments of the industrial networks.Some of these problems are related to uplink power management in such a network.

2 Traffic management models in industrial networks. Priority based models. Equilibrium models

Some traffic management models for industrial networks apply priorities. One part of the data into the network should be transmitted with priority for very short periods, because is critical for industrial processes. Priorities can be applied according to the type or sources of the information stream.

Priority based models implementation can be additionally complicated by mobility of some end wireless clients. Analyses and decision applying in this case require expensive hardware devices.

Equilibrium models do not use priorities. They try to provide equal conditions for all participants in the same network segment. This politics are easier to implement, use cheaper equipment and provide shorter response time. They can be used in a combination with heuristic approaches. This can increase the efficiency of a network management.

3 The influence of interference in wireless industrial networks. Prevention

Interference is a phenomenon that describes the complex impact of two or more waves with the same frequency at certain points. In the context of wireless industrial networks it is affecting the distribution of radio-waves. There are two basic types of interference sources – internal and external. External sources will not be described in this paper. Internal interference appears when two or more devices use same or near frequency channels.

The prevention of interference requires shielding, setting remote working channels, using hopping frequency for transmission (like Bluetooth) or use of a multi- element antenna for the access point.

4 Vector equilibrium model for uplink power control

This model prevents participants from interference influences, generated between them by extra upload power emission. Figure 1 represents interference between three access points in an industrial network. The aim of this model is to minimize balance vector I_{ABC}, shown on figure 1.

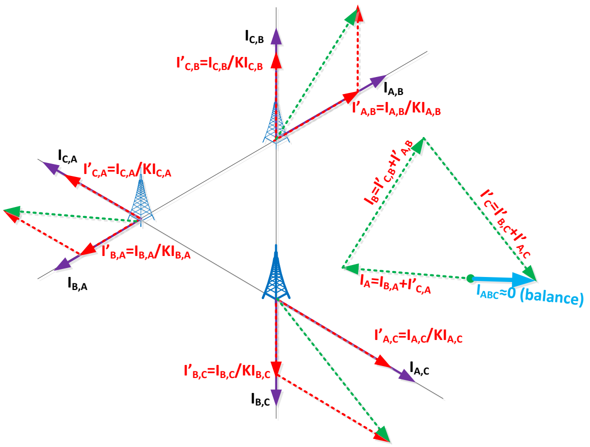

FIGURE 1 Vector representation in balanced model

When uplink power misbalance occurs, there are some common scenarios that can be realized. They can be analyzed on figure 2.

5 Conclusions

Equilibrium upload power management is a key factor for increasing the efficiency of wireless industrial networks and reducing internal interference.

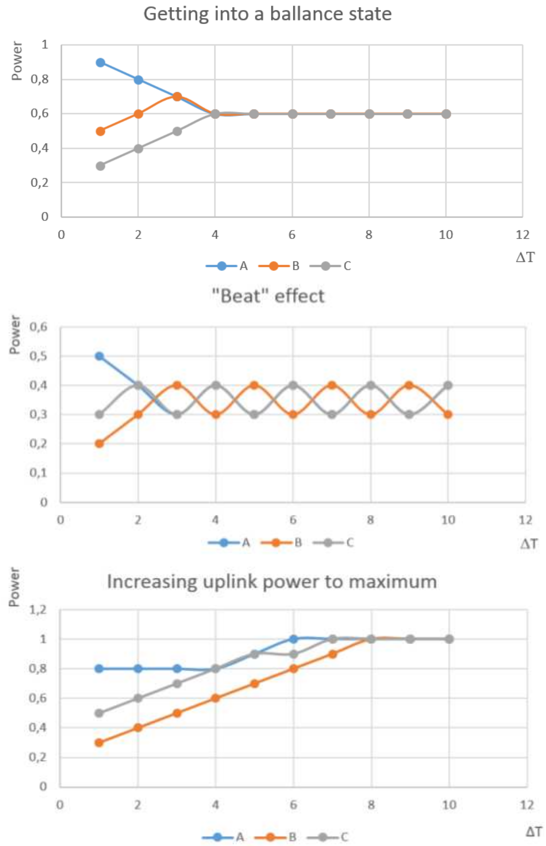

FIGURE 2 Misbalance start state scenarios

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Mobile sites as a part of the digital model of modern daily newspapers

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Abstract

Changes in the sphere of conventional printed publications have been acquiring global dimensions. Is there any future for the printed newspapers? Problems of the daily newspapers transition from paper to digital bearers are discussed in the present paper. A model of the future digital newspaper is presented here. The mobiles sites of Bulgarian newspapers and magazines are viewed in the paper. The advantages of the mobile platforms through smart phone access are presented here. The sites have been viewed in the aspect of the necessity of "New digital model of the modern newspaper." An analysis of their utility in the point of view of readers and news publishers has been made.

Keywords: Digital model, mobile sites, news, newspapers, magazines

1 Introduction

Smart mobile phones are multifunctional devices. Their sales in recent years have surpassed personal computers in sales. [1]. Many people use their phones in their free time – for quick access to news and news sites. The advantages and disadvantages of the mobile sites compared to desktop at access by mobile phones are presented in the paper.

Predictions for the death of the printed media have appeared since the origin and rise of radio. Later at the emergence of the new exciting media – the television, almost all analyzers were convinced that it would bring the end of newspapers. As it is well known all these predictions have failed to come true – just the opposite – radio and television are not competitors fighting for influence any more but they are becoming partners for development.

The emergence and quick development of Internet have become medium for the appearance of new electronic media. They present news quicker than paper newspapers. This has become the reason for publishers and editors to ask questions about the future of newspapers and to make pessimistic prognosis. Is there any future for newspapers?

2 The necessity of a Mobile platform

For the convenience of the owners of mobile devices some news media offer possibility for quick access to a lighter content of their site through a smart phone. With such an access the users are automatically redirected to the mobile platform of the corresponding media and it this way they get quickness of loading and save traffic data.

3 Advantages of the mobile versions of sites at smart phone access

The content is as close to the user as possible. Speed of loading and work in the site. Friendly interface in compliance with the small size of the smart phone. Easier navigation in the site, reading and sharing information. All menus and panels for navigation are in compliance with censor navigation and the small area of the screen. Full compatibility with all mobile operation systems [2] and browsers for them. Lack of Flash elements in the mobile platform [3]. The use of Flash elements (SWF - Shockwave Flash or Small Web File) in internet pages enriches its content and presentation but makes difficult the access to them especially through portable devices. Another basic disadvantage of SWF-files is that they require very quick internet connection and generate huge traffic. At the same time they take a lot of resources and weight down maximally the processor which leads to high energy consumption and so to quick exhaustion of the batteries of the mobile devices [3]. Not all modern mobile operation systems support functionally Flash elements in their browsers [2].

4 Digital model of modern daily newspaper

The author of the present research has more than 15 years experience in printed news media. There is a practical experience gathered for their creation, expansion and development, and observation of their crises, problems and successes. In our opinion internet is not a thread but a new transition medium for the printed news media. Their future is clear – in order to survive they have to benefit from all digital forms, which have been offered by the new technologies. Let us not stop only to the availability of electronic site [4]. It is only one form of existence in the digital era. The others are:

1. Availability of a mobile version of the site for quick access through smart phone and tablet;

2. A mobile application working under the three most widespread operation systems for smart phones and tablets - Android, iOS, Windows phone;

3. Concluded agreements with providers of electronic books and distribution of the newspaper as an electronic interactive document in all readers of electronic books and sites for distribution of electronic sites;

4. Strong presence in social networks and looking for feedback with readers through them and if possible the online users to be able also to be its numerous reporters.

5. Availability of digital archive with a new structure and possibility for searching. In order the site of the media to be successful, in our opinion, it needs deeper and fuller temporary archive in which the technologies for semantic web at supporting digital archive to be applied.

A common web based platform is in the basis of this new digital model. It contains two bases of data – one information reference and an advertising one containing all advertisements of the daily newspaper. The new digital transformations of the news media (desktop site, mobile site, mobile application for smart phones and tablets, and digital format for electronic books) get information from the main web based platform (Fig. 1.).

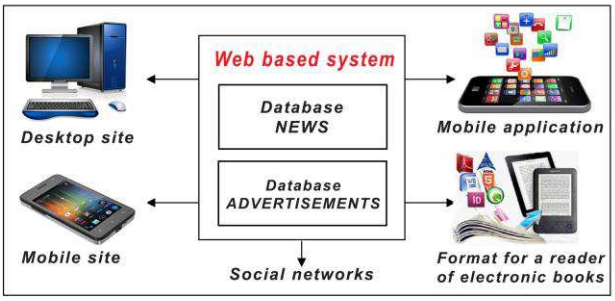

FIGURE 1 New digital model of a web based platform

5 Conclusions

We have to conclude that in XXI century newspapers have to be transferred to new modern digital bearers of information. A new digital model of the newspaper in the epoch of internet in which the website of the media is only one of the forms of the newspaper of the future has been presented in the paper. The others are the mobile version of the site, the application for smart phones, and strong presence in the social network, a version of the issue formatted for electronic books. Though the mobile devices are being equipped with more and more powerful processors and their browsers are becoming more and more compatible with the desktop systems we consider the necessity of mobile versions of online issues of the newspapers of Bulgaria. A lighter version which is in compliance with the size of the smart phone offers an easy and convenient interface. Traffic and time for loading and reading the news are saved. The entire customer experience is much better at access to the site through the mobile platform than through the desktop version.

Acknowledgments

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Dialogue expert system at command line interface – DES – CLI Ryahovetz

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Abstract

The article describes the construction of a dialog expert system that supports the work of the system administrator. In its operation it uses the command line, which greatly improves its functionality and flexibility.

Keywords: Expert system, Command Line Interface - CLI, Data Hoard - DH, Logical Unit - LU, Dialogue Interface - DI

1 Introduction

Many commercial companies and existing open source communities compete in attracting more customers with a variety of innovative hardware and software developments. The race is to achieve simpler and easier to use devices and programs that guarantees them a larger share of the market. But despite the strong development of these technologies, we cannot ignore the fact that all these decorated, aesthetically appealing and easy to use interfaces obscure the existing functionality of the products. Knowledge of the system are encrypted in the database implicitly and facilitate the handling of the operating environment via the command line.

2 Exposition

The well known from the past command prompt, called **CLI**, reliably serves professionals in this area. For the inexperienced user it is difficult, but there are strong advantages for professionals compared to the graphic environments. It is used actively at server level, especially in **UNIX** and **UNIX like** platforms and even in the **Windows** server platforms in all business environments, banks and others. Practically the command environment is the foundation and not the GUI. In many server platforms, it is even impossible to launch **GUI** because the architecture does not allow it: namely "**RISK Reduced instruction set computing**", which relies on productivity and security. They have not even written a graphical interface or if they have, it will strongly tend to the command view with the purpose of stability. Each layer adds extra risks to the security and potential crashes.

We can indicate a number of advantages of **CLI** such as: stable and fast interface for communication with the operating system; low consumption of system resources; full control over hardware resources and operating system; full control over processes; ability to carry out complex activities; fast communication, configuration and control from one environment to another; opportunity to easily automate routine tasks through scripting; full control over standard streams stdin, stdout, stderr; opportunity for easy routing and localization in logs formatting for subsequent filtering and monitoring.

- Architecture of the system

The system includes the following modules:

1. **DH – Data Hoard**. Module organizing the storage of input – output data and control of information. This module can be divided into sub modules.
2. **LU – Logical Unit**. This module has the specific task to perform only and exclusively logical operations.
3. **DI** – **Dialogue Interface.** Dialog interface (fig. 1) for interconnection between end users and the system. This module has the main task to accept requests from the end user and returns the necessary information.

- Functioning of the system

Operation of the system is based on events occurring in the dialog interface **DI** or the **SB** segment for performing scheduled tasks. On a proper command it transfers to the main controller of the dialog interface **"CSID"**. It turns to the main controller „**LUIODI**" of the logical unit **"LU"** with the information submitted, almost unchanged.

The controller is duplex, because it works both ways, it can receive and transmit and determines where the request came from and what its purpose is. For example: an incoming request on **"DI →LU"** and thus the data is passed on the simplex sub-controller **LGR** (logical unit receiving data).

The received data can trigger logical operations for transforming and translating them in a convenient form for the next module **"DH"**. After formatting the data if needed by more complex logical operations, the main controller **"LUIODI"** turns to **"LEU"** for their implementation.

Data, passed on this conveyor, is ready to be put on the next main controller **"LUIODH"**, serving for connection to the module that stores data and determines the type of operation – extracting or entering information. If the event is data entry, it passes to the sub-controller **LID** for input data. For large amounts of data, several stacks can be formatted and submitted asynchronously for faster performance, otherwise they pass synchronously.

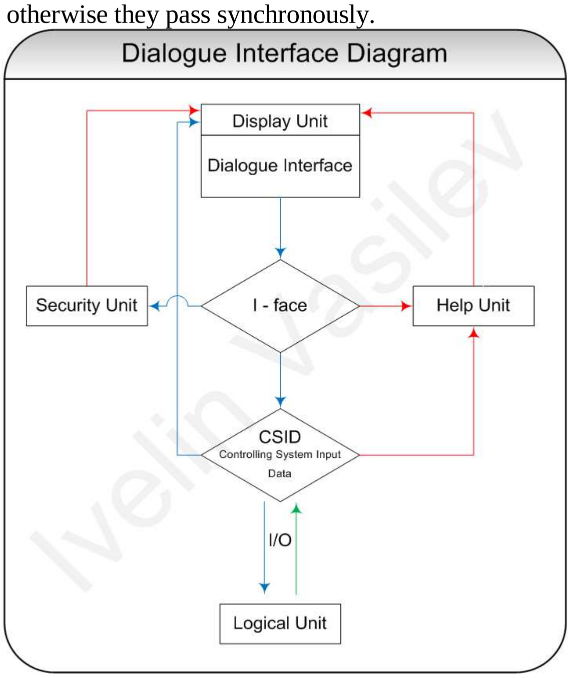

FIGURE 1 Dialogue interface

For dependent data, the asynchronous method fails, and the synchronous-transaction method is used. Thus the prepared data are submitted for entry to the module **"DH"** and a record, change or deletion is performed. Modification of data can be direct or through **"DB-LPO"** if additional logical processing is needed. The need of this logic at the lowest level is for achieving faster performance when processing large volumes of information. This avoids unnecessary iterations with the **"LU"** logical segment.

At optimization, the most common requests are implemented in the section **"MSS"** and are invoked in matching events. The idea is one statement to be used repeatedly. For additional control or its reduction is used **"COS"** controlling optimization section of the module **"DH"**, which creates, prohibits, permits or deletes a set of constants, triggers, indexes and other control-optimizing techniques within the selected database.

The logic controller is for primary processing of raw data, which transmits to the controller **LUIODI**, which in turn distributes them to the sub-controller **LRD**. In complex dialog templates, data is divided into stacks and returned asynchronously to the dialog interface and loaded at the locations indicated on the template. In simple consoles the data is returned synchronously.

The element carrying out scheduled implementation of routine tasks is **SB – Scheduler Batches**. It runs certain processes in background, such as calculation or routine data extraction for a period of time, updating the system.

3 Conclusion

The described system solves everyday tasks of administration and management of different platforms. The quality of the resulting advices depends on the knowledge entered into the system base. Further development would be in the direction of adding new modules and increasing the relevancy of its recommendations.

Acknowledgments

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Self-action in executive's activity

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Abstract

The conceptual approach is examined focusing on the efficiency of maintenance business improving. The proposed methodology reduces the level of unapproved interference in a stable process. This is achieved by the use of objective performance tracking strategy throughout the course of its achievement.

Keywords: axioms, operation & process, addition,formalization, professionalism

1 Introduction

In this study the concept of "executives" and "management" have significant semantic difference. According to [1] the executive address the performance and is associated with enforcement activities. Management is focused on training and is characterized by service of process. According to systems theory in the context of business organization executive activity padded to the whole management process [2]. By this the developer should have objective means to assess the level of implementing addition. In other words, it is necessary to define a measure of the total binding activity with a single process [3].

As this measure is proposed to introduce a parameter that has the name "self-activity level". This option reflects the fact unplanned intervention in the activities of the manager. During such interference is presence there are interruptions in operation, up to its complete stop. Moreover, at the exanimated period and resolve the problem, complete loss of control over the conduct of business. All this is associated with substantial losses, and causes the loss of touch with reality. The manager has to be done due the absence of legal requirements on a huge scale, unforeseen by nature, efforts to cope with unexpected circumstances. This work, which has spontaneously arisen foundation, is self-active. If the manager gives unsuccessful solution, then it has a negative impact on its image, and limits the degree of its autonomy. It should be noted that the high level self -activity indicates a mismatch of the process and activities, and requires significant changes in the structure of the organization. The basis for these changes is the development of a fundamentally new system of limits, which on the one hand increases the period of large-scale and temporal coverage of the formal business, and on the other hand increases the degree of autonomy of the manager.

2 Conceptual scheme of the research

In Fig.1.1 and 1.2 compares two options, conditionally displaying the action proposed conceptual scheme.

The first version is characterized by small scale coverage of business (S_1). The strategy of the organization is described using a simple law (F_1) to bring the system from an unmanaged state (W) to controlled (O) on a small time interval (T_1). The number of constraints that determines the level of autonomy of the manager (A_1) is the average. Calculated level initiative (S_A_1) is equal to 88.9%. For such a system of business organization is characterized by a very frequent intervention in the management process at low efficiency leadership activity.

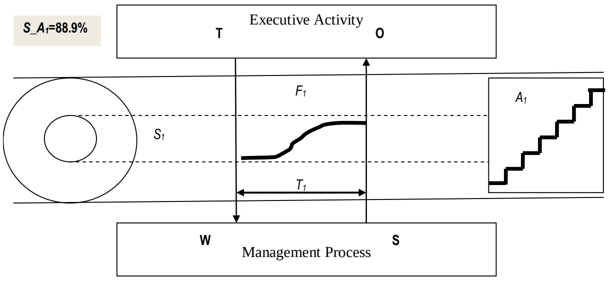

FIGURE 1 Conceptual scheme of version with high level of self-activity

In Figure 1.2 shows a variant considerable improvement in the organization. This is achieved through the use of a wide set of strategic management tools, such as: development of business policy, based value cost management, the use of axioms management, design of a reliable organization and others [1-3].

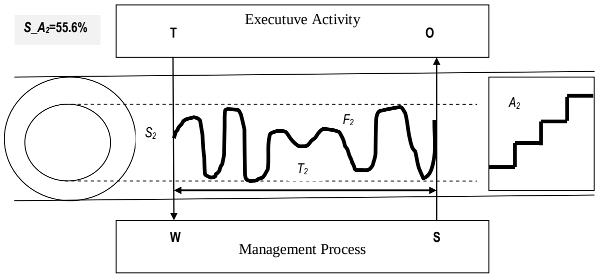

FIGURE 2 Conceptual scheme of improved model/version

The development of the organization shall be examined for repetition on a predetermined strategic trajectory (F_1) on the extended time interval (T_2). The condition of the system is characterized by a large scale coverage of business ($S_2 > S_1$), and requires a high level of competence manager ($S\_A_2 < S\_A_1 \& A_2 < A_1$). This is achieved by the removal of some restrictions, usually limiting the level of responsibility in the strategic decision-making.

3 Conclusion

Studied the conceptual approach is a new approach to management. Its use helps to expand the arsenal of strategical tools, which improved the capacity of the organization and increases the level of professional competence of managers. This is achieved by the coordination of future activities with the current process, the gradual elimination of the negative impact identified large-scale circumstances. Thereby, it is possible to improve the reproducibility of the future activities and to prepare instructions for the conduct of the manager in the event of unforeseen situations.

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The use of "Data envelopment analysis" to analyze the relative efficiency of the organization

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Abstract

In the article discusses the use of methodology of "Data Envelopment Analysis" to evaluate of the relative effectiveness of organization's activities. Shown that the relative effectiveness can be used in case of lack of sufficient information. The simplest DEA model and calculation's algorithm are considered. Examples of the practical use of the approach for evaluating the performance of the power companies.

Keywords: algorithm, data envelopment analysis, linear programming, model, organizations efficiency, relative effectiveness

1 Introduction

In the process of organization's development the manager inevitably faces with questions assessing its effectiveness. An experienced manager can intuitively feel efficiently or efficiently running his organization, but to determine the optimal ways of efficiency improving without quantitative assessment impossible. Such assessment can be conducted by analyzing results of operations the organization and then comparing it with the competing companies. Such approach is the basis for the benchmarking strategy directed at identifying and implementing best practices and technologies.

However, in practice, in most cases, a detailed analysis of competitors is not possible due to shortage of information. In these conditions for managers it is important to use tools that allow you to obtain an preliminary estimate of the relative efficiency of the companies on the basis of data available.

One such approach is "Data Envelopment Analysis" (DEA) – the methodology of relative analysis of complex systems (technical, economic, social, etc.). Start of this method was laid in the 1970s-1980s in the works of A.Charnes, W.Cooper, E.Rhodes [1], R.Banker [2].

In this article are considered the use of DEA-methodology in relation to the analysis of organizations efficiency.

2 The simplest DEA model

Today DEA methodology developed deep and covers a much wider range of concepts and possibilities than simply calculating the efficiency of complex objects (see eg. L.Seiford, R.Thrall [3]). But we will consider it in its simplest formulation.

DEA approach proposes to assess the effectiveness of the studied objects in relation to each other. In this case, a each object is considered as a "black box" which transforms the input parameters into an outputs according by the unknown algorithms (see. Fig. 1). Same, we can say that the organizations activity is reduced to the following formula – "to take a set of inputs and produce a set of outputs".

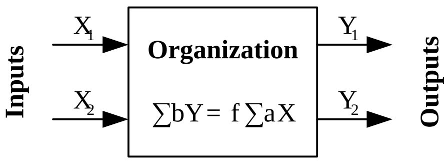

FIGURE 1 DEA representation of the economic system

Suppose we have N organizations operating in a competitive environment, each of which is characterized by a set of inputs (X) and outputs (Y). Then the indicator for the effectiveness of each organization can be calculated as the ratio of the results (outputs) to costs (inputs):

$$\theta_i = \sum b_j \cdot Y_{ij} / \sum a_j \cdot X_{ij},$$

where: a and b – is the weighting factors for input and output parameters, respectively.

Measure of the relative effectiveness of each organization in the set can be found by solving a linear programming problem in the following formulation:

$$\theta_i \to max$$

$$\begin{cases} bY/aX \le 1 \\ a \ge 0 \\ b \ge 0 \end{cases}$$

Finding the solution is carried out according to the following algorithm (see eg. W.Cooper, L.Seiford [4]):

- Selected the one organization from set for focus and calculated weight to the inputs and outputs that give the best possible efficiency for the organization in focus.
- For all the other organizations from set assigned the

same weights and compares the resulting efficiencies with that for the organization in focus.

- If the organization in focus looks at least as good as any other organizations from set, it receives a maximum efficiency score.
- But if some other organizations from set looks better than the organization in focus then it will receive efficiency score less than maximum.

It follows an important property of DEA-model: DEA identifies the best object from set and compares each object with only it. Eventually all organizations are ranked in the range from 0 to 1 (where rank = 1 for the most effective organization).

Calculated indicator of object rating is an evaluation of the effectiveness of the process of transformation of "inputs" into "outputs". From this viewpoint the DEA model can be interpreted in terms of the production function as a quantitative relationship between the values of output and factors of production.

3 The example of DEA model's practical application

For an example of practical application of DEA model will compare several Russian electric power companies (see. Table 1). The data are taken in the public financial statements of companies for 2013 [5].

As input parameters take the company's total assets (TA), the average number of staff (AS), and as output net profit (NP) and business value (BV).

TABLE 1 The parameters of statements of companies

Company	TA	AS	NP	BV
TGK-1	121	5,0	3,22	108
TGK-2	49	2,5	0,07	32
TGK-3	240	6,0	8,03	214
TGK-4	63	6,0	-1,19	57
TGK-5	58	1,5	0,30	40
TGK-6	58	5,5	0,65	40
TGK-7	84	5,5	2,12	71
TGK-8	6	0,1	0,22	4
TGK-9	96	7,0	0,13	71
TGK-10	136	3,0	4,49	118
TGK-11	29	5,0	0,26	24
TGK-12	40	3,5	-0,29	29
TGK-13	37	1,5	1,53	33
TGK-14	13	6,5	0,37	9

Calculation of relative efficiency was carried out using a mathematical package Matlab by using the built-in function linprog(). The results of calculation are presented in figure (see Fig. 2).

It is seen that only two companies can be considered completely effective (TGK-3 and TGK-13). Two more companies are close to ideal (TGK-10 and TGK-1).

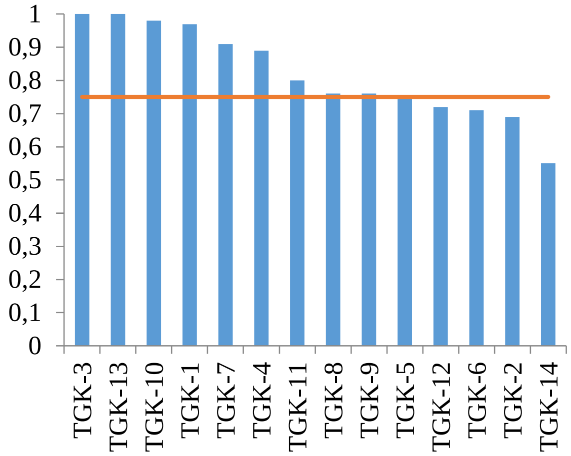

FIGURE 2 Relative efficiency of Russian electric power companies

We take for a threshold value of efficiency is 25% less than that of the leading companies (red line). It can be seen that the four companies are significantly below the threshold (TGK-12, TGK-6, TGK-2 and TGK-14) and therefore their activity cannot be considered effective (it should be noted that indicator of efficiency for company "TGK-14" is significantly lower than all companies).

4 Conclusions

DEA is not always the right tool for a problem but is appropriate in certain cases.

It allows you to estimating relative efficiency of a objects but it not suitable for estimation of absolute efficiency. DEA method can show you how well you are doing compared to your competitors but not compared to a theoretical maximum. At the same time, the DEA is an indispensable tool in the assessment of efficiency in case of the minimum available or contradictory information.

DEA approach is not self-sufficient way of managing, but it can be an effective complement as manager's tool.

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Coordination communication mechanisms of the configuration management process

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Abstract

Methodology the sustainable functioning of the organization is proposed. On its basis is developed to enable the management system to conduct fundamental changes. Changes are made in terms of holding strategic goals.

Keywords: Object restrictions, feature, change, potential, development.

1 Introduction

Methodology the sustainable functioning of the organization is proposed. On its basis is developed to enable the management system to conduct fundamental changes. Changes are provided in terms of holding strategic goals. The goal occurs during the implementation of a new specialized suggestions. There is a need of implementation of the programme of psychological stability as fact that in the modern world in the conditions of dynamic development of the entire climate there is a decrease in the duration of working life and performance. Young social management is still far from rationality. It is largely past tense character, and often does not meet the requirements of conditions.

2 Overview of the study area

The purpose of this research is to theoretically is to develop performance criteria security program of the personality on the basis of a viable system to experimentally verify technology ensure the process of formation.

3 Formulation of the problem

In the frame functioning control systems are used feedback mechanisms that provide stabilization target [2]. Such a control system configured in accordance with the preferred model according to which are sent in advance to the actions of [1]. Their orientation is conducted in accordance to the algorithms of the maintenance management system in a healthy state [3, 4]. Subject of study are management mechanisms using coordinating communication foundation synthesis of trends in the development of the organization. As grounds the concept of uniform management process and shared leadership activity. The concept is based on binding of objective regularities identified in the field of management, with the characteristics of leaders who took part in practical activities.

4 Conclusion

Proposed coordination and communication mechanisms determine the quality of the professional competence of the administrative machine. The degree of managerial skill is manifested at the level of binding of the trends of development of the organization. It expresses the ability of the control system to adapt to changes in the external environment and to provide for such specific effect

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Evaluation of the office of transport and logistics companies through intangible assets

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Abstract

The authors attempt to identify and produce a classification of factors influencing the intangible assets value (IA) one of the strategic sectors of the national economy of Latvia - logistics and transport. Indicated significant factors influencing the attractiveness of investment in transport sector, are classified intangible assets, methods of their evaluation. Produced by clustering of external and internal factors that affect the cost of the intangible asset, the ability of the transport and logistics companies act on them.

Keywords: costs, investment, logistic, oorganization

1 Introduction

The geographic location of Latvia is a key role in the formation and development of the transport and logistics industry and the creation of transport and logistics companies (TLC), which is the supply chain of goods movement between East and West. Geography and transportation infrastructure predetermined high concentration of TLC on the market.

The main advantages of the transport sector of Latvia referred to as:

1. The geographical location;
2. Membership in the EU;
3. Track gauge 1520 mm;
4. Ice-free ports;
5. Integrated network of Railways and roads [1].

2 Intangible assets the logistics industry

Logistics is primarily a logistics management and this in turn implies investments in the management system, i.e. in the implementation of such functions as planning, allocation, control and optimization of material flows.

The assets of the transportation and logistics companies, and companies operating in other sectors of the economy, consist of tangible and intangible assets. Assessment of the company's assets is produced for investors in the absorption or purchase, to assess the management of the company.

Investment attention is also given to the formation and development of intangible assets as valuable resources and acquisitions, brand, information technology, customer bases, administrative decisions and other business factors that do not have such clear outlines as tangible assets. When producing estimates of tangible assets of the company-no problem, but when the valuation of intangible assets, certain challenges arise.

Traditional financial reporting has focused on the past, the fact that static and financially. She practically throws no light on the assets that today, in the era of knowledge economy, are crucial to company success, and was able to hold it. The current financial indicators do not give any real idea about the most important factors of success, and the balance is very little said about the prospects of the company. Investors today are focusing on the future - on the growth, continuous movement on intangible assets. They come to market assessment, using intuition and methodology for determining the cost, no more controlled by the company. These techniques, for which managers may have no relation [2].

When the valuation of intangible assets using the following methods:

- costly;
- profitable;
- comparative;
- standard market value.

3 Factors affecting goodwill TLC

When analyzing the external and internal environment, in which it operates, TLC, the authors of the study, have identified factors directly or indirectly affect the value of intangible assets TLC.

Political:

- geopolitics;
- influence policy in other countries (sanctions);
- political associations (unions);
- international law.

This factor is in relation to the external organization and determines the future of the organization. To affect this factor, the organization is unable, if not transnational corporations (TNCs).

Economic:

- credit and financial institutions;
- availability of financial resources;
- the attractiveness of the market.

This factor is, according to the organization, external and depends on the world economy as a whole. To affect this factor, the entity may, if it is not TNC

State:

- image of a state;
- legislative acts;
- tax policy;
- political processes;

- lobbying;
- loyalty to the state (state program).
- the attractiveness of the industry in the state;
- the ability to support the business.

This factor is regulating, setting conditions of the activity in a particular state and the state's ability to help the private sector.

Regional:

- the inability of retaining positions;
- the attractiveness of the region;
- the work on the image;
- regional policy of the competitors.

This factor regulates and specifies the conditions of the organization's activities in the region.

Industry:

- the attractiveness of the industry;
- capacity market;
- the number of participants;
- state program support;
- creative destruction.

This factor reflects the number of industry participants, the size of the market (competition), the loyalty of the state to the industry (software development).

Internal:

- personnel qualifications;
- management apparatus;
- flexible policy of external relations and relations;
- development and implementation of innovations (ACS);
- management system (adaptation; motivation; managing the supply chain; customer; operational management);
- building logistics chains.

This factor reflects the internal state of the organization, the ability to adapt to external conditions.

4 Using method "Value Explorer" for the evaluation of intangible assets

One of the methods to determine the value of intangible assets of the organization is "Value Explorer". Method helps managers to get the information that allows to harness the latent potential of their intangible resources, to determine the economic potential by identifying the key competencies of the company [2].

5 Conclusion

Intangible assets of companies in the transport and logistics sector are a hidden reserve of increasing its value. Primarily in terms of assessing intangible assets, we evaluate the quality of management, qualification of the personnel, existing relationships within the organization. Second, the estimated communication with the external environment - a quality built logistics chain, building relationships with government structures.

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The efficiency evaluating methods of training within the organization

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Abstract

The article presents an overview of the main methods of evaluating the effectiveness of training and staff development, and recommendations for their use for the evaluation of different forms of education for the achievement of results within the organization. The concepts and techniques used to provide support and development of participants of educational process.

Keywords: coaching, emotional intelligence, education organization, management, subject

1 Introduction

Creating space for the meaningful leaders capable of altering the standard approaches to management. Trend is business training aimed at increasing awareness of himself, and only then, the emphasis is on the process of managing other team members of the company. Who determines the motion vector of development, what are the stages of proceeds the company in the period of the volatility of the market today. Despite the toughening of the game, on the field of business, it is important to have flexibility in achieving their interests, and create partnerships for the commercial success of the company.

The professional judgment of the Manager is formed, chose guideline on the level of professional training, competencies and skills. In modern campaigns come to the fore such concepts that are related to the internal evaluation result: the existence, in respect of social, personality, and skill. These factors invariably affect the external result of the work of the organization, such as timeliness, creating relationships, actions aimed at the creation and collaboration that allows us to isolate those features that determine the competitiveness of the Manager in light of future developments. That is, the ability to empathize, to adapt and to convince [1].

Issues of feasibility, cost- efficiencies of different forms of corporate training (consultation, facilitation, training, seminars, lectures, internships) is still relevant in the business community because, despite the crisis, the need remains and even increases the significance of the development and efficiency of staff.

Coaching is an art to enhance the productivity, training and development of another person. It is not based on knowledge, experience, wisdom, or foresight of the coach, and on a person's ability to study and action is not only technique, which applies in certain circumstances, the method of interaction with people, the way of thinking. Coaching is an art to enhance the productivity, training and development of another person [3]

Use of features of the concept of coaching in the approach to management is a management method, the method of interaction with people, the way of thinking.In this article we will discuss the following methods of assessing the effectiveness of training:

- methods Donald Kirpatrik;
- method Jack Phillips;
- method biparametric evaluation;
- to assess the efficacy of training in integrated systems of assessment type of KPI [3].

2 The technique of Donald Kirpatrik

The technique of Donald Kirpatrik involves the assessment of the four levels with time intervals:

- the first level - emotional;
- the second level of evaluation knowledge, proficiency testing;
- third - level behavior, the expert assesses how participants changed their learning behavior;
- the fourth level is the output level, expert evaluation, copyability the impact of changes on the organization as a whole.

As with any research tool, the method has the appropriate limit [4].

3 The technique Jack Phillips

Jack Phillips, for example, suggests that economic efficiency as "the return on investment in human capital".

With respect to any economic processes often used approach to the assessment of activities based on the profitability of certain processes, and in this case, the approach Jack Phillips is a traditional and, in the case where the economic effects of staff training are evident and measurable, it is advisable to evaluate the profitability of these activities on the methodology proposed above.

4 Methods of assessment biparametric

McGee offers parametric assessment, i.e. considering the effectiveness and efficiency of learning, it also introduces the concepts of efficiency and effectiveness and their optimal combination introduces the concept of performance training [4].

We for our part in the solution of the feasibility assessment, the learning effectiveness of the proposed sequential approach to the solution of this question, we have to abandon the idea of developing a universal tool for measuring the effectiveness of training in organizations, and to find methods of measuring efficiency", given the specificity of incident events, and their spectrum is quite wide. If the task is to assess the success of activities through the reduction of the cost of a business process, in this context, a special case is the reduction of costs, the best would be the following set of formulas for evaluating the effectiveness of training [4].

5 Evaluation of the efficiency of training in integrated systems of assessment type of KPI

Often estimating separate directions of development of the company, to apply modern management of a comprehensive assessment system that includes a number of specific indicators that reflect the effectiveness of the units, in the framework of models, which successfully applied the methods of comprehensive evaluation, for example, elucidating the contribution of certain units on the overall performance. Among the above models it is possible to note the applicability of each of them for the tasks of evaluating the effectiveness of staff training, highlighting under the Department responsible for the training, a specific set of target indicators to assess this division of the company. Technology and tools of coaching allow you to clearly see your goal, and define individual way of its achievement, inspiring and revealing the potential of man. Contact with human values, creation of vision allow to achieve the best results, contribute to personal growth, raising the level of awareness, responsibility for decisions, confidence, conscious on life and more [1].

6 Limitations of methods for assessing the effectiveness of training

Thus, the overall limitations of the above methods of evaluation of effectiveness and impact of the following:

1. To assess the effectiveness of training is usually required for group evaluation. Methods based on subjective assessments of respondents and to obtain a more objective picture need to interview a few participants in the learning process and third-party observers. In the coaching of the first persons in this group score is not always possible. First, managers do not always inform others about the lessons with a coach. Secondly, they are not always ready to be evaluated by subordinates. I.e. from the coach in the case of the first persons require special privacy.

2. The subjectivity. Respondents most often not appreciate the education, and the coach, and the score reflects their attitude to learning, per se, but to the person who conducted the training.

3. It is not always obvious causal link between training and subsequent events. It is difficult to answer unequivocally, for example, the question whether there has been an increase in revenue due to learning or due to changes in the economic situation.

4. All these methods aim to estimate the changes of behavior, and do not reflect the changes that have occurred at other levels.

5. These tools primarily measure the symptoms change. The coach, to evaluate the effectiveness of their own work, it is useful to understand what internal changes happened to the man.

7 Conclusion

The concepts of usefulness and value are usually used in two different ways: (1). the perceived value, the degree of pleasure or pain, joy or suffering in the real event and 2). Selectable value, the contribution of the expected outcome in the overall attractiveness or unattractiveness option. This distinction is rarely p resultsthe explicitly in the theory of decision making, because it tacitly assumes that the perceived value and selected value coincide. This assumption is part of the concept of the ideal agent, decision-makers, capable of predicting future feelings with high accuracy, and accordingly evaluates the options. Ordinary people, however, compliance with selectable values perceived values far from ideal Some of the factors that will affect the sensations are difficult to predict, and some of the factors influencing the decision is relatively unimportant for the perception of events [5]. The paper presents some of the possible tools for evaluating the effectiveness of the application of the concepts of coaching, based on the analysis of individual changes of the semantic space of a person is the reflection of inner meanings.

These methods allow evaluating the work of a coach in the mode of individual work with the client, while maintaining maximum confidentiality, which is important when dealing with top managers. Methods are not straightforward in their application, due to a wide spectrum of action, and with adequate use, you have the possibility to solve the above mentioned problem. Development of a system of indicators will not only allow for a comprehensive assessment and real-time tracking of the level of effectiveness of these measures [4].

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Exaggerated economic models

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Abstract

Goods and cash flow in the context of business striving for maximal profitability. Economic tendenciesinthe following context. Work of economics in the existing way for self-destructiveness. The task of any business model should be not the maximal profitability but balance between profit and sufficient financial resources for consumers.

Keywords: cash flow, consumer, fabricator, maximal profitability, model, tendencies in economics

1 Exaggerated economic models

Contemporary business targets at gaining maximal income. But the quantity of material resources, as any resources is a certain limited quantity and for the development and functioning of economics there is a need for the goods flow (more intensive it is more effective is development of economics). Presentedmodelsshow how exactly this process takes place in the context of maximization of income and what prevents its intensiveness.

These models do not reflect real situation but show the direction of tendencies in economics. Analyzing these tendencies possible ways of solvation of described issues could be found. These issues are connected with improper choice of target and underestimation of dependencies in economics.

2 First model

World economics could conditionally be separated into two parts – manufacturers and consumers. Quantity indicators in this case are of no significance.

In this model manufacturers have the goods but consumers have material resources and cost of the whole production is equal to the material resources of the consumers. Situation is perfect as 100% commodity turnover is guaranteed. For further consideration of the model it is significant to take into account the price of the product. That is to state that in fact manufacturers and consumers have equal quantity of material resources – 50 to 50.

Let us see how this situation will develop further.

Assume annual economic growth of 5% (the number is rather high and it is done intentionally to highlight the tendency).

Assume as well that annual income of the manufacturers – 10% (this percentage could be more, as in this case, it should reflect direction of business development and every manufacturer tends to maximize his profit).

100+5%=105	
Manufacturer	**Consumer**
50+10%=55	**105-55=50**

FIGURE 1 Distribution of the first year

105+5%=110,25	
Manufacturer	**Consumer**
55+10%=60,5	**110,25-60,5=49,75**

FIGURE 2 Distribution of the second year

In this case we will have that total mass of material resources in a years' time will bedistributed as follows: 55/50 (fig.1.1), i.e. economical balance would shift to manufacturer.

What will happen after one more year? Situation will be more uneven. (fig.1.2)

In fact this distribution is 55% to 45%.Process goes on increasing and after 15 years consumer would have nothing at all.

Of course, the model is exaggerated – in the real world these economical groups are under many factors that influence distribution of material resources and value of the consumer group would never be zero. Moreover, each manufacturer is at the same time consumer. But we should remember that not every consumer is a manufacturer and even manufacturers themselves are not able to consume everything that they produce.

Another principle that could be applied in this case is the following division of the economical groups: one category is those who get profit, another – those who get salary. Here it could be stated unambiguously of the concentration of the capital of one group in detriment to another. It influences negatively economics in total, slows the development, results in crisis situations. But this principle was not applied because in this case shows up highly expressed social context that was necessary to avoid, because the model is economical.

To sum up everything that was stated above it could be concluded that thus, the economic situation develops and does not go in line with this model, the tendency is inherent. Existing form of economics (in the context of business striving to maximize its profit) works on the self-destruction. In order to change the situation there are necessary methods to keep balance growth of economics and profit of the business sector in total, so that in the consumer sector there was approximately half of the material resources to ensure meaningful turnover.

3 Second model

The next model – is closed model of one manufacturing item where there are one employer and three employees. Goods are produced that by default are required by workers, but not needed by employer. Price of the goods for the convenience of further calculations will be assumed as 6 conventional financial units (c.u.).

In the first case employer hires three employees for the manufacturing of three goods items. Employers get their salary and thus each of them has the possibility to purchase of one goods item. Employergets6*3=**18c.f.u.**

Let us consider another situation. Employer hires only two workers in order to produce three goods items, thus saving half of the values of the third goods item (i.e. c.u.) But as the third worker is not hired he does not have material resources to buy necessary item. So employer gets 12c.u. for 2 items and saved 3 c.u. (6*2+3=**15**c.u.) and one item that couldn't be sold.

Further let us imagine that there are millions of such production units and they could freely exchange goods and financial resources. Situation is as follows: produced 3 million of goods items, out of which only 2 million could be sold. As each of the employers is interested to sell all three goods items taking into account conditions of such competition all the possible resources would be used even pricing. Assume that as a result the price will be lowered for one third (up to 4 c.u.). In such conditions even employers who have sold all three items will profitless, than in the first case: 3*4+3=**15c.u.** (three goods items for 4 c.u. plus 3 c.u. of savings). Some will not get anything at all.

Summarizing let us return to the original model. As a result employer got in average for 2 goods items 8 c.u. and 3 c.u. of savings, in total – 11 c.u. and one goods item that is not possible to sell, because of the lack of material resources in group that is interested in buying of this item. Thisitemmarketvalueis4 c.u., i.e. even in case of selling employer could not get the sum that would be equal to the sum of original model.

Conclusion is as follows: increase of the profit by saving on a labor force (that in essence is the mass of consumers) destroys as economics as a whole and economics of a single manufacturer.

The task of any business should be not only profitability, but the supply of the consumers with the financial resources, as the decrease of quantity of financial resources leads to unnecessary toughening of competition and false over-production (goods are not sold because the consumer does not have necessary resources).

4 Conclusion

In order to conclude what was stated above, attention should be paid one more time to the tendencies that are showed by models.

Economics in the context of maximization of profit works for a self-destruction, therefore it is necessary to pay maximal attention for the study of the instruments that allows to keep total economic growth rate and total profit of business sector balanced. This balance should ensure counterpoise of the material resources in the sectors of consumers and manufacturers for ensuring meaningful turnover.

It is necessary to take into consideration that the task of any business should not be profit maximization, butprofit on condition that consumers have sufficient financial resources.

References

Models that are introduced in the article are not connected with any concept of economics. Therefore, the literature that has influenced description of these models could be assumed all the books that I have been reading.

Organizational diagnosis is a method for improving any enterprise performance

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Abstract

The purpose of this research paper is to identify the main approaches and methods of organizational diagnosis of the enterprise taking into account all the subjective and objective factors and to determine the main aspects that affect the enterprise performance as a whole.

Keywords: diagnostics, reliability, organizational structure, methodology

1 Introduction

In modern times, any organization in the course of their work passes its "life cycle", and therefore faces a number of common problem situations. Every enterprise has its own unique organizational structure determined by the specifics of the job, as well as economic, political, social and ethical standards.

2 Problem statement

For a detailed examination and diagnosis of the enterprise, it is necessary to understand the concept of which the organization's general management is made of. The clearest example of the conceptual framework of organizational diagnosis was portrayed by Marvin Weisbord. His Six-Box Model fits well within the scope of managerial, administrative, research and consulting practices. (See Fig. 1.1) [1].

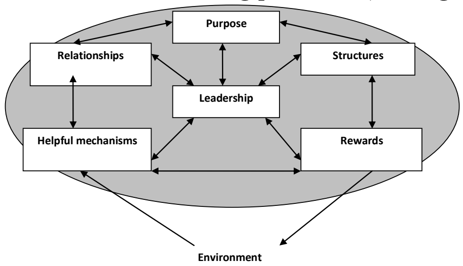

FIGURE 1 The Marvin Weisbord Six-Box Model

The Weisbord Model has a simple form, and is well suited for detailed examination of the enterprise when applying any functioning company on the given model, which is the initial step of any kind of company diagnosis.

For a more detailed diagnosis, Consulting Management, or the ability to make the least amount of mistakes, should also be taken into account. The use of consultant services is essential. During an enterprise diagnosis, a consultant can identify the main problems in the organization [2-7].

When conducting an organization diagnosis companies are offered accessibility to examine the general condition of its self and gain information novelty upon involving the client's interest.

Because organization diagnosis assumes obtaining information through the questioning of company's employees, there needs to be found a reliable approach that can be used at work for a diagnosis to turn out successful. The choice of approach – through the problem or a task, is based on the consultant's own professionalism. A consultant also conducts a diagnostic interview, which involves asking specially structured questions to a selected group of employees.

3 Results of the study

Self-diagnosis is one of the initial steps of conducting an organizational diagnosis. It includes the following methods: "The Methaphor", "The Cross", "The organizational life cycle scheme", "Analysis of administrative errors", "Analysis of organizational pathologies". Upon each method's examination we can make the following conclusions: organizational diagnosis is a tool for strength demonstration of top-level managers. These conclusions are based on the analysis of aforementioned methods, which reflect these tools in order: SWOT analysis, BCG Matrix and PEST analysis.

In the modern world, standard analysis techniques have become outdated and have many disadvantages. Therefore, the author of this article recommends drawing attention to the basic methods of LCAG and DIKW concept. There needs to be a new interpretation of SWOT analysis through LCAG method. If a situation arises in which a manager or administrator is faced with challenges that are deficiently constructed and do not fit in the standard of decision-making, there will come a time in need of wisdom and application of the DIKW concept.

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The systems view on organizational development

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Abstract

Despite the fact that the term "Organizational development" appeared in the late 50's and early 60-ies of the last century, many respectable publications were issued on this topic for the last half a century but till now doesn't exist common understanding of the role and place of the organizational development in modern company, neither it's general definition.

Keywords: Organizational development, definition, systems view, management processes, organization cultural postulates

1 Introduction and body

The organizational development in different companies means the various activities. Activities of organizational development can be:

1 Are completed by one or two specialists ensuring the subdivisions job instructions and regulations preparation and support in actual form.
2 Could consist from work of huge, hypertrophied directorates and departments involved in formation and implementation of corporate culture:
   2.1 internal communications;
   2.2 organization of corporate events (event-management);
   2.3 building performance management system;
   2.4 building quality management system;
   2.5 formation and development of the personnel reserve;
   2.6 organization design;
   2.7 employees rights and responsibilities empower development programs;
   2.8 business processes optimization and generally all relating to change management.

Scientific studies have similar situation. Some believe that organizational development is only to improve production and management processes (the same design and optimization of business processes). Someone understands organizational development as a long-term work to improve the problem-solving processes and organization update by more effective co-regulatory of organization cultural postulates.

If we are speaking about improving production and management processes, then development outside of the already existing processes is impossible. And this raises the question: Is it appropriate, to talk about organizational development in this approach?

The second approach is more complicated, and offers the need to upgrade in addition to improve existing processes. And all this should be based on a common interpretation of the cultural tenets of the organization.

The essence of this approach lies in the fundamental importance of "cultural postulates" or organization principles. The development direction elaborates based on these principles, and adjusting activities in accordance with changes in the external environment.

But in any case, organizational development should increase the efficiency of the enterprise as a single system. So development is in better management function handling at constant activity or in the quest for a certain level of quality of management function performance during the necessary activity changes. Thus, a change in the production process or activity is not development for the organization.

2 Conclusion

So balanced managerial functions holding is, in fact, a measure of the quality of organizational functions. Gorgeous planning system will not give anything to organization as to whole system in general, without corresponding to it implementation plan control system. Information system should provide the ground for planning and communication between planning and control. Motivation system allows too overcome bureaucratic obstacles, but would be senseless without the proper information system.

The above business strategies, proven in practice, such as the Quality Management System and others can give a definite effect on the development of the organization. But without understanding the content of organizational development, which is in management functions balance, the effect will be short-term and can be dangerous in management functions relationship loss.

Genesis of management science through the prism of practical and theoretical studies in the researches of Beer S. and Litvak B.G.

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Abstract

The paper author touches upon the topical issue of management science and considers comparison of Management Studies, which are based on the theoretical and practical researches of Beer S. and Litvak B.G. In the author's opinion, these luminaries of management science managed to demonstrate clearly (via the employment of their extensive researches) the importance of a clear methodological structuring and systematizing the science of management, its necessity and its prospective development.

Keywords: knowledge, experience, operation, construction, result, classification, structure

1 Introduction

There is a question if it is possible to say that the experience is at the forefront of management science. It is so! Only experience can teach you how to manage and control [10]. The fact is, it is possible to say without any exaggeration that there is no science of management as a united system of concepts and management process, resources, technologies and designs, which are an integral part of a unified project management with unified laws of control [1, 2].

Then what is the theoretic basis of science of management? Equilateral and fragmented theories of scholars, inconsistent definitions of fundamental concepts, starting with the concept of strategy, different approaches, various schools, and famous gurus' points of view are giving a way to efforts aimed at the creation of a unified management science [1, 8].

2 General

The genesis of the science of management is considered in this study through the designation of critical points of development [3, 5]. The occurrence of any phenomenon in the management has its origins and its urgent points of development determining whether the future manager' features can be implemented and if yes, then to what extent [1, 8, 9]. The author has identified these points of comparison by employing the correlations of the papers of Beer S. and Litvak B.G.

The basis of the author's judgment about the similarity or difference of theories of two scientists is a comparison as cognitive operation [4, 6]. The author examines and compares two approaches not only from a theoretical point of view, but gives priority to the issue of management practices as the basis of management science. The significant attention is paid to the solution of managerial tasks, as well as to laws and principles of decision-making ensuring the success achievement; the authors under consideration devoted their attention to examining these issues in their studies [1, 7].

The set goal presupposes completion of the following tasks:

1) to compare the researches of two scholars for obtaining the efficient conclusion and to identify the nature of their papers within the new management structures;

2) to identify the ways of expression and the possibility of administrative components of simple and complex management structures.

The topicality of the study is determined by the importance of studying the "parallels" within the management science. Their classification, according to the author's opinion, serves as a foundation for investigation of Beer S. and Litvak B.G.; the principal content of their study is search for such parallels.

Problem solving allows a higher level of comprehension of the theoretical and practical fields of the management science within the theories investigated by the author. There is a task to trace the evolutionary emergence of management science through the prism of researches of Beer S. and Litvak B.G.

2 Conclusion

Methodological structuring and systemizing are important trend of development and establishment of management science. The investigations under consideration are not only an important (although at first glance totally unrelated link), but also, undoubtedly, a typical example of the possible further research in this direction.

The hypothesis of "parallels" in the issue of studying the science of management, put forward in this study, is, in author's opinion, an opportunity to take a new look at the model of management not only from a theoretical point of view, but also from its practical part. It is possible to prove the undeniable right for life of science only by connecting its critical points.

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Identification of managing problems during educational process

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Abstract

High school professor and a student, who having many years of experience in management, in the course of studying the discipline "Key competences of managers" on the 3 rd year BA program, set out to identify the underlying mechanisms that enhance the management capacity of participants in the educational process. Solving the problem is carried out in the proposed conceptual framework.

Keywords: control & management, keyed competences & learning outcomes

1 Introduction

The present survey begins with any questions: What the control's abilities are different from the management's skills? Are a today's students ready to demonstrate professional managerial skills during educational process? Whether we to transfer the function of forming managerial skills to the employer? Whether it is possible to prepare school graduates, who do not have the life experience, to the profession of a manager?

Analysis of the responses to the questions has several contradictory grounds [1-5]. Therefore our attempt to get an exhaustive answer was failed. We reduce the essence of this problem failure to the methodological nature. Revealing the contents of this problem, you should be able to do in a timely manner by classifying typical, familiar and convenient solutions, and focus on the precarious position associated with a manager's unconscious qualities formation. They are working out requires a clear awareness that binds the today's educational process with future practice. As connecting elements are the backbone-increased requirements for core competencies and beyond the educational standards of the principles governing the learning outcomes [6].

2 Description of the problem

In general, the professional manager consciousness is not characterized a degree of specialized training as a general educational level, reflecting the ability and a need for self-education, culture and methodology of thinking, adaptive and innovative business opportunity outlook and social position [1]. Our approach is based on the formation of a special educational climate. Its peculiarity is expressed not in charge of the educational program successful completion, but this is focused on the development of unique offerings that allow not only to identify the real problems of administration, but also to improve the activities of existing organizations. It should be noted that such proposals are prepared in the form of management products, which are offered in terms of resistance to innovation, observed by the external environment. In other words, there is a working out special management skills extrapolated to the readiness of the product developer to implement non-standard management solution.

In the course of such knowledge tasting process requires mutual trust and understanding between the lecturer and students. Their joint effort should be focused on the search for new non-standard control arms, and face directly to potential employers.

In the case of the introduction of the employer is not only a person who is interested in improving the skills of the potential employee, but also acts as an active participant in improving the educational process by offering its part the new requirements for the competence of the manager.

3 Conclusion

Considered conceptual approach allows adapting the current educational process to a promising applications decision. Errors are detected and synthesized trends in the development organization during adaptation process.

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Demonstration of a product of management

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Abstract

The purpose of this paper is to develop and implement a program of basic management functions. For a manager to work successfully, they need to be able to accept full responsibility for their actions.

Keywords: activity, value, goal, goal-oriented development, organization

1 Introduction

For the manager of the organization it is important not only to understand the idea of process management, but also to convey his conviction to the company's employees.

Proceeding from this objective, the concept system and function implementation in the management of the organization are highly important. It is planned to make sense out of the organization's development based on the limited entirety of factors affecting it, and the stages that the organization undergoes in the duration of its development [1, p.18].

2 Statement of the Problem

The purpose of this paper lies in the development and generation of a starting business in order for it to develop consequentially and successfully.

There is a need to make grasp of the understanding of the organization's development based on the organic combination of factors affecting it, and the stages through which an organization goes in its development. Therefore, a possibility to predict problems which, at some point or another, become characteristic to the organization in general appears.

The prediction allows developing a strategy of overcoming difficulties that may arise on the way of its development, thereby minimizing the harm caused by the crisis to the organization, and possibly also salvage it from its destruction.

3 Results of the Study

When infiltrating the process, the first thing to do is identifying primary and frequently used combined cooperating processes of a specific nature. The process will include resource and resource management's activities.

The relationship of resource and process can be determined using "input" and "output" [1, p.19].

Using this technology, the assigned resource required to complete the process can be considered as "input" from the point of view of the process. The resource that was transformed during this process and gained some kind of value to the consumer can be regarded as an "output". According to this technological process, the resources are being moved, stored and processed. They are called "inputs" and "outputs" only with respect to this one particular process.

"Output" from one process will be an "input" for the next or another process [1, p.20-21].

The following five stages should be singled out for afore mentioned reasons [2, p.32-33]:

- growth through creativity;
- growth through policy guidance;
- growth through delegation;
- growth through coordination;
- growth through cooperation.

The solution of assigned tasks will allow creating mechanisms, which are focused on the use of ideas, in which the organization develops akin to a living organism, all for the opportunity to study the organization with the entire set of processes occurring in it [3, p.113].

4 Conclusions

The system developed by the author may enable the experimental examining of efficiency of such an approach, in which the leadership is ready to opt out of the existing structures prior to the stage of revolution exacerbating the situation.

The modern business platform needs to get an established management system, which will become an integral part of management processes at all stages of managers' decisions.

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The development of strategy based on SWOT-analysis using LCAG terminology assets

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Abstract

A new form for business plan development is proposed. The proposal is reduced to the description of present organization structures and conducted in terminology of organization's reaction to the emergence of new circumstances. Hence, structure'smanoeuvreincaseof unexpected events is provided.

Keywords: danger, opportunity, strategy, effectiveness, route

1 Introduction

It is impossible to propose strategy development measures without the information about SWOT-analysis method source. Facts that are given about methods usage confirm problem's formulation. However, they do not reveal whole picture. Summary about LCAG method authors has only general information [1, 2].

2 Problem definition

Concept schematic is illustrated in Figure 1.1.

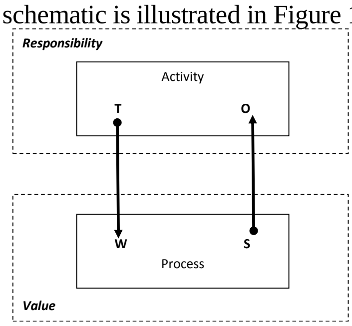

FIGURE 1 Concept schematic of the study

The main task of this study isthe creation of effective manoeuvre structure: development of strategy based on SWOT-analysis using LCAG terminology.

During the current study, several tasks were set:

1. Found the SWOT-analysis source;
2. Develop a conceptual schematic;
3. Combine all elements of the schematic into structure;
4. Define conflict level of organization as a priority of organization's adversaries destructive forces of organization;
5. Develop strategy formulation procedure based on SWOT-analysis using LCAG terminology.

Tasks 2-5 weresuccessfullycompleted. A binding schematic of internal factors' process (Strengths, Weaknesses) and external factors' activities (Opportunities, Threats) was proposed. Four factors about the product were analyzed as structure, where a new factor is introduced, named as "ultimate". This factor characterizes the destructive force of organization. The proposed procedure can be used for realization and security of business-ideas [4, 5].

During the task solution, the organization acquires resources for the result structure evaluation. This will allow top lan trajectories of strategy during performance development.

3 Conclusion

The proposed approach allows to value structure's performance within the specified route.

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Organization of the workplace on methodology of lean manafacturing

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Abstract

In this research, examination of the operating Latvian enterprise "IML Furs" was conducted. The offered approach is focused on identification of a problem in technological process of processing of waste of primary production. The author consistently described the main productions in terms of creation of value for the enterprise. Thus, the actions, which are not creating value are excluded from process. Ways of optimization of working processes were as a result revealed.

Keywords: efficiency, process, system.

1 Introduction

The Lean Manufacturing (LM) represents the system aimed at providing maximum efficiency of production at the minimum expenses. This technology is considered optimum on a ratio of the price to the reached result [1].

Lean Manufacturing - means of fight against shortcomings, which in terms LM are designated as muda. Muda means losses, waste, or activity, which consumes resources, but does not create value [1]. In other words, mistakes, which should be corrected come to light.

All actions, which make a stream of creation of value, can be divided into three categories:

1) The actions creating value;

2) The actions, which are not creating value, but inevitable (muda the first sort)

3) The actions, which are not creating value which need to be excluded immediately from process (muda the second sort) [1].

Actions, which belong to muda the second sort, need to be eliminated.

2 Statement of a problem

Main objective of work is finding of an optimum point of efficiency at research of productions, for reduction of expenses and increase of competitiveness.

For achievement of a main objective of work, it is necessary to solve the following problems:

- To describe the main productions at the enterprise;
- To reveal the actions creating value for the enterprise and the actions, which are not creating value, which can be excluded from process.

For identification of actions, which belong to muda the second sort, it is necessary to break all work in firm into processes.

During research, the following processes are revealed:

1. Service of the client
2. Production of a curve of a product. Calculation of necessary material.
3. Purchase of materials.
4. Furrier's works.
5. Sartorial works.
6. Preliminary fitting with the client. If it is necessary, it is remade.
7. The product is finished up to the end, the necessary accessories are established.
8. Final fitting. Delivery of a product to the client.

After studying of productions of firm it was revealed muda the second sort. So, after a subcut of skins "waste" is formed.

From this, such waste tailoring of 6 various products is possible. Painting is necessary for such plates sewed from pieces.

The fur remains at the moment develop in one bag. Its sorting is carried out by the end of a season. As a result production of a product from pieces begins in six months, and its sale is carried out by the beginning of the next season.

3 Results of research

To exclude the actions which are not bringing value and for improvement of this process, it is necessary to carry out timely sorting and a subcut of pieces, i.e. right after a subcut of skins, to sort pieces, then to podkroit and spread out on different bags that further time was not spent for it. And in process of a set of pieces on a product to carry out tailoring of a product.

If all processing happens at once, for production of a product from pieces will be spent, approximately half there is less than time. And besides, if to combine tailoring of the main products with products from pieces, the chance to sell a product from pieces in the current season increases, without expecting half a year till the next season. It will allow to achieve improvement of quality and to increase profit.

4 Conclusions

Philosophy of lean manufacturing – the powerful weapon for creation of value and fight against losses in the organization of any type [1]. Application in any organization will allow to achieve essential increase of overall performance and reduction of losses. Introduction of lean manufacturing – not the single project, but the continuous, proceeding throughout all existence enterprises a commitment to excellence and to elimination of non-productive expenses [2].

At a successful solution, application to all productions of the enterprise is possible. In production, it will promote fast performance of tasks, providing an order on a workplace and favorable working conditions that will lead to increase of overall performance and development of the enterprise.

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Development of human resource projects in the IT industry

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Abstract

Living in a rapidly developing world, it has been noticed, also, the daily changes of the IT technology. New softwares appear every day, and most of the people do not know how to deal with them, because they do not have any knowledge about what its functions are and what is its purpose. The projects regarding Human Resource Development (HRD) are designed in such a way that allows employees to develop themselves at high-standards levels within the company. Projects for Human Resource Development have been made in order to provide individual development for each employee in the country. The mission of this thesis is to define the importance of the HRD projects in the IT industry and also to define the main steps of a HRD project in order to be ready for implementation.

Keywords: human resource development, management, project management

1 Introduction

Living in an era where the business environment is constantly changing, it has been realized the importance of investing in HRD projects in order to increase productivity and to develop the workforce within the company. Also, it has been proven that there exists a strong relationship between, the long-term organizational effectiveness and proficiency regarding the individual learning and the power to assimilate practical knowledge. One of the biggest problems that employees face today it is represented by the fast developing technology and the lack of knowledge, that the people have regarding the new released software. If this problem is also encountered this will lead to an unprepared personnel that could actually face the new market demand at an international level. Unprepared personnel will also lead to an unsuccessful productivity because of the new machinery, the company will need to have.

2 General

Living in an era where the business environment is constantly changing, it has been realized the importance of investing in HRD projects in order to increase productivity and to develop the workforce within the company. Also, it has been proven that there exists a strong relationship between, the long-term organizational effectiveness and proficiency regarding the individual learning and the power to assimilate practical knowledge. One of the biggest problems that employees face today it is represented by the fast developing technology and the lack of knowledge, that the people have regarding the new released software. If this problem is also encountered this will lead to an unprepared personnel that could actually face the new market demand at an international level. Unprepared personnel will also lead to an unsuccessful productivity because of the new machinery, the company will need to have.

One of the causes that lead to these problems it is represented by the lack of involvement of the Human Resource Department, of a company, in developing their own employees. Managers must always know that knowledge means power and in order to get it, sacrifices must be made. This sacrifice refers to the time, disposition and money to invest, in order to get the most of the employees. T.W. Schultz agrees upon the fact that knowledge among employees is a very important aspect that a manager should take into consideration. He states that economic growth and the concept of development it is a function of investment and, accumulation of knowledge it is a function of physical capital. He suggests that in this context, investments must be made in the necessary materials, in accumulating the right skills, and also in giving the right education.

Based on Schultz's ideas, other scientific authors found that there are also other intangibles that must be taken into consideration, such as: the improvement of labour discipline, the transformation of labour into a more productive source and practicing the existing knowledge. The HRD literature has shown us in many ways that projects related to the Human Resource Development should be made in a way, so that it could be related to the business trategy of each company. High-impact Learning, a model made by Brinkerhoff and Apking in 2001, it shows a strategic alignment between HRD and the business model. This is a model that uses the the process of mapping in order to leverage learning with the business goals. HIL model focuses on four principles: 1) strategically learning objectives; 2) deep business leverage to learning objectives; 3) establish a systematic learning-to-performance process; 4) integrate with performance support systems and factors.

The main objectives of this thesis is to see how the concept of Human Resource Development is seen in the companies that exists in the IT industry, how they are using this concept (if they are using it), see the effects of the lack of HRD projects in the company, enumerate the type of HRD projects. Also based on theoretical approaches I will make relevant hypothesis, which I intend test them with the help of SPSS program. I have chosen the IT industry because technology nowadays is developing very fast and all the employees that want to work in this domain need to have updated information about the current software. Without any proper training it is very hard to obtain it. Employees that are working, in order to work at higher standards need to have projects that can help them to be more productive in any situation.

3 Conclusions

Living in a fast development technology era, every company must seek to develop the potential of every employee. Some of the consequences can be seen when one employee is not motivated, leaves the company because he found a better opportunity, in another company. If the importance of the HRD projects has not yet been seen, urgent measures must be done because, if they are not present one company can lose credibility in front of its competitors. At the end of the literature review, I will draw the necessary conclusions, which will help us determine the importance and what type of HRD projects can be done in a company that delivers IT services.

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Motivational and demotivational factors, which influence Latvian youngsters in choosing of seafarer's profession

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Abstract

The paper provides with the analysis of European and Latvian labor market of seafarers, as well as analysis of actions of EU/EEA maritime educational institutions, which, recognizing of the problem of shortage of seafarers, make efforts to increase income of students into the maritime professional studies. The paper offers directions, how Latvia could contribute into the sustainability of EU seafaring industry.

Keywords: seafarer's profession, maritime education, maritime educational institutions, shortage of seafarers

1 Introduction

Shipping is a high productivity industry. The marine and maritime economic sectors forming the EU's 'blue economy' represent roughly 5.6 million jobs and account for a Gross Value Added (GVA) of €495 billion [1]. Each worker is estimated to have generated €88,000 of GDP, significantly above the EU average of €53,000.

Different authoritative institutions predict different shortage of seafarers on the worldwide level. The number of shortage may differ, but they definitely agree with each other, that the shortage exists and in future it will become bigger [2]. As example, Baltic and International Maritime Council (BIMCO) and the International Shipping Federation (ISF) reports in 2010 estimated shortage of seafarers of about 13 000 (2,1%) and approximate balance of ratings; Drewry estimated more important shortage for the officers - near 30 000 (no estimation given for ratings). In the 2014/2015 these institutions estimate shortage of 30 000 and 15 000 of seafarers (correspondingly).

For OECD group the shortage of officers is predicted to be more significant with a gap of 63 000 of officers and 192 000 rating in 2015. For the year 2010 these numbers were less significant: 45 000 and 145 000 correspondingly [2]. This comparison gives a view of trend, that the situation is going to be worthen in future.

In order to keep same ratio in the weight of European officers in the worldwide force, number of officers will have to grow in the next 10 years of 10% in Western EU Countries and 20% in Eastern EU Countries [2].

BIMCO/ISF study also show that more than 25% of officers are over 50 years old and more than 50% - over 40 years old [2]. Actually, maritime Industry professionals are getting older and the number of new graduates is not compensating this tendency steadily.

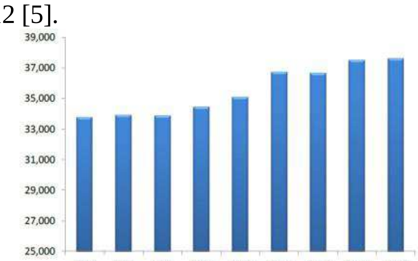
Regarding the number of professional seafarers, Latvia holds the 5th place in Europe with more than 13 thousand seamen, two Maritime Colleges and the Latvian Maritime Academy (LMA) with over 500 students. The pool of the Latvian seafarers is stable for the last 4-5 years but the number of graduates from maritime institutions is declining. [3]. Latvian Seafarers are well known among first class shipowners and have stable and well paid positions on board of their vessels and ashore in their offices.

Latvian seafarers also positively contribute to Gross National Product. This contribution in 2010 was 1,3%. Comparing with average employee in Latvia, contribution of ship's officer is 4,5 times higher, ship's rating – 1,3 times higher [4].

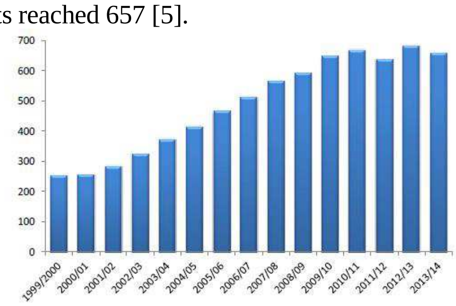
2 Discussion

The larger world and EU fleet becomes, more seafarers are required to satisfy the demand on manpower. Every maritime educational institution in Europe understand, how important is to maintain and increase number of EU seafarers versus the increased demand. Therefore, maritime educational institutions try to involve more and more youngsters into the maritime field. Let us look on the data show the number of students study at EU maritime educational institutions.

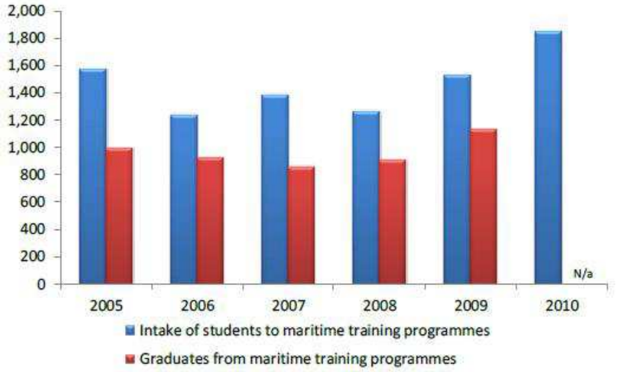
Indicatives show, that in comparison with year 2004 number of students in maritime educational institutions is increased on 11% with a value of approximately 38000 in year 2012 [5].



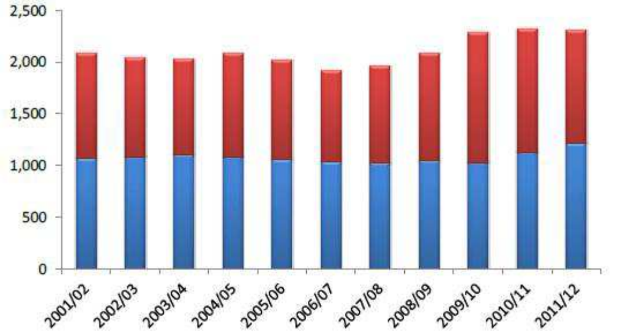
In Belgium number of students is increased on 162% since 1999 till 2014. For the present days the number of students reached 657 [5].



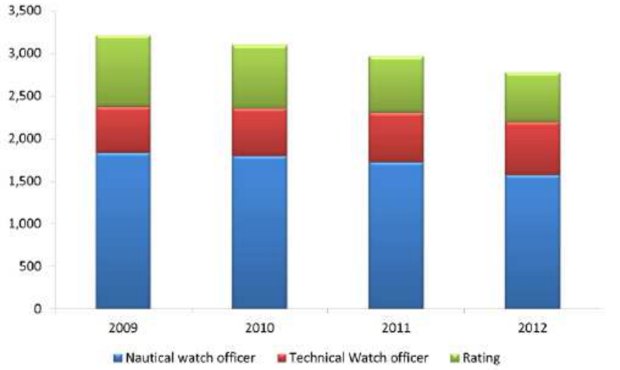
In Denmark number of students fluctuated on more or less the same level during the period between year 2005 and 2010. The number of entrants had been increased noticeably in 2009/2010, what can be an effect of the "World Careers" publicity campaign launched by Danish Shipowners' Association in 2008 [5].



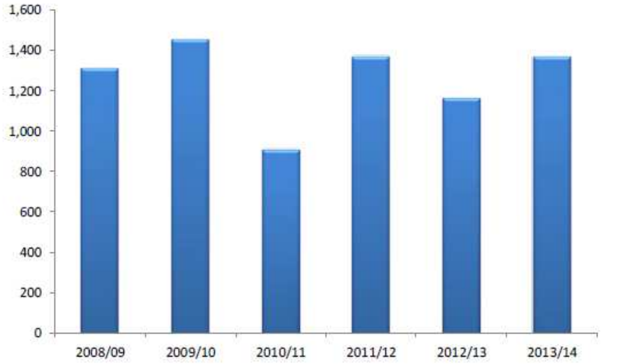
In France number of students also fluctuated on the relatively same level during the time period from year 2001 till 2008, but then the number was raised up to 1200 on educational programs for ratings and 1100 - for officers [5].



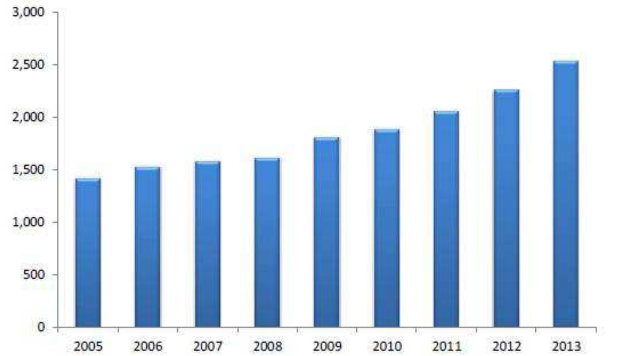
The statistical data of Germany shows that the number of german students has gradually decreased from 3200 in 2009 to 2800 in 2012. In comparison with educational department it is evident, that relative number of students on educational program "Ship Engineer Officer" became higher: 17% in 2009 and 23% in 2012. This reflects efforts of German Shipowners' Association to promote this type of education to youngsters [5].



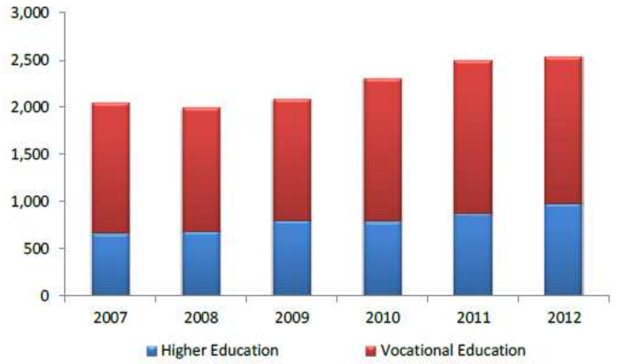
The number of students in maritime educational institutions of Greece was quite unstable during the period of 2008 - 2014. In the current stage number of students reached approximately 1400. Greece has the biggest fleet in EU, but number of students is not so big in comparison of other EU countries [5].



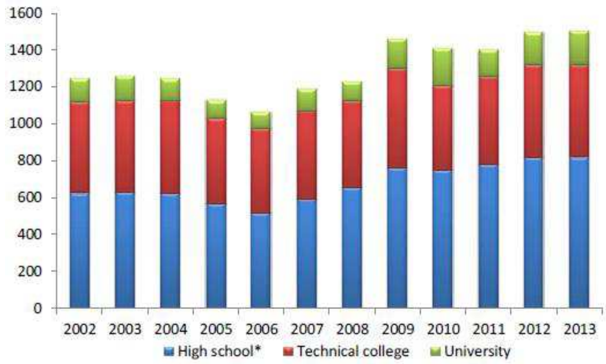
Italy shows quite sufficient and stable positive trend in number of students at their maritime educational institutions. In 2013 approximate number of students reached approximately 2500 students, what is 79% more in comparison with the year 2005 [5].



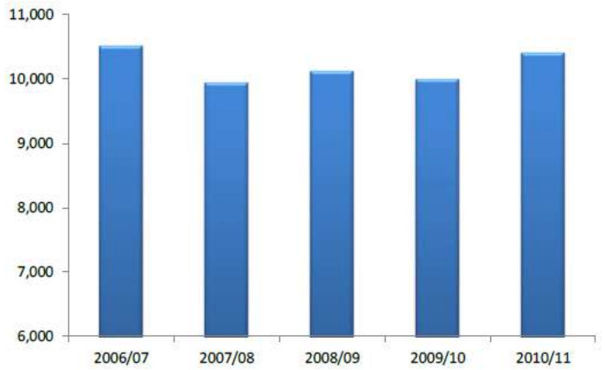
Netherlands shows quite stable positive trend on number of students at maritime educational institutions since the year 2007. Number of students in higher educational programs is increased on 48% and in vocational educational programs - on 12% since the year 2007 [5].



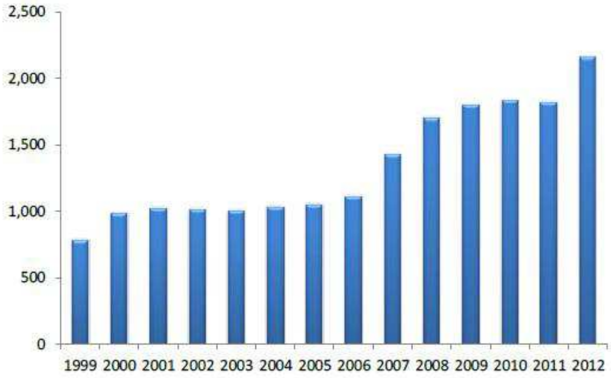
Since the year 2002 till 2006 the Norwegian trend showed negative tendency, when the number of students at maritime educational institutions decreased from 1240 to 1060. But in 2007 the Norwegian Maritime Forum launched a campaign to promote and highlight maritime sector opportunities to youngsters. Since that time the number of students has increased and reached 1500 in 2013, showing the growth of 42% [5].



The number of student at maritime educational institutions of Poland is quite stable between 2006-2011. At present moment Poland produces the largest number of maritime professionals. Annual number of students fluctuates on the level of around 10000 [5].



The UK shows very positive and stable trend since 1999, what is the effect of the tonnage tax regime, which requires, that any shipping company must recruit and train one new cadet each year for every 15 officers posts. The number of students has risen strongly from 780 in 1999 to 2200 in 2012 [5].



3 Conclusions

The latest industry trends show the tendency that the situation with shortage of seafarers is getting worse and moreover ships' professionals becoming older. To compensate officers demanded by the industry and retired seafarers, it is necessary to all of the EU/EEA countries make efforts in promotion of the seafaring profession to increase income to maritime educational institutions.

Latvia has good seafaring traditions formed during centuries. Latvian officers are recognized as highly competent and demanded on the tanker marked all over the world. But the number of graduates of Latvian maritime educational institutions are not enough. The research show, that there are interest among Latvian youngsters in this profession. Moreover, the research found main motivational and demotivation factors, which influence on the choice of Latvian youngsters. So the maritime educational institutions shall take this factors in consideration, while promoting the profession

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Use of system dynamics and simulation in modeling and analysis of vaccine supply chain management

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Abstract

Over the last century or more, immunization programs have contributed massively to public health advancement, significantly increased longevity and reduced child mortality rates, and to economic growth, development and prosperity across the board for most of the world. Consider, for instance, the success the global healthcare agencies and nations have had in eradicating small-pox, the "scourge of mankind" which had killed an estimated 300 million people in the 20th century alone, and in almost eradicating poliomyelitis (with only a few hundred cases reported in the last year in Pakistan, Afghanistan and Nigeria).

Keywords: public health, longevity, child morality rates

1 Introduction

Despite the significant and indisputable economic benefits of immunization, vaccine supply chain management is no easy task, given the number of different actors involved (the governments of a host of countries, international health monitoring and disease-control organizations such as WHO, the US Centers for Disease Control, UNICEF or the United Nations Children's Fund, and GAVI or the Global Alliance for Vaccine and Immunization, public health planners, the pharmaceutical industry, clinics, hospitals and healthcare providers and the 3rd Party Logistics, or 3PL, providers), and a slew of different factors or parameters relating to the clinical and regulatory environment (e.g., safety, efficacy, probability of success, and operational effectiveness), economic or commercial considerations (e.g., scalability, cost, and profit potential, which would depend on market shares and sales volumes, growth rates and gross or net margins) and the operational and strategic aspects of the vaccine supply chain or system.

"Since the business of making vaccines became a commercial proposition, profitability has often been elusive," according to Lagerwij, et. al[1]. "The economics are difficult: Costs of development and production, already high, are rising. Profit margins historically have been lower than those of other pharmaceutical products, in part because of the complexities of manufacturing and distributing vaccines as well as their stringent safety, testing, and quality requirements. And scaling-up of immunization programs along with the introduction of new vaccines have put a significant strain on decades-old logistics and delivery systems."

More importantly, the "winner-take-all" nature of the vaccine market dynamics translates into a rather limited number of suppliers for each product class, with high costs and associated risks representing major challenges to the "winners" in the vaccine market ("…compare the 38% cost of goods sold (CoGS) with 21% for pharmaceuticals…The average vaccine takes 10.71 years to develop and has a 6% chance of making it to market…"). As a result, many major manufacturers, especially in the United States, have left the market, leaving 90% of the world's production and two-thirds of R&D to companies in Europe and elsewhere.

On the one hand, the vaccine value chain economics depend on the ease and accuracy with which vaccine sales can be projected or predicted, compared with other pharmaceuticals (pediatric vaccines being more readily forecastable based on annual birth counts, compared with hard to predict volume for vaccines targeted at limiting unpredictable outbreaks, e.g., H1N1 and other influenza viruses), since poor forecasting can result in delays or shortfalls in delivery, additional costs, and risks such as the loss of reputation, for instance.

On the other hand, a centralized, well-managed supply chain can get the right product to the right place at the right time, reducing waste, meeting market demand, and reducing operating costs. However, given how vital it is to ensure product stability and the limited capacities of many markets in this respect, a major obstacle to delivering vaccines to populations in the developing world is the temperature sensitivity of such products, necessitating the use of expensive but not very reliable cold chains for storage and distribution.

A number of recent developments have radically affected vaccine supply chain economics: i) live-attenuated vaccines (LAVs) are more effective as substitutes for inactivated versions, requiring a lower dosage and less exposure: once they are evaluated for safety and efficacy, LAVs may help reduce operational costs, carrying costs, and waste; (ii) a new wave of vaccines, e.g., DNA vaccines, stimulate a strong cellular response and are safer than LAVs, and are relatively easy and inexpensive to design, produce,

[1] Antoinette, Sudeep Suman, Jamie Hintlian, and Kevin Chen, Robust Supply Chains Could Help Pave the Way, 13-2-SpRpt-Final downloaded on March 23rd 2015 from BioProcess International's Website: http://www.bioprocessintl.com/manufacturing/vaccines/special-report-path-vaccine-profitability/

and transport because they do not require temperature-controlled environments, as well as easier to administer, allowing vaccination teams to use less sophisticated and less expensive equipment. For instance, a study demonstrated that making a pentavalent vaccine thermostable increased its availability from 87% to 97%.

In this thesis, we aim to use System Dynamics and simulation to model and analyze the role of efficient and effective supply chain management (or getting the right vaccine for the right disease or combination of diseases, at the right temperature to the right place at or before the right time and at the right cost or price[2]) in delivering the wide ranging benefits of immunization.

[2] Here the "rightness" of the place, etc., would depend on whether we are referring to the pediatric vaccines used for the routine immunization of infants and children, or to those vaccines used for combating epidemics such as ebola, swine flu, etc.; and on whether the vaccines are prophylactic in nature and intended for acute diseases, or therapeutic in nature and targeted at chronic diseases.

The main aspects of the tourism market of Ukraine

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Abstract

The article reviews the main aspects of the tourism industry and the potential of the tourism industry in the world and the state of tourism in Ukraine. Investigated what proportion takes the tourist industry in the global services market. Indicated on issues that significantly reduce the role and importance of the industry. Studied research scientists, who were involved in this issues in their work.

Keywords: tourism, rates, industry, service market

The tourism industry even during the global financial crisis contains potential for not only tourism development but also related sectors: transport, communications, construction, agriculture and so on.

However, with its significant tourism potential of our country has a number of problems that significantly reduce the role and importance of the industry: the lack of an integrated approach to the development of the industry, the lack of a common information field of tourist facilities and resources, complex political situation, poor transport, high moral and physical depreciation of fixed assets not only in public services, but most orhaniatsiy that involved not only in industry but also in services.

According to the International Tourism Organization share of tourism in world GDP is 9% and 30% of world exports, it is also 6% of world trade. The tourism sector employs more than 235 million people - every twelfth employee. In 2011, the services of the tourism industry in the world have used about 983 million international tourists. In 2012 their number exceeded 1 billion people. The total turnover of world tourism market in 2012 amounted to 1.2 trillion US dollars in 2011, the figure was 1.3 trillion dollars [2].

According to the World Economic Forum in travel and tourism Ukraine among 124 countries ranked only 78th place. Therefore, this area leaves a great opportunity to find and activity.

According to the World Tourism Organization UNWTO Ukraine's share in tourist flows in Europe is about 4% and about 0.9% in European revenues from tourism. This significant difference in the structure of natural and cash flows may indicate poor performance Ukrainian tourism industry and poor use of available travel resources.

However, despite a number of adverse factors, the tourism industry in Ukraine is developing dynamically. Analysis of tourist flows in Ukraine (Table 1) shows the dynamic development of tourism in the last 5 years (average growth was 8.4%) relative to the stable development of outbound tourism (average annual growth - 7.5%) and stable internal dynamics flows (12.7%), which may indicate Increasing the competitiveness of Ukraine in the international arena. The development of tourism in turn contributed to investment in the industry and thus further increase the competitiveness of the industry.

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Information systems in management of trade enterprises

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Abstract

Consider the need for information systems to improve the efficiency management of trade enterprises. The attention is focused on building relationships with consumers trading enterprises. The proposed mechanism systems use customer relationship management (CRM). Disclosed the essence of each element of CRM trade enterprises (marketing, sales, customer support). Shown the results of the implementation of CRM on trade enterprises. Identified software CRM for trade enterprises.

Keywords: trade enterprises, customer relationship management, competition, marketing, management

1 Introduction

Information systems are an important resource in the management of trade enterprises. They allow the effectiveness of their operation and development, maximize profits and increase customer satisfaction. It should be noted that the main purpose of the operation of trade enterprises in a competitive environment is to meet the needs of consumers.

In practice, trade enterprises are using all sorts of information systems that allow for efficient formation of commodity resources, fixed assets, personnel, capital and other resources. When using information systems occupy an important place management of relationships with customers (CRM).

2 Overview of the study area

CRM is a business strategy, a strategy to attract customers and manage relationships with them, which is aimed at optimizing their value in the long term. It presupposes the existence of trade enterprises defined philosophy and culture, customer-oriented and aimed at improving efficiency in marketing, sales and service [1].

In practice, the CRM is a process of active deepening of knowledge about customers and use this knowledge to set up a business and strategies to meet the individual needs of customers [5].

CRM functional models for trade enterprises include three parts: marketing, sales and support.

Block marketing includes tools that enable:

- planning and execution of marketing campaigns and analyzing the results for each target group, product, region, and so on etc.;
- budgeting and forecasting results of marketing campaigns;
- analysis and the formation of the target audience, generate a list of potential customers and their distribution among the sales force;
- the creation of a marketing database: collection of information on product lines, prices of consumer market, competitors;
- the creation of marketing materials and management.

Tools of unit sales provide an opportunity to carry out: control of the classification of customers, contacts, sales cycle; sales forecasting; automatic preparation of commercial offers; management areas; monitoring of potential sales.

Tools of the unit support the following tasks: tracking the needs of consumers; maintenance of databases; implementation of the warranty and post-warranty service; contract management.

In a competitive CRM in trade solves three major practical problems:

- development of a database of clients. Customer information collected and processed in any way, this is the competitive advantage of trade enterprises in the consumer market. With this knowledge about their customers retailers can move to a new level of relations, which is the basic principle of regularity and consistency influences – from dating to a sale and further service. This technology is a set of marketing databases and allows you to achieve excellent results through a point impact on your potential customers;
- organization of interactive process with clients. Is a planning and monitoring results to the client. Through analysis of feedback trade enterprises must promptly determine the effect of their marketing initiatives, to more accurately assess the existing demand and make appropriate changes to its product portfolio;
- control activity management system. As a result of the implementation of CRM sales management system generates a set of specific organizational and economic procedures to track the activities of commercial and operational staff on the degree of customer satisfaction.

More often trade enterprises use the following types of CRM [2]:

- operating – registration and on-line access to the primary information regarding customer needs, product lines, pricing, purchasing power, and other options for segmentation;
- collaborative – the organization of close cooperation with end-users, up to the client to influence the internal processes of trade enterprise (holding polls to change the quality of products or services, web-site to track the status of their customers order, notification via SMS about events related to the shares, sales opportunity for the customer to configure and order independently in real time);
- analytical – reporting and analysis of information in the various sections (analysis of the results of marketing activities, analysis of the effectiveness of sales by product, customer segments, regions and other options).

The result of the implementation of CRM in trade is:

- increase in sales volume, due to a more efficient sales system that allows sales representatives to spend more time at the client, as well as more effective control system;
- increase in revenue and profitability, which is associated with understanding the client's needs, a higher level of customer satisfaction and less need for additional purchases;
- increase customer satisfaction. Consumers consider trade enterprise focused on solutions to their specific needs and assess attention in relation to their needs;
- reduction of administrative costs for sales and marketing. To reduce costs resulting automation of business processes; system allows you to more accurately define the target customer segments, understand their needs and to personalize the product range and sales support for these segments.

In the CRM market proved themselves information systems for trade enterprises such software developers as Microsoft Dynamics CRM, Oracle CRM On Demand and Oracle Siebel CRM, SAP CRM, Terrasoft CRM, Salesforce.com, NetSuite CRM.

3 Conclusions

CRM is customer-oriented business strategies and specific software technologies to automate and improve business processes in areas such as sales, marketing, customer service and support of commercial enterprises.

Effective use of these information products allow trade enterprises to promptly identify the needs of consumers, to improve its product range and pricing policies, provide quality service, improve competitiveness.

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Necessity of organizational changes of domestic enterprises conducting as path to their development

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Abstract

The publication focuses on the need for an assessment by an independent expert team of specialists, under the leadership of senior management, organizational change, as the most important stage of development of the company, details the steps in the process of organizational change management company.

Keywords: development strategy, tactical planning, process model of organizational change, management, company.

Organizational development can be interpreted as a long-term management of domestic enterprises on the process of improvement and problem solving updates. This development is a strategic way, on the one hand, the increase in the overall efficiency of the company, on the other - increasing sense of satisfaction and improve the working conditions of employees.

Its content and among other organizational techniques define the following features:

- organizational development are some tactics, according to which should be planned changes in enterprise strategic period;
- planned changes are directly dependent on the severity of the problems that the existing condition of the company and it is impossible to use effectively for future development;
- diagnosis of the existing condition of the company and the process of carrying out the necessary changes, usually a person or an advisory body that are not members of the company.

Development strategy should include the following main areas of change: improving personal relationships between, soul-company and its staff; easing tensions between the working groups within them; improvement of the management team that is focused on use of professional skills of working groups; development of improved, built on the principles of organic methods to resolve disputes and conflicts personnel.

Thus, the development of a company means mobilizing the full potential of the team to ensure its effective functioning. If employees of the company have some problems, this indicates a need for organizational change. Therefore, organizational changes that occur in the process of organizational development is planned phased process designed to improve the activities of domestic enterprises.

Organizational change is an implementation in accordance with the concept of organizational innovations in all subsystems of the company (economic, social, technical, technological, marketing) or separately in each of them.

Organizational planning of a company should be aimed at achieving the following objectives: determine the types of physical and mental work; distribution of their duties for the successful implementation and identifying those responsible for their performance, that is the definition of management roles and responsibilities for their implementation; provide employees at all levels of government means necessary to the performance of the most effective duties of employees: criteria for evaluating the effectiveness of work to suit the goals and objectives of the enterprise and productivity incentives.

Typically, the planning process of organizational development in a company provides independent special team that include experts chaired by top officials of the enterprise in the following stages: diagnosis of the enterprise with the help of data (interviews, surveys, observations, documented analysis); Decision Analysis and connections; organizational development plan; concrete actions in the style of the data obtained.

Resistance to change is unavoidable. But after management decided to make changes, the resistance to be overcome. To deal with this problem often stemming, company management to understand why employees do not want to change. Personnel resist change for three main reasons: uncertainty, a sense of loss, belief that the changes will not bring anything positive.

It is advisable to determine methods by which you can reduce or completely eliminate resistance to change in the enterprise: an open discussion and transmission of information in a team; involvement of subordinates in decision-making and the process of change in the enterprise; support and motivation of staff during the change; negotiations for approval innovations; forcing workers are set to negative changes make changes.

Thus the process of change in the enterprise has its own characteristics and shortcomings, but its management should develop the skills correctly assess the situation and choose the most effective methods of reducing resistance to change as an inevitable factor of enterprise development.

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Problems of state regulation of tourism in Ukraine

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Abstract

The article singles out scientific and practical problems of determining the nature of state regulation of the tourism industry, and provided design principles that you'd like to state regulation of the tourism industry and made suggestions for improving this process within the legal framework.

Keywords: state regulation, economic issues, legislative regulation, policy areas, the tourist industry.

Problems of tourism industry in Ukraine and the crisis of the modern period necessitate increasing of the efficiency of government regulation. In these circumstances, state institutions must find the forms and methods of regulation that will assist entities in the industry to withstand the crisis tendencies from outside - on the one hand, and on the other - to implement all the functions of management for improvement of tourism enterprises, organizations and institutions.

Rightly observed in the studies of A.K. Ilyashenko "... the possibility of self-regulation of tourism today is completely depleted, resulting in the formation of an urgent need of effective state tourism policy ..." [1]. In turn, on the basis of the Hague Declaration on Tourism, the Belarusian scientists A.P. Durovych and N.I. Kabushkin made an important conclusion - "Tourism should be planned by public authorities ..." [2, p.617]. Thus, it is evident that government regulation is necessary in terms of prevention and overcoming of the crisis in the tourism industry - as an instrument of state policy pursued by the government.

However, accourding to the analysis of scientists' and economists' researches, that refers to determining significant differences of essence, selection of forms and methods of state regulation of the tourism industry.

There is no generally accepted views on the nature of state politics in tourism and classification of appropriate forms and methods of state regulation of the tourism industry among scientists, which is a scientific problem.

So we can state that the lack of legal definition of "State Regulation of the tourism industry" and its false interpretation of individual researchers the opportunity exacerbate selection of effective forms and methods for the development of this industry (first with a practical perspective) and, secondly - do not allow to perceive and articulate basis to characterize these forms and methods is a methodological problem.

Based on the considered characteristics of state regulation the following conclusions can be reached as to what should be considered in justifying the term "State Regulation of the tourism industry": first is that government regulation is an instrument of state policy in the field and, therefore, must contain in itself the common form, and secondly, it is something that is basic areas such as "political-legal", "economic" and "social", and thirdly, through the use of forms and methods of state regulation of political legal sphere, are prerequisites for economic development of the tourism industry, which in turn provides improved social services.

These principles of construction process "of government regulation tourism industry," as de facto define the basic areas between which formed the logical relationship where the center - connecting chain is the economic sphere. Obviously, for its development - as the basis for development of the tourism industry requires political will and adequate legal decisions of public institutions using administrative and incentive forms and corresponding methods for the economic development of the area. Logic can say that beyond economic development cannot provide the social, that create new jobs in the area, to increase wages of workers to develop social infrastructure in tourist areas and so on.

Naturally, based on the awareness of the important role of tourism industry in the development of the national economy, namely it is necessary for the economic sphere to concentrate for the selection of forms and methods. The process of governmental regulation can be viewed from three positions: as a system of action, as a function of management, as a process of action. Accordingly, the above principles grounded construction process of state regulation can be considered logical in terms of selection of forms and methods, taking into account the priority areas identified that affect the form and development of the tourism industry.

The results of the study allow to state that at present there are practical problems of scientific problems of legal regulation in the tourism industry in Ukraine. Identified conflicts necessitate their removal from the specification of basic concepts that need, in turn, revision of the legislative framework in which the regulation of the tourism industry in Ukraine.

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Social entrepreneurship: issues and trends

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Abstract

An aim of this abstract is to investigate phenomenon of social entrepreneurship. It takes into consideration its establishment factors, history of development, types of entrepreneurial activity that might be classified as social entrepreneurship; points most successful young entrepreneurs during recent years, gives examples of NGO foundations and awards established to underline success in this area of business. Second part of the abstract analyse issues and trends of social entrepreneurship activity in Latvia, based on the Latvian inhabitants survey and their attitude to this field of societal and business activity.

Keywords: social entrepreneurship, NGO, foundation, non-profit

1 Introduction

Every year grows amount of NGO – non government organizations, associations, foundations and private companies which announces themselves as belonging to social entrepreneurship and supporting other companies involved in this area of a business. It is officially admitted already that social entrepreneurship does not matter nonprofit or voluntary activity, it is possible and acceptable to gain profit and to remain socially active and beneficial at the same time. Legislation of the countries should be changed altogether with an approach to taxation and other evaluation of this field of the business. Latvia also remains as an area where social entrepreneurial activity takes place and amount of involved organizations grows annually. The aim of this abstract is to investigate both issues and trends of social entrepreneurship in Latvia and abroad.

2 Definition, types, representatives

Social entrepreneurship is the attempt to draw upon business techniques to find solutions to social problems. Conventional entrepreneurs typically measure performance in profit and return, but social entrepreneurs also take into account a positive return to society. Social entrepreneurship typically attempts to further broad social, cultural, and environmental goals are often associated with the voluntary sector. [1]

Ashoka, the largest network of social entrepreneurship worldwide, has following vision on social entrepreneurship and its role in the modern society: "Social entrepreneurs are individuals with innovative solutions to society`s most pressing social problems. They are ambitious and persistent, tackling major social issues and offering new ideas for wide-scale change. Ratner than leaving societal needs to the government or business sectors, social entrepreneurs find what is not working and solve the problem by changing the system, spreading the solution and persuading entire societies to move in different directions. Social entrepreneurs often seem to be possessed by their ideas, committing their lives to changing the direction of their field. They are visionaries, but also realists, and are ultimately concerned with the practical implementation of their vision above all else. Social entrepreneurs present user-friendly, understandable and ethical ideas that engage widespread support in order to maximize the number of citizens that will stand up, seize their idea and implement it. Leading social entrepreneurs are mass recruiters of local change makers – role models providing that citizens who channel their ideas into action can do almost anything". [2]

Types of social entrepreneurship:

1. The Leveraged Non-Profit
2. The Hybrid Non-Profit
3. The Social Business Venture[3]

In total, Forbes mentions about 30 of young entrepreneurs who established their business with large social contribution in US. However, social entrepreneurship has a long time tradition in Europe as well. In 2013, by the support of the European Commission the portal with the aim to join social entrepreneurs was established: SEE, Social Enterprising Europe. There is information about different foundations, supporting this area of business, such as:

1. The Skoll Fundation
2. The Schwab Foundation
3. Ashoka
4. Grameen
5. NEF

3 Resources

Social economy in Europe is a large part of the business. Today, the social economy represents 10% of all European businesses and employs over 11 million paid employees. However, the social business is united under the most common challenge, which is: funding. Funds dedicated to investing in social business can be costly and difficult to set up and gather investments.

4 Trends

Some trends for the next 10 years, what should be expected by the social entrepreneurship:

1. Commerce as a way of combating poverty.
2. Crowdfunding
3. Data
4. Transparency
5. Crowd brainstorming
6. Visual marketing
7. Design

5 Social entrepreneurship aspects in Latvia

The concept of social entrepreneurship in Latvia is still under development, therefore we have a unique opportunity to build it exactly the way we need it.

A legal framework for social entrepreneurship in Latvia has to be created so as to not only support establishment of new social enterprises, but also to help successfully expand the already existing ones.

6 Conclusions

The financial crisis unleashed economic fear throughout Europe bringing high unemployment rates, increasing poverty and widening social gap. The pressing economic situation demands a new way of thinking and developing instruments, which will bring both prosperity and social welfare and cohesion.

However, the level of trust in Latvia to non-governmental organizations is low. Foundations are trusted only by 20% and not trusted by 32%. This means there must be a lot of work on further dissemination of social entrepreneurship ideas and its promotion in Latvia, both on the level of NGO and the state.

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The priorities of improving the innovative potential of Ukraine's regions

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Abstract

In the paper organizational and legal basis to improve the system of management of regional innovative potential development were defined. Analytical approaches to the planning of the regional innovative potential development as an instrument for implementing the strategy of innovative development were improved. The conceptual basis for working out a regional strategy of innovative potential development taking into account specific, trends and challenges of socioeconomic development of regions Ukraine were grounded.

Keywords: strategic planning, innovative regional development, regional strategies, regional innovation potential

1 Introduction

The study of organizational and legal basis of the system of management of regional innovative potential development has allowed determining what factors braking activation of innovative processes and the development of IPR (innovative potential of the region). It is a failure to comply with current standards to stimulate science, technology and innovation, the lack of a systematic approach to state regulation of these areas. This requires clearly outline management system as science, technology and innovation, and innovation potential, in particular at national and regional levels.

2 Analytical planning the development of innovative potential of the region

Development of regional innovative potential requires the use of analytical planning. Which provides for the definition of a state in which it's possible to plan the IPR with the initial limitation of the environment. And the future state of the IRP, achieved through the implementation of appropriate measures. Selection of the optimal development scenario IPR provides the calculation the integral evaluation of the generalized scenario. For determining the overall goal of planning, identifying structural changes. This approach allows predicting the future state of the implementation of the strategic priorities of the innovative potential of the region. Also allows for efficient use of hidden features and eliminate the existing limitations of the innovation potential of the region in the future.

Analytical planning has revealed the critical factors of development and increases the innovative potential of the region. This is to attract investment in innovative activities (35.7%), the introduction of preferential taxation, subsidization of businesses innovative activities, preferential treatment of depreciation and investment credit (17.21%). Accordingly, the key obstacles in the development of regional innovative potential have a negative impact of shadow capital and corruption schemes in innovation and investment area (7.48%), low level of innovation financing (5.67%) and a decrease the number of highly qualified researchers (4.79%).

Possible scenarios for the group of regions with a sufficient level of innovation potential based on the results the choice of the strategic priorities its development, the interests and needs of the subjects of innovation were studied. Calculations show that under a scenario of growth IPR will most likely be an increase in GRP (3.84%), increasing local revenues (by 3.83%) and the development of knowledge-based industries (3.79%), which will improve the competitiveness of the region (3.36%) and the level of employment in the region (3.35%). The limited positive changes caused by long-term negative impact of general economic problems, the prevalence in the economy of both the state and the regions of low-tech industries, market reforms without taking into account scientific and technological factors, the inefficiency of the state and regional systems of innovation stimulation, which is mainly declarative, regulatory unsettled issues of commercialization and commissioning of research results, taking into account the optimal combination of the interests of their owners, business and government were determined.

Application of analytic planning as a tool for strategic management of innovative activity in the region allows analysing the strategic priorities of IPR. And also consider the development management of the regional innovative potential as a multiobjective problem. The solution to this problem requires the involvement and use of adequate and effective tools, implementation interests coordination of all subjects of management decision-making development of regional innovative potential. This allows improving quality of innovation process planning in the region. Investigating ways of applying the method allow considering it as an effective tool for strategic management of innovation potential. It's based on a comprehensive analysis of the system and the introduction of a planning system factors-barriers and factors-stimulants. And also based on the goals and policies of all actors that influence the management process, considering alternatives and possible scenarios for the development of the innovative potential of the region.

The principles for working out a regional strategy for the regional innovative potential development as a complex system were conceptually defined. That by implementing its tasks laid down on the formation of management strategy of regional innovative potential development, harmonize its main directions with the existing innovation potential and also on the principles of the system, dynamic, planned, integrated design of the organizational structure and information system, effectively implements the functions assigned to it management IPR. As a result of intensive use laid down mechanisms are expected to increase innovative activity, compensation deficit innovative resources and growth rates of development of regional innovative potential.

Based on the analysis of strategic priorities for the development of the innovative potential of Ukraine's regions determined that the innovation strategy of the region shall consist of five priority areas. On the basis of which are realized the planning specific activities to implement the development strategy of the regional innovative potential. Priorities are considered in the relationship and focus on the mission and objectives of innovation strategy.

3 Conclusions

Thereby the process of managing the development of innovative potential is a complicated system task. The solution of it requires the development and implementation of the strategy of regional innovative development and the use of mechanisms for planning, financing, implementation of regional innovative programs and projects. And also needs the formation of the target markets and the use of the innovative potential of the region. This will ensure the effective implementation of the management functions of subjects of innovation.

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Informational wars as an instrument of management by public consciousness

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Abstract

The paper considers the role of information as a factor for Information Society development. The essence of the concept of "information warfare", which is a form or degree of information confrontation was determined. A confrontation consider information as a contest of social systems in information-psychological sphere because of the desire to influence certain spheres of social relations. It is proved that the information war at the present stage is in information transparency, that people have access to different sources of information.

Keywords: information, information war, society, information-psychological influence, policy.

In today's post-industrial countries are confidently affirmed model of the information society in which knowledge (information) are the decisive factor in the development of society.

The practice of information-psychological influence in today's world gets more and more development. The terms "information" and "psychological war" actively used by politicians and political scientists

According I.I. Zavadsky: "Information warfare is a comprehensive, integrated strategy, due to the increasing of significance and value of information in matters of command, control and policy" [1, p.19]. Accourding to the definition of N.I. Panarin, information warfare is a "comprehensive joint use of forces and means of information and armed struggle" [2, p. 8]. There are other definitions as "information war is a communication technology through the impact of information and information systems enemy to achieve information superiority in the interests of national strategies, while protecting their own information and information systems" [3, p.12].

More generally, the information war is a war to seize raw materials, energy and human resources of another country, using such an impact on people's minds in the field of ideology, religion, politics, history, philosophy, science, and society of the country where victims of aggression deliberately introduced misconceptions about what is happening in people's lives that allow the aggressor freely manipulate both the Government and the people of this country and make capturing resources, almost without encountering any resistance, without invasion [4, p. 4]. To master the power and the capital widely used are mechanisms of social consciousness change [5, p.27]. As the domestic and foreign practice, effective means of manipulating them is information war [4, p. 5].

It is a coherent set of special operations of an informational impact on stakeholders, providing guided evolution receptors in a direction favorable to its proponents, the mastery of its capital and power.

The objectives of information warfare in the real and virtual space is usually making the negative image of the object of attack that can cause serious damage, sometimes with irreversible consequences. The object information attack may be a company, business leaders, staff and individuals. The objectives of any information warfare is control system: the system of governance, enterprise management system, decision-making system specific person (values, mentality) [3].

By means of information warfare are any communication tools - from media to mail and gossip.

In recent years, the importance of information warfare is steadily increasing, while their main features can be considered no visible damage and gradual, imperceptible implementation in all areas of political life. That is why the problem of information warfare and the establishment of information security are relevant today.

In conclusion, it should be noted that despite the numerous works devoted to the subject of the information war, its information-psychological component remains virtually unexplored. The study of the underlying processes and patterns of information confrontation, implemented in the form of news and information and psychological operations.

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Potential and prospects of development of agro-, ecotourism, its role in the revival and sustainable development of rural areas of Belarus

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Abstract

The current state, condition and prospects of the development of rural tourism; reasons hindering the development of agro-, ecotourism, rural tourism in the Republic of Belarus; the role of rural tourism as a means of economic and social revival of rural areas are considered

Keywords: agrotourism, ecotourism, the development of rural tourism, the problems of entrepreneurship in rural areas

1 Introduction

These A great role in the development of the tourism industry of a country has the development of agro- and ecotourism, or, in other words, rural tourism, which can provide in local areas the economic development of local communities while preserving and improving the quality of natural environment. The experiment has shown this in Poland, Lithuania and Scandinavian countries. Rural tourism is considered in most countries as a means of economic and social revival of rural areas.

2 General

Rural tourism is a diversified concept, which includes, besides rest in the countryside, an acquaintance with cultural monuments and industrial heritage, as well as the elements of education, holidays, festivals, ecological attractions, theme parks and museums that is why rural tourism is the most polymorphic concept among all types of tourism. It is important to understand that the effective development of rural tourism is possible only in case of "balance of interests" of all its components. In order to ensure the harmonious coexistence of all the components of rural tourism, it is necessary to take into consideration the interests of residents and tourists and take care of the environment.

The balance of these three components can ensure the realization of the basic principles of sustainable development:

- nature-oriented principles that protect the environment from destruction and that control acceptable load on rural areas;
- social principles that guarantee the protection and inviolability of cultural diversity and the local community's way of life;
- economic principles that contribute to the development of economic diversity of the region, the creation of jobs, the control of migration to the city;
- cultural and historical principles that ensure the beneficial influence of tourism on the local population and cultural variety.[1]

The usage of the mentioned principles is extremely important in planning of the development of rural tourism. They should be the basis of the subjects: producers of rural tourism services, travel agencies, tourists, bodies of state authorities and a local government. This will ensure a harmonious and efficient development of rural tourism.

The prospects of the development of rural tourism are largely defined by changes in the legal basis. It should be mentioned that the development of business activity in rural areas in the Republic of Belarus is slow and inconsistent, at a slower pace than the economic reforms realization and the private sector establishment. This situation is typical for each transition economy. And this is connected not only with the reasons and circumstances of an objective type, but also with a lack of attention and influence of patterns of a civil society, business, scientific and industrial associations to the problems of rural areas and in whole economy of small business.

At the moment, the promotion program of agro-, ecotourism in Belarus as a whole is particularly important. Its goal should be a rise of public awareness and the creation of a positive attitude to this type of recreation.

3 Conclusion

The modern state of the tourism industry in the Republic of Belarus indicates that it still does not take the same considerable position in the national economy, as in the developed countries. Despite the available tourist and recreational potential, an advantageous geopolitical position, the presence of rich historical and cultural heritage, the country takes a very modest place in the world tourism market and is far behind neighboring countries (out of 15 thousand objects of historical, cultural and natural heritage for tourism purposes is used less than 5%). [2]

Overcoming of the existing trends in the development of tourism involves activation of the state policy in this sphere, giving tourism a status of the priority direction in the economy, the creation of legal, institutional and economic foundations of the formation of the Republic of Belarus in the modern competitive tourist complex.

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Features of formation of human resources in modern conditions

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Abstract

The role of human resources in social and economic development were analyzed. The main requirements for the modern workforce revealed: personal, communication, educational, professional skills.

Keywords: Human resources, Personal qualities, Communication quality, Educational quality, Professional skills.

1 Introduction

Modern professionals need to navigate the complex global environment that can work on international labor markets operate modern information and communication tools and more. The modern type of employee who can be quite competitive in the international labor market requires a special type of thinking. Actual is not primarily the presence of a certain amount of knowledge (though that is important), and the ability to operate with this knowledge, work with arrays of information to be able to find and analyze it.

2 Overwiew

The current level of production requirements for the characteristics of the employee includes specific criteria for its highly professional skills and personal qualities that serve him indispensable. But the simple separation characteristics of the modern worker for personal and professional is not enough in today's terms. As part of merit increasingly important group of such skills as communication – that is ability of the individual to build relationships with others and work in a team. In turn professional skills can be very general and specialized content. Without going into a detailed analysis of the content of the modern worker training, we define the following main groups of his qualities:

- Personal qualities - these features characterize a particular identity in itself: hard work, organization, honesty, responsibility, patriotism, temperament etc.
- Communication quality - describing the relation of the individual to the people who surround her: teamwork, to find common ground with other employees, leadership, etc;
- Educational quality - a general skills and knowledge of understanding the world: the general outlook of scientific and cultural identity, creativity and independent thinking, commitment to continuous lifelong learning;
- Professional skills - skills to implement it strictly professional duties, the specific knowledge and skills, work experience and so on.

The results of education involve the formation of a specific complex cognitive, professional, personal and communicative characteristic of the individual.

The basic qualities of man are the same individual, and they are placed in the primary socialization in the family and secondary socialization in the formal education system. At first glance, they are likely to relate to the individual and his immediate environment, not its production activities. But it is the personal qualities define and communication, and professional, that is performed as communication and professional functions. Throughout his life, including the system of formal education formed human communication skills, ability to communicate with others, build relationships, team work, and so on. Al.

QUALIFIED person making system specific knowledge and skills acquired in the course of training. At the same time teaching profession in modern conditions require ever higher levels of scientific understanding, strong development of cognitive skills as the foundation for the formation of highly professional skills. Modern production requires not only experts who are fluent in all the subtlety of a specialized business, how many professionals who will work in new, unpredictable, rapidly changing conditions. It is therefore important features are the modern worker creativity and independent thinking.

3 Conclusion

Professional quality employees primarily have a direct economic value because of the type, extent and quality of the employee depends on the level of income. Thus, the magnitude of the impact of employee education and for him and for the company and for society as a whole will depend on the performance of his work and reflection, reflection of the growth in wages.

At the same time, labor productivity is determined not only the amount of professional knowledge and skills of the worker and his personal traits such as industriousness, honesty and behavior traits: the ability to build relationships and collaborate with other team members. Moreover, these features also can produce economic results, they can also find their expression in the growth of productivity and wages. If a person is hardworking, diligent, seeks to learn, regardless of the level of formal education, it can become a qualified expert in their field. If an employee is trying to avoid work, unorganized, then returns to his professionalism will be lower. Of particular importance are the basic features as patriotism, loyalty to his country and his people, respect for nature, his native land.

Socially responsible advertising: the nature and characteristics

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Abstract

The article reveals the essence of socio-responsibile advertising. The features of functioning of socio-responsibile advertising analyzed in modern Ukraine

Keywords: corporate social responsibility, marketing, advertisement, market, customer, company, information, advertising business, products.

1 Introduction

Advertising is an important part of information warfare in the world, an instrument of global competition, the impact on developments in other countries. In Ukraine an advertising business is take place. It is independent and successful. The advertising industry is developing according to the laws of the market, keep pace with the world and the Ukrainian economy. Rising economy - the advertising industry is also growing, and vice versa. Advertising acts as a kind of barometer of economic life, a presentiment of recessions and crises, growth and downs. The ethic of corporate social responsibility is to alignment of business operations with social values. CSR consists of integrating the interest of stakeholders - all of those affected by a company's conduct - into the company's business policies and actions

2 Overwiew

In the modern world in a triangle relationship - the state, which sets the rules and monitors, producer and consumer - it is important that advertising does not act only on the side of the business. It seriously affects the formation of consumer preferences and priorities must be socially responsible to the society for consumer goods and services promoted.

For an campaign to be considered socially responsible, the advertising used in the campaign must meet an ethical standard. Corporate social responsibility marketing has been a focus of several major ad campaigns, but if the ads used in the campaign are seen as deceptive by the public, the company is unlikely to be considered socially responsible regardless of the theme of the advertisements.

Truthfulness is the first requirement for any socially responsible advertising. However, this requirement is not as straightforward as it may appear. Factual information can be presented in such a way as to deceive the viewer, while an image can be manipulated yet still create an accurate final impression. For example, if an advertisement says a certain product is inexpensive without revealing that it will wear out very quickly, then the information is factually accurate yet deceptive. Any customer buying the product would be likely to end up spending more money rather than saving, because it would have to be replaced so soon. Another ad might use camera tricks to create the visual impression.

Socially responsible advertising should not promote or contribute to anything damaging to society. If an advertisement makes use of racial or sexist stereotypes, shows irresponsible parenting practices, encourages irresponsible use of alcohol or sexual behaviors, or attempts to emotionally manipulate a vulnerable audience such as children, then many would consider it to be socially irresponsible. Most of these standards are a matter of opinion. Any advertising message could be considered emotionally manipulative depending on how you look at it, so in practice it comes down to a subjective assessment of what is appropriate and what is not. There is always a risk that your ad campaign could unintentionally offend customers.

Corporate social responsibility marketing is the practice of combining a company's charitable activities with its marketing campaigns. Corporate social responsibility can benefit the company in more than one way. It can improve the public perception of the company, increase sales and improve employee morale. Need to find a middle ground, to the person who comes to work in this area, not only about his personal well-being, but also about other users. After promoting bad products on the market, advertisers, remaining ordinary consumers will not be able to fence himself and his family from a quickie.

However, you cannot restrict the activities of the advertising business from the legal point of view, and ethically. We should talk about more effective industry self-regulation, enhancing the role of business associations in the field of advertising. Feedback consumer society and lawmakers who regulate the market should take into account the interests of representatives of the advertising industry.

3 Conclusion

Socially responsible advertising and its base - a socially responsible creativity, it is necessary factors of development and civilization Ukrainian advertising market. There are many reasons that lead modern advertising to be socially responsible. And, above all, its active implementation of the social environment. After all, today is unprecedented increases the level of commercialization of any information. Socially responsible advertising should fulfill his true vocation - to draw attention to social problems, and in the long term - to change the behavioral model of society. That is its purpose and place in the system of advertising.

Ensuring the economic security of intellectual property

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Abstract

The article defines and systematically problems of economic security in the field of intellectual property.

Keywords: economic security, intellectual property, intelligent security, state regulation, scientific and technical sphere.

1 Introduction

The problem of economic security in the conditions of transitive economy was especially acute since the last inherent numerous negative consequences of reform that is manifested in the disintegration of production structures, rupture of economic relations, the imbalance between the mining and processing sectors of production, minimize the internal market, the imbalance of regional development, a significant reducing the cost of research and innovation and as a consequence - reducing the level of invention, patent-licensing and innovation activity, the loss of competitiveness of domestic producers, increase in the level of counterfeiting and piracy etc .

2 Overwiew

Economic security - the security of the state's economy from external and internal threats, when it is possible and the ability to create a socio-economic conditions for stable operation and development of the individual, society and the state. Economic security is the foundation backbone component of national security. It manifests itself in other areas of national security

Economic security - a multifactorial phenomenon, which can be viewed as a system consisting of s such basic functional components: financial, social, informational, intellectual, technological, military security, environmental security, and others.

In the process of developing measures to ensure the economic security of fact we are dealing with multiple levels of abnormal - security: challenges, risks, threats and hazards. That danger is the boundary of abnormal -Security, in the case of intersection super-complex system, which is the economic security becomes uncontrollable, deadbands to external influences.

Under intellectual security we mean the state of protection of intellectual potential of the individual, company, region, state, which is formed by the administration and staff of enterprises, public authorities through the implementation of measures of legal, economic, organizational, engineering and socio-psychological nature of internal and external threats (hazards), unauthorized use and the negative impact of (unfair competition, industrial espionage, patent expansion), and maintaining it at a level that ensures the process of creating, producing, implementation and protection of the rights (objects) of intellectual property.

The use of international and interstate instruments (Paris Convention for the Protection of Industrial Property, the Berne Convention for the Protection of letter-tural and artistic works and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), and others.) In order to enhance innovation and protection of national interests promotes the development of mechanisms for the regulation of patent and licensing trade and promote and protect the rights of producers and consumers of high-tech products. Conclusion of international and intergovernmental agreements is a prerequisite for the effective development of relations of mutually beneficial cooperation in the field of intellectual property rights, the establishment of safeguards compliance and restoration of violated rights of intellectual property, as well as the suppression of unfair competition.

3 Conclusion

Implementation of the strategy of innovative development of the country's economy in terms of globalization challenges requires a clear and adequate response to the challenges of modernity in relation to IP objects and unconditional compliance with national interests in this sphere. In this regard, the systematic implementation of a set of preventive and protective measures for the protection of IP acquires strategic importance not only for the priority market segments IP, but for all the high-tech industries of the national economy.

The estimation of the labour digital market development in Ukraine

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Abstract

Under the conditions of the digital technologies active development there are significant changes at the global labour market. The main type of the digital employment is electronic free lancing. Digital technologies and globalisation raise a competition level and form a request not just for digital employment, but for innovative digital employment. Here the estimation of digital employment in Ukraine has been shown. The factors which stipulate the digital migration from Ukraine have been determined.

Keywords: digital labour market; globalisation; digital employment.

1 Introduction

Information of the labour process makes the pre-conditions for existing and developing of the digital labour market. The digital labour market is characterized according to the following features: first, digital work presence which result is digital commodity (service); second, digital infrastructure presence, which has on-line platforms for job searching and suggestion of services, electronic payment systems, information systems and so on; third, digital employment presence.

2 Overview of the study area

One of the kinds of digital employment is electronic free lancing. Electronic free lancing is a flexible employment form which gives an opportunity to distance an employee him/herself from an employer with the help of information-and-computer technologies using. Electronic free lancing is a variety of self employment and that's why for such employees the characteristic features are: high motivation for self realization, achievement of success in the professional field, confession of achievements by other specialists in a corresponding sphere. What is more, this form of employment allows regulating the working hours and relaxing time independently.

According to the information of the joint statement of two largest on-line platforms "Elance" and "Odesk" as for the end of 2014, a number of free lancers registered on them consisted of 9.7 million persons, and the number of employers was 3.8 million. Only on these two platforms the total earning amount of free lancers has raised from near 500 million $US till 3.2 billion $US at the period from 2009 till 2014. The salary per one working hour varies from 13 to 27 $US depending on complication of work done and a status of developer [1].

Globalisation and information technologies promote a competition level on the one side, and on the other side they strengthen competitive advantages of persons with good education, high professional level, talent, responsibilities, and readiness to solve non-standard tasks. At the digital labour market an intellectual labour is highly sought; it is connected with a specific of rendering services.

The carriers of human capital have received a new degree of freedom and opportunities for self realization, and the employers have got an access to the intellectual resources of the whole world.

The digital labour market promotes to form not just simple digital but innovation employment.

The carriers of innovation human capital are the individuals, which constantly perfect their knowledge, professional skills and use them to produce innovations in any field of activity with ICT using. The main customers of labour services at the digital labour market are the innovation global companies and young quickly developing companies.

The customers of services at free lancers are such companies as "Microsoft", "Disney", "Amazon", "Cisco", "Open Table", "Pinterest" and others [2].

As for Ukraine we use the research data of the outsourcing programming market of East Europe to estimate the level of digital employment in our country. This research has been done by "Top$dev" company which is a service of program developers and IT recruiting search. In this research they have analysed the data of more than 88 thousand free lancers' profiles and 260 thousand of projects at the total amount of more than 350 million $US which are represented by the largest free lance exchanges. On their results Ukraine in 2014 is a leader among the East Europe countries on a number of IT-service orders. The Ukrainian part at this market makes 33%, Russia (21.8%) and Romania (9%) take place the second and the third positions accordingly [3]. The largest IT freelance centers in 2014 in East

Europe have become the following Ukrainian cities such as Kharkov (6.74%), Kiev (6.63%), Lvov (3.33%) and Zaporozhe (3.07%) according to the volume of the performed orders. Russian cities such as Omsk (3.06%) and Moscow (2.88%) place the fifth and the sixth positions [4]. The presented data show that Ukraine is one of the largest exporters of the talented specialists in the sphere of information services for the developed countries.

The Ukrainian universities are the scientific-research and educated platforms for IT-talented people training. At the same time having the difference in IT services payment in Ukraine and in the developed countries, the graduators and students of our higher educational establishments prefer to work for the Western companies.

There are nine Ukrainian universities, six Russian universities, two Byelorussian universities, two Bulgarian universities and one Polish university among Top 20 which students or graduators perform IT-orders for the developed countries. Among the Ukrainian universities the leaders are Kharkov National University of Radio Electronics (the 3d place at the rating), National Technical University of Ukraine “Kiev Polytechnic University (the 5th place), Zaporozhe National Technical University (the 6th place), National University “Lvovska Polytechnika” (the 9th place) [4].

So in Ukraine, a powerful scientific-educated basis for training competition-capable specialists in the IT field has been created. At the same time our country is a donor for the developed countries because of the economic, political and social causes. The main factors stipulating the digital migration out of Ukraine are an insufficient salary level, social lifts absence, difficulties in own digital business activities, a high level of corruption.

3 Conclusion

Ukraine is characterized with the high level of human potential in the field of IT services and at the same time it is one of the largest IT-exporters to the developed countries. It is stipulated by the good conditions for the appropriate education getting, additional opportunities and freedom of digital employment at the global labour market on the one hand, and by the low labour payment level and social defence in our country on the other hand. Under the conditions of deep crisis just the digital labour market helps in Ukraine reduce the employment difficulties, falling down the population’s solvency, mass immigration of the highly qualified working force.

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Competitiveness in the conditions of global instability: prospects of agrarian enterprises financing

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Abstract

The paper considers the role of Competitiveness in the Conditions of Global Instability: Prospects of Agrarian Enterprises Financing. The priorities of the state policy aimed at reforming of agrirain sector of Ukraine was determined. Significant technology driven export-orientedness of Ukrainian economy, amid the pessimistic assessments of world trade conditions, leads to a functionary policy of supporting export activity and competitiveness of Ukrainian enterprises.

Keywords: Competitiveness, Global Instability, Agrarian Enterprises Financing, Reforms in agriculture.

Reforms in agriculture should consist in introducing of transparent and competitive market of agricultural land. The main focus should be shifted towards the creation of market institutions that will allow to optimize existing forms of agricultural production in terms of their efficient, not only economic, but also social and environmental, functions.

The priorities of the state policy aimed at reforming of agrirain sector of Ukraine should be:

• improving regulation of social and economic relations on the use, conservation and rehabilitation of agricultural land, creating a system of state price and tax leverage on land market circulation, preventing speculative shadow land agreements;

• the introduction of international practice proven support tools of marketable agricultural production and improving the agriculture competitiveness, support of small commodity producers, family farms and cooperatives. Experience of Europian countries shows the need for such financial mechanism as state land bank that would establish the right to limit the turnover of land in the market area (up to a certain percentage), especially in regard to their resale, and to oversee price formation in the land market;

• supporting sustainable rural development, creating favorable conditions for the implementation of peasants business initiatives;

• revival of the cooperative movement in agricultural production, promotion of peasants entrepreneurial initiatives;

• closer cooperation of large commodity production and small-scale rural commodities producers on the basis of agricultural clusters.

In general, it should be noted that the prospects for agricultural enterprises financing in Ukraine are more favorable than in the EU. Competitiveness of Ukrainian producers in the global instability, from the objective point of view, can significantly improve provided there are institutional changes both of micro-and macro-level. Whereas, the central prerequisite for this must be long-term guarantees of activity meeting not only the state interests or the interests of individual large and complex monopolistic structures of the ruling party (in agriculture - agricultural holdings), but also the interests of small and medium businesses representatives.

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Improvement of personnel system in telecommunications company JSC "Balticom"

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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 increasing 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.

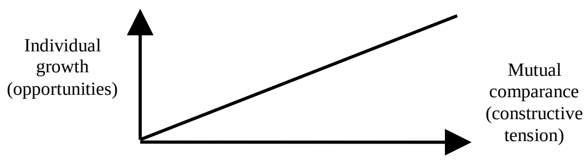
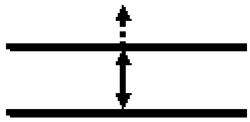


FIGURE 1 Motivation scheme

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 does not 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 telecommunicatons 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.

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Software solution for implementing a web-based e-journal system in the St Cyril and St Methodius University of Veliko Turnovo

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Abstract

Recently, the interest of the Bulgarian scientific community in the scientometric indicators impact factor, IF and impact rank, SJR, which reflect the level of citation of articles published in various magazines, is increased. Inclusion of scientific journals in global indexed systems for citations Scopus and Web of Science requires the editors and publishers to meet the selection criteria, strictly established by these systems, which generally meet the international standards for the issuance of scientific periodicals. As one of the 13 criteria for selection of journals in Scopus is online accessibility - accessibility to the journal site with a mandatory English version and the quality of the journal site, the author is one of the initiators for creating a platform for periodic electronic publications of the University of Veliko Tarnovo.

Keywords: e-journals, Internet-based system, Open Journal System

1 Introduction

The University Publisher "St. St. Cyril and Methodius", established in 1992, specializes in the publication of literature, specialized for higher education institutions. Yearly it issues more than 70 titles: scientific, popular science, educational, handbooks, scientific journals and yearbooks.

The idea for creating a structure of the platform for periodic electronic publications of the University of Veliko Tarnovo is to aid the application for inclusion of scientific journals of the University in the electronic databases Scopus and Web of Science, which requires the publisher to implement the selection criteria, strictly established by these systems. The site of Scopus Content Overview [1] presents these criteria, divided into 5 categories. One of the 13 criteria for selection of journals in Scopus, is online accessibility - accessibility to the journal site with a mandatory English version and the quality of the magazine.

2 Exposition

Open Journal Systems (OJS) is open source software for organization of reviewed scientific journals [5], developed by the Public Knowledge Project [3]. Released under GNU General Public License [4]. Version "OJS 3.X" is being developed since August 2013, but still not ready, the old version "OJS 2.X" is still being updated, as the latest version is 2.4.5 from September 17, 2014, which points to the fact that the project is in development. The advantages are open source and the easily accessible language PHP. If needed, the code can be modified and even upgraded, runs on Unix like operating systems. It is developed specifically as journal system with user roles.

Despite the indisputable advantages, the reviewed software is still underdeveloped and not flexible enough and imposes additional requirements to the platform, on which it will be located. So after analyzing the available technology options, we chose the following technologies and programming languages for the realization of the platform for electronic periodicals of the University of Veliko Tarnovo:

- HTML 5
- CSS 3
- PHP
- MySQL
- JavaScript + jQuery
- AJAX (Asynchronous JavaScript and XML).
- Bootstrap Framework

The accepted concept involves the development of administration and a public module:

2.1 ADMINISTRATION MODULE

a. Interactive responsive design
b. Management of multiple journals
c. User access levels – Each journal has a moderator who has access only to the management of the respective journal (1 moderator can manage more than one journal and one journal can be managed by more

than one moderator)

d. Adding static pages to each journal – editorial board, ethical rules, information about the team
e. Adding information how to contact the team of the journal (contact data)
f. Adding a new issue to a journal with specifying section, ISSN, number of pages, price
g. Adding articles to a journal issue in the given sections (author, title, abstract, full text, PDF file)
h. Different visibility options can be set for each article (only the author and the title are visible, + abstract, + full text, + PDF file)
i. Option to add a price to each article
j. Option to add a journal issue as a draft – after adding all the articles of the issue, it will be published in the public module of the site, i.e. adding the articles to a journal issue can be spread over time.

2.2 PUBLIC MODULE

a. Interactive responsive design
b. Home page for choosing a journal
c. Main menu with the static pages (editorial board, ethical rules, about us), archive, contacts
d. Quick link to the last issue of the journal
e. For each issue, the included articles are visible according to the visibility settings set by the journal moderator / administrator (only the author and the title, + abstract, + full text, + PDF file)
f. Search – by author, by keywords
g. Contacts (form automatically sending an e-mail message to the journal team)
h. Option for e-mail subscription, in order to receive notifications when a new issue is added in the system.

TABLE 1 Main objects of the system (hierarchy)

	1 level - System
Managed by:	Administrator – initially set when installing the system
	2 level - Journal
Managed by:	Journal moderator – set by the Administrator Administrator
Data:	Journal name Faculty Editorial board About the team Ethical rules Contact data Default visibility settings for the articles
	3 level – Journal issue
Managed by:	Journal moderator – set by the Administrator Administrator
Data:	Issue number Date Number of pages Price Sections
	4 level - Article
Managed by:	Journal moderator – set by the Administrator Administrator
Data:	Author Title Abstract Full text / PDF file Visibility settings for the article

5 Conclusions

Each university needs objective data for assessment of the science, for making decision for further development.

Main problems of the quantity assessment of publications are an insufficient number of Bulgarian journals in Scopus and Web of Science. The editorials of scientific journals in Bulgaria, overcoming the trend of poor performance in global scientific information systems, take actions towards the online integration of periodicals in global catalogs, scientometric systems, abstracts and full text databases, repositories (digital archives) with open access.

Acknowledgements

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The problems of development of the Ukrainian tourist market and ways of their solutions

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Abstract

Nowadays tourism rightfully can be called the most promising business in the world in general, and in Ukraine. Tourism important social and political phenomenon. The tourism industry can safely be called one of the most important components of the global economy. In Ukraine, the hotel business, one of the most promising and successful businesses. Also, the Ukrainian hotel business is very lucrative sector for investment.

Tourism is the most important part of the global economy, nowadays. Hospitality Industry headed by its hoteliers seeking to improve living conditions and services. For every person who travels to another city or country, it is important to feel the comforts as at home. This is the goal of hoteliers. Ukrainian tourism industry is no exception and also developing rapidly from year to year.

This article were analyzed the situation at the Ukrainian market of hotel services, its macro- and microenvironment. The article reflects the pressing problems of development tourism industry in Ukraine. In the present article displayed overall Ukrainian tourist market and analyzes the main problems.

Keywords: tourism, market, services, economy

Topic of the article - the problems of development of the Ukrainian tourist market and ways of their solutions. Relevance of the topic is much important for Ukraine, because the economic situation is extremely critical nowadays. If to draw attention to this topic, it can help to improve the country's economy. However, due to political situation in Ukraine, as of today, the relevance of the theme of tourism development takes a back seat.

The purpose of this study - is the main reasons and problems existing in the Ukrainian tourism. The main idea of the project is formation of the problems for tourism development in Ukraine, and their rationale.

The object of study serves the market of the tourism industry in Ukraine in this article.For studies conducted in the prepared article, were used datas from the website of the State Statistics Service of Ukraine, the government portal and the site of the Verkhovna Rada of Ukraine, and many other web sites, covering the economy and the situation in the country as a whole.

Government of Ukraine should think that the tourism resources of Ukraine - a source of revenue to the state budget finances. Anyway, it is necessary to change the Ukrainian market of tourist services and move towards international standards, which will undoubtedly affect the budget increase. Ukraine has rich tourist resources, and it is important to develop tourism as it can "bump" the economy in the country. The state must do everything to facilitate international cooperation and build strong economic and institutional international relations to improve Ukraine's economy through the development of the tourism industry.

At the moment, Ukrainian tour operators are increasingly paying attention to advertising foreign tourism, domestic tourism and advertising there is little, except for the well-known areas such as the Carpathians and the Crimea. This is also the reason for the weak development of domestic tourism.

Undoubtedly, Ukraine has all chances to become a developed and strong state. Due to its rich natural resources of the tourism industry in Ukraine can be developed at a level no worse than in other more developed countries. However, to date the development of tourism is compounded by the economic and political situation, which occurs in the south-east of the country.

Settlement of these problems mentioned in the article, will affect how to improve the economic and social development of the country.

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The investigation of business e-environment - a basis for development of e-business strategy and e-marketing strategy

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Abstract

Modern business cannot be considerid as a narrow national phenomenon. Business via Internet is a perspective area. It offers access practically to people all over the world. Internet creates the possibility to new services and goods. The object of the present research paper is Business e-Environment. The subject of the research paper are e-Business strategy and e-Marketing strategy. The objective of the paper is to study the interaction process of Business e-Environment and the development of e-Business strategy and e-Marketing strategy in Latvia. Research Basis are e-Busines, e-marketings and its Business e-Environment in the Republic of Latvia.

Keywords: Business e-Environment, e-Business strategy, e-Marketing strategy, development, interaction

1 Introduction

The objective of the paper to elucidate the factors of Business e-Environment influencing the development of e-Business and e-Marketing strategies in Latvia. The tasks advanced in order to reach the objective: 1) to identify the concept of Business e-Environment; 2) to carry out analysis of the factors influencing the development of e-Business strategy; 3) to carry out factors influencing the development of e-Marketing strategy.

2 The concept of Business e-Environment

Business e-Environment is a set of objective and subjective facts defining and measuring the situation in e-Business during a certain period of time and factors influencing it.

Business e-Environment conditionally can be divided into two levels:

- Business e-Microenvironment;
- Business e-Macroenvironment.

Business e-Microenvironment is the internal Business e-Environment - intranet. Business e-Macroenvironment is the external Business e-environment - internet.

E-Business is the basic elements of e-Entrepreneurship. However apart from the type of e-Business its activities are influenced by certain factors of the Business e-Environment. Moreover both the e-Business and the Business e-Environment as a whole can be affected by various factors.

3 Analysis of the Business e-Environment factors influencing e-Business

Correlation between the e-Business and Business e-Environment takes place continuously. The interaction is complicated and becomes apparent in many and various ways. On the one hand e-Business with its activities influences the Business e-Environment, but on the other hand the Business e-Environment makes the e-Business to act in on way or another. Thus the flow of Business e-Environment factors circulates in two directions. One direction of this strem flows from the e-Business to the Business e-Environment, but the other - from the Business e-Environment to the e-Business.

4 The Development of e-Business and e-Marketing Strategies

An e-Business strategy is the set of plans and objectives by which applications of internal and external electronically mediated communication contribute to the corporate strategy (Chaffey 2002). The e-Business strategy supports the various functional strategies. The e-Business strategy is related to the Information Systems strategy. Out of functional strategies we especially emphasize e-Marketing strategy because these is closely related to e-Business. E-Marketing strategy is here to stay and will play an increasing role both B2B and B2C marketing as it is increasingly doing in C2C as well. The key to successful e-Marketing strategy is to compete effectively on reach, affilation, richness, and range. Ultimately, the goals is to develop above-average perfomance through a sustainable competitive advantage. E-marketing strategy is rooted in the classic elements of Porters five forces and sustainable competitive advantage. Any e-Marketing strategies should be based on businesses run like bricks and mortar companies using classic metriks like gross margin and size of order (West, Ford, Ibrahim 2006).

5 Conclusions

The factors influencing the establishment of e-Business and e-Marketing strategies development are as follows: internet access of households, place of Internet use, enterprises having a website or a homepage, favourable Busines e-Environment, development level of ICT branches, current and projected customer use of each digital channel within different target markets.

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The challenge of globalization

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Abstract

Globalization is the process, which takes place in the social context. It includes society, the state and other social structures activities, their environment. Affects: links between growth constraints, movement and other characteristics on a global scale. In economics, globalization describes: changes in the global and regional economies arising from the free (financial, human and otherwise) the movement of capital, intensive international trade, cultural and others exchange. This presentation examines globalization in relation to the management of international human resources and evaluation of wind energy investment projects.

Keywords: globalization, international human resource management, capital budgeting, wind energy.

1 Introduction

The concept of globalization refers to an increasing flow of goods and resources across national borders and the emergence of a complementary set of organisational structures to manage the expanding network of international economic activity and transactions.

In this context would be discussed the challenges of international human resource management and wind energy investment projects.

2 International human resource management

New scientific knowledge, informatization, and the high level of assimilation of information resources are becoming the basis for the existence of highly effective and competitive organisations. During the recent years, the majority of organizations in the whole world, and especially in countries with transition economics, place increasing importance on the formation of the methods of work that would allow for activity in the context of new economic conditions created by a rapid process of globalization, business automatization, and the use of information technologies. As a consequence of economic globalization, the global activities of companies are becoming inseparable from international assignments. As a result, the development of international human resource management provides an increasing amount of significance to the processes of expatriation and repatriation which are often described as a prospect for multinational companies. The analysis of studies oriented towards international human resource management reveals that these processes that acquire an increasing significance are specific of not only positive, but also problematic characteristics that are becoming a real challenge for international companies. In order to avoid various difficulties and possible damage thus successfully implementing and managing the process of expatriation, companies pay a lot of attention and finance to the improvement of this process, analysis of their mistakes and try to find the best solutions.

2 Wind energy investment projects

Wind energy is one of the most important sources of renewable energy in the Middle and Northern Europe. The popularity of wind energy has grown due to the environmental reasons, the growth of fossil fuel prices, decrease of wind energy costs and the attitude of developed countries to reduce their dependence on the imported fossil fuel. Consequently, the need necessity to assess economic viability of wind power projects has been increasing.

Households are one of the potential operators of wind power projects. However, recent studies do not pay enough attention to the analysis of these projects. There are a number of studies, which are focused exclusively on the financial evaluation of large wind power generators parks. It was determined that the projects of small wind power are to be treated as low risk projects, therefore, traditional project evaluation methods can be applied to evaluate them. Financial analysis of three small wind power projects of various capacities is carried out and their economic viability is evaluated for different wind climate conditions. The distribution of the values of the internal rate of return (IRR) in household wind power projects in Lithuania has been deduced.

Organizational-economic mechanism of renewable energy investment growth

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Abstract

The use of alternative energy sources has a global perspective for the further successful development of civilization in according to thisis it is necessary to develop and rational the organizational-economic mechanism of investment development of alternative energy in terms of energy dependence, as well as identifying the main levers of influence factors and block of its implementation. Alternative energy is the basis of providing power safety of the country, that underlines the large value of the offered organizational-economic mechanism of the investment providing development of alternative energy in the conditions of power dependence and certain basic levers and factors of influence.

Keywords: investment process, organizational-economic mechanism, alternative energy.

In modern conditions the task of improving energy security of Ukraine is considered with the market potential of alternative energy, a prerequisite for effective regulation of which is to determine the strategic priorities of its development, the development of an appropriate institutional environment and regulatory framework. The use of alternative energy sources has a global perspective for the further successful development of civilization, because there are phenomena that violate the stability of civilized society development in the world: traditional energy sources runout, increase in the value of their reproduction, intensely polluted environment, destroyed biosphere, an excess amount of organic waste of industrial, agricultural and domestic origin is formed. However, the development of alternative energy requires activation of investment processes in this area at the present stage. Taking this into consideration, the problem of development of organizational-economic mechanism of investment support of alternative energy development is highly relevant today.

At the present stage the organization and effective functioning of the process of investment development of alternative energy received considerable attention. We identified several areas in which there can be actions directed on activization of investment process in the field of alternative energy. All the spheres are interrelated and have mutual influence. Implementation or activation of factors of one group will have a positive impact on all spheres of influence on this process. Qualitative and quantitative improvement of each of the factors will increase the volume of investment resources from the respective areas and, as a result of their interaction, from other sources of investment resources.

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 [1]. 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 positive results from it will be received by both the parties involved in its implementation, the investor and the investment object.

We suppose that the regulation of investment processes in alternative energy in modern terms requires the use of active state investment policy, as often the main source of investment can only be state funds, in addition, many areas of investment: policy need regulation: formation of depreciation policy, tax policy, credit financing of alternative energy innovation policy, human resources policy, price policy [2].

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. The program consists of two blocks of implementation of this process: the essential, including the purpose, object, subject, object and conceptual development strategy unit that contains the objectives, principles and ways of its implementation.

The program also includes the implementation of investment processes unit, which marked the necessary measures and effective unit, which evaluated the success of the strategy and marked its efficiency, which is reflected in achieving the desired effect (in the sphere of alternative energy achieving of both economic and environmental effects are important).

The program of investment development in alternative energy processes determines the necessary measures to stimulate investment in alternative energy sphere, consistency of implementation and main areas on which it should focus. Implementation of the program presented here requires a sufficient volume of investment resources to support effective activities and achieve the desired effect, which may be supported by several sources.

According to the authors, in this situation, interaction between alternative energy and credit institutions on the basis of already existing commercial banks is advisable. The help of the state is an important direction, contributing to improvement of interaction between the commercial banks and the energy sector, separate directions of state investment policy in relation to stimulating the growth of volumes of investment resources [3].

The optimal variant of development and activation of investment processes in alternative energy is an effective management of separate elements of the system, that forms the necessary level of resources, sufficient for realization of investment projects, introduction of investment developments and improved advanced technologies as a result of introduction of investment developments in the conditions of a limited budget financing [4]. It can be promoted by the realization of the project of the Program of activation of investment processes in alternative energy 2020. The aim of the offered project of the Program is stimulation of investment activity in alternative energy for the increase of profitability of this sphere and diversification of power balance of Ukraine.

The following results are expected from realization of the project of the Program:

- an increase in investment attractiveness of alternative energy achieved with the legislative settlement of investment activity taking into account the zonal and natural features of Ukraine;
- effective strategic development of regions, taking into account activation of investment processes in the priority types of alternative energy;
- increase in amount of effective investment projects that will be realized, contribution to perfection of technologies of production, increase in the productivity and profitability of alternative energy with the use of the improved technique;
- diversification of energy balance of Ukraine and reducing energy dependence of the state;
- reducing greenhouse gas emissions and environmental load;
- growth of volumes of investment resources that are in the sphere of alternative energy in Ukraine.

Energy and alternative energy, as its component interacts with many sectors of the economy, because, on the one hand, it is the supplier of its products into other areas and, on the other hand, it is a consumer of products of various industries. Because of this, the intensification of investment processes in the field of alternative energy will stimulate activity in various sectors of the economy, which will positively affect the economic welfare of the country as a whole.

Thus, alternative energy is the basis of providing power safety of the country, that underlines the large value of the offered organizational-economic mechanism of the investment providing development of alternative energy in the conditions of power dependence and certain basic levers and factors of influence, and also blocks of its realization by means of the program of development of alternative energy. Realization of the Program project will allow to activate investment activity in alternative energy that will have positive influence not only on energy, but also on the country on the whole.

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Risk-management features in educational system

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Abstract

In the modern society, there are many intensifying tendencies such as uncertainty under the influence of the new external factors: globalization; ICT expansion into all the spheres of the public life activity and connected with them changes; strengthening of uncertainty and instability of the market environment. The formation of the educational risk-management is a necessary in such circumstances.

Keywords: education, risk-management, universities, educational risks, educational risk-management.

1 Introduction

The education system as an important field of the national economy and society in general performs its activity under the conditions of increasing of internal and external risks number. The proper response on the modern factors must be grounded on understanding and comprehensive thinking of all the possible risks.

2 Overview

Educational risk-management is a system of risks and threats administrating in the educational activity including the process of risks detecting and identification, strategy and tactics of making administrative decisions, which are directed to reduction or avoiding of the possible losses. The final aim of educational risk–management is increasing of competitiveness as the national system of higher education and also its subjects.

The difference between the educational risk-management and the risk-management in its usual understanding lies in the fact, that in education it is not so much important to estimate risks from the investments, how these threats that ruin the traditional order of functioning or as a result they can have considerable losses. Understanding the education phenomenon as a public benefit of the mixed type is expanding the educational risks concept out of the limits of their traditional perception only as the losses of business income. The losses in education can be much more global in consequence of its strategic meaning for the public progress, such as poor quality of qualified personnel training, weakness of formation of personal and valuable lines of the human resources, insufficiency of ensuring innovation development of a country, losing positions in the international competition also.

The stages of the educational risk-management are following:

1. detecting the possible risks and threats, estimation of their negative effects;
2. development of risks administrating strategy with the purpose of their negative effects minimization;
3. founding out the methods and instruments of risks administrating;
4. realization of strategy accompanying with the constant estimation of the results reached.

The levels of educational risk-management are the levels at which risks administrating performing exist: a micro level (an educational institution), regional level (region or district), meso level (the whole field of education or subsector, for example, the higher education), macro level (the national system of education), meta level (the level of international or regional systems of education, for example, the European system of education).

Educational risks are the calls or threats for functioning and development of the system of education of such level that they can lead to the considerable losses. The economic losses in the education are the following: release of a significant part of the highly qualified personnel, closing the educational institutions, contingent loss, reduction or lost of the financial resources. Social losses are: strengthening of the process of social selection and reduction of the social mobility function, significant disproportion at the labor market: unemployment of the highly qualified specialists, low level of labor payment also. Pedagogical losses can be such as inefficiency of the educational system, insufficient level of general education or graduators' competence. As political losses we have absence of national educational system prestige because of its inefficiency or corruption, low indexes at the ratings, educational system unattractiveness for the foreign students. The types of educational risks are the following: external and internal, political, legal, economic, demographical, and others; the entrant inefficiency preparation level, the personnel quality, the management quality, the material-and technical basis quality, resources sufficiency for development, marketing quality also.

3 Conclusions

The innovative development of national universities and the whole system can be removed only if we act on prejudice rather than a mode of rapid response to sudden events. The challenges facing the higher education (Ukrainian, Latvian etc) are serious and determined how global trends and specific conditions of our time. We needs of professional risk management in higher education.

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Resource-based transit system as a part of Latvian economy

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Abstract

Latvian transit system, especially ports, is currently functioning as a resource-based transit system, servicing mostly CIS export needs. This creates numerous threats to Latvian economy, especially in situation of severe dominance of the empty backhaul, as well as considering political and economic confrontation of Russia and NATO countries. Current numbers show that Latvian logistics is severely unbalanced and disintegrated. Application of harmonising measures will solve most of the problems, increase the social output of logistical enterprises and decrease the dependence from certain transit cargo shippers.

Keywords: Resource-based transit, transit network integration, intermodal gateway

1 Introduction

Latvian transit system, by its geographical and modal situation, is ready to serve as an intermodal gateway and even as an integrated transit network, which will service not only regional, but also transcontinental needs. Current situation shows that nearly all available capacities are used in a different way – Latvian port, rail and frequently even road systems work as resource-based transit systems for CIS cargo flows, servicing only a limited number of shippers, within a limited scope of cargo types and extreme volume of empty backhaul. All this might create a huge threat in case these shippers eventually change their delivery pattern.

2 General

The structure of Latvian international logistics sector shows extreme disproportions in key indicators. Those indicators show not only the share in the macroeconomic results but also show the impact.

Impact is created by values that lead to unevenness:

- 9% of international cargo is transported by road vehicles, which is extreme for a country without inland waterways;
- 6% of sea cargo volume is transported using intermodal containers and mostly corresponds to resource-based economy;
- 77% of empty backhaul, leading to imbalance and ineffectiveness in the use of transport system capacities.

Legal regulations allow the system to function in this situation, but this leads to flaws and dependence on the external conjuncture.

One of the possible solutions to the problems stated, apart from the changes in legislation, is transit network integration with rapid transition through transhipment hub phase to the creation of value-added logistics hubs in all of the major Latvian ports, creating Riga – Ventspils port cluster and establishment of multiple exit gateways in Latgale region. Since Latvian logistical system is not concentrated but rather dispersed, this approach could create a major breakthrough in regional development, normalisation of employment in logistical occupations and eliminate the treats caused by resource-based character of the existing transit system.

3 Conclusion

Logistical sector of the Latvian economy continues to work as a support gateway to CIS commodity transit. This situation and all of the threats it creates will be eliminated when the transition phase is concluded with the creation of value-added Riga-Ventspils logistical cluster. Infrastructural and legal developments will balance the cargo throughput, decreasing the role of commodity transfer in the favour of intermodal cargo.

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Abstract

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Educational and scientific cluster: essence, functions and mechanisms

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Abstract

Today's demand is forming of the new forms of an educational activity organisation. These forms should allow performing their functions under the modern conditions, ensuring high efficiency and competitiveness of the educational system in its close cooperation with business and economy. One of such forms is educational and scientific cluster.

Keywords: educational system, risk-management, universities, educational and scientific cluster.

1 General

Educational and scientific cluster (ESC) is a unit of interrelated establishments of universal education and professsional education, scientific establishments, enterprises taken according to a certain principle (for example, regional, branch, programmatic-having a special purpose and others) and their cooperation with the aim to reach synergistic effect from the united into a single system and to reach the aims in forming the system of qualified human resources preparation for the demands of regional and national economy, which must be competitive and effective one. Regional educational and scientific cluster - is a unit of interrelated establishments of universal education and professional education, scientific establishments, regional enterprises and their cooperation with the aim to reach a synergetic effect from the uniting into a common system and to reach the aims in forming the system of qualified human resources preparation for the demands of the regional economy, which must be competitive and effective one.

The aim of ESC creation is ensuring of a common educational and scientific environment in a region as the basis of forming the system of qualified human resources preparation for the demands of the regional economy, which must be competitive and effective one.

The ESC functions are following:

- creation of a common system of continuous studying starting from a school and ending at an enterprise;
- raising of educational services quality based on competitiveness and creation of possibilities to choose subjects and teachers;
- strengthening of connections with the regional enterprises (being included into a cluster) that will allow to expand the possibilities of the students' practicing, joint research projects and training specialization forming according to the region demands;
- uniting of personnel, material-and-technical, financial potential of the higher educational establishments for powerful scientific researches and development carrying out;
- strengthening of educational services export possibilities and joint problem deciding for the foreign students attraction.

There are following tasks:

1. raising of quality and competitiveness of educational services;
2. ensuring possibilities of the different educational ways in the joint educational regional environment;
3. realisation of a synergistic effect from the uniting of teaching and scientific personnel of all the cluster educational establishments;
4. ensuring integration of education, sciences and economy of a region;
5. creation of a powerful regional centre for personnel training of different levels and scientific researches;
6. forming of personnel training innovation structure, focused on the perspective directions of regional economic development.

The cooperation mechanisms are:

- founding the current and strategic directions and the personnel preparation levels for a region; determination of regional demands volume in the personnel of different specialities;
- creation of possibilities for the students' work practice and for the graduators' employment;
- forming of the interdepartmental temporary scientific collectives for scientific researches and developments carrying out;
- uniting of both different higher schools' personnel potential for the educational activities performing and powerful NDDKR with the purpose to ensure development of the region;

- creation of different firms which will realise technological and business development of subjects of a cluster.

2 Conclusions

There is demand to form educational and scientific clusters which are caused with both the need to realize the main functions of education (such as teaching, research), and all-round development of such activities directions as innovations, commercialization, entrepreneurship. In this context the educational and scientific clusters are come forward as an effective form of the uniting of educational institutions, science and business establishments with the purpose to carry out innovational economic development of a region and of a country in general.

Management of a transport company's logistics risks

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Abstract

The present paper provides review of the main risks of transport companies. The review of methodologies [1, 2], associated with the testing and analysis of the key methods of quantitative risk analysis [2], is being presented.

Keywords: logistics risks, management of logistics risks, evaluation and minimization of risks, methods of quantitative risk analysis.

1 Introduction

There is no doubt, that logistics risk management currently is one of the key problems at the moment. The functioning of a modern market environment is unthinkable without risk. Risks are a recognized danger in logistics and supply chain management, as well as in any other sphere of economic activity. Logistics managers must be able not only to identify risks, but also to evaluate them, taking into account the impact of risk factors on the results of the logistics activities, and make decisions in regards of protection against risks.

Due to the fact that transport is one of the key sectors of the economy, being an important source of financial revenue, sustainable economic development of the region as well as living conditions and standards of the population depend on efficiency of the transport operation. Therefore, it is important to assess, manage, prevent and minimize risks related to operation of transport companies.

There are many different methodologies of risk management. The present review of methodologies will be very useful for the practical work of transport companies [2].

The main objective of logistics is cost minimization, profit maximization and risk minimization. All three of these components are important criteria for the development of transport logistics model. Paying attention to risk management is one of the key objectives of each company. Effective risk management, by contrast, is a decisive factor for obtaining a positive economic effect for all supply chain participants. Risk associated with logistics system functioning should be minimized or even neutralized.

2 Overview

Assessment, management, prevention, minimization and risk allocation are the tasks of a comprehensive solution, which can be addressed by the management of the transport company through a variety of risk management methodologies.

On the basis of the tasks, handled by transport logistics, it is possible to identify the main types of risks that may arise at each stage of the supply chain.

It should be noted that among the main causes of risks there might be not only a statistical possibility of an unfavorable situation, but also three other factors of external and internal logistics environment: uncertainty, randomness, and counteraction.

Transport companies' risks can be divided into the following main groups:

a) The commercial risk. Associated with disrupting the supply, shortfall in production, an increase in transport costs, violation of delivery terms, outstanding financial obligations, loss of income share (profit);

b) The risk of loss due to changes in weather conditions, including natural disasters;

c) The technical risks. Associated with the operation of technical equipment of the logistics system;

d) The risk of loss of the goods as a result of theft, including loss of cargo without trace or theft of the vehicle with its cargo;

e) Environmental risk. Associated with damage to the environment, for example, during transportation or storage of products;

f) The risk of civil liability in connection with damage to natural or legal persons in the process of logistics activities [3].

3 Solution

Risk management, as well as any management activity, has its goals, objectives and management methods. The methods used for managing risks, associated with the logistics system of transport companies, can be divided into three groups - methods for identifying risks, methods of risk assessment and management and methods of response to risks associated with logistics system of transport companies. The present paper provides a detailed review of the first two methods used for management of risks associated with the logistics system of transport companies.

Risks management activities implemented by transport companies shall include the following phases (Figure 1) [1]:

1st phase. Risk identification. Identification of internal and external factors that determine the occurrence of logistics risks [1]

2nd phase. Risk assessment. Assessment and analysis of the identified factors [1, 2]. Simulation of the possible impact of the risk universe on the activities of the company

3rd phase. Selection of a method and measures to manage risk

4th phase. Risk prevention and control

5th phase. Result assessment

6th phase. Recommendations and conclusions obtained during the evaluation of results

4 Conclusion

The functioning of a modern market environment is unthinkable without risk. For any organization, in whatever sphere of activity it may participate, risk management is the identification, analysis and control of the risks that may endanger the organization's assets and profitability. At present the problem of risk management and risk assessment is one of the key issues of transport companies' operational management. The tradeoff of risk and business activity level, profitability and reliability, based on the analysis of the role and place of risk, is a significant part of the management decision making process.

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Management analysis of innovation projects in case of limited resources

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Abstract

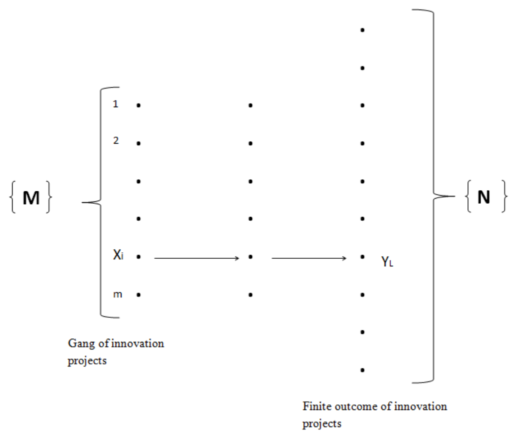
Considering a question of management and coordination of innovation and investment projects from point of joint implementation with maximum probability.

Keywords: innovation, investment, optimization, resource, probability, efficiency

1 Introduction

The necessity to approve innovation and investment projects arises when innovation projects reach the required level of certainty of the end result and measurability of its characteristics. In other words, the task of coordinated control of innovation and investment processes occurs. Let us assume that M innovation projects have been formed, each of which has sufficient certainty of the end result, as well as a set N (McN) of investment projects have been prepared for the possible financing of innovation projects. Besides, there are cost, resource and time restrictions for a possibility of financing projects during the entire period or in some periods. In such conditions it is required to select the best options of implementation of investment projects in accordance with the set restrictions for resources and the accepted optimality criteria.

Increasing competition on the market of goods and services require continuous improvement, as well as developments and innovations in different areas. This causes the formation of a big number of innovation projects, which require the corresponding financing.



When substantiating the decision-taking mechanism to select the financing of the corresponding innovation project, the interests of both the customer and the investor should be taken into account.

2 Conclusion

Proposed analysis allows optimize approval for joint management of innovation and investment projects.

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Priority areas to stabilize the Ukraine banking sector

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Abstract

This publication envisage the priorities stabilize the banking sector Ukraine aimed at increasing the capitalization of banks; improvement of approaches to the regulation of banking transactions with related persons; strengthening the responsibility of bank managers, owners of substantial destiny and other related worthy for activities that lead to the insolvency of banks; assess the quality of banks' assets in order to determine the need for additional capitalization of banks; Further purification banking financial institutions that are insolvent, make money laundering and fail to comply with the law; develop a coordinated system of extra-judicial restructuring loans and promoting voluntary restructuring currency mortgage loans.

Keywords: banking sector Ukraine, stress testing, financial stability of banks

1 Introduction

Persistence and stability of the banking system is one of the most important conditions for the development of any national economy. The stability, clarity and predictability of the banking system allow to increase predictability of activities to investors and to increase the force of attraction of other economic agents. The stability of the banking system depends not only on the level of competitiveness and demonstration of sustainable growth, but also aggregate capacity to resist crises. Therefore, crisis management is gradually becoming apparent and in absolutely essential factor of everyday banking. This simple and accessible tool for antichrists' management are the still rare in the banking system of Ukraine.

2 Format

In 2014, Ukraine has experienced an unprecedented combination of political, financial, economic and banking crisis. The conflict in eastern Ukraine with accumulated in previous years macroeconomic imbalances destroyed macro-financial stability of the country. Actions of National Bank in this difficult period were radical and systemic challenges is quite consistent with severe crisis.

The decline in aggregate demand and flow of savings bank in the non-banking sector significantly undermined the financial stability of the banking institutions of Ukraine. Thus, in 2014 the number of banks with banking license of the National Bank of Ukraine decreased from 180 to 163 banks. During the year, 33 banks declared insolvent and transferred to the Fund Deposit Guarantee, and 17 of which were taken the decision to liquidate. In addition, two banks were withdrawn and revoked banking licenses in connection with the annexation of the Crimea.

The most impressionable to shocks were banks that performed risky unbalanced policy or lent large-scale projects and suffered a loss of temporary occupation of the Autonomous Republic of Crimea and the situation in eastern Ukraine. weighing in unstable conditions for the development of the banking business, the NBU in 2014 conducted stress tests of 35 large banks. Originally completed in late August, stress testing 15 largest banks in Ukraine, conducted by the terms of reference agreed with the International Monetary Fund and the World Bank. Tests showed that nine of the fifteen banks need to raise capital. The required amount - 56 billion. UAH. During stress testing situation was simulated for 3 years. Accordingly, capital deficit estimated for the entire period. These results largely coincided with the findings of a comprehensive inspection, which has managed to hold the controller in some banks. Diagnostics and benchmarking audit companies engaged in the "big four", a list of which was agreed with the IMF and the World Bank. Diagnosis was made on the basis of the balance sheets of banks, recorded on January 1, 2014. The auditors examined the loan portfolio of banks on that date, assessed value of assets revaluation conducted mortgages, checking accuracy of reserves and so on. With stress tests evaluated the stability of banks in case of a possible deterioration in the next three years, that may change as the value of collateral real estate, as in some situations, borrowers will act as problem loan portfolio increased more. Check these 20 financial institutions be completed by the end of October 2014. The results were expected. Capitalization needed 18 facilities totaling $ 66 billion. UAH. With owners and investors of these banks held a constructive dialogue and consensus reached on the need for a statutory capital of financial institutions.

It should be noted that stress testing is a method of quantitative risk assessment, which is to determine the value of an inconsistent position that puts the bank at risk and in determining shock value of changing external factors – exchange rate, interest rate and so on. The combination of these values gives an idea of amount forfeit or income received by the Bank, if things develop on the assumptions laid. Stress testing is widely used to measure credit risk, liquidity risk, foreign exchange risk, interest rate risk and asset values.

The purpose of stress testing, conducted in Ukraine was to evaluate the risks and determine the capacity of institutions to withstand shocks in the financial market. As a basic risk factors NBU recommend using the following: 1) macroeconomic indicators stable economic situation (economic recession, a radical change in direction of development of the economy, first-class companies defaulted borrowers, etc.); significant fluctuations of the currency; openness and accessibility of the interbank market; level of political stability and international; the stability of financial markets, including opportunity to counter speculative attacks; changes in interest rates, for example, LIBOR, the discount rate, etc; the possibility of impairment of property which is pledged as collateral for bank credit operations (eg, due to falling real estate prices, the crisis of Industrial Sectors, etc.); volatility in energy prices; 2) microeconomic indicators: access to external sources of bank liquidity support; the competitive position of the bank (determined by the method of SWOT-analysis as a generalized assessment).

Also, to stabilize the banking system of Ukraine should solve the issue of protecting the interests of creditors. After all, this leads to a decrease in foreign investment in Ukraine and increase the portfolio of bad loans Ukrainian banks because of the deterioration of payment discipline borrowers, in particular, do not pay on loans.

A law on the strengthening of owners and managers of banks - additional leverage on them, it will significantly enhance the conservation and enhancement of guarantee funds of individuals and businesses. Today the banking system needs to "clean" - the banks do not have to engage in non-core business operations and serve their shareholders. After this, they expose to risk funds as their clients and other market participants, the stability of the banking sector as a whole.

To strengthen the banking system, the National Bank of Ukraine:

- Displays the market problem insolvent banks and banks involved in money laundering;

- Increased capital requirements for new banks to 500 mln. USD., And approved a plan to increase the equity of banks with a minimum of 120 mln. USD. to 500 mln. USD.

- Improved procedures for the withdrawal of banks from the market. Now it is a truly international practice, which was developed jointly with the IMF and the World Bank.

3 Conclusions

Further, the main priorities regulator in banking supervision: the level of capitalization of banks; improvement of approaches to the regulation of banking transactions with related parties; identify the real volume of transactions with related parties and taking measures to reduce them; strengthen accountability, including by establishing criminal liability of bank managers, owners of substantial participation and other related entities for activities that lead to the insolvency of banks; assess the quality of banks' assets in order to determine the need for additional capitalization of banks; Further purification banking financial institutions that are insolvent, make money laundering and fail to comply with the law; develop a coordinated system of extra-judicial restructuring loans and promoting voluntary restructuring currency mortgage loans.

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Risk assessment for intra-corporation calculations

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Abstract

The paper considers one of the main causes of currency risk that is unreasonable changes in exchange rates. The separation of currency risk on operational, translational, and economic is done. Outlines the methods of control of hazards and reduce their impact on the final financial result of TNCs. A definition of the «risk of intra-settlement» as the probability of losses related to cash flow as a result of defects or errors in internal processes. Classification of sources of intra-corporation risk is proposed that are based on personnel, processes, systems, environment. An integrated use of technique analogies sensitivity simulation for quantitative risk analysis of losses is discussed. There was improved formula that estimates the future value of money in intra calculations.

Keywords: multinational companies, overseas departments, intra calculations, risk management strategy risk, currency risk, methods of risk, exchange rate risk assessment.

Transnationalization process, which is characterized by increased interconnection and interdependence of the subjects of the world economic system not only promotes the emergence of new forms of business organization, such as transnational corporations, but also improve the tools and methodology of cash flow and profitability of individual companies.

TNC phenomenon, the mechanism of their functioning, development problems are investigated in a number of works of foreign and domestic scientists and economists. The range of TNCs functioning researches in recent years significantly expanded with attention to large domestic corporations, some of which compete with foreign ones. However, it should be noted that, despite its considerable financial and material resources, not all TNC are equally successful: some of them leaves the market or closes its manufacturing plants, going for export only.

However, despite the great theoretical and practical material, the topic of risk assessment at TNC's intra calculations remains under-investigated.

For the implementation of intra-settlement affected by the following factors: the need to maintain or strengthen the control of subsidiaries; the need to obtain from branches of regular tides of funds; selection of objects funding; attempts to minimize the amount of taxes; changes in interest rates, exchange rates and other factors that TNCs can be regarded as a source of funding; attempts to minimize currency, financial and political risks.

Due to the fact that intracorporate calculations are related to payments in foreign currency, economic entities have the potential currency risk due to adverse changes in exchange rates.

Currency risk is divided into operational, translational and economic. Operational risk is mainly related to trading activities, as well as cash transactions on financial investments and dividend payments. This risk arises when the specifics of the transaction requires the payment or receipt of funds in foreign currency at some point in the future.

Translation risk has been associated with investments abroad and foreign borrowing. It affects the size of the indicators of balance sheet and income statement. Translational risk affects the accounting and financial reporting. It differs from the operation lies in the fact that it does not involve cash flows or the size of payments. The risk of damage or risk of diminishing returns occurs in the preparation of the consolidated statements of multinational corporations and their foreign subsidiaries.

Economic risk refers to the future contractual agreements. It has a long-term character and is associated with the development of promising companies and easier and is projected to have the most negative consequences for the policies of major companies, namely: decrease in profit in future operations (direct economic risk), the loss of a certain part of the price competitiveness compared to other manufacturers (indirect economic risk).

Since the financial risks are the result of the implementation of commitments in the process of transfer of funds, it is often these risks are the risks of the payment system. These include settlement risks, liquidity, credit, time, systemic and moral hazard.

Timing risk arises from the possibility of changes in the financial condition of the parties in the period between the receipt of the information about the payment and performance of the final settlement. Interim risk is also the risk arising in cases where the participants of payment are in different time zones.

Moral hazard occurs when the system participants do not take any steps to reduce the risk or hope that other members or the central bank as a guarantor of the final settlement will cover their obligations without proper security.

Systemic risk arises when all the other risks are amplified to such an extent that collapse is threatened entire payment system. This risk may arise as for financial reasons and because of failures in communication networks, equipment failures or shortcomings of the software [3].

When determining the risk management strategy business entities must comply with a certain sequence of actions:

- analyze and identify risk;
- conduct a risk assessment;
- implement risk control, which implies its acceptance or election optimization methods;
- in the case of optimizing the risk to apply external or internal optimizations.

Risk assessment is a powerful tool in decision-making and is a useful tool with which it becomes deeper, and investment decisions - more efficient through the use of appropriate methodology.

Therefore, when assessing the risks arising from the calculations within the corporation, especially advisable is to assess risk both quantitatively and qualitatively. Quantitative risk analysis is to determine the extent of the individual risks and the risk of this type of activity. Qualitative analysis is the most complex and requires in-depth knowledge, experience and intuition. Its main purpose is to determine the factors and areas of risk.

For a quantitative analysis commonly used are the following methods: analogies; sensitivity; simulation; the risk of loss, and so on. n.

Companies often are limited to a simplified approach in risk assessment, based on one or more of the major factors that in a particular situation are most important.

In absolute terms, the risk can be defined as the product of the probability of failure and the magnitude of these undesirable effects that occur in a particular case. [4] In some cases, the magnitude of the risk is defined as the probability of occurrence of undesirable effects.

In relative terms, the risk is defined as the potential losses, attributed to a specific basis, for which it is most convenient to take the total cost of resources or the expected return from the operation. For the base to determine the relative amount of risk taking cost of the planned total cost of this type of risk taking and risk is measured by the coefficient.

It is natural that all companies pay quite a lot of attention to parity "money - time". Financial managers often face the challenge of determining the present value of cash flows (PV) and future value (FV), i.e. the value of money, with the addition of interest payments. Developed a convenient model, which allows to navigate in this price possible future income.

So, on the basis of the foregoing, it can be argued that in the present conditions, no decision is taken without calculation and risk assessment. The ability to predict the maximum degree of probability that an event in the future allows you to work out plans and projections strategy against risk. It is clear that there is no universal method to perform a complete analysis and to assess the risk of the project or the operation. Each of the currently known methods has its own advantages and disadvantages. Considering the increasing degree of transnationalization of economies, unstable political situation in some countries and the introduction of new technologies and financial instruments problem of risk assessment is extremely urgent in terms of ensuring the financial sustainability of economic entities.

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The need to study human resource management approaches on the example of telecommunication enterprises of the Republic of Kazakhstan

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Abstract

The article is about a need to study an impact of the human resource management policy in the enterprise, the current system of selection, training and education of personnel, and capability building on the success of the company in a highly competitive environment, on the basis of data provided by the studied international telecommunication company.

Keywords: Recruitment, training of personnel, training, telecommunications operators.

1 Introduction

One of the main conditions for competitiveness and economic growth in the telecommunication companies, which have a great influence in the development of business and entrepreneurship, is the availability of trained and qualified personnel, i.e. human resource.

Remains relevant the saying "Recourses decide everything." Modern organizations are getting more and more dependent on the ability of employees to effectively use their internal resources for the benefit of production.

2 Overview

The main criteria for the success of the enterprise management have always been diligence and discipline.

New economic conditions have required new knowledge, skills of employees to think big, the ability to adapt to unusual conditions in the frequently changing environment.

Addressing critical management tasks, such as selection, training, preparation, compensation, employee motivation in the circumstances was not possible within the existing outdated approaches to management.

The search for new sources for performance improvement of modern enterprises, the search of such a source within the organization, application of new methods in management styles give a revolutionary turn in management thinking.

The modern approach to human resource management emphasize the formation of an organizational culture that creates the conditions for continuous learning, development, cohesion, job satisfaction, staff motivation in achieving the organizational objectives. The need for serious attention of leaders to the issues related to the change in the organizational culture, and building unique organizational values are making knowledge, professionalism and commitment to the organization, teamwork, and willingness to change as main guarantors of the quality of products and services. In turn, the production of quality products and the ability to fully meet the growing demands of consumers become vital factors of competitiveness of any modern organization.

3 Decision

With this kind of understanding of the business nature leaders will be able to form an organizational culture that will integrate intelligence of people, awaking in them the initiative, creativity, innovation, ambition, self-empowerment to take decisions; attract to the organization new professionals and create an environment that will facilitate the goal alignment between the employees and the organization. Only under such conditions it is possible to reveal the maximum potential and the capability of each employee which is the key to the company success in today's rapidly changing environment.

Also in this studied international telecommunication company a high attention is paid to human resource management issues.

These issues are under the functions of the Organizational Development and Human Resources Board (OD & HR), which includes the departments of personnel administration; selection, adaptation and retention; organizational development and department of compensation and benefits.

Within the organization there was created a University for the purpose of training and development of employees.

To study the effectiveness of the structure of human resource management theoretical methods, by analyzing and comparing with other similar companies and building hypotheses as well as empirical methods, by selecting multiple segments of the company's employees, observing, questioning and interviewing with video and audio recordings for the survey purposes, are used.

4 Conclusion

There is no one-size-fits-all program for human resource management. Every year more and more new approaches to human resources management are introduced. A certain management style forms certain methods of human resource management and ways to implement in personnel and social policy of the company. These aspects are expressed in concepts such as equality, respect, working conditions, the effectiveness of the organization. Personnel policy, which is conducted in the company determines the success of his work in a competitive market and thus creates trust of the shareholders.

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The formation of effective budget policy of Ukraine

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Abstract

The complexity of political, social and economic processes determine the need to take into account the peculiarities of social problems in the formation of state policy. Now the main trend is to implement only the measures to stabilize the political and socio-economic situation in Ukraine. The modern limit of the post-industrial society implies that spreading of processes of globalization requires rethinking of approaches to forming both state policy on the whole and budgetary one in particular. Coordination of fiscal policy among the countries will allow to form and realize competitive policy on all the levels of state administration

Keywords: fiscal policy, European integration, fiscal security.

European vector of development of Ukraine necessitates the formation of a competitive fiscal policy of the state and problems of implementation of effective public policies across countries in practice is of particular importance.

The complexity of political, social and economic processes determine the need to take into account the peculiarities of social problems in the formation of state policy.

In the strategic aspect, fiscal security is guaranteed only by competitive economy, which can be built only due to regeneration and accelerated development of promising sectors of the national economy with the balanced budget policy [2]. But now the trend is to implement only the measures to stabilize the political and socio-economic situation in Ukraine. Budget priorities should be determined on the basis of an integrated approach in the context of the formation of the concept of fiscal policy with regard to the identification and analysis of internal and external factors, which determine the processes of social development, taking into account hierarchical components of the state system of priorities, which include long-term priorities of the state and medium-term priorities of the territories. Adherence to such requirements for the formation and implementation of the priorities of fiscal policy is possible by solving the main tasks of a certain stage of development of society and ensuring a close relationship between important areas of financial policy. The basis for selecting priorities should be scientifically based definition of the directions and evaluation the real financial possibilities of the implementation of priority programmes with the use of budgetary funds.

Effective fiscal policy is considered as the strategy which provides the maximum possible at the present stage of achieving the objectives of public financial management and the fiscal balance based on the efficient functioning of the budgetary system of the state. A key criterion for effective fiscal policy should be the criterion of high quality public services, which provides the optimal value of state revenue and expenditure at the permissible level of tax burden.

The competitiveness of fiscal policy is based on the basic principles of objectivity, transparency, consistency, commitment, coordination, which of course must be adhered to and their content is as follows.

The principle of objectivity in fiscal policy reflects the objective processes of state development occurring in the economic environment, finances and society. The observance of this principle at the formation of fiscal policy is very important and is applied not only to the situation in the country, but also takes into account global developments in the field of economics and finances. Availability of objective and reliable information is an important condition for the competitiveness of fiscal policy. For this, we need to move to a unified system of high-quality global financial reporting standards and the harmonization of legislation in the field of finances in accordance with the requirements of the World Trade Organization and the recommendations of the Council of the Organization of Economic Cooperation and Development [7].

The implementation of the principle of openness and transparency is important in the conditions of market economy and necessitates openness at all stages of the budget process and accountability of budgetary relations, and society, as a taxpayer, should be informed of the budgetary policy of the state.

The principle of consistency involves the formation of fiscal policy for the next financial year taking into account the achievements of the previous period to ensure effective management of the entire fiscal system of the state. The sequence of budget policy provides the necessary condition for the effectiveness of fiscal policy is the close relationship of the fiscal strategy and budget tactics that define the processes of social development, taking into account hierarchical components of the state system of priorities and include long-term and medium-term priorities of the state [5].

A fiscal policy can be considered effective, if such policy is obligatory for implementation, otherwise it turns into an empty political slogan. Realization of the principle of obligatoriness depends not only on activity of executive branch of power but also on activity of legislature. Adherence to the principle of obligatoriness in a fiscal policy is providing of financial stability in short-term and medium-term periods.

The modern limit of the post-industrial society implies that spreading of processes of globalization requires rethinking of approaches to forming both state policy on the whole and budgetary one in particular. The coordination of fiscal policy in the countries of world community is a basic task at the present moment. Thus, the leaders of 23 countries of European Union arranged about integration of the fiscal policy on 8 December, 2011, which undoubtedly allowed to provide the domestic budgetary policy of the country balanced and effective [1].

In our opinion, it is a fiscal policy based on the principle of coordination that will become an effective instrument of management in the conditions of spreading of processes of financial globalization. Approaches to the spreading of public acquisition and finances must be common in all the countries for realization of general policy of income and expenditure. Thus, coordination of fiscal policy among the countries will allow to form and realize competitive policy on all the levels of state administration [2].

In the conditions of political and economic instability, it is necessary to take into account that fiscal policy is a category of secondary structure and it is conditioned by the economic development of the state. In connection with it the state, forming a fiscal policy, is obliged to take into account global socio-economic progress trends, the certain stage of development of society and to adhere to the complex approach to the development and realization of measures of budgetary process.

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Positive effects from using gamification in university lectures

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Abstract

In this article, I will give information about gamification and I will show you the benefits from using gamification in student lectures. Gamification is process of using mechanics, thinking and rules from video games, board games, sport games or other types of games in working, studying ,social or business situations .My experience whit the topic had show me applying gamification in student lectures make the classes more interesting, useful, visited, fun and practical directed. I am going to show you few gamification elements. Here I will give you information about the few types of organizing your lectures classes and from the results; I can conclude the best way to conduct classes is by gamificating them.

Keywords: gamification, students, fun, thinking, mechanics

1 Introduction

In my university in Bulgaria, the teachers have few ways of conduct classes and to teach the students.

First way is by making lectures mandatory whit final exam in the end of the semester. This way make students come every time, but that does not mean they listen every time because their mark don't depend from that and they can just sit and study hard for one week or few days before the exam.

The second way is by making lectures not mandatory that makes students not to come if they are not interested in the subject because they know they gain nothing from listening and can sit and study before the exam.

Of course some times there can be middle exam or some paper work but that do not change the final results, that is students just want to pass the subject and most of them don't care what they study, and in the future they are going to remember nothing.

On the other side adding gamification to your class make the lecture more attractive for students.

Some of the way is to change the evaluation system by making it whit points, adding many small task that give different amount of point instead of final mark is from one exam or from presentation and exam. This way students will now they can gain some points every time when they come to lectures not only in the end. The feedback here is very important so the students can know how many point they have and their mark in the moment you can make a leader board that show this results.

You can change the normal distribution (you need to solve 51% of the test to pass) by Gauss distribution that make students more motivated and relaxed and rival between, by scaling your leader board for example: 15% have worst mark,20% have the next one 30% have the middle one, 20% next one and 15% the best one. This way the marks depend from the whole group.

The small task that are given I classes can be individual or in teams, single task or task that are linked and depend from the previous one. Making team task, make the students more unite, and help them learning additional skills like working in team brainstorming, leadership and allocation of roles. The single task help students fulfil the deadlines. Separate from this we can add some business simulation games, that all students together play in lectures and need more than one lecture to finish the game, they separate all students in teams attract the attention of the whole group.

Off course there must be some kind of test too but he give amount of points that are important for the final mark but do not determined it .Whit all this methods students gets faster feedback for their work.

They become more motivated, have more fun on attending the classes learn additional skills, gain good practice, and wonderful memories from the team activities.

2 Conclusions

Gamification is element who is becoming more and more important part of the working, the studying, the social or the business situations

Using gamification in student lecture is going to make the lectures more interesting and more visited. The practice and the additional skill they gain will help them to be rival capable and highly qualified on the job market.

Acknowledgments

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Analysis of the "commercial activity" definition

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Abstract

The essence of business enterprise in a competitive environment, the analysis of existing approaches to understanding the concepts of "commerce", "trade", "commercial activity" and revealed the nature of their relationship were done.

Keywords: commerce, commercial activities, trading profit.

The word "commerce" is derived from the Latin «commercium», which means trade. Dictionary by V.I. Dahl gives the definition of commerce as "bargaining, trade, trade turnover, merchants and crafts." A Harvard Business School believed that "commercial activities exist to profitably satisfy consumer needs". The mentioned concept providing professional activities, whose main goal is profit.

The term "commercial activity" appeared in Ukraine with the term "market". According to p. 1, p. 42, Chapter 4 of the Commercial Code of Ukraine, commercial economic activity (business) is understood as independent, active and systematic at your own risk economic activity carried out by business entities in order to achieve economic and social benefits and profit [3].

B. Abchuk believes that commercial activity - an activity to ensure the sale of goods, accompanied by carrying out appropriate calculations to obtain the highest possible profit in the existing law [1].

B. Apopiy called business method implementation of business processes as sequential operations that provide organizational, economic, social and legal aspects of commodity-money exchange [4]. I. Belyayevsky explains the term "commercial activity" as an activity of sale and storage of goods to meet consumer demand and profit [2].

F. Pankratov interprets the concept as a set of trade processes concerning acts of buying and selling for profit [5]. An analysis of the definition of the concept of "commercial activity" has made it possible to conclude that most scientists believe that the subject is business processes in turnover for profit and customer satisfaction.

Business of an enterprise provides the conditions and mechanism of sale of goods and services. These activities include operations and processes of organizational, managerial, legal, economic and content. We agree with the opinion of V. Apopiy about what business does not cover commercial transactions that belong to the continuation of production in Circulation: product promotion, storage, packaging, packing, goods delivery, sorting goods forming parties [4].

Thus, the business of an enterprise is an activity that in a market competitive environment aimed at organization and management of the sale of goods or services for profit and customer satisfaction.

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Region description according to the parameters of economic characteristics of reporting

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Abstract

Under consideration possible regional model presentation in terms of resulting vector key parameters of economical regional characteristics on base of statistical reporting. Predicting each parameter in desired prediction interval τ obtain resulting vector in a point of our time section interest.

Keywords: region, model, vector, key parameters, classification, forecast.

1 Introduction

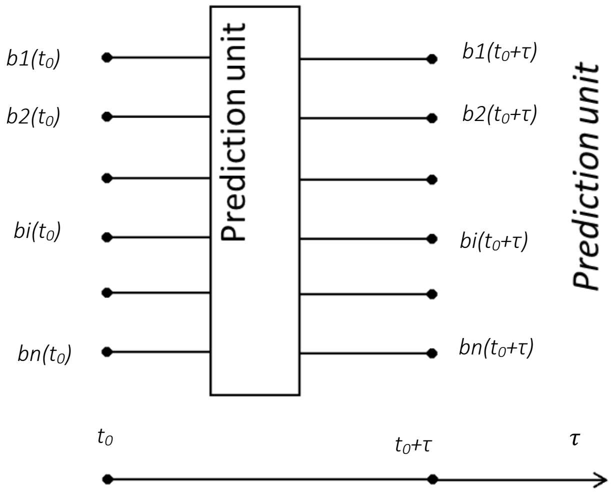
A region description model is offered in the form of a resulting vector of parameters, the constituents of which are the most important figures in statistical reporting, each of which is presented by a separate vector as a determining parameter.

The regional macroeconomics theory practically corresponds to the region paradigm as a quasi-state, especially when production, employment and incomes are made the cornerstone. By combining different statistical characteristics, types of regions can be distinguished. Each of the characteristics is a parameter $b_i, i = \overline{1, N}$ determining one of N indices of the region.

Description of the behaviour of a set of determining parameters in time can be presented as a resulting vector of a random process, which can be non-stationary in the general form: $\vec{B}^N(\tau)$=$\vec{B}^N[\ b_i(\tau)],\ i = \overline{1, N}\ ;\ \tau \in [0, T]$.

The region classification process as an object is a data conversion system at the interaction of the object and the classifier, and this process consists of evaluating the observed vector of the determining parameters and decision taking on the object belonging to one of possible classes.

By combining different statistical characteristics and allocating the corresponding types of regions to certain groups, they can be efficiently compared with each other. Besides, usage of the described model of the region presentation according to the resulting vector of the determining parameters allows types of regions and building regional typologies to be allocated.



2 Conclusion

Received model of presentation region in resulting state vector by key parameters of regional economical characteristics received on statistical reporting data base permits conduct their classification. As well use of economical-statistical methods of predicting valuation of each parameter may present resulting state vector on any time interval.

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Competitive opportunities of region: perspective of determination

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Abstract

The need to identify competitive opportunities of region to convert them into factors for sustainable regional development are proved in the paper. The structure of competitive opportunities of region is proposed and the prospects for the use of the results of their evaluation are identified.

Keywords: region, competitive opportunities, competitive potential, competitiveness, structure, monitoring, regional management.

Complication of managerial problems in condition of intensification of interregional competition and influence on processes of globalization sets tasks before state and regional authorities in order to improve system of management, including mechanism's search and methods of state regulation of territory, focused on its competitiveness. Regions of Ukraine are in need in modernization of system's management of social and economic development, indicators of efficiency, which are not quantative indexes but qualitative ones in new developments' conditions. The basis contains particular politics, directed to transformation of competitive potential of region into a factor of its stable development, providing a transition economic system into qualitatively new level of economic progress. There are actual investigations, which are connected with definition of structure and functions of competitive potential of territory, its influence on regional competitiveness.

Nowadays in Ukraine regions are different according to the level of economic development, which is a result not only a preservation of differentiation of their industrial, resource and innovative potential, but also its force. Main reason of effective economic politics as in national so in regional level has not decided yet. In connection with there is a problem of formation of effective and adequate regional competitive politics, directed to provision of region's competitiveness. From these positions an investigation of competitive potential of region is a primary task, solution of which will allow improving competitive positions of a region on national and international levels.

It is known competitive potential of region includes variety of components, which is a component of a structure and performing definite functions, which will change according to strategic purposes of development. There will be different a result obtained in the process of realization of competitive potential of region. Basic structural elements of competitive potential of region are economic, human, innovative, investment, infrastructural. Such scientific approach is the most traditional and widely used [1].

While increasing competition between territories and regions will cause an usage of new resources and abilities, which are situated in the sphere of management, enterprise, and integration and и отображают modern современные organizational and economic relationships of region. That is why the structure of the competitive potential of the region along with other elements, it is necessary to consider to potential of enterprise, a potential of internationalization, diversification, restructuring and clustering.

Competitive potential is a reserve, which can use the region, modifying and adjusting strategic development priorities and implementation High competitive potential of the region allows you to save or increase the rate of development and stop the negative effect of external and internal factors [2].

So, the competitive potential of the region and its functional structure determine its competitiveness and there is a source of competitive advantage of territory. The complexity and variety of this category is confirmed by its structure and functional purpose.

A determination of the functional structure of the competitive potential of the region is necessary to construct and improve the use of its competitive advantages by choice more efficient rates of development, investors mobilization etc. An analysis of the competitive potential allows identifying regions, which have succeeded in the development of a competitive factor. Such information may be useful to create different kinds of formal and informal associations' areas in which the most important goal will be to cooperate through the exchange of experience and transfer of innovation in all spheres of social and economic development of the territory.

Besides, the results of investigation can become competitive potential of the information base for the formation of a regional competition politics and the adoption of regional authorities informed decisions in the management of steady development of the territory.

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Improvement of entrepreneurs' educational system of the Republic of Kazakhstan

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Abstract

In the article was presented the operational system of education for beginner and qualified entrepreneurs and improvement of quality of educational services based on new forms and educational technologies of the joint-stock company "Damu Entrepreneurship Development Fund" of the Republic of Kazakhstan.

Keywords: Support for entrepreneurial activity, business is an education for entrepreneurs, upgrading a competence of entrepreneurs

1 Introduction

The main condition of economic growth of every country especially in the period of the global economic crisis is a private enterprise.

Small and Medium Enterprises are an entrepreneurial activity of small businesses.

Providing an employment this sector of business increases the economic growth, as the result the sector affects the structure and quality of gross national product (gross national product is a totality of benefits created by citizens of a country)

The role of Small and Medium Enterprises in economy:

- To provide the activity of market participants, to create a cooperation between branches of economy and business entities;
- To implement the consumer needs of his/her services, because he/she is required of quick payback for the further development;
- To create a business environment and a competition in the market;
- To solve social and economic problems.

2 Overview

The Small Enterprise is required to develop constantly and adapt flexibly to market conditions because of stiff competition. The all actions are aimed at making a profit. Also the small enterprise cooperating with large companies affects the rapid adoption of innovation process in production. In condition of crisis, the current economic situation is demanded new forms and methods of educational programs to improve the competence of entrepreneurs.

The main goal of education is "the process of acquisition and development of individuals' methods of activity (or change of cash)" [1,s. 566].

Also the purpose of training programs are increasing of would be and qualified entrepreneurs by providing the educational programs to improve the competence.

Today the effective and short-term educational programs for entrepreneurs created to improve the professional knowledge and skills are the one of the most important subsystem of educational system as a part of "realization of supplementary educational programs and services in order to meet the educational needs of citizens, society, state comprehensively" [2, s. 30]

The international experience shows that the small businesses in USA produce the 40% of gross product and provide jobs for almost half of the working population. The share of small businesses in production is 60-70% in Germany, Canada, and the United Kingdom.

Development of sustainable and competitive private enterprise is one of the priorities of the economic policy of the Republic of Kazakhstan.

In the Address of President of the Republic of Kazakhstan N.Nazarbayev to the nation "Kazakhstan's way - 2050: Common aim, Common interests, Common future" is noted that small and medium enterprises are sound economic basis of our Universal Society of Labour [3].

3 Decision

Today members of the public support to small businesses comprehensively with an entrepreneurial initiative to transfer into the medium category. The significant purpose in training and developing of business education of entrepreneurs serves a program "Business Road Map - 2020" on combining the plan of the second five-year plan of industrialization.

According to the Law of the Republic of Kazakhstan "On private entrepreneurship" directions of state support of private entrepreneurship include improved regulations, development of infrastructure, educational, scientific, methodological and informational provision of activity and financial support.

In the article will be considered an activity of JSC "Damu Entrepreneurship Fund" which was established on the basis of the decision of the Government of the Republic of Kazakhstan on April 26, 1997.

The mission of the Fund is assistance of quality development to Kazakhstan's SME through a comprehensive support, which is included a wide range of financial instruments and programs for the development of competences.

To implement the mission the Fund operates in two main strategic directions:

1. To provide with financial support to SME's subjects.
2. To develop competences SME's subjects through the providing the training programs [4].

Also in the article will be described effectiveness of training programs aimed to improve entrepreneurs' competence.

4 Conclusion

Implementation of innovative technologies in production requires the competitiveness, mobility, from specialist and ability to effectively update professional knowledge.

Associated with the strategic purposes of the organization the system of entrepreneurs' education provides the maximum readiness of people to solve their problems, raise the level of work motivation transforming the vision, mission and values of the company in the resource of staff.

The system of education related to the process of organizational development and using advanced methods and techniques of effective learning in terms of industrial and innovative development of the country will increase the competitiveness of entrepreneurs.

The organization is capable only on what is capable it's staff.

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Psychological culture as an important element of successful sales in the tourist industry

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Abstract

The main subject is devoted to the psychology of tourist product's sales.

Important issues such as the creation of the necessary psychological climate, conducive to the successful implementation of bilateral negotiations: and the creation of a good impression of the manager, as the main indicator of the effectiveness of sales, are described in this article.

It is necessary to say about customer service in the office. In the text of the article discusses the typology of customers and reasoning of the successful presentation of tourism product.

The article ends with the mention of such possible scenario, as a conflict. The article reveals the causes of conflict in the tourism industry, and gives recommendations for the prevention of conflicts.

Keywords: tourism, psychology, typology, conflict

1 Introduction

Currently, tourism is a powerful industry. For mutually beneficial operation of this industry certain conditions should be observed.

Since the duties of tourism management includes constant interaction with people, he should know aspects of human psychology for successful negotiations.

After all, the ability of manager of a particular tourist organization to create the desired psychological climate for the client largely determines the success of the transaction. Knowledge of the psychology of human perception is valuable for successful presentation of the tourist product for each person.

2 General

A psychological culture of tourism product sales begins with the creation of a favorable psychological climate, which is a starting point of successful bilateral talks (discussions) between the manager of tourist firm and the client.

Favorable psychological climate during the tourism product sales is largely due to the fact of the mental client attitude. The right psychological climate is created by the persuasion of the client in his or her importance not only for manager but also for the tourism company [1].

Psychologists distinguish a number of aspects that provide any person with a good psychological state of health. Knowledge and usage of these aspects during the tourism product sales will create and maintain a client good mood.

Another key (decisive) factor, which has an influence on effective tourist product sales is the manager ability to make a good impression. A special role in the process of tourist product selling in the office plays affiliation – the scenario-role overcoming model of behavior [3].

It is necessary to interpret every potential customer as an individual with his own interests and desires, and, in this connection, to build relationships according to his personal interests.

In the customer service process a tourism organization manager certainly will interact with different categories of people, who have their distinctive features, as well as service requirements and getting information about tourism products. In this regard, it is recommended that the manager should select this type of presenting information that would interest a potential customer.

In addition, the manager must inform the client about security considerations, cost savings, the novelty and originality of the route, luxury, prestige and popularity of the tour. Finally, the manager settled a completing transaction.

It is necessary to mention such possible moment (situation) during a conversation between the manager and the client, as a conflict. It can occur as a result of the client receiving of inaccurate or incomplete information, as well as improper performance by tourism organization of their duties, so a tourism organization manager must provide the client honestly with both pluses and minuses of the selected package [2].

Following these recommendations, a manager will be able to avoid the conflict and leave the client only positive memories which will be associated with tourism organization work.

3 Conclusion

Important factors, somehow affect on the sales of tourism products, include: a favorable psychological climate in tourism organization and pleasant impression about manager.

It is necessary to overcome the development of scenario-building model of relations. It is recommended to accept the client as an individual personality and build talks focusing on his interests and hobbies.

Each client represents a psychological type. Therefore, the ability to see instantly a certain type of a client will help the manager to find answers about client's beliefs, perceptions, values and needs. All this ascertainment will help optimize the process of realization of the tourism product, and will help to achieve the most complete customer's satisfaction.

Conflict in tourism happens, unfortunately, quite often. It is important for the staff to know about possible causes of the conflicts in the tourism sector.

The task is to provide the customer with complete and accurate information, which would exclude any misunderstanding.

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Open education: continuity of approaches and risks

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Abstract

The paper discusses new opportunities of the modern open education for the development of the creative and competitive person, as well as challenges, problems and threats for an individual in relation to increase of a role of information, knowledge, informational and communicative technologies in the life of the modern society.

Keywords: modern standards, quality of education, competence, open education, distance learning, educational continuity, didactic principles, risks

1 Introduction

Global changes in the world, bound to integration and expansion of interstate cooperation, an advancement of science and technologies have significantly changed 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.

2 General part

According to the European educational standard, legal documents of the World Bank, the IMF, UNESCO, the Bologna agreements, the national laws "About Education" one of key approaches of continuity in education is ensuring continious quality of education [1] on the basis of civilization, subject and competence-based approaches within an integration paradigm [2].

The realization of strategy of a development of education is implemented today not only within classical formal education (at schools, gymnasiums, lyceums and universities), but also through informal, distant and open education by means of the individual educational trajectories (IET), the individual curricula (IC), and the individual educational programs (IEP) [3].

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

It is essential nowadays for all the participants of educational process to understand the direction of a strategic development of education. To overcome theexisting barriers in the educational sphere is possible through continuity of approaches to education, quality and effectiveness at development of educational competences (common cultural, preprofessional, professional, methodological).

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About the market-oriented economy and the consequences of its development

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Abstract

According to the widely believed, the central part in world crisis and post-crisis processes certainly belongs to a market economy. This paper deals with the main consequences of the extensive development of the market economy. The papers consist of the expression of known scientist on scales of economic development and the consequences of such development.

Keywords: free enterprise, labour, land, capital (money)

The concept of development at one time became the basis of the G. Gegel dialectics as the doctrine of the overall development. The whole world of natural history was presented like a process, as a continuous motion, change, transformation and development.

The free enterprise, which rose above the earlier Economy - it's subordinated to purely market goals economy.

"Thanks to the" market-based mechanisms of self-regulation production and distribution of goods and services made "privileged" for sale on the market. And in this case, the act of sale became a source of income. Development of market relations has led to the formation of factors of production market: labor, land, capital (money) - a price which is, respectively, wages, rent, interest.

According K.Polanyi the title of the free market is devoid of total control and monitoring as rather unstable system. Moreover it has a devastating social system of the society for the consequences. At the same time draws attention to the fact that by its nature labor, land and money are artificial commodities. Labor (labor force) became human beings and their activity related to the processes of life support. Land - it is the nature, the natural sphere in which they (the people) live. Money in his opinion, it is the purchasing power of symbols and no more.

The dominance of market mechanisms (relations) over the people and the natural sphere of their existence could eventually lead to the degradation of society. "Every society, even for a short period would be unable to stand the effects of such a system outright fictions, if his human and natural base, as well as its economic system would not be protected from the ravages of this "devilish mechanism" [1].

Object of worship becomes what surrounds a person in his daily life, which he gives an exaggerated importance - money, power, fame, success, intelligence, etc.

Worship becomes widespread, including a lot of hidden elements of market ideologies and religions. In return for material benefits, professional recognition, "new right" people are not aware of what is involved in the transaction, which will never be the winner. He signed a monstrous contract, sacrificing their talents, aspirations, himself [2].

Against this background, have not lost relevance thought G.Galbraith, which have been made over half a century. Initiative on the question of what should be done does not come from the sovereign consumer who through the market would guide the work of the production mechanism in accordance with their wishes in the end. Rather, it comes from a large industrial organization seeks to control the market, and moreover, to influence the consumer in accordance with their needs. And in doing so, the organization has a profound effect on the value system of the consumer and his beliefs, many of which will be used to counter voiced by our point of view [3].

One of eternal problems of human society is the economic exploitation some people by others, which is expressed in a gratuitous appropriation of the labor of others. Striving to eliminate this problem - the main reason for rebellions, protests, revolutionary action, the struggle for change in the social system for human civilization.

Today's, changing views on all aspects (components) of the society as a whole. Nowadays a lot of problems in the world economy are related to the imperfection of theories that form the basis of the economic policies of individual countries.

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State promotion of regional economic development

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Abstract

Abstract. Detected the state stimulation of economic development of regions for the actions of public authorities, the purpose of which is the impact on the economic development of certain areas. It was characterized the prerequisites of development and implementation of new public management mechanism on territories. Grounded the purpose of stimulation of regional economic development. The directions of implementation of state regional policy in Ukraine were detected.

Keywords: government incentives, economic development, tool, mechanism, regional policy area.

In the context of market reforms in the national economy the role of territorial administration was underestimated for a long time. Conceptual framework and mechanisms of regulation of territorial development are not enough spelled out in legislation and effectively used by state and local government. The difficult situation of Ukraine's economy prevents the realization by governments prudent and efficient regional strategies and encourages governments to extraordinary tactical and operational matters. The way out of this situation possible only with implementation of effective mechanisms of regulation of territorial development through strong political will. The result should be a system of regulation mechanisms of state regulation of territorial development that can really affect the sustainable development of regional economies.

The fundamental works domestic and foreign scientists were devoted to the methodology for state management as a social phenomenon and complex process, including the development of regional and sub-regional socio-economic systems at various levels.

The spatial organization of the national economy as a control object is a combination of natural, economic and social environment. In this capacity, it provides general directions of regional regulation. In this regard, the regional economy has specific features: the lack of complexity, expressed mono level of culture; intermediate position between the center of the regional economy and local government level, between the micro and macro levels. However, regional economy is one of the varieties of macro-level, though it does not have all the features. Modern economy of the region is very complex and multidimensional regulated. Difficult-structural system of the regional economy cannot be regulated through some consistency toolkit.

The mechanism of implementation of a regional system of regulation involves the purposeful combination of centralization and decentralization in decision-making at the regional reproduction process.

Regional development as an object of public administration is a complex system of interrelated elements with its specific structure, culture and level of development, which significantly affects the socio-economic situation in the country and it depends on effective mechanisms for implementing their own growth dynamics, solves a number of internal issues regarding the effective use of all available resources on the basis of self-reliance and self-sufficiency [1, c. 19].

Recent studies have to identify the main trends in the development and streamlining management of territorial development in modern conditions of deep market reforms. First, the need to develop management systems with dynamic change caused by the complexity of the control object and its essential characteristics. However, the structure of government, the level of detail functions and selection of optimal management is largely dependent on the specific socio-economic conditions - concentration of production, specialization, the amount of economic activity (main, auxiliary, service), branching connections, the number of high-tech industries, the availability of education and so on. These characteristics vary greatly even similar in basic economic performance of the region. The most significant challenges that the state should respond and the undertaking of a new territories' management mechanism, are [2, c. 101]:

- global world civilization processes complications conditions of the Ukrainian state and the deterioration of its use of the advantages of its geopolitical position;
- a growing backlog of Ukraine's leading countries in terms of quality of life of people, the level of investment attractiveness, competitiveness and development of innovative environment;
- increasing asymmetry of regional development, degradation village, city crisis settlement network, reduce the number and quality of labor potential and increased migration of the working population, especially young people, in many regions of Ukraine;
- attempts to use issues of regional development, economic, social, cultural, mental and other differences between regions and their current political structuring for escalating political confrontation that hinders the achievement of national unity creates a threat to national security;
- national values immaturity, instability and nehomohennist national political, economic, linguistic, cultural, and information;
- inability of most local communities to decide matters within their competence;
- inadequacy of the existing territorial organization of government, administrative-territorial structure of

the state of the new challenges and development;

- imperfect system of legal, institutional, staffing formation and implementation of state regional policy.

Thus, in the present conditions of deep market reforms in management of territorial development is a key element in the polity that is influenced by many factors, some of which provides a set of its theoretical foundations and enhances regional and local impacts. However, there are problems of management development areas, due to complex interpenetration natural, spatial, economic, political and social contradictions associated with significant heterogeneity of countries and territories polistructure territorial organization of government. That is why there is a justified need for state regional policy in Ukraine in the following areas:

- formation of an effective system of regional public authorities, capable of ensuring sustainable development areas to provide quality public services to people;
- facilitate the improvement of material financial, information, personnel and other resource support regional development, the tasks of local government;
- promotion of inter-regional integration, poverty and alienation inter-regional integration of informational, educational spaces into a single all-space;
- the creation of effective mechanisms at the national level regional interests and regional-local communities, ensuring incorporation identity of regions and their competitive advantage in the formation and implementation of state regional policy.
- formation of the legal framework required for implementation of the Concept of state regional policy, in particular, the law on foundations of state regional policy, other laws, amendments to existing laws of Ukraine;
- the legislation of Ukraine in accordance with the requirements of Council of Europe and the European Union;
- optimization of the territorial basis of public authority ordering the boundaries of administrative units;
- establish and maintain proper environment, improve the quality of life, decrease territorial differentiation of the human development index, the formation of polycentric system of state territory;
- establishing mechanisms for determining the "problem" areas in the region and implementation of public reaction to the situation that they have developed.

Determined that the government stimulation of economic development of the regions by the state authorities, the purpose of which is the impact on the economic development of certain areas with a view to facilitating the progress of economic complex and social protection.

Thus, the objectives of stimulation of regional economic development should be:

- legal support for the economy of the region, the legal establishment of legal norms of economic activity, taking into account characteristics of the region, control and guarantee full compliance by all business entities;
- to ensure reliable operation of the most important industrial and social structures and individual critical infrastructure of the region;
- preservation, restoration and effective use of public property in the region
- determine the optimal size and structure of the public sector, and ensure its effective functioning;
- social development and maintenance of the population, the concentration of the necessary resources by redistributing an appropriate share of the social product.

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Tourism tendencies are at the present stage in the Republic of Belarus

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Abstract

Tourism development is one of the priority areas of socio-economic development in Belarus. Our tourism potential is based on the diversity, natural beauty and virginity, the uniqueness of historical and cultural heritage. The aim of the Republic of Belarus is to create favourable conditions for the formation of effective competitive tourism market that can provide manifold opportunities in order to satisfy needs of Belarusian and foreign citizens in the tourist services. In our country 14392 immovable material historical and cultural monuments are registered, 2,542 of which have a national importance, and some objects and memorial monument have an international interest. This facts open up great opportunities for the excursions development of various contents for different categories of local (native) people and foreign tourists from different parts of the world.

Keywords: tourism development, tourism potential, international interest.

1 General

In 2014 the most visited foreign countries traditionally were Russia, Bulgaria, Greece, Egypt, Spain, Italy, Lithuania, Poland, Turkey, Czech Republic. 82,7% of total number of the Belarusian tourists going abroad in an organized way fell to the share of these countries.

The number of tourists leaving the Republic in organized way still prevails over the number of tourists visited the country. In 2014 five Belarusian citizens leaving abroad were the share of each one of foreign tourist visiting our country (in 2005 – six). The number of organized tourists arrived in the Republic in 2014, was 137,4 thousand which is 0,5 more than in 2013. 115,6 thousand people arrived from the countries of CIS (1,3% more than in 2013). The leading position among the countries of the Commonwealth on organized tourists kept Russia – 113,2 thousand people (increased by 1,7% in comparison with 2013) and Ukraine – 1,8 thousand people (decreased by 10,3% in comparison with 2013).

The leaders in the visits number of the Republic among the countries, which are not CIS (Commonwealth of Independent States) members are: Germany, Italy, Latvia, Lithuania, Poland, United Kingdom, Turkey. In 2014 a share amount of these countries was 48.3% of the total number of tourists from non-CIS countries (in 2013 - 56.4%). In 2014, just as in 2013, the average length of foreign tourists stay in the Republic of Belarus was 4 days [1].

Existing historical and cultural potential of Belarus allows us to develop both inbound and outbound sightseeing tourism. In our country 14392 immovable material historical and cultural monuments are registered, 2,542 of which have a national importance, and some objects and memorial monument have an international interest. This facts open up great opportunities for the excursions development of various contents for different categories of local (native) people and foreign tourists from different parts of the world. Another important point is the fact that these resources of excursion tourism are distributed throughout (everywhere), which make possible to develop it everywhere. While creation a new tour routes you should also take into account that the modern period is the period of new trends development in cultural life, when previously forgotten names, monuments and events are revived, new aspects in the historical heritage evaluation are developed. It extends the excursion subject, the possibility of developing new excursions [2].

2 Conclusions

Not less important reason of the usage of sight-seeing tourism as an important factor of regional development is the fact that its development does not require large expenditures. At the same time it opens up good prospects for economic development of regions. As a result, the orientation of our country for the development of excursion tourism (as one of the main types of tourism) can be one of the possible economic, social and cultural development in some regions, the increase of the financial receipts share from international and domestic tourism.

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Employment policy in Ukraine: problems and challenges

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Abstract

Current development of Ukrainian labour market is characterised by significant influence of globalization tendencies, from one side, and worsening of macroeconomic and political situation in country, from other side. That is why it is necessary to improve employment policy in Ukraine as a major instrument of the stabilization of the situation in labour market. Relatively low unemployment rate as well as shortening of labour demand, widening of low-quality employment in non-formal sector of economy, significant wage arrears remain the main problems of the current development of Ukrainian labour market. Implementation of active labour market programs aimed on the providing of the growth of labour force competitiveness is the main challenge of employment policy in Ukraine. This article is devoted to the definition of the most appropriate way of employment policy improvement in Ukraine.

Keywords: labour market, employment policy, labour force competitiveness

1 Introduction

Human development as an integral factor of the national economy competitiveness growth became a priority of world economy's globalization process. Obtaining of the competitive advantages associated with effective using of competitive human resources provide a success in the economic development. The important condition of the productive using of labour potential is elaboration and implementation of effective employment policy aimed on the stimulation of labour market development. It stipulates the necessity of the investigation of the problems and challenges of employment policy in Ukraine.

2 Overview

One of the main challenges of the world economy's globalization process is a labour market development as a necessary element of national economy competitiveness growth. Effective employment policy foresees the necessity of the realization of measures aimed on the minimization of the outflow of qualified labour force, improvement of the quality of labour force through education, training and retraining; elaboration and implementation of active employment programs for low-competitive persons; providing of social support for the unemployed, career guidance, and so on.

For improvement of labour market development in Ukraine it's necessary to develop the efficient strategy for providing of the growth of labour force competitiveness; to improve the legislative basis for restructuring of national economy based on the introduction of new technologies; to provide the effective policy-making for minimization skill mismatch, improvement of occupational structure of employment that foresees elaboration and implementation of adequate employment and education policy [1].

Using of mainly resource competitive advantages (in particular, low labour costs) by the majority of producers allowed them to save on investments to human resource development and enhancement of the quality of work places. It leads to the preservation of a great number of low-skilled jobs with harmful labour conditions concentrated mainly in mining and quarrying, in manufacture of chemical products, manufacture of basic metal and metal processing [2]. Absence of effective structural reforms in Ukrainian economy stipulates the saving of a great share of employment in non-formal sector of economy, shortening of labour demand. That is why it is necessary to elaborate and implement complex measures aimed on macroeconomic stabilization, providing of labour force competitiveness growth, labour demand and supply matching.

3 Decision

Implementation of active labour market programs aimed on the providing of the growth of labour force competitiveness is the main challenge of employment policy in Ukraine. It foresees the necessity of activation of employer's participation in staff training and retraining, organization of education process, elaboration of educational and occupational standards.

4 Conclusion

Participation of transition economies in the global competitiveness process might be successful under condition of the elaboration and implementation of effective employment policy. It stipulates the necessity of the elaboration of the new approaches to the development of training and retraining of employed and unemployed persons, stimulation of employer's participation in educational process.

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Transformation of employment relations in Ukraine: problems and prospects

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Abstract

Slow rates of employment restructuring were non-sufficient for formation of innovation occupational structure of employment in Ukraine. Decrease of the number of employed in Ukrainian industries had not accompanied by significant increase of labour productivity. It was a result of low innovation activity of industrial enterprises, as well as a lack of investments stipulated by absence of consistent policy of structural reforms. That is why it stipulates the necessity of the change of employment relations towards activation of employee's participation in social innovations, providing of labour productivity growth, formation of innovative employment structure. This article is an attempt to define the most effective way of the transformation of employment relations in Ukraine.

Keywords: employment relations, restructuring, occupational structure

1 Introduction

Transition of Ukrainian economy from factor-driven to investment-driven stage of development might be provided on the basis of innovation changes, increase of productivity. Saving of low-value-added orientation of production, labour intensive manufacturing remains typical for Ukraine. Until now export-oriented Ukrainian industry has been significantly vulnerable to influence of external shocks connected with worsening situation on world markets of metal, chemical production. Correspondingly, it significantly influenced on employment relations and jobs structure.

2 Overview

During pre-crisis period Ukrainian labour market development had characterized by change of employment structure (by sectors). Employment growth in service sector had accompanied by reducing of the number of employed in manufacturing and agriculture. But employment restructuring was non-sufficient for formation of innovation occupational structure of employment in Ukraine. Traditional skills inherent to earlier periods of industrial society slowly transform into entrepreneurial and innovation-oriented habits needed for innovation society. At the same time reduction of employment in Ukrainian industries was not accompanied by significant increase of labour productivity as a result of low innovation activity of industrial enterprises, lack of investments stipulated by absence of consistent policy of structural reforms.

Falling-off in world demand for steel and chemical products, aggravation of negative economic processes inside country, external financial instability had influenced significantly on employment perspectives in industry. Deterioration of economic situation in export-oriented industries from the beginning of recession leads to employment reduction in manufacture of basic metals and fabricated metal products, limitation of skills improvement. As a result of worsening situation at Ukrainian labour market unemployment rate had increased. Especially it related to the real sectors of economy vulnerable to the external shocks. To minimize a negative impact of industrial output reduction, to avoid mass laid offs and to keep professional staff enterprises used practice of partial employment (coupled with wage arrears). The deepening of economic crisis was associated with growing scales of the involuntary underemployment in Ukraine's labour market (unpaid or partly paid administrative leaves or short daily (weekly) hours of work).

On another side, the deepening of economic crisis stipulates the restriction of opportunities of job placement. Demand for labour in manufacturing had reduced as a result of sharp industrial output fall mainly in export-oriented industries. Decline in employee number during last period of time was accompanied by reducing of union membership, weakening of the trade unions, worsening of the quality of working life during recent period of time, non-effective social dialogue and collective bargaining in Ukraine [1].

3 Decision

Market oriented transition of Ukrainian economy leads to the transformation of employment relations, but until now employment restructuring was non-sufficient for formation of innovation occupational structure of employment [2]. It stipulates the necessity of the change of employment relations towards activation of employee's participation in social innovations, providing of labour productivity growth, formation of innovative employment structure.

4 Conclusion

Low efficiency of structural reforms in Ukrainian economy, vulnerability of export-oriented sectors of economy to the external shocks had stipulated low innovation activity of the majority of enterprises, non-adequate transformation of employment process in Ukraine. That is why it is necessary to improve the efficiency of social dialogue, to elaborate measures aimed on transition to the innovative employment model.

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Models of intellectual capital management of transnational corporations under globalization conditions

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Abstract

Nowadays success, rapid growth andsustainable economic development of multinational companies directly dependent on the company's investment in its intellectual capital.For the most part, management of intellectual capital in transnational corporations is built on certain models.Advanced transnational corporations use models in terms of their resource, strategic goals and needs of the country in which the parent company is situated.

Keywords: multinational corporations, intellectual capital, intellectual capital models, globalization, economic development

1 Introduction

At the present stage development and success of multinational corporations in a competitive environment is increasingly dependent on intellectual capital. In modern multinational companies nowadays mainly dominated not key assetsandmateriel inventories, but information, knowledge and other elements of intellectual capital. In the current socio-economic conditions intellectual capital and its components is a strategic asset that plays a dominant role in ensuring the sustainable economic development of multinational companies.

2 Overview

Due to research, over 80% of transnational corporations, which are included in "Fortune - 500" rating, implemented knowledge management systems and continue to actively develop this area of activity, focused on accumulation as well as protection of intellectual capital and promotion of their own market positions.

Intellectual capital management of world's transnational corporations is carried out on the following main models:

- Model of intellectual capital management based on knowledgedeployment strategy;
- Holistic model of intellectual capital management. Accordingtomostscientistsholisticapproachinvolvesconsiderationofprocessesintheformofanintegralsystemthatcanidentifyprocessespatternswithoutthoroughstudyofdetails;
- Intellectual capital management model based on the conceptual model of considered organization; this approach involves the management of inter-related components of intellectual capital based on constant and continuous generation, acquisition and dissemination of knowledge, change and improve their behavior by studying their own experience, creation of new products and services, permanent use of employees ideas and analysis of clients and partners knowledge;
- Management models of intellectual capital accumulation and protection based on engineering knowledge management system. This model focuses mainly on the development of business processes, i.e. the technological component of the intellectual capital of transnational corporations;
- Model of intellectual capital management strategy based on the creation of new knowledge.

3 Conclusion

Research has shown that modern multinational corporations for management as of accumulation and protection of intellectual capital in conditions of globalization use the model of development that is most appropriate because of their resource, as well as their strategic goals and needs of the country in which the parent company disposed.

Analysis of consistency of calculation of an estimate of the higher education institution ranking

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Abstract

At all stages of the development of education it is important to solve the strategic task of providing the quality of education.

It should be noted that in recent years, a large number of private higher education institutions appeared in Latvia. These institutions, just like governmental universities, declare having big goals and tasks, which are fulfilled in the process of education.

However, there is a significant degree of non-compliance of the claimed goals and objectives with the actual results that are achieved in the process of their implementation. This is due to the fact that each of the active participants in the educational space interprets these goals and objectives in their own way.

Keywords: education research, higher education quality

1 Introduction

In order to meet the needs of citizens, society and labour market in a qualitative education, the state administration should be implemented in following areas:

- improvement of the national system of evaluation of educational institutions and organizations in order to harmonize indicators of a modern developing education system, and a standard methodological and informational support of licensing and state accreditation of educational institutions;
- development of new forms and mechanisms of evaluation and quality control of educational institutions according to the implementation of educational programmes, including involvement of the community and various professional associations to ensure the objectivity, credibility and transparency of the evaluation of educational institutions;
- improvement of the mechanisms of recognition of equivalence of education documents for enhancement of academic mobility of the development and increase of export of educational services;
- improvement of the governmental certification of scientific and scientifically pedagogical personnel in order to enhance the quality of the training of highly qualified personnel, and to ensure the reproduction and development of the personnel's potential in education and science.

Elements of the governmental administration must be present not only in public, but also in private universities. This important strategic goal of enhancement of the efficiency of education management should be supported, in our opinion, through the implementation of activities with programmes in the following areas:

- introduction and development of models of integrated educational institutions implementing educational programmes at various levels of education, as well as at university level, educational, scientific and industrial systems to ensure an adequate response of the education system to the rapidly changing needs of individuals, society and economy;
- introduction of mechanisms of interaction between vocational training institutions and employers, who ensure the involvement of additional material, intellectual and other resources into education;
- introduction of models of social and governmental administration in educational institutions, contributing to the development of institutions of public participation in educational activities as a possible condition of openness and attractiveness for investments in education;
- improvement of management in a changing organizational and legal forms of activities of educational institutions and in accordance with the priorities of the development of the education field , which will provide conditions for the growth of the economic independence of educational institutions, increase their responsibility for the final results of operations, increase the efficiency and transparency of funding in the education field;
- improvement of the system of education management.

All the above suggests that there should be concept of how to characterize the educational institution in terms of quantitative estimation of the possibility of the university to conduct educational and scientific work with the required quality. Such characteristics give the rating of the higher educational institution, which quantitatively reflects the possibility of a high quality training of professionals or conduction of scientific research at an appropriate level.

2 Overview

In order to provide a quantitative evaluation of the possibility of a higher education institution to conduct the study and scientific work with the required quality, it is necessary to have the understanding of the notion that characterizes the educational institution from this point of view. Such a characteristic feature can be the rating of the higher education institution, which represents a generalized vector with many components, consisting of a number of vectors – components, which determine the performance of the higher education institution in different directions of study and scientific work.

These directions are crucial in evaluation of the characteristics of the higher education institution and they allow evaluating its potential possibility of training the specialists and the academic stuff.

The lack of appropriate tools for measurement of the defining parameters leads to the need to conduct expert evaluations. Apart from an occasional error each expert can also make a systematic error. Therefore, the total error of classification will also depend on the number of experts.

3 Decision

As educational and scientific work are crucial for rating evaluation, we shall introduce the vector, which characterizes study activities $\bar{R}_y$ and a vector, which characterizes scientific work $\bar{R}_н$. Vector $\bar{R}_y$ shall include such components as the number of professors and associate professors, the size of the area necessary for 1, 10, 100 students, equipment of libraries, provision of technical support for education and other parameters, which define the learning process. All of these components can be easily reduced to a single vector $\bar{R}_y$ by weighting coefficients. Similarly, the components, which determine the level of the scientific work, such as the Master studies, Doctoral studies, specialized scientific advisory on thesis defence etc., are lead to a single vector $\bar{R}_н$, which reflects the level of the scientific work in this higher education institution.

4 Conclusion

This paper suggests understanding the generalized vector of the ranking as the sum of two resulting vectors. One of them defines the training component, the other – the scientific component. Thus, the generalized vector is characterized by the point on a plane, which has an infinite number of values.

In the implementation of the classification according to the parameters of the ranking of a higher education institution, in this case, the present numerical set of appropriate parameters shall provide a strictly technologic feature. Different importance of constituent parameters on the axes does not provide any difficulties, since these values can be given in corresponding weighted coefficients.

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The directions of providing innovative orientation of the economy transformation

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Abstract

It has been pointed out in the article that under the conditions of economic breakdown consequences overcoming and ownership relations transformation the problem of innovative development in Ukraine has the special meaning nowadays. It has been stated by the authors that 86% of overall volume of industrial products is produced by the enterprises, whose industrial cycle refers to the third and fourth technological mode. The evidence of the mentioned processes could be seen in the products low competitiveness due to high energy and material consumption of the main industrial branches. This causes the necessity of efficiency upgrading of state policy innovation encouragement due to its inner optimization. The authors proposed the innovative and reproductive approach, the main essence of which consists in the regional economics structure transformation, emphasizing on area of specialization and innovative complexes forming for their development activization.

Keywords: innovative approach, innovative development, development

Social development innovative orientation is the main condition of science and technical progress acceleration and the competitiveness enhancement each of single business entities and national economies on this basis.

During 2010-2011 Ukraine's economy raised at a rather rapid rate. So, the GDP growth in 2010 made 4,1 %, that is 18,9% better than it was in 2009. In 2011 the GDP trimestrial speed growth could be observed, it was higher than the 2010 rates [1].

At the same time, from the beginning of the third quarter of 2012 there was the real GDP decrease. According to the final results of 2012 the mentioned tendency caused the GDP increase only to 0,2 %. During the three quarters of 2013 GDP minus dynamics could be observed and according to the results of the year the statistics verified zero addition of this rate.

According to the previous statistics for 2014, GDP decreased in the third quarter to 6,8% (Figure 1 [1]).

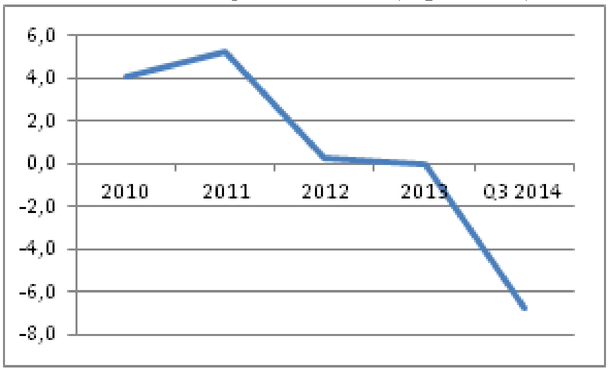

FIGURE 1 GDP Annual Growth, %

During 2012-2014 changes in measures in primary processing and primary industries go down gradually.

Industrial productions dimensions dynamics is determined by the exciting regional economics structure, which didn't experience any essential modifications over recent years and that's why, as a rule, several branches with low innovative and investition facilities still have substantial significance for many regions [2].

In the structure of the industrial production overall volume the relative share of enterprises, whose manufacturing cycle refers to the third technological mode makes up 44%, whose manufacturing cycle refers to the fourth technological mode makes up 42% and those, which refer to the fifth technological mode make up 14%.

All above mentioned determines the practicability of new approaches formation in the terms of regional economics state adjustment, the use of which would make it possible to raise the competitiveness of our country's business spheres subject to the existence of innovative facilities, financial and other kinds of resources [3].

In our opinion, the essence of the innovative and reproductive approach in the process of state adjustment lies in the regional economics structure transformation with the emphasizing on area of specialization and innovative complexes formation for their development activization [3].

At the first stage of this approach implementation it is rational to use the intellectual resources concentration and orientation in order to solve the problems of innovative assurance of branches, which haven't lost the development facility.

At this stage the production organization of research intensive industrial goods is also necessary. It is possible to facilitate innovative and reproductive processes, in this context, by means of full technological modes creation, interindustry cooperation stregthening, orientation on the outer market segments, with the help of which competitiveness can be quickly realized.

The criterion of tasks fulfillment of this stage will serve the specific weight decrease to 20% in the volume of sold products of the third technological mode with the simultaneous increase to 35% of the fourth, 33% of the fifth and 12% of the sixth technological modes.

At the next stage of innovative and reproductive approach implementation a gradual increase of the part of resources, which should be directed to the researches carrying out and production organization based on the fifth and sixth technological modes, is necessary.

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Small innovative enterprises in the digital economy: features of the operation and management

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Abstract

Post-industrial economy is usually associated with the origin of the information or the digital society, where the leading place begins to take the field, based mainly on information processing, management and production of knowledge. The activity of small innovative enterprises becomes a key factor in the efficient functioning of the innovation system in the national economy in such circumstances. The advantage of the digital economy is a short period of time from the initial idea to its realization. European investors are now actively fund various digital startups. The possibility of funding projects not only through traditional channels, but also with the help of crowdfunding platforms is one of the features of the digital sphere. In addition to the investment component for a successful and long-term operation of small innovative enterprises need an effective human capital. From the standpoint of management must take into account a number of characteristics and features of the digital sphere.

Keywords: digital economy, small innovative enterprises, virtual organizations

Post-industrial economy is usually associated with the origin of the information or the digital society, where the leading place begins to take the field, based mainly on information processing, management and production of knowledge. With this structure, the global economic system efficiency and competitiveness of companies is increasingly dependent on the level of organization and management of its resources, the availability of advanced means of communication and cooperation with customers and partners, volume and quality of accumulated staff professional knowledge and skills and capabilities of their intensive use.

A key factor in the effective functioning of the innovation system in the national economy in such conditions is the formation of small innovative enterprises (SIE), and not only the activities of large companies engaged in the update of the structure of production under the pressure of a competitive environment. It is necessary to take into account the diversity of forms of organization of innovative activity of small enterprises, which can independently generate small value chain, and to be an integral element of a major national or transnational technological chain.

Digital European economy is growing 7 times faster than other industries. Today, the potential of the European digital business is estimated at tens of billions of euros [1].

"The market is big enough, but it's very focused," said Reinis Zitmanis [1], the representative of the Digital Champion of Latvia. In his opinion, the company had access to the European and worldwide markets "need to offer something very specific, very convenient and a good price for the user. And it has to offer something new, something that was not available before.

For example, the French startup "Yoopies", launched in 2012., became the Europe's leading social platform for child-minding services and allowed to move from the usual oral dissemination of information about babysitters to digital. The company's turnover is growing at 300% per year. In Latvia, the digital sphere is also actively developing, there are many small and medium-sized enterprises - the innovators in this area.

The advantages of the digital economy - a short time from idea to its realization of the network.

The companies of the sector mainly implements the strategy narrow segmentation. Such companies produce innovative products of high customer value. Because of their effectiveness these companies are often the objects of acquisition by corporations. An example can be considered Skype Technologies (Limited), acquisitioned in 2011 by Microsoft Corporation. Merging with larger companies can be quite understandable and effective in the absence of necessary resources for the further development. Moreover even in the structure of corporations such companies can maintain a high degree of autonomy.

Today, digital startups are the object of active interest of European investors. [2] To launch the project Infogr.am, allows users to create infographics from their own data were used 1,5 million euros raised from two venture capital funds from Germany and the UK. French startup "Yoopies" raised 200,000 euros through business angels and has just received another injection of funds. One of the features of the digital sphere is the ability to raise funding not only through traditional channels, but also with the help of crowdfunding. The use of this financing scheme allows to monitor the market needs, in any case received feedback from potential customers to the proposed new product. In case of positive reaction from customers such financing scheme allows to get the required amount of the initial investment for the project.

Creating a company with a purely digital activity, or transforming traditional business to digital there are number of features in setting up in this field.

"The first thing to notice is that the management may not be as vertical as usually happens. It is more like teamwork. You must be ready to listen to the ideas and opinions of other employees, as well as to consider the opinion of customers." explains Reinis Zitmanis [1] For example, users of social network "Yoopies" can look for a babysitter based on 50 criteria, including geolocation, a diploma, profile, testimonials and rating, etc. Thus, the digital sphere creates the necessary starting conditions and basis for the development of intelligent services segment, the key characteristic of which is the individualization of services for each client [4,30].

It is possible to allocate following features of virtual companies from the management position.

A central role in any virtual organizations takes modern information and communication technology, which provides and facilitates the work of all entities within the network.

Essentially, the virtual organization acts as a form of co-existence of companies and business elements that are not related to any formal structural constraints and working together to achieve mutually beneficial goals. Such an association may be formed on various time periods.

In virtual organizations often deliberately blurred boundaries. The group of actors connected by computer networks, can participate in the same manufacturing process, but being geographically in different places. Depending on the specifics of ongoing projects corporate structure can be quite volatile. Virtual networks bring together suppliers and distributors in the supply chain. The important point is that the organization and its customers are becoming an integral part of the production process of a virtual organization. Supplier and customer are closely related, and for the implementation of the services requires the participation of each of them.

Benjamin Suchar, founder and CEO "Yoopies", notes that in 2012 in their base was registered 10 babysitters, and today - 400 thousand, and not only in France but throughout Europe. Riga's company Infogr.am currently has two million customers worldwide. And they see the market potential for them in the next 10 years at about 100 million customers.

Virtual organizations have a high potential flexibility and adaptability, as its structure allows them to quickly restructure and redeploy its assets, if required by the changed strategy.

Tangible assets of virtual organizations is usually substantially less than that of traditional firms, and scattered geographically. Unlike real virtual organizations corporations are not defined by location and interconnected networks. The consequence of such characteristic is mobility, because the significance of the actual place of work is reduced through the use of communication networks. The project team can be formed from entities located in different countries.

Infogr.am was set up by three people in 2012. Now it has 35 staff from 12 nationalities in Riga and an office in San Francisco with two people. The project "Yoopies" was launched in France in 2012 with a staff of three, and now it is available in 7 languages and 9 countries, despite the fact that staff has increased to 15 people.

In addition to the investment component for a successful and long-term operation of small innovative enterprises need an effective human capital.

Uldis Leiterts, co-founder of Infogr.am, stresses that the investors' connections and knowledge was more important than raising money. These connections helped the company to hire a team of professionals who had experience at Google and other international companies.

Management of organizational, technical and technological changes require careful attention to human factors, improvement of professional skills. The success of any project depends on the competence of the employee, his responsibility, timeliness and quality of the work. Management of small innovative enterprises requires a special approach, understanding and support innovation by all staff. Continuous learning and professional development of staff, information about the latest developments in the field of activities, incentives for knowledge and self-education, creating conditions for exchange of experience - all these measures are necessary to improve the competence and professionalism of the staff [3,334].

The formation of the market of qualified intellectual work, which is an integral part of modern economic development, should be considered as the process of transforming the public demand for innovative solutions in specific areas of effective use of knowledge.

Thus, the virtual network structures represent a new form of business organization in innovation economy. Competitive advantages of small innovative enterprises are created through the efficient combination of abilities and intellectual potential employees; technological capabilities in this sphere and a variety of investment opportunities. In other words, the digital sphere directs the companies to concentrate efforts exclusively in the areas of activity to which they are best suited.

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Features of the application of expert methods in the evaluation of competitiveness in the innovation economy

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Abstract

Making the Russian economy innovative character, which is a continuation of the global trend, determines the appearance of new means of competition - production innovation. Rapidly changing market demands is the reason the search for new methods of investigation for the timely update of information on the potential demand for the most correct marketing decision making, which is especially important in the production of innovation. One of these methods are repertory grids that identify unconscious needs of customers for products, innovations, and allow manufacturers to market products that will be in demand, thus ensuring profitability, profitability and competitiveness in the conditions of formation of an innovative economy.

Keywords: innovative economy, forecasting, expert methods

Radically changed the external environment required skills of doing business in a competitive environment.

It is in the face of competition tested the strength and ability of enterprises, the efficiency of the production potential, their management structures, namely the competition encourages manufacturers to put maximum effort to reduce costs, the production of more sophisticated products and their rapid renewal. The sharper competition and its diverse manifestations, the higher the level of competitiveness and economic units of the national economy as a whole [3].

Essence, forms and methods of competition in the past few centuries have undergone significant changes. "Center of gravity" of competition shifted from price competition to non-price. An important means of competition was intense introduction into production innovation.

In these circumstances, manufacturers are increasingly forced to take into account in their work by the fact that the continued existence and development of the business is directly related to the competitiveness of enterprises and the competitiveness of their products.

Manufacturer, plans to enter the market with innovative products, often have to "act blindly", being absolutely uncertain future demand for the proposed new [4].

Rapid change in market demand requires new methods of research and complete information about the possible demand for the most correct decision-making. Increasing competition forces companies to be "scenarios" with their detailed and incremental development. For this type of plan, you must have the maximum possible number of relevant information, data collection and processing which require more precise and modern approaches [2].

Study and forecasting of demand of the population is a complex, multi-criteria problem, with most of the criteria and procedures numerically immeasurably evaluation examining hard. This task is complicated by the fact that the assessment for each criterion alone is not enough and, of course, ultimately requires an integrated assessment of all factors. The situation is complicated by the fact that the criteria are comparable to each other hard (different internal contents, different units of measurement).

It should also be noted that the use of only economic criteria in the analysis of long-term development of the socio-economic processes makes the task a flat, one-way, inconsistent and outdated.

Problems that are solved by experts, in each case have their own specifics. Therefore, it is practically impossible to develop a universal model of expertise.

The most common methods of rendering individual assessments are ranking, score in points or interval scale, the method of preference, the method of paired comparisons, interviews, etc. Methods of rating and pairwise comparisons possible to determine the average coefficients of significance or weight of the phenomena under consideration. Method preference allows obtaining estimates the significance of the results at the time of the adoption of certain decisions on condition that each expert of its ordinal scale preferences of these results.

Among the methods of group expertise can be called Delphi method, the method of the Commission, the method of "brainstorming" method "PATTERN" method forecast graph, voting methods and the colloquium and others.

The essence of any expert analysis or conclusion is primarily in the selection and formation of a group of independent, fully competent in this area professionals to express their consensus view is adopted as expert evaluation.

Potential opportunities for expert methods do not yield to the methods of mathematical modeling. They provide a comprehensive and integrated approach to inter-which cannot be fully identified and formalized. The long-term development of expert techniques in combination with other is a powerful tool to improve the quality of forecasts.

It should be noted that in the practice of marketing research expert assessments are used not only as an independent method of forecasting of market processes, but also widely used during the logical analysis of the predictive calculations obtained by economic and mathematical modeling of the phenomena studied and regulatory practices forecasts.

Repertory grid method allows to reveal latent needs of customers on new products, which, in turn, enables the company to produce goods more adequately satisfy the consumer, thereby maintaining a high level of profitability and competitiveness of manufactured goods [1].

The effectiveness of the method of repertory grids is to define the scope and range of the demand for innovative products, by identifying and changing individual needs of potential buyers, which in turn significantly reduces the financial risks of companies that have decided to produce innovative products.

From the analysis of existing methods of assessment shows that the most common area for analysis of competitiveness - a comparative evaluation of the product competitiveness of the enterprise. Such an assessment in practice to carry out most easily, because information about consumer properties and product performance is available.

Due to the difficulty of obtaining information about the various aspects of the competitors (other than food component) is of particular interest to estimate the measure of competitiveness of the company in time without taking into account the activities of competing firms. Of course, such an assessment is limited. Competitiveness indicators in this case by themselves only describe the dynamics of changes in the efficiency of the market activities of the company and do not contain any information about its position in the market relative to its competitors.

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Problems of innovative development of Latvia

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Abstract

One of the main factors in implementing development strategy is to change the economy to an innovative way of development. The main role of the state consists of the creation of mechanisms and certain measures to provide formation about the national innovative system and development of innovative business. In the course of innovative development, the essential role belongs to small and medium-size enterprises. (SME's)

Keywords: innovations, small and medium-size enterprise, innovative activity, investments.

1 Introduction

The task of increasing innovative activity of small and medium enterprises (SME's) provides positive impact on economic growth. The fact that SME's have low levels of organizational costs for maintainance of business, administrative efficiency and flexibility, and the ability to react quickly to market demand and their readiness to bear increased risks makes them effective instruments of development and implementation of progressive change.

According to Eurostat, innovatively active companies are engaged "in release of the new or considerably improved product (goods or services), participating in the incomplete or abandoned innovation projects, new and advanced organizational forms, business structures, marketing concepts and strategies, as well as it is also involved in the sphere of internal development plans of the company, training of the personnel and use of technology and equipment necessary for innovative activity" [1].

Following the results of the year 2013, the European commission pointed out the improvement of the situation of innovative activity in the European Union with the simultaneous strengthening of the gap between the EU countries in this area. Classification of the EU countries on the basis of innovative activity remains rather stable.

So Innovation leaders are countries such as Sweden, Germany, Denmark and Finland. In this classification Latvia belongs to the Modest innovators group. Poland, Romania and Bulgaria are also in the same group. Our most close neighbours, Lithuania and Estonia showed better results. Thus Estonia was in the Innovation followers group, and Lithuania in the Moderate innovators group. [2]

At the same time Latvia, Lithuania and Estonia show the best results in innovation improvement, according to the results of 2013.

The indicator of success of innovative activity, and also sufficiency of its financing can be estimated by several indicators:

- Investments in research development ;
- Openness of branches for investment both internal, and external;
- State encouragement of scientific activity;
- Share of innovative enterprises (% from the total number) and etc.

In 2014 in Latvia, the share of the innovative enterprises was 22%. Unfortunately, our country shows low growth rates of this indicator, in six years it increased only by 2% (2008 – 20,1%).

In Latvia in 2013, investment in research and development made 0.6% of GDP, in 2014 – it was 0.8%, one of the lowest indicators in the EU. In comparison, Estonia in 2013 had R&D expenditures of 2.4% of GDP. [2]

In all cases, innovation activity in the EU is connected with the role of small and medium-sized enterprises, commercialization of innovation and the development of systems of scientific research. However, Latvian small and medium size enterprises do not have enough strength for investment in research and development and therefore the high technology sector is poorly developed.

To increase innovative activity in Latvia it is necessary:

- To improve and develop infrastructure of innovation support.
- To develop actions directed for stimulation of innovative activity of small and medium size business.
- To increase efficiency of cooperation between science and industry.
- To increase quality and competitiveness of higher education.

2 Conclusions

In world development innovation is considered as the main factor of preservation of competitiveness in the world market. Innovation positively influences the process of creation of workplaces and improves the quality of life.

For the further growth of Latvia's economy, it is necessary to concentrate on four key directions, namely: innovation, professional skills, the financial sector and infrastructure.

Having focused on these designated areas, the Latvian economy can enter a new round of development.

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10 step model to build a business plan

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Abstract

The project method is appropriate - a group of trainees generates and negotiates entrepreneurial idea and conducts activities in 10 steps to submit a project contribution to the group and society. The work is performed in software of a real capital company that creates science-business relationship. A well-developed plan may be submitted to an investor assessment and funding and can create Student Entrepreneurship. The main steps and rules for the development of an entrepreneurial plan are presented.

Keywords: entrepreneurial plan, generate and finance idea

1 Introduction

A business plan is a written description of business's future, a document that tells what you plan to do and how you plan to do it. The way to get startup ideas is not to try to think of startup ideas. It has to look for problems. A business plan specifies the business details prepared by an entrepreneur in preparation for opening a new business. Most entrepreneurs have to borrow money, and after establishing that the venture is feasible, a business plan is absolutely critical to persuade leaders and investors to participate in the business. There is a system that can easily create a business plan in 10 steps. The details of a business plan may vary but a typical business plan contains much of the following:

Step 1: Elevator Pitch.

An Elevator Pitch is a short statement used to quickly (ideally within a minute) and simply define a product, service, or organization and its value proposition. This is the part that investors will see first when look through the list of investment opportunities. The provided information in this section must generate strong interest for an investor to view entire Pitch. That step includes: title, description and logo.

Step 2: General Information.

General information includes specific contact details and description of business in a wider context.

That step includes: industry, main office, city, state, country, executive summary, mission statement, embed slideshow and embed video.

Step 3: Return on Investment.

This is arguably the most important part of the model. It must be able to show the investors when and how much money will make for them. Investors would often like to know how and when they can liquidate their ownership shares in the business, too.

That step includes:

- Liquidity event (an event that allows investors in a private company to cash out their ownership shares). The system allows selecting one of the options: Initial public offering, Merger or acquisition, Share repurchase, None and Other.
- Time to Liquidity Event (the number of years before investors in a private company can expect to be able to cash out their ownership shares.): The set value can vary between 1 and 5 years.
- Payout Schedule: Projected Capital Gains (% of Initial Investment) and Projected Annual Dividends (% of Initial Investment). The provided data will be used to calculate the internal rate of return of this investment. Capital gains is the appreciations of the value of an investor's share in this business. Annual dividends is the annual payment an investor gets for his share in the business.
- Estimated IRR (Estimated internal rate of return). Calculated from the provided data in this section, the internal rate of return is used by investors to measure and compare the profitability of an investment. The higher IRR is, the more likely it is the business to be financed. This value system is automatically calculated according to the set values in the above fields.

Step 4: Key Financial Indicators.

That step includes:

- Preferred Currency: USD or EUR- all monetary values in the business plan will be denominated in this currency
- Assets - total assets of the business to date - tangible or intangible.
- Liabilities - total liabilities of the business to date - current or long term.
- Cash Flow: Cash Received; Cash Spent; Net Cash Flow - Projected cash flow is the one of the most important indicators used by investors. Here must be provided forecasts for the next at least three years. Net cash flow is calculated automatically, depending on the received and spent cash flows.

Step 5: Pre-Money Valuation.

Determine the value of the company before this investment. The value of the company depends on a number of qualitative and quantitative factors such as the size of the potential market, the current stage of development of the product/service, expected revenues/cash-flow/profit margins, competing products/services, experience/expertise of the team, intellectual property, business plan, existing customers/partnerships, assets, etc. It is often challenging to put a monetary value on these factors. In the end, however, the actual value of the company is what an investor is prepared to pay for it today.

The PMV largely determine the success of funding campaign. If the company is underpriced, that platform allows for competing investors to place higher bids and thus drive the value of the company up. If the company is overpriced, it might be difficult to raise money. That step includes only one point: Pre-Money Valuation (PMV) – the value of the company before the investment. When values in the previous step are correctly set, this coefficient is calculated automatically by the system.

Step 6: Investment Round.

That step includes:

- Amount to Raise: The Amount of money that is to be raised in this investment round
- Investment Round to Last – The duration of this investment round in days, counting from the time of plan submit. This time can be extended later to a maximum of 120 days.
- Funds will be used as follows: Milestone, short description, Months, Budget – Investment is sometimes provided as a series of instalments, rather than a single outlay. This allows investors to control expenditures and major progress. It must outline the major milestones of the business along with the time and money it will take to reach them. The total budget for all milestones should equal the Amount to Raise.
- Burn Rate – Projected average negative cash flow per month.
- Price per Share - The total Amount to Raise will be divided into a number of shares to be sold to investors. A high share price may discourage small investors.
- Total Number of Shares to Sell – Calculated from Amount to Raise and Price per Share.
- Share of Company to Sell - Calculated from amount to raise and Pre-Money Valuation. The last two system fields are automatically calculated.

Step 7: Sales & Marketing.

That step includes:

- Market Trend: It may be Growing, or Flat, or Shrinking by percent – Is the market for these or similar products or services growing, flat or shrinking? How fast (year-on-year)?
- Total Market Value –Total current value of the target market.
- Major Competitors – Having competition is not necessarily negative. Knowing the competitors is crucial for business success.
- Competitive Advantages – how does the product or service compare against to the competition.
- Target Customers
- Existing Customers – major customers that are currently using these products or services.
- Time to Market – The number of months before the product or service is available for sale.
- Time to Break-Even - The number of months before the business revenues equal expenses.
- Sales & Marketing Strategy – the quintessence of the sales and marketing strategy.

Step 8: Other information.

That step includes:

- Development Stage: Just an idea, Under development, Working prototype, Production Stage – The current stage of development of the product or service is an important factor in determining the present value of the business. Furthermore, some investors focus on certain investment stages (pre-seed, seed, early, bridge, etc.).
- Intellectual Property – patents, trademarks copyrights etc. Intellectual Property Rights may significantly increase the value of the business.
- Invested Own Funds – The amount of the invested money in the business. Investors often consider this to be an indicator for commitment to the success of this business.
- Risks – The potential risks that might jeopardize the success of the business.
- Risk Mitigation – the plan to mitigate the risks that might jeopardize the success of the business.
- Keys to Success – the most important factors that will make the business a success.

Step 9: Team Description.

While there are many factors that determine the success of a business organization, the single most important one is its people. Strengths, Weaknesses & Limitations of the Team: LinkedIn Profiles: First/Last Name LinkedIn URL – to demonstrate the strengths of the team, provide the LinkedIn profiles of up to five of the key team member – founders, engineers, etc.

Step 10: Document Deck.

To complete the pitch, it must upload up to five more documents - Business Plan, Operations Plan, Sales & Marketing Plan, Financial Plan, etc. Confidential information is not recommended.

2 Conclusions

A clear-cut model in developing an entrepreneurship plan may have high practical value and compatibility, which are the necessary motivators for creativity and further investments.

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University business accelerator

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Abstract

This is a review of essence, history, practices and benefits from the business accelerator. Below you can find a justification of necessity, opportunities and benefits from the creation of student or University business accelerator.

Keywords: business accelerator

1 Introduction

The national program for development of Bulgaria 2020 has the aim to contribute for a vision of Bulgaria as a state with a competitive economy, which has all the conditions for a complete social, creative and professional realization of the individual through intelligent, sustainable, inclusive and territorially balanced economic growth. One of the three main goals of the Program is to increase the standard of living through competitive education, creating the base for quality employment and social inclusion. Business accelerator is one of the instruments for achieving these goals.

2 History and essence of the business accelerator.

Accelerator literally means speeding up of the system that makes the economy grow. Accelerator is a coefficient, which shows how much the investments grow when the income is increased, i.e. "income - expenditure" and not "expenditure - income", the same as with the intensifier. The formula of the accelerator is presented as a relation between the investments in a certain year and the growth of the income compared to the previous year. The increase of the income, on equal terms, leads to a increase of investments in a subsequent period and vice versa. The discovery of this principle reveals the mechanisms of the economic growth and its fluctuations. The autonomous investments lead to a sustainable growth, if there is no change in the tendency for saving, the accelerator and the coefficient of output [5]. The business accelerator gives market motivated enterprise and technological discoveries, which could be the engine of the economy from the increase income of the capital companies in a previous period of time. The first accelerator (capital catalyst) is Y Combinator, which was started in the Silicon valley in 2005 by Paul Graham. It was followed by TechStars in 2006 and Seedcamp in 2007. As a result of the increasing popularity of the American capital catalytic programs in Europe are created Seedcamp (based in London) and Startupbootcamp (a group of European catalysts with localized programs and a offices based in Copenhagen, Amsterdam, Dublin and Berlin). More than 200 startup catalytic programs exist in 2011 in USA and Europe. FORBES published the first analysis of the startup catalysts in April 2012 [3]. Catalysts emerge in many cities as well as in specific educational institutions [6]. They are called alternatives for the academics from business administration. They give the new entrepreneurs mentoring, advice and practical realization of a business project. Essential features of the business accelerator:

1. The process of application is opened for everyone with a good idea, but it is extremely competitive;
2. Capital investment in startup companies is simply designed in exchange for equal rights;
3. It relies on small groups, not individual inventors;
4. The new companies should have a "diploma" until a certain period of time, usually in three months;
5. The startup companies are accepted and supported through groups of classes in sessions;
6. The process through which many startup companies go in the catalyst can be divided into 5 separate levels: awareness, applying, program, demonstration day, post-demonstration day;
7. The focus of the activity of the companies is: online services, online trade, software and mobile applications, media, SmartTV and telecommunications, applications and services in the sphere of online trade, business applications for corporate clients, socially oriented business, informational and communication technologies.

The benefits for the residents could be summed up in the following main courses:

- Expertise of a project by specialists and partners in the business accelerator, successful entrepreneurs;
- Consultations in designing of business models, marketing strategies, financial and legal issues, expert service through all of the stages of the development of the project;
- Help in preparation for participation in competitions for grant support of startups;

- Access to infrastructure;
- Access to educational programs;
- Services of experts-mentors and a person in charge of the project;
- An opportunity for development and recreation in the company of creative and positive individuals;
- An opportunity for giving an order for services for attracting investments from partners of the business accelerator – business-angels and equity funds;
- IT support. [1]

3 Need and opportunities for development of accelerator of university business in Bulgaria.

The need for development of university accelerator originates from the problems of the economic growth, the state and the tendencies of the employment as a whole and divided into age groups, the coefficient of youth employment for the age between 15 and 24 years, level of education and qualification. The youth is one of the most affected groups by the crisis.

A business accelerator for students in University can be created in cooperation with a capital company and it has mutual benefits for all stakeholders. The material, technological, informational and intellectual base of the University is combined with the innovativeness and the enthusiasm of the students for creating entrepreneurial ideas working in a team. The competencies of different discourses are integrated in a classic University. The formation of the necessary number of teams allows the invitation of a capital company for the conduction of sessions for mentoring, education and starting of a business. This besides being a contribution to the Bulgarian economy and employment is also a source for hope for the youth. The combination between education and starting a business changes the motivation for studying and increases the practical orientation of the education. In accordance with the present resources there could be developed ideas for student entrepreneurship.

The business accelerator for students is dedicated to facilitate the development of innovative entrepreneurship and it is a stimulus for employment growth, support for the creation of new companies and the supply of services to potential new entrepreneurs. It generates synergy between academic and industrial studies. This is possible through the support of research departments and laboratories in all the stages of the creation and later in the process of growth of new companies.

Main activities:

- Revealing a company culture for students, researchers, PhDs and teachers;

- Information, education, consultations and preparation of the potential entrepreneurs which are interested in starting a new entrepreneurship;

- Support in the process of searching of finances and the creation of business programs for stimulation, encouraged by other institutions;

- Partnership in national and international networks for creating a company. The business accelerator offers the new companies:

- availability of zones, equipped with informational and telecommunication infrastructures;

- mentoring and informational activities in support of the company development;

- support in searching public finances, accompaniment of private investors and risk capital in requesting for finance;

- organization and management of the activity of acceptance and a secretary. The companies and teams, which qualify the following, could have access to the services offered by the accelerator:

- the should be in a stage of creation or they are already created not more than a year ago from the moment of applying;

- they work in innovative spheres and have a specific experience in research centers at the University;

- they should have a good outlook for economic success.

4 Conclusions

University business accelerator is a necessary and a possible practice in accordance with the goals of the economy, the education and the capital companies. With the creation of adequate organizational management and financial mechanisms in accordance with the regulations the accelerator could start as a continuation or part of the educational process in one or more universities.

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Nature, meanings, and elements of the marketing strategy

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Abstract

A review was made, considering the views of 10 leading foreign and Bulgarian authors regarding the nature and elements of the marketing strategy. Based on the different approaches, the meaning of the marketing strategy and its efficient application, a new vision is represented regarding the nature of the marketing strategy, methods for consistency, and combination of elements, and their content.

Keywords: marketing strategy, elements of the marketing strategy

1 Introduction

The marketing strategy is a result from the corporative strategy of the organization and assists its realization through specific methods, activities, and instruments, oriented towards provision of services for the organization's target groups.

2 Nature of the marketing strategy

The definition of the market strategy's nature is extremely important for its correspondent development, application, and efficiency. There are great number of different definitions of prominent scientists and practicians in the scope of the marketing area.

The present review represents views for the nature of the marketing strategy, according to Phillip Kotler, Armin Zeiler, J. Evans and B. Bermann, W. Pride and O. Pharrel, Richard Lewki, Michael Porter, Bruce Henderson, R. Kervin, V. Mahajan, R. Varadarajan, N. Krusteva and I. Petrova, Galina Mladenova.

The analysis of the cited definitions shows that the strategy is defined as an combination of approaches and methods, means or a plan for action, description or ways of combination, formula for competitive business. In summary, the strategy is a way towards the right direction. Undoubtedly, it has the nature of a plan, and in this sense, it can be viewed as a complex of purposeful activities.

The common in all definitions is that the desired result is the realization of the organization's aims through the elements of the marketing mix, which is the formula for success. A precondition for effectiveness is the satisfaction of needs and preferences, the feeling for the products as your own. Since the product cannot satisfy all preferences, the knowledge for leading criteria and decision making while purchasing an item are crucial. In the contemporary marketing paradigm of relationships, the main differentiating approach is the spirituality.

Based on analysis on the leading contemporary theories, the following newly summarized definition is suggested: The marketing strategy is a planned complex of purposeful activities, containing the elements of the marketing mix, according to the market possibilities and resources of the organization, assisting for the achievement of differentiated competitive advantage, through which the marketing aim is achieved.

3 Elements of the marketing strategy

The marketing strategy consists of several key elements, needed for its successful application. The correspondence and conditions between them play an important role during the efficient realization of the marketing aims.

The marketing strategy is developed on the grounds of thorough analysis that characterizes its component parts. Although the components are reviewed separately, it is important that their two – way effect and their reciprocal action to each other will be taken into account.

Reasonably, there is a model suggested, regarding the consistency of the following structure elements of the marketing strategy:

- Analysis of the market and target groups;
- Main aims;
- Key competitive advantages and market challenges;
- Marketing mix;
- Activities and tasks;
- Strategic marketing budget.

4 Conclusions

The clear and correct definition of the marketing strategy and its elements is crucial for the efficiency and practicality of the organization and community.

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Preconditions for establishment of the entrepreneurial university in Kazakhstan

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Abstract

The article describes the features of the new model of university - entrepreneurial university, as well as reflects the characteristics of the Karaganda Economic University, which is currently on a way of creating an entrepreneurial university.

Keywords: competitiveness, entrepreneurial university, Kazakhstani University

1 Introduction

In today's world, the competition is becomingoverpowering, penetrating into the internal environment of any company that needs to be competitive at every level of both external and internal environment.

In the external environment, competitiveness is based on the new level of cooperation between the company and its partners, which become important economic actors of the new economy. In the internal environment, an increasingly important role in enhancing the competitiveness of companies is played by employees, providing the utmost impact on the competitiveness of the organization. Formation of new realities in the current economic climate depends on the change of company's management of competitiveness. It is necessary to modify the principles and models of successful entrepreneurship, rethinking of the essence of entrepreneurship, its objectives and content aspects of the activity (work with information, knowledge, management of intangible resources and turning them into assets).

This provision is not new and is especially important for universities in modern conditions.

2 Overview of the study area

Nowadays rather high demandsareimposed on universities from the external environment, which include not just consumers, but students as well. Existing, often traditional, ways of meeting these requests do not work. Therefore, today there is a process of creating a new model of university - entrepreneurial university. This model should bea precondition for many Kazakhstani universities to improve the quality of educational services in the first place, and in the future it will be the key to maintain the statusof active, qualified social institution.

The review of literatureshows that the thorough study of the process of creating entrepreneurial universities in Kazakhstan has not been conducted. The nature of entrepreneurial universities is considered in the works of B.R. Clark, G.N.Konstatinov, and S.R.Filonovich, A.O.Grudzinskiiet al. Based on research findings, B. Clark has developed five common transformationalelements that are inherent in entrepreneurial university. B. Clark, one of the most famous developers of the given conception, said that the main feature of the entrepreneurial university is the absence of fear to commercialize the generation and disseminate the knowledge [1]. The following definition of the entrepreneurial university can be formulated: "Entrepreneurial University is a higher education institution that systematically makes efforts to overcome the limitations in three areas - the generation of knowledge, teaching and transforming knowledge into practice - by initiating new activities, transformation of the internal environment and modification of interaction with the external environment" [1].Currently, there are certain attempts to create entrepreneurial universitiesin Kazakhstan. However, these disparate and isolated cases do not allow conceiving a general picture of the status and prospects of development of entrepreneurial universities. Moreover, the mechanism of formation of entrepreneurial universities in Kazakhstan is indistinct.

The article considers Karaganda Economic University of Kazpotrebsoyuz (KEUK). KEUK carries out training of specialistsat all three levels of national education system: Bachelor - Master - Doctorate PhD. In accordance with state license, university realizes 21 higher education programs and 16 graduate programs. According to the general ranking of universities it was ranked 2nd among humanitarian and economic institutions, and has 15thplace in the top 20 best universities in Kazakhstan. All educational programs of the University are included in the top twenty specialties of the Republic of Kazakhstan.

The university has created successfully operating basic elements of scientific innovation infrastructure of the university, the main objective of which consists in creating favorable conditions for the implementation of scientific and innovative projects of students, undergraduates, doctoral students and faculty of the university.

Changing economic conditions in the country and in the world lead universities to commercialization of the research activities and, as a result, to the capabilityof selling the outcomes of scientific and technical creativity. In this situation the creation of a system of realization of scientific andinnovative products, producedby a higher education institution, in the local and international marketsis one of the ways to increase the efficiency of universities within a market economy.

The university has developed a model of electronic-innovative university: educational portal of distance learning, virtual enterprise, educational and innovative complex “Electronic Tax Committee”, and digital library.

3 Conclusions

The given article describes the main aspects of the university’s activity, promoting confidence that the University is on the way towards development of its own entrepreneurial potential.

The promising areas of the topic include qualitative study of the universities of Kazakhstan, specification of the degree of readiness of universities to become entrepreneurial and develop a mechanism for transition universities of Kazakhstan into the category of entrepreneurial universities.

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Motivation of employees' labor activity in companies in Kazakhstan

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Abstract

The in-company mechanism of labor motivation is formed under the influence of a whole range of socio-economic factors, many of which represent rather independent subsystems of this mechanism. All these factors concern either to a number of economic ones, or social ones, but all of them, anyhow are included into the employees' system of interests. Without availability of such a system it is impossible to create the in-company mechanism of labor motivation. In the oil and gas companies this mechanism is not taken into consideration while developing labor motivation in the framework of the Company Strategy.

Keywords: Human Resources Management, Motivation, Companies, private sector, Kazakhstan

1 Introduction

In the coming-to-be period of the market economy system in Kazakhstan specific importance should be given to the enhancement of the level of work with the staff of the oil and gas companies wherein to lead this work on a scientific basis using experience which has been gained for many years of domestic and international experience. The issue concerning the activity with the personnel is one of the most important one at the present stage of the economic development of the big number of countries in the world [1].

The researches of personnel services experience in a number of oil and gas companies in the Republic of Kazakhstan show that it is needed to carry out the labor relations radical reform, directed not only toward the growth of compensation of employees in all branches of economic activity, but also toward organization of equal economic relations between employees and employers, effective functioning of labor market, wider development of social problems directly in a sphere of production [2]. Not the last place in this process occupies running of personnel services of national enterprises and production, which must stimulate growth of production and staff quality, interest of appearance of employees initiate, organizational discipline and speeded up introduction of innovations in all kinds of production activity, help to normalize functioning of production and technical services and its' branches, creating these conditions for stable and dynamic growth of common production volume in each particular branch of the national economy [3].

When considering motivators, longevity and effectiveness are important. Motivators such as fear or incentives have effects that can be counterproductive or shortlived.

Thus, the use of internal motivational factors needs to be considered. Each organization has a distinct personality, managers should try and remove barriers from their organization that cause job dissatisfaction and are a detriment to motivating employees. Factors such as company politics, unproductive meetings, withholding information, and unfairness lead to low morale and overall job dissatisfaction.

Methods of strategic analysis as SWOT analysis were used to accomplish specific tasks. The method we applied to strategic analysis is based on the model of nine-factor strategic management introduced by Robert Matthews [4] and subsequently aligned with the requirements of ISO-9000.

2 The analysis of the system of the personnel services' functioning in the oil and gas companies

The results of the interviewing the personnel in some fields of Kazakhstan companies, including JSC "Anaco", "Karachaganak Petroleum" and LLP "Ah-danmunay" showed that they do not see the difference between the functions of personnel departments and human resource management departments. Moreover, some line managers of small companies and service stations engaged in oil mining, just do not understand why they need in specialized personnel departments because they believe that 2-3 company employees can be engaged into filling in the documents.

As a result, in Kazakhstan a new pattern has appeared: the labor results of employees in no way are related to the companies' activity, almost everywhere the employees are not involved into the management of production process, they are not informed about the financial results of the operation of their businesses, in the oil and gas companies of Kazakhstan authoritarian style of management becomes stronger and stronger and it's not always clear what for the wage increase can be realized or what for the premium is paid [4].

At the same time the respondents pointed out that the social assistance of the company is usually one-off cost and of small size, not comparable to the revenues that the companies have as a result of their production and marketing activities. The result clearly revealed a low level of transference of authority from one level of management to another one, that the budget allocated for this purposes is not enough at all, the personnel services haven't enough functions. In the big oil companies in Kazakhstan with foreign participation many of these problems are already resolved.

The state of equipment and technologies in the oil companies of Kazakhstan, especially in small ones where there are high level of equipment wear and low level of processes automation of oil production and transportation, aggravates the negative tendencies [5].

There are problems with the level of total wages paid for the actual amount of work performed in a certain time period with respect to the plan taking into account the system of bonuses in companies, the lack of clear regulations on labor tariffing and the impact of price rising on the growth of wages.

The instruments to overcome these negative tendencies in Kazakhstan could be:

- establishment of additional to the disciplinary perfect criteria to reduce payment, dismissal of an employee from the company or increasing his salary according to specific indicators;
- wider development of the social labor incentives and social programs within companies;
- working out parallel movement of employees from one position to another with the help of organized system of alignment and replacement of professions;
- creation of perfect system of employee's labor results assessment with the help of expert (quality);
- working out a ranking system of quality indicators as the basis for the additional material incentives of each worker.

The implementation of the latter provision requires to determine the legal status of the employee in the company's activity, where besides the description of the workplace, job descriptions and the availability of the rules the system of bonuses should be taken into account:

- standards to perform work functions;
- possible ways to enlarge empowerments;
- perspectives to change specific forms of activity;
- standards of professional development opportunities of the employee while receiving additional training or experience [5, 6,7].

In addition, currently at the big oil and gas companies in Kazakhstan the problem of employees removal from participation in production management is quite obvious. The same problem can be seen in all big Kazakh management structures , which can be estimated as a consequence of the period of reforms in the country when the authoritarian style of management dominated at all levels of management. As the consequence there were no strong mechanisms to involve employees into the process of production management and to develop employees potential and democratization of control systems [8, 9, 10].

As a result, today Kazakhstan has weakly developed stimulating management methods, which cannot provide strong influence to motivate workers and to form their desire to maximize efficiency. In this respect, the most positive examples they have in Germany, where they have an excellent conditions to involve employees into management through the mechanism of acquisition of companies' shares in Norway, Sweden, Denmark, France, Japan, where many elements of certain participation has been already worked out.

3 Conclusion

1. The oil and gas companies as the biggest production enterprises of Kazakhstan can be considered as the most developed ones concerning the efficient personnel management by means of motivation to productive working activity. Therefore limitations of the working activity of the oil and gas companies of the Republic of Kazakhstan concerning usage of labor resource are not typical for other industrial Kazakhstan enterprises in regarding ways of their overcoming. However searching for ways to improve staff management in these companies can be considered as strategic ones for all production enterprises of Kazakhstan.

2. The most striking weakness of personnel management in the oil and gas companies of the Republic of Kazakhstan, regardless to their forms of ownership, and the founders is the functional limits of the personnel service. They cannot fully influence on the adoption of specific management decisions in respect of the staff and poor participation in the development of incentive system to encourage employees to work effectively as well as the lack of funding the activities to develop training and education of future human resources for these companies

3. Many modern economists point out that the choice of objectives in terms of maximizing revenue growth in the conditions of market relations may be false. Preservation and development of the labor resources should be the priority. This fact requires new approaches to human resources management in Kazakhstan and the formation of a new concept of specialists training for the oil and gas companies in our country.

4. The formation of the rational construction of management structures takes a special place in the personnel management mechanism. However, while searching for methods of such system construction the certain principles should be realized and systemization of which should allow overcoming weaknesses of the given management at the Kazakhstan enterprises.

5. Kazakhstan's step system of economic stimulus, which is connected with the quality and intensity of working activity is not used effectively. Almost everywhere, they do not handle the social methods of management capable to support economic methods and to strengthen motivation system as a whole. Creation of similar system demands preliminary calculations because such incentives depend on budgets of the organizations and should assume not only the will of the top managers in the given direction, but also considerable improvement of planning work at the Kazakhstan enterprises.

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Prospects of the river cruise tourism development in Belarus

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Abstract

Currently, of all modes of transport, river tourism most susceptible to climatic factors. The main advantage is the possibility of transport in the open air, and, without being constantly inside the vehicle while driving. This type of holiday has rightfully earned its niche in the tourist market and became one of the most common types of travel. The creation of an internal transit system, will allow to enter the European market, which qualitatively and quantitatively increase the demand for Belarusian water tourism.

Keywords: river tourism, transportation, outdoors, services Belarusian water tourism

1 Introduction

Cruise tourism is one of the oldest types of travel in the World. Originally it was a wooden rafts and boats, which in modern tourism could be attributed to alternative modes of transport. Later people began to travel for the purpose of subjugation of neighbouring States, finding new resources for survival or commit new geographical discoveries. Its usual for us the outlines of cruise tourism has acquired in the 19th century [9.page.36].

The concept of the cruise include the organization of sea and river travel with a visit to the port cities of several countries [4.page.15].

Modern cruise ships in addition to traditional services (swimming pools, elevators, movie videos, restaurants, saunas, solariums, etc.) provided volleyball courts, tennis courts, Golf, fitness clubs, discos, theatres, spas, etc.

Currently, the development of scientific and technical progress has led to the creation of huge ships - ships, able to carry thousands of passengers, carry them in a very comfortable environment for long distances, to provide, during the trip, a huge variety of entertainment, to make round trips across seas and oceans and even travel on the ice. Now tourists can afford to take a cruise on financial opportunities and to connect different types of tourism, such as educational, recreational, Congress tourism and even undergo treatment.

2 General

River transport in Belarus is on the stage of development. Thanks to an intensive program of state support and interest of foreign companies Belarusian river navigation becomes perspective sector of the transport complex of the country.

A prospective solution is the water tourism development, i.e use of water resources for the tourist areas development, especially that we already have the certain foundation (base) and rich natural, historical, cultural and recreational potential of the country.

In 2006, to create in Belarus a river passenger fleet appeared requirement - President's request to develop an incoming tourism. In this regard, to the list of navigable rivers: Neman, the Pripyats and Dnieper rapidly added August channel which ancient gateways reconstruction was finished.

Many travelers prefer river cruises because of the low population (fullness) of river vehicles compared with the sea. River cruise for tourists can be in one direction or have a circular route. For tourist cruises can be used comfortably motor ships, speed ships (hydrofoil ship or air-cushion ship), as well as small capacity vessels. According to the purpose of travel the vehicle selection is made.

An important direction in the sphere of transport services is the close collaboration of various transport systems. It contributes to the creation of multimodal stations, scheduling coordination, harmonization of transport services and rendering of services to passengers.

In that way on the tourism market we can provide mixed road and river tours, which by their informative and entertaining program will be much richer and more interesting in comparison with monotraffic one.

Taking into account the geographical location of the Belarus navigable rivers this kind of tourism can be provided: on the Dnieper-Bug Canal and the Pripyats River from Brest to Mozyr; rivers Berezina and Dnieper, Sozh from Borisov to Gomel. Perspective can be tours of Neman - it can be cruise tours with mixed use of transport (road and river) along the Neman from Stolbtsy, Mir, Nesvizh to Grodno and then on the territory of Lithuania, visiting Navagrudak, Berezovka, Shchorsa, Lyubcha, Ivie. A similar development can get and cruises along the Dnieper, Sozh and the Western Dvina.

In Belarus, the creation of internal and transit systems allow us enter into the European market, that increase qualitatively and quantitatively the demand for Belarusian boating services.

3 Conclusions

Cruise tourism refers to a special type of tourism, as it is quite time-consuming, capital-intensive type of tourism.

Belarus is proud of its water resources: a huge number of rivers and lakes spread throughout the country. Water spaces Belarus ambitious and unique, and river cruises in Belarus starting to become more popular. In order to go on a cruise, no need to waste time looking for suggestions of other countries, because you can use the suggestions of their country and spend a few unforgettable days, even though we live right on the river landscape spaces.

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Social franchising of private clinics in Kazakhstan

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Abstract

The weaknesses of the healthcare system in Kazakhstan have been observed; the range of sources from government publications to original research has been used; the social franchising of private clinics model as a solution of the health sector problems has been proposed; the research for internal use to identify the willingness of private sector to be involved has been conducted; the data collected has been processed and the recommendations have been provided.

Keywords: public/private healthcare sector, reproductive health, social franchising model, health services, strategic planning, innovative approach, social responsibility

1 Introduction

Current stage of health system development can be described as serial integration of Kazakhstan economy into the global system accompanied with application of new approaches in the sector's organization aimed to institutionalization. However, the recent country health system has not been studied enough, and this is an obstacle in decision-making. Obviously there is need to transfer to the new system through adaptation and application of modern technologies in new institutional environment.

Consequently, the health sector of the Republic of Kazakhstan needs innovations while preserving rights both consumers and providers of health care services.

2 Health sector problems

Limited access to services and the general level of awareness of reproductive health issues illustrated by the following statistics: extremely high index of maternal deaths during childbirth; low level of condom use; relatively high rates of abortion; increased incidence of diagnosis of breast and cervical cancers. Quality reproductive health services are not available to all, as provided in the private health care on a fee basis. The costs of these services are quite high.

Taking into account all of the above, the lack of access to health services is determined as urgent **problem #1.**

The public health sector, the country inherited as a Soviet legacy, has historically developed a vertical hierarchy, with the transfer of management authority to local levels**.**

Representatives of vulnerable groups do not have registration (labor migrants and their families) are not allowed to have access to the services existing in state health clinics.

Taking the above-mentioned facts into account, the lack of access to health services provided in state health clinics for vulnerable populations is determined as urgent **problem #2**.

Private health sector operates through self-sufficiency and their profits, so the interest of clinics in capacity enhancement is obvious and undeniable.

All these facts are linked to the **problem #3**: limited private clinics' opportunities.

3 The proposed solution

Central Asian branch of Population Services International proposes the social franchising model in private health sector as an option to establish fare access to reproductive health services for vulnerable women in reproductive age. This option is based on PSI's global experience in South Asian and African countries. PSI considers piloting the model as project on the territories of Republic Kazakhstan, Republic of Tajikistan, Kyrgyz Republic within the current projects funded by US Agency of international development in Central Asia.

This search is focused on the context of the Republic of Kazakhstan, since the basic studies were conducted among private clinics located in Almaty city.

Private clinic, in turn, provides services to the holder of the voucher at a discount (70%). Vouchers are distributed by social workers to potential customers. Social workers conduct informational and educational work among the target group, creating demand to receive medical services. Informational and educational unit of the model, aimed at changing the behavior of a potential customer from risky to safety, is an important part of social franchising marketing model.

The model will cover around 7-10 private clinics located in Almaty city. Association of private clinics in a network will provide overall marketing costs, which significantly reduce the level of operating expenses for marketing activities based on one clinic.

Section of quality control is the main technical aspect of the model. The model will be funded by international donors, representatives of the business environment, including pharmaceutical companies.

4 Research methodologies

To better estimate the possibility of social franchising model and the level of demand for it, PSI team has decided to conduct research study for internal use.

The survey aimed to collect information about current situation in the private health sector in Kazakhstan, based on the private clinics of Almaty city. Particularly, the accent was made on the package of services for women of reproductive age, the price, the motivation of clinic staff members and the problems they face on the way to success.

Authors have conducted dozens of in-person interviews with private and public sector gynecologists, proctologists, clinic administrators, health business professionals and doctors. These visits were an essential part of information gathering activities for this research, as they provided with a first-hand understanding of the status in the private sector. They also served the dual purpose of deepening PSI Central Asa's existing health sector relationships and building new relationships with potential franchisees. On-staff gynecologists and doctors in PSI Central Asia offices have also provided advising during the survey.

5 Research results

Authors conducted long-form in-person interviews with seven of the identified providers. Information gathered from the interviews was condensed into the clinic profiles attached to the thesis.

The new strategy design for private health sector development is a unique chance to transfer from a soviet model characterized by vertical and hierarchical systems of care to innovative model developed to make the healthcare services in Kazakhstan sustainable and institutionalized, particularly, the reproductive health services.

This innovative model assumes the application of social marketing and Private Public Partnership (PPP) methodlogies as a collaboration of government and business units to stand against social problems such as the limited access to the health services among women of reproductive age.

The strategy aimed on developing of unified social franchising model should be based on detailed data analysis during the research.

STIP (Science, Technology, Innovation and Partnership) approach should become a cornerstone of the newly created operational platform for private clinics. The tools that could be adapt to the fluctuating environment factors is the crucial central point in the strategic planning process, thus the start-up will require technical analysis, supportive supervision and accurate data management.

6 Conclusions and recommendations

Current barriers and obstacles, which were found during the research, will be solved through application of technical pack of services. There is a task to develop operational, strategic and business plans with elements of social marketing including innovative approaches and global experience to increase capacity of clinics' staff members on stigma and discrimination.

Recommendation

The model of social franchising will allow applying electronic surveillance systems, to computerize client's archives, to establish electronic individual packages with information for every client (disease story, treatment schemes, dates of latest contacts, etc.,).

Another innovative way to applicate the social franchising model into operational structure of private clinics will also allow further use of global PSI experience in social franchising (SMS communications with clients). This approach will illustrate technical readiness to apply technological innovations in the sphere of social support towards the vulnerable groups.

The application of social franchising model will allow to increase client's turnover through strengthening of medical package of services for vulnerable women living in Almaty city. The package will contain reproductive health services, including antenatal services, consulting on family planning, services on detection of cervical and breast cancers, additional services, etc.

The application of social franchising model on reproductive health will ensure strengthening of professional capacity of medical staff of private clinics through provision of trainings on reproductive health and family planning issues and informational materials and access to web resources.

The application of social franchising model includes development of strategic plans with environmental analysis within the geo locations of private clinics, social and economic factors, national strategies and competitors, fund recourses, etc. The model contains a SWOT and PEST analysis.

Clinics which will participate in our model should work hard on their CSR.

Another huge obstacle in the health sector development is lack of human resources and lack of access to global information and tendencies.

The social franchising model will propose new modern strategic mechanisms to manage the sector together with innovative technologies and marketing tools. All these factors will influence the client's turnover and overall profit.

The model's application will also increase capacity of medical staff of private clinics through the training programs, provision of informational materials and access to web recourses.

The model's application contains the development of strategic plans, which will allow the clinics to act as a transparent and relevant mechanism.

Authors of this paper propose the application of social franchise model to further development of corporate social responsibility of private health sector as a decision option to improve reproductive status of socially vulnerable women of reproductive age.

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Features of the development risk management in Ukraine

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Abstract

The paper considers the features of the development risk management in ukraine. The prospect of further studies of domestic specialists in the field of risk management is development of the domestic standard of risk management with consideration of modern domestic specific features of development of risk management in Ukraine and leading foreign experience.

Keywords: risk, corporation, risk management, international standards of risk management

Recently, the economic environment within which entities and financial institutions operate, characterized by a significant degree of uncertainty and risk. During recent years theoretical and methodological study of the phenomenon of risk are being reflected in the work of native scientists such as I. Bushueva, YY Blagodyr, V. Vitlynskyy, AI Hradil, SP Zaharchenkov, O. Pernarivskyy, LY Sloboda, IA Shubenko and others. A number of theses, monographs and publications covering the issue of risk phenomenon belongs to Russian authors such as I. Balabanov, LR Nasruliniy, GS Panova, VT Sevruk, AB Shirinsky, A. Shumsky, M. E. Yudenitch etc.

In XX-XXI study of the problem of risk in economics has become particularly acute. This is due to a variety of reasons, including such as political developments, competition, tax regulations, fluctuations in prices and exchange rates, changes in laws and so on. With certainly can be said that the further transformation of the economy without taking into account factors of uncertainty and risk will not provide sustainable development of the Ukrainian economy, as apparent need has become to choose a single theoretical and methodological basis for a more complete analysis of the nature, characteristics and prospects of different socio-economic processes.

There are stages in the evolution of views on the phenomenon of risk in economics: the Middle Ages, the period of economic schools (beginning of the 18th – beginning of the 20th century), the period after the Second World War (from the mid 60's to early 90's 20 century), the modern stage (since 1990).

An integrated theory of risk management in the national economics is just being formed. It is natural because any scientific theory is a generalization of real experience and is recognized only when was held practical approbation (approval). National scientists, as scientists from the post soviet countries are developing issues related to risk management at the level of individual enterprises. I. Balabanov, V. Vitlinskiy, V. Vyatkina, V. Hamza., G. Goldstein, V. Granaturov, A. Hutsa, and others, in their works they treated the nature of risk, risk management techniques, mathematical models of risk management, and more.

The analysis of the publications of Ukrainian authors and works of foreign scientists showed that in the literature there is no systematic understanding of the concept risk and credit risk because of different interpretations of its components risk and credit. However, there are different approaches setting relationship between the bank and contractors, as well as the impact of credit risk on these relationships determines the relevance of these theme.

The more complex and clouded the socio-economic environment is, the more urgent necessity risk-based construction and improvement of accounting tools for its analysis, modeling and prediction. Persons who deal with these issues in economically developed countries are one of the most highly paid and are not interested in a wide spread their knowledge and experience, and therefore the study of relevant experts Ukraine foundations of modern economic risk will contribute to comprehension the deep understanding of economic phenomena and processes, flexible professional thinking, ability to manipulate methodology for analysis and decision making under uncertainty, knowledge of strategy and tactics economic crisis management object in the real world.

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Author's innovations in the development of the interior project in a specific qualification work

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Abstract

The development and realization of a modern interior project is based on several postulates including: combination of ergonomic laws, the theory of color and principles of composition; being well-informed of new technologies and having practically unlimited possibilities for ordering and implementing one's desires. One can compare the development of an interior project with inlaid work. The interior consists of several interconnected and mutually subordinated elements, such as decoration materials, illumination, furniture and equipment. By choosing certain elements among numerous available others, one creates a unique interior. In case coordination of the elements is indivisible and concerted, when the functional question of the interior has been settled through it and the connection with tenants is quite obvious, the interior is considered successful and harmonious. Harmony is a self-understandable formation/ unit. That is the interior axiom. In the modern demanding and quickly changing world, simultaneous to the self-understandable harmony, intrigue, surprise and astonishment prove to be the object of desire. Innovations introduce a surprise effect into the interior. Innovations are directly inherent in interior elements, the way of their treatment, as well as in variations of their usage.

The process of the development of a modern interior project is described in the given work, the author drew parallels with analogues, carried out the search of factors indicating successfulness of interiors, developed and tested the conception, studied characteristics of decoration materials as well as the wide market of furniture, illuminators and equipment. One has also worked up a visual project.

Keywords: new twist, diagonal ode, wall painting charisma, vector of traditions, the era of trends

1 Introduction

On entering premises people momentarily perceive their character through all perception channels - they see their color, form, lines, touch materials and surfaces, move around the premises, spend some time there and take a rest. Any interior reflects the lifestyle of its tenants.

FIGURE 1

On starting the development of an interior project, when the architectural basis of the premises lies like a white sheet of paper in front of one's eyes, you never know how the result will look like. In the making of the interior its premises dictate their own terms.

FIGURE 2

Simultaneously with these terms, the tenants wish to materialize their own values. The greatest advantage of modern times is erosion of bounds in design and lack of a clear-cut dominant in styles. As a bearing serves the idea, around which the interior is tied up and played up with the help of designer trends and novelties. This idea of the project is exploited throughout all the process of its working out. The project has been developed for an apartment. That is why the idea of creating a homely and comfortable interior served as its basis and not simply as a stylish design of square meters. The project's concept crystallized in the process of cooperation with the client. The idea to achieve the feeling of freedom and space, create a free and easy atmosphere, enlarge the living space by its partial combination with the kitchen and the corridor, accentuate the attention on qualitative and unchangeable values, as well as dilute intense heat in the premises on the southern side by balancing it with coolness – that is the kernel of the project development, the concept of the interior design.

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Corporate identity development for educational and guidance center

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Abstract

Corporate identity is one of the most useful and importat thing. A corporate identity is the overall image of a corporation, firm or business in the minds of diverse publics, such as customers, investors and employees. It is a primary task of the corporate communications department to maintain and build this identity to accord with and facilitate the attainment of business objectives. It is usually visibly manifested by way of branding and the use of trademarks. Companys use corporate identity to look individual. But companies need to be individual, to attract new customers, to be recognizable, to have own style. This work shows all the stages of development of corporate identity and logo [1].

Keywords: corporate identity, educational center, logotype, design.

1 General

The main aim of this work was – to make special, business-like and unique design for educational center - Riga educational and guidance center. This center manages and organizes qualification improvement of teachers in Riga.

There was tasks what author should do:

1. Study and analysis of the theory
2. Getting information about the company
3. Make interview with customer
4. Analysis of the elements of corporate identity of the company
5. Analyze business analogues
6. Creation logo and main elements of corporate identity

First step in creating logo was to analyse other educational centers. Learn more information about logotype creation and how to create a good, eyecatching corporal identity. After analysing other companies logotype, author has noticed, that all educational centers do not have corporate identity, or have, but not whole. So in this work the main aim was to create whole corporate identity, to make center recognizable and competitive. Creating a logotype, it was necessary to show that the center is connected with people and society. Author use silhouette of a man. The color of logotype is blue. The blue color symbolizes authority, calmness, confidence, loyalty, recognition, honor, trust, and even force [2].

Creating whole Corporate Identity, author choose grey colour for the backgroung, because it`s does not distract attention from the logo and goes well with blue. To make the corporate identity look different, author added blue-green circles that form the pattern. All documents have logo and contact information about educational center.

Second task was to design some souvenirs:

- Banner
- Booklet
- Certificate
- Table and pocket calendars
- Signage
- Card
- Cup
- Umbrella
- Handle
- Advertising on the car
- Promotional stand
- T-shirt
- Badge

This thing will help the center to be more memorable and stylish. These gifts can give on the contests and competitions, which holds Riga educational and guidance center.

To summarize, author has anylized other companies logo, learned more about logotype and corporate identity creation, author has interviewed customer about their prefers. Author try to make a logotype based on customers will and on own knowleadges about logotype and corporate identity creation. In the result, there was created the whole corporate idenity for educational and guidance center, which will help to make the center a recognizable and memorable.

2 Conclusions

All companies need the corporate identity. Because company should stand out from the competition and be recognizable and memorable. Corporate identity consists of a set of documents and souvenirs. For the development the corporate identity, company needs logotype to identify individual style. The color of logotype is important – the meaning of the color and the influence to the customer. All items are important to the creation of corporate identity [3].

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Corporate identity development

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Abstract

Corporate Identity became the most important way, how to singularize company and make it look different. Because of that customers can easier remember their favourite firms. Despite of this development is very popular, to create eye-catching identity and logotype, designer should have knowledge about colours, proportions, composition and one of the useful skill is – to interview the customer and get the main idea of what he/she wants to see in the final work. Recognizable regardless of culture or language, symbols enable companies to cross language barriers, compete globally, and maintain brand consistency across a wide range of media [1].

Keywords: Corporate Identity, Logotype, Interview with customer

1 Introduction

The main aim of this work was – to make special, unique design for security firm „INIGA". This company secure build , houses and almost all what customers need to protect. There was tasks what author should do –

1) Learn about logotype meaning;
2) How to create good Corporate Identity;
3) Analysing opponents logo;
4) Learn more about why company needs their own Corporate Identity;
5) Make interview with customer;
6) Create logotype and Corporate Identity for the security firm „INIGA".

2 Decision

First step in creating logotype was to analyse other security companies logos and learn more information about logotype itself and how to create good, eye-catching corporal identity. After analysing other companies logo, author have noticed, that almost all security firms are using shield form or stylized eye. And that is correct because almost all people when they see shield , it associate with defence and safety. Or if they see eye – it means that someone is watching them. Author have make a decision to use both of these form and add some more details. In the end, authors logotype for the security firm consist of main shield form. Inside it – there is lock were you can see stylized eye.

FIGURE 1 Iniga's Logotype

When time came to create whole Corporate Identity, author looked over a lot of them to catch some ideas and make my identity unique. In the end of small research, author have made corporate documents in white colour. To make them look different, added 2 straights lines (blue-violet colour, and sky-blue colour). All documents have logo and contact information about security firm „INIGA".

FIGURE 2 Iniga's Corporate Identity Documents

Author next task was to design some souvenirs. One of the most useful souvenirs is notebook with pen. This two has logo and lines. Company can gift them to the customers or make notes by their own. Next was a cup. There are 2 colours – white and black. Also in these colours there are two caps. It could be also present to the customers or to their workers. Because they both are in same colours – they will combine. Also there was created some of clothes – T-shirt and jacket to company workers. Wearing this 2 peace of corporate identity– will definitely point out workers from another people. Also they can wear a cap for the head protection – black cap on winter from the cold, white cap on summer from the hot sun because white will reflect a stream of light. Next are 2 kinds of stickers. First is with what you can mark the protection object. Second one, you can just stick on the computer, or somewhere else, where people want. Not less important is car design. Car has a logo and lines, but their are not straights anymore.

There are distorting to create more attention around the car.

FIGURE 3 Iniga's Corporate Identity Souvenirs

3 Conclusion

In the end of work, author have analyzed other companies logo, learned more about logotype and corporate identity designs, author have interviewed customer about their wills and tried to make logo and identity based on customers will and also on my own knowledge. In conclusion, there was created the whole Corporate Identity, which will attract more attention and will allocate workers of the security firm „INIGA" from another people.

References

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