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First principle calculations of Y, Ti and O solute interactions in *fcc*-Fe lattice for ODS steels development

Aleksejs Gopejenko[1*], Yuri F Zhukovskii[1], Yuri A Mastrikov[1], Eugene A Kotomin[1], Sergei Piskunov[1], Pavel V Vladimirov[2]

[1]*Institute of Solid State Physics, University of Latvia*
[2]*Karlsruhe Institut für Technologie, Institut für Angewandte Materialen, Karlsruhe, Germany*

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

Abstract

Ferritic alloys containing a high density of nanoscale Y–Ti–O clusters exhibit superior creep strength and potential for high resistance to radiation damage. Over the last decade it has resulted in increase of interest in studies of the Y, Ti, and O interactions in *fcc* Fe lattice. In this presentation we describe from first principles the mechanism of inclusion of Ti atoms during the mechanical alloying of yttria. The inclusion of Ti leads to the formation of various particles containing Y, Ti, and O such as $YTiO_3$, Y_2TiO_5 and $Y_2Ti_2O_7$, leads to the decrease of the average size of the ODS particles to about 5 nm comparing to the average size of 10-20 nm of pure Y_2O_3 inclusions, and thus results in a more homogenous distribution of the ODS particles in ODS steels improving mechanical properties and radiation resistance of the ODS steels.

Keywords: oxide dispersed strengthened steels (ODS), *ab initio* calculations, density functional theory

1 Introduction

Reduced activation ferritic-martensitic steels strengthened by yttrium oxide Y_2O_3 (yttria), $YTiO_3$, Y_2TiO_5, and $Y_2Ti_2O_7$ allows increasing the operating temperatures of the future fusion reactors by 100°C, thus improving reactor efficiency. Small amounts of Ti are added during the mechanical alloying of yttria allowing to refine the dispersion of the reinforcing oxides during hot isostatic pressing (HIPping). As the size of Ti atom is very similar to the size of Fe atom, the former is substituting regular iron atoms in the Fe lattice much easier compared to yttrium substitute atoms, while oxygen atoms may both substitute regular iron atoms in the Fe lattice and occupy interstitial positions. The results of the calculations performed within this work describe the interactions between two Ti atoms, Ti and vacancy as well as between Y and Ti in *fcc* Fe lattice.

ODS steels are manufactured during the mechanical alloying followed by the HIP process at temperatures of around 1000-1200 K under the pressure of 100 MPa. There is experimental evidence that a noticeable part of Y, Ti, and O atoms are present in the solid solution already after the milling. Both size and spatial distribution of the ODS particles noticeably affect the mechanical properties and radiation resistance of the ODS steels. To the best of our knowledge, to date the formation mechanism of the ODS steels are not fully understood.

2 Computational details

VASP 5.2 computer code based on the Density Functional Theory (DFT) approach with a plane-wave (PW) basis set combined with the Perdew-Wang-91 GGA (Generalized Gradient Approximation) non-local exchange-correlation functional has been used to perform *ab initio* calculations [1]. The core electrons are described using the Projector-Augmented Wave method (PAW). Its computational procedure includes an iterative solution of Kohn-Sham equations, which is based on residuum-minimization and optimized charge-density mixing routines, it employs a plane-wave (PW) basis set combined with the PAW scalar relativistic pseudopotentials [2]. The latter include Fe core electrons of ($4s^13d^7$ outer shell), O ($2s^22p^4$), Y ($4s^24p^65s^14d^2$), and Ti ($3p^64s^23d^4$) atoms with 8, 6, 11, and 12 external electrons, respectively.

To define the calculation parameters necessary to obtain plausible results numerous preliminary test calculations have been performed. Some basic lattice parameters such as lattice constant, bulk modulus, cohesive energy, and vacancy formation energy assessed basing on these calculations have been found to be in a good qualitative agreement with the ones reported in the experiments and other theoretical studies.

The cut-off kinetic energies should be set to at least 800 eV, the k-point sets in the Brillouin zone should be at least 7×7×7 *k*-mesh for supercells (SCs). The supercell models used in the calculations are cubic, with the extension of $4a_0 \times 4a_0 \times 4a_0$ containing 64 atoms, respectively, while the calculated optimized lattice constant has been found to be 3.448 Å [3-6].

3 Results and Conclusions

The results of the calculations prove that vacancies play a

crucial role in the formation of the ODS nanoparticles in ODS steels as they play essential role in migration of impurity atoms inside fcc-Fe lattice (oxygen, titanium and yttrium) and stabilize defect complexes.

The smallest binding energies in the configurations when O atoms occupy the substitute positions have been found when two Y or two Ti atoms as well as Y and Ti atoms are positioned as the 1NN. The binding energies between the defects very moderately increase with the growth of the distance between two Y or Ti atoms in Y-O_{Fe}-Y or Ti-O_{Fe}-Ti configurations as well as Y and Ti atoms in Y-O_{Fe}-Ti configurations when two Y or Ti atoms as well as Y and Ti atoms are 2NN, respectively.

A pattern between the binding energies and the displacements of the defect atoms is established: the larger is the displacement of the defect atoms towards each other during the relaxation, the larger is their binding energy.

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Applying formalism of a constrained 2D structure to modelling surfaces of TiO_2 nanotubes with different diameters

Oleg Lisovski[1,2*], Sergei Piskunov[1], Yuri Zhukovskii[1], Dmitry Bocharov[1], Stephane Kenmoe[2], Eckhard Spohr[2]

[1]*Institute of Solid State Physics, University of Latvia, Riga, Latvia*
[2]*Department of Theoretical Chemistry, University of Duisburg-Essen, Essen, Germany*

**Corresponding author's e-mail: olegs.lisovskis@cfi.lu.lv*

Abstract

Research in the field of catalysts for solar water splitting grows constantly. In particular, nanotubular structures are intensively studied due to their attractive properties. In order to get deeper insight into photocatalytic water splitting, it is necessary to employ computationally costly methods, e.g. ab initio Molecular Dynamics. For large, stable nanotubes such approach is not affordable with the currently available computational resources. Due to this reason for simulations of such systems we proposed a computationally cheaper approach based on 2D-periodic models with structural motifs from full-size nanotubes. Earlier, two of the validated models exhibited decent performance in terms of water simulation on surfaces of (101) and (001) TiO_2 nanotubes of one specific size. In this study, we provide further validation of the models by testing them against a wide range of nanotubular diameters, and we investigate the lower and upper limits of the model's applicability.

Keywords: nanotubes, titania, surface, water adsorption, water splitting, simulation, DFT, MD

1 Introduction

Previously we have discovered prospective photocatalytic properties of (101) (0,n) and (001) (n,0) TiO_2 nanotubes (NTs), pristine and defective, via DFT simulations [1-5]. In order to get deeper insights into solar-driven splitting of water, one needs more advanced methods, e.g. ab initio Molecular Dynamics (MD). Since the size of the considered stable NTs is excessive for ab initio MD, we proposed three different 2D models with different constraints that would allow to simulate water adsorption on TiO_2 NT surfaces. These models were developed at the DFT level [6] and have already been used by us for water adsorption simulation at ab initio MD level [7]. Still, each model's performance was tested only for one specific NT. We understand that a broader validation is required, therefore we chose two best-performing models and investigated their applicability limits. Our hypothesis was that the models would fail for the smallest NTs, i.e. ones with the highest strain, and for the largest affordable NT models using a simple slab approach would be more cost-efficient, while the 2D models would in general be useful in the medium NT size interval. Identification of the interval's size was our goal.

2 Computational details

The 2D constrained models of TiO_2 NTs were developed at the hybrid DFT level of theory, employing the method of LCAO based on localized Gaussian-type functions in the form of atomic-nuclei-centered basis sets. The used computational program was CRYSTAL [8], and B3LYP was chosen as an exchange-correlation functional. Motivation of this particular choice and further detailed are available in our previous papers [1-5].

3 Testing 2D models along different NT diameters

In our earlier work [6] we discovered that a 2D Fixed Volume Slab (FVS) model based on a TiO_2 slab with lattice constants modified according to a specific full-size NT, worked well for simulation of water adsorption on the inner surface of (101) NTs. The second, Constrained Fixed Volume Slab (CFVS) model, a mathematically stratified surface of a NT wall, exhibited decent performance for modelling of water adsorption on outer surface of (001) NTs. The third model – segments of a NT wall translated infinitely in a plane – did not show any promising results. The two promising models were tested for a broad range of NT diameters, starting from the smallest possible and up to chirality index n = 50. As validity criteria we used water adsorption energy, band edge positions, optimized geometry, and DOS similarity.

4 Conclusions

Both tested models were capable to provide decent agreement in terms of water adsorption energy along almost the whole range of NT diameters. In the small NT domain, the FVS model yielded somewhat better results in terms of DOS form, band edge positions, and geometry – the nature of CFVS model constraints seems to produce too high geometry distortion for the 2D models of the smaller NTs. In general, both the FVS and CFVS models proved to be useful in a NT range wide enough.

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Problems in theoretical modelling of nanodevices in the frameworks of embedded molecular cluster model

Emma K Shidlovskaya

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

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

Abstract

Applicability of cluster embedding method with non-orthogonal wave functions for theoretical study of processes in nanodevices is studied. We demonstrate that our cluster embedding method is compatible with quantum transport theory based on time-dependent DFT. We conclude that quantum transport theory methods may be applied if we use one-electron approaches both with orthogonal and non-orthogonal wave functions. Possibilities to generalise quantum transport theory methods on the case of temperature-dependent electron transitions and theoretical modelling of temperature-dependent processes in nanodevices 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 this approach [1].

Our present aim is further development of cluster embedding method with non-orthogonal wave functions for quantum-chemical modelling of processes in nanodevices. We study possibility to combine our cluster embedding method with quantum transport theory approaches for theoretical treatment of processes in nanosystems and calculation of electric current in nanodevices.

2 Cluster embedding equations

Our cluster embedding scheme [1] is based on Hartree-Fock (HF) method. In the last years HF one-electron equations are rarely used. Calculations usually are carried out in the frameworks of density functional theory (DFT) with one-electron Kohn-Sham equations. Besides that, for theoretical modeling of nanodevices we want to apply quantum transport theory based on DFT. Therefore, we should find cluster embedding equations our variation procedure gives when we use DFT Kohn-Sham approach.

Total energy of many-electron system described by non-orthogonal one-electron wave functions on the both HF and DFT Kohn-Sham levels may be written in the same way. Varying expression for the total energy and analyzing our variation procedure we demonstrate [2] that our cluster embedding method based on HF calculation scheme is compatible with DFT Kohn-Sham calculation scheme. Cluster embedding equations remain the same if instead of Fock operator we use Kohn-Sham Hamiltonian. Therefore, there exists possibility to combine our cluster model (with non-orthogonal one-electron wave functions) and quantum transport theory based on time-dependent DFT (TDDFT). We came to conclusion 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. Our initial embedding equations [1] are established to give localized in the cluster region occupied states and delocalized vacant ones [3]. To get occupied and vacant states of the same localization degree, we have modified [3] our initial cluster embedding equations.

3 Quantum transport theory and cluster model

One of the approaches for calculation of electrical properties of nanodevices is quantum transport theory methods developed by Gross with co-workers [4]. We study possibility to combine our cluster approach with approach of Gross et al. Method of Gross implies that wave functions of nanodevice central part are orthogonal to the wave functions of the electrodes. We show [2] that approach for electric current calculation developed for orthogonal wave functions may be applied for non-orthogonal wave functions if we transform initial equations assuming that overlaps between wave functions are small ($S^2 \ll S$). Using this assumption, we may combine our cluster embedding method with approach of Gross et al. and calculate electric parameters of nanodevices.

We conclude [2] that our cluster embedding method is compatible with electric current calculation method based on TDDFT [4]. We propose calculation scheme for electric parameters of nanodevices using our cluster embedding method and combining it with electric current calculation

methods based on TDDFT.

4 Conclusions

We demonstrate that our cluster embedding method is compatible with DFT Kohn-Sham method. We conclude that our embedding scheme may be combined with TDDFT. It means that we can use electric current calculation method based on TDDFT and obtain electric parameters of nanodevices from the first principles. We use TDDFT based quantum transport theory method of Gross et al [4] and propose approach for calculation of electric parameters of nanodevices. Consideration of calculation procedures and derivation of corresponding formulas leads us to the following conclusions.

Quantum transport theory methods for electric current calculation may be applied if we deal with 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 consider temperature-dependent electron transitions. In the frameworks of one-electron approach we can define temperature-dependent occupation numbers for vacant and occupied one-electron states. One-electron density may be constructed and continuity equation for electric current may be obtained using these occupation numbers.

Situation is more complicated if we want to overcome limitations of one-electron approximation using approaches like configuration interaction (CI) or perturbation theory (PT) methods. Our cluster embedding scheme is compatible with PT or CI methods because occupied and vacant cluster states are localized in the cluster region in the same manner. One-electron density may be constructed for these methods, too. But possibility to get continuity equation and expression for electric current in general form requires further study.

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Simulation of interstellar dust mantle and surface chemistry

Juris Roberts Kalnins[1], Raimonds Narnickis[2], Anton I Vasyunin[2]

[1]*Engineering Research Institute „Ventspils International Radio Astronomy Centre" of Ventspils University College, Inženieru street 101a, LV-3601, Ventspils, Latvia*
[2]*Ventspils International Radio Astronomy Centre,*

**Correspotnding author's e-mail: simts@latnet*

Abstract

We have developed a algorithm that uses a macroscopic Monte Carlo model approach to calculate gas-phase chemistry and chemistry occurring on the surface and in the mantle of interstellar grains with diffusion occuring in the mantle taken into account. The algorithm is based on Gillespies stochastic simulation algorithm and A.I. Vasyunins MONACO algorithm for interstellar dust. This code allows for many reactions to be simulated compared to microscopic methods that only allow for small reaction systems to be used.

Keywords: Monte Carlo, diffusion, interstellar dust

1 Introduction

The interstellar medium is literally the material which fill the space between the stars. It mainly consists of rarified gas which is about 99% of the whole medium and the other 1% is interstellar dust. Interstellar dust consists mainly of silicates, carbon, ice, and iron compounds and originates from the death of stars. The surface of interstellar dust allows molecules to meet and reactions to occur between them. In a similar way the mantle of interstellar dust is important because it allows complex molecules to form in the interstellar medium. Cosmic ray proton rays and photon rays split the molecules coming from the dust surface in the mantle into smaller molecules or atoms allowing reactions to occur that make complex molecules.

2 Chemical and computational methods

The chemical model is composed of three parts. The gas phase, the surface phase and the mantle phase. Gas molecules attach to the surface of the dust by accretion and desorption, because of weak Van Der Waals forces the molecules on the surface can also hop the surface and find partners for reactions. These surface molecules are transferred to the mantle (using the modified MONACO algorithm [1]) where they are bombarded with cosmic ray protons and photon rays allowing them to decompose into smaller molecules to enable the formation of complex molecules in the mantle. The sketch of the model is shown in Figure. 1

The model is macroscopic, so we don't simulate each molecule individually with x,y,z coordinates, but we know the amount of a particular molecule in the gas or the surface or the mantle. We assign molecules in the surface the prefix "g" and the molecules in the mantle the prefix "m" and write reactions as we would in the gas, and use Gillespie's algorithm [2,3] to simulate reactions.

The sketch of the computation model is shown in Figure 2.

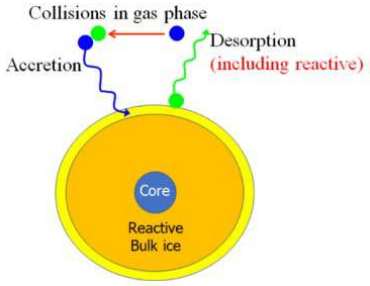

FIGURE 1 Physical model of interstellar dust

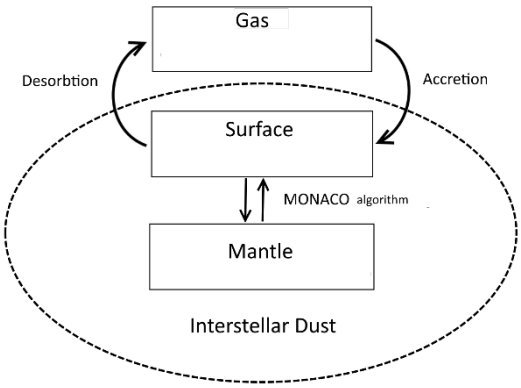

FIGURE 2 Computational model of interstellar dust

3 Mantle model description

In our modified model we introduce ficticious reactions in the mantle to simulate diffusion, for example:

$$mO + mH \rightarrow mOH.$$

The representation of this model can be seen in FIG. 3. The red molecule switches places with its neighbour and

then initiates a reaction with the blue molecule. This model has been used before in [4], but it was for a deterministic model and it hasn't been used in a stochastic context before. The rate constant for swapping of mantle molecules of species i is

$$k_{swap,i} = v_{0i}\, exp\left(-\frac{E_{swap,i}}{T_d}\right),$$

where v_{0i} is the characteristic vibrational frequency of an harmonic oscillator for species i, T_d is the dust temperature, and $E_{swap,i}$ is an energy barrier associated with the swapping of species i with an water molecule that is next to a species i molecule. The ratio of E_{swap}: E_{des} is assumed to be two times that of E_{dif}: E_{des} where E_{dif} is surface diffusion energy, and E_{des} is desorption energy of a species. The rate of reaction between two mantle species is then

$$R_{ij} = N_i N_j\left[k_{swap,i} + k_{swap,j}\right]/N_M,$$

where N_i is the number of species i molecules in the ice mantle, and N_M is the total amount of molecules of all species in the ice mantle.

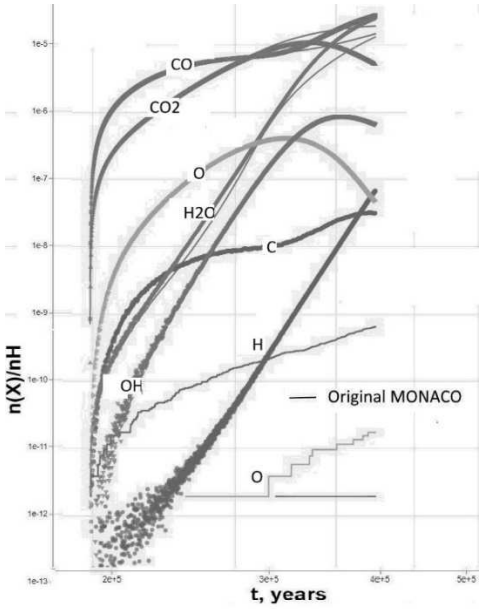

FIGURE 3 Representation of multilayer structure of the icy mantle of interstellar grain in the MONACO model

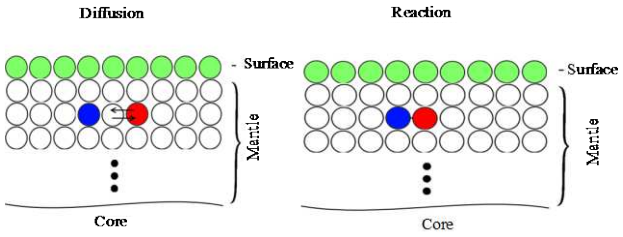

FIGURE 4 Molecule concentrations in the mantle (bulk) using the modified algorithm and the original algorithm. The lines are data from the original MONACOmodel and the points are for the modified model

4 Results and Conclusions

Simulation results on the model with implemented diffusion is shown on Fig. 4 and Fig.5.

Diffusion essentially changes the concentrations of radicals stored in the bulk phase.

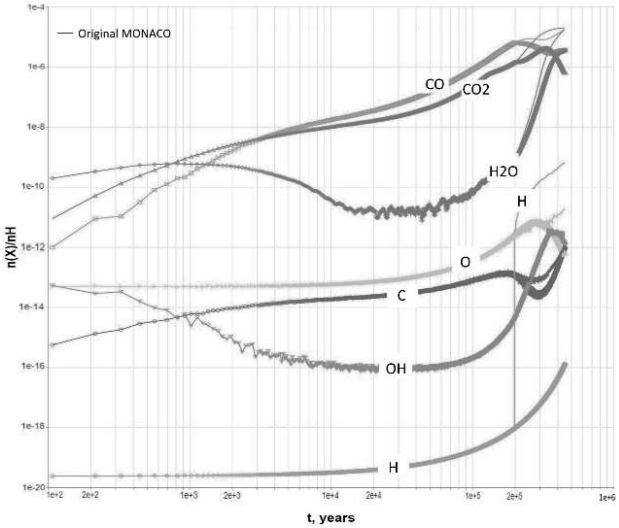

FIGURE 5 Molecule concentrations on the surface using the modified algorithm and the original algorithm. The lines are data from the original MONACO model and the points are for the modified model

Acknowledgments

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Number generation based on the chaotic sequences

Yelena Kozmina[1*], Alytis Gruodis[2]

[1]***ISMA,*** *1 Lomonosova Str., build. 6, LV-1019 Riga, Latvia*
[2]***Vilnius Business College, Kalvarijų 129-401, LT-08221 Vilnius, Lithuania***

**Corresponding author's e-mail: jelena.kozmina@isma.lv*

Abstract

Several classical algorithms for generation the recurrent chaotic sequences are observed and discussed in the framework of cryptographic usage for learning purposes.

Keywords: Verhulst equation, discrete chaos

1 Introduction

Information hiding technologies must be treated as the important tool for different tasks in the contemporary world. Traditional encryption/decryptions techniques (for example AES, DES-3, IDEA) are oriented for data transmission between the correspondents, otherwise, the usage of digital multimedia requires the new approach for security. In that case, chaotic encryption systems are useful for solving problems related to authorisation, copyright [1].

This work is devoted to the observing the most popular number generation techniques in information systems, where chaotic sequences play the role of cryptographic keys.

2 Overview

Generation of chaotic sequences is grounded on the 'randomness' behaviour. Two criteria are very important in order to estimate the 'quality' of sequence: uniform distribution and independence [2]. Uniform distribution allows controlling the sequence behaviour. Occurrence of each state with the same or approximately the same frequency must be realized for all sequences. Independence could be titled as a sophisticated parameter, some sort of the 'state of art': no one sequence value can be generated from the other values. Unpredictability of the sequence members could be distinguished using following criterion: each number must be statistically independent of neighbour numbers and generally of other numbers.

Logistic growth model is known as the simplest model of a discrete chaos. In the middle of XIX century, population growth was studied by Pierre Verhulst [3]. Nowadays, *logistic map* could be titled as the simplest system for describing the chaos as a determined system in recurrent form. For t=0,1,2,… sequence x_t represents the current value related to the certain state, $x_t \in (0;1)$, and r represents the system parameter:

$$x_{t+1} = r x_t (1 - x_t). \quad (1)$$

Figure 1 represents the one-dimensional chaotic distribution x_t, when t varies from 0 to 500 with step 1. Detail description of solutions of Verhulst equation in differential and discrete form is presented in [4]. Also, two-dimensional dynamic system described by Duffing's equation [5] could be used for number generation.

In [6], several recurrent routines for generation purposes are proposed:

$$x_{t+1} = 1 - (1.5 + r) x_t^2, \quad (2)$$

$$x_{t+1} = (3.5 + r) x_t^3 - (2.5 + r) x_t, \quad (3)$$

$$x_{t+1} = \cos\left((2 + 100r) \arccos(x_t)\right), \quad (4)$$

where r represents the system parameter in interval (0÷0.5), and $x_t \in (-1;1)$.

One-dimensional chaotic sequences are vulnerable to attacks of the phase space reconstruction [6]. According to this circumstance, additional routines were used. Equations (2), (3), (4) represent the chaotic sequences with *logistic map* [3], *cubic map* [7] and *Chebyshev map* [8] respectively.

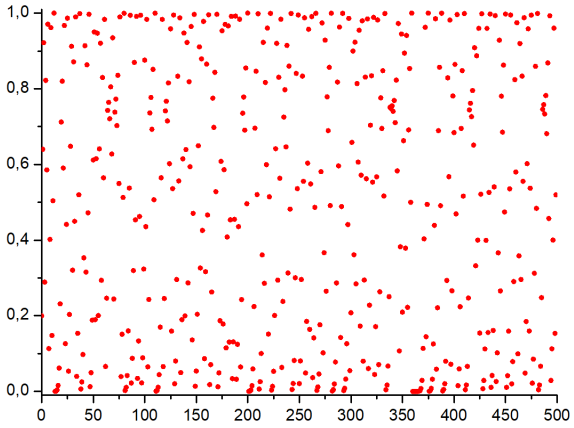

FIGURE 1 Distribution of x_t , $t \in [0;500]$, r=4.0, according to (1)

In [7], properties of sequences generated by cubic equation were described, where a represents the system parameter in interval $0 < a \leq 4$:

$$x_{t+1} = a x_t^3 + (1 - a) x_t. \quad (5)$$

In [8], novel image encryption algorithm based on two generators is presented. Algorithm consisting of two parts (*Chebyshev map* based as well as rotation equation based) demonstrates an excellent level of security. Rotation equations are presented below:

$$x_{t+1} = -a - (x_t - a)\cos\theta + (y_t \sin\theta)/r_t, \quad (6)$$

$$y_{t+1} = -x_t\, r_t \sin\theta - y_t \cos\theta, \quad (7)$$

$$r_t = \sqrt{0.5\left(x_t^2 + \sqrt{x_t^4 + 4y_t^2}\right)}, \quad (8)$$

where θ=2 and a=2.8.

In [9], an idea of linear congruential generators was proposed firstly. Sequence is described by following equation:

$$x_{t+1} = (a\,x_t + c) \bmod m, \quad (9)$$

where $m>0$ represents modulus, c represents increment in the range $0 \le c < m$, initial value x_0 must be selected from interval $0 \le x_0 < m$. It is necessary to point out, that selection of values for a, c, m is critical for generation of statistically independent numbers.

3 Conclusion

Several techniques for number generation could be used in order to receive the statistically independent number sequences like chaotic [2]. Statistical tests allow estimating the quality of generated sequence in order to avoid the predictability [8].

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A novel technique for optimization of airline seat protection levels for multiple nested fare classes of single-leg flights

N.A. Nechval[1*], K.N. Nechval[2]

[1]*BVEF Research Institute, University of Latvia, Raina Blvd 19, LV-1050, Riga, Latvia*

[2]*Aviation Department, Transport and Telecommunication Institute, Lomonosov Street 1, LV-1019, Riga, Latvia*

**Corresponding author's e-mail: nechval@junik.lv*

Abstract

A novel, rigorous methodology of the optimization problem of airline seat protection levels for multiple nested fare classes of single-leg flights is presented. A number of results useful for practical applications are obtained. An illustrative example is given..

Keywords: Multiple nested fare classes, Airline seat protection levels, Optimization.

1 Introduction

Assigning seats in the same compartment to different fare classes of passengers is a major problem of airline seat allocation. This problem has been considered in numerous papers. See for instance the articles by McGill and Van Ryzin [1], Littlewood [2], Richter [3], Belobava [4], Curry [5], Wollmer [6], Brumelle and McGill [7], Nechval et al. [8-12] and the references cited therein.

Littlewood [2] was the first to propose a solution method of the airline seat allocation problem for a single-leg flight with two fare classes. The idea of his scheme is to equate the marginal revenues in each of the two fare classes. He suggests closing down the low fare class when the certain revenue from selling low fare seat is exceeded by the expected revenue of selling the same seat at the higher fare. That is, low fare booking requests should be accepted as long as

$$c_2 \geq c_1 \Pr(X_1 > u_1), \tag{1}$$

where c_1 and c_2 are the high and low fare levels respectively, X_1 denotes the demand for the high fare (or business) class, u_1 is the number of seats to protect for the high fare class and $\Pr(X_1>u_1)$ is the probability of selling more than u_1 protected seats to high fare class customers. The smallest value of u_1 that satisfies the above condition is the number of seats to protect for the high fare class, and is known as the protection level of the high fare class customers. The concept of determining a protection level for the high fare class can also be seen as setting a booking limit, a maximum number of bookings, for the low fare class. Both concepts restrict the number of bookings for the low fare class in order to accept bookings for the high fare class.

It should be remarked that there is no protection level for the low fare (or economy) class; u_2 is the booking limit, or number of seats available, for the low fare class; the low fare class is open as long as the number of bookings in this class remains less than this limit. Thus, (u_1+u_2) is the booking limit or number of seats available for the high fare class at time. The high fare class is open as long as the number of bookings in this and low classes remain less than this limit.

Richter [3] gave a marginal analysis, which proved that (1) gives an optimal allocation (assuming certain continuity conditions). Belobava [4] proposed a generalization of (1) to more than two fare classes called the Expected Marginal Seat Revenue (EMSR) method. In his approach, which is known as the EMSRa method, the protection level for the highest fare class u_1 is obtained from

$$c_2 = c_1 \Pr(X_1 > u_1). \tag{2}$$

This is just Littlewood's rule expressed as an equation, and it is appropriate as long as it is reasonable to approximate the protection level with a continuous variable and to attribute a probability density to the demand X_1. The total protection level for the two highest fare classes $u(2)$ is obtained from

$$u_1 + u_2 = u(2) = u_2^1 + u_2^2, \tag{3}$$

where u_2^1 and u_2^2 are two individual protection levels determined from

$$c_3 = c_1 \Pr(X_1 > u_2^1) \tag{4}$$

and

$$c_3 = c_2 \Pr(X_2 > u_2^2). \tag{5}$$

The total (nested) protection level for the three highest fare classes is obtained by summing three individual protection levels, and so on. This process is continued until nested protection levels, u_j, are obtained for all classes except the lowest. The booking limit for any class j is the just $(U-u(j\text{-}1))$, where U is the total number of seats available. The EMSRa method does, however, not yield optimal booking limits when more

than two fare classes are considered. The nonoptimality of the EMSRa approach has been reported independently by Curry [5], Wollmer [6], and Brumelle and McGill [7].

Brumelle and McGill [7] show that under certain continuity conditions the conditions for the optimal nested protection levels reduce to the following set of probability statements:

$$c_2 = c_1 \Pr(X_1 > u(1)),$$

$$c_3 = c_1 \Pr\big(X_1 > u(1) \bigcap X_1 + X_2 > u(2)\big),$$

$$\vdots$$

$$c_m = c_1 \Pr\big(X_1 > u(1) \bigcap X_1 + X_2 > u(2) \bigcap$$

$$\ldots \bigcap X_1 + X_2 + \cdots + X_{m-1} > u(m-1)\big). \qquad (6)$$

These statements have a simple and intuitive interpretation, much like Littlewood's rule. Just like Littlewood's rule and the EMSRa method, this method is based on the idea of equating the marginal revenues in the various fare classes and therefore belongs to the class of EMSR methods. The method is called the EMSRb method.

2 Problem Statement

Now we describe how protection levels for multiple nested fare classes of single-leg flight can be determined when we deal with nested seat allocations. The performance index which can be used to determine the optimal allocation of seats between m dependent (i.e., nested) fare classes, subject to U (the total airplane seat capacity), is given as follows.

Maximize the total expected revenue for a single-leg flight with m nested fare classes,

$$R(u_1, \ldots, u_m) = R_m(u_m) + E_m\left\{R_{m-1}\left(\sum_{i=m-1}^{m} u_i - X_m\right)\right\}$$

$$+E_m\left\{E_{m-1}\left\{R_{m-2}\left(\sum_{i=m-2}^{m} u_i - \sum_{i=m-1}^{m} X_i\right)\right\}\right\}$$

$$+ \ldots + E_m\left\{E_{m-1}\left\{\ldots\left\{E_2\left\{R_1\left(\sum_{i=1}^{m} u_i - \sum_{i=2}^{m} X_i\right)\right\}\right\}\right\}\right\}, \qquad (7)$$

subject to

$$\sum_{j=1}^{m} u_j = U, \quad u_j \geq 0 \quad \text{for } j = 1(1)m, \qquad (8)$$

where

$$R_m(u_m) = E\{c_m \min(u_m, X_m)\}$$

$$= c_m\left(\int_0^{u_m} x_m f_m(x_m)dx_m + \int_{u_m}^{\infty} u_m f_m(x_m)dx_m\right)$$

$$= c_m\left(u_m - \int_0^{u_m} F_m(x_m)dx_m\right) \qquad (9)$$

represents the expected revenue from the mth fare class, c_m is the fare level for the mth fare class, ($c_m < c_{m-1} < \ldots < c_1$), u_m denotes the booking limit for the mth fare class, X_m denotes the customer demand for the mth fare class, $f_m(x_m)$ is the probability density function of X_m, $F_m(x_m)$ is the cumulative distribution function of X_m,

$$E_m\left\{R_{m-1}\left(\sum_{i=m-1}^{m} u_i - X_m\right)\right\}$$

$$= c_{m-1}\int_0^{u_m}\left(\sum_{i=m-1}^{m} u_i - x_m - \int_0^{\sum_{i=m-1}^{m} u_i - x_m} F_{m-1}(x_{m-1})dx_{m-1}\right) f_m(x_m)dx_m$$

$$+ c_{m-1}\int_{u_m}^{\infty}\left(u_{m-1} - \int_0^{u_{m-1}} F_{m-1}(x_{m-1})dx_{m-1}\right) f_m(x_m)dx_m \qquad (10)$$

represents the expected revenue from the $(m-1)$th fare class, u_{m-1} denotes the protection level for the $(m-1)$th fare class,

$$E_m\left\{E_{m-1}\left\{R_{m-2}\left(\sum_{i=m-2}^{m} u_i - \sum_{i=m-1}^{m} x_m\right)\right\}\right\}$$

$$= c_{m-2}\int_0^{u_m}\int_0^{\sum_{i=m-1}^{m} u_i - x_m}\left(\sum_{i=m-2}^{m} u_i - \sum_{i=m-1}^{m} x_m - \int_0^{\sum_{i=m-2}^{m} u_i - \sum_{i=m-1}^{m} x_m} F_{m-2}(x_{m-2})dx_{m-2}\right)$$

$$\times f_{m-1}(x_{m-1})dx_{m-1} f_m(x_m)dx_m$$

$$+c_{m-2}\int_0^{u_m}\int_{\sum_{i=m-1}^{m} u_i - x_m}^{\infty}\left(u_{m-2} - \int_0^{u_{m-2}} F_{m-2}(x_{m-2})dx_{m-2}\right)$$

$$\times f_{m-1}(x_{m-1})dx_{m-1} f_m(x_m)dx_m$$

$$+ c_{m-2}\int_{u_m}^{\infty}\int_0^{u_{m-1}}\left(\sum_{i=m-2}^{m-1} u_i - x_{m-1} - \int_0^{\sum_{i=m-2}^{m-1} u_i - x_{m-1}} F_{m-2}(x_{m-2})dx_{m-2}\right)$$

$$\times f_{m-1}(x_{m-1})dx_{m-1} f_m(x_m)dx_m$$

$$+ c_{m-2}\int_{u_m}^{\infty}\int_{u_{m-1}}^{\infty}\left(u_{m-2} - \int_0^{u_{m-2}} F_{m-2}(x_{m-2})dx_{m-2}\right)$$

$$\times f_{m-1}(x_{m-1})dx_{m-1} f_m(x_m)dx_m \qquad (11)$$

represents the expected revenue from the (m–2)th fare class, and so on.

3 Optimal Solution of the Problem

The optimal solution of the above problem is presented in the following theorem, which is based on the following assumptions:

(1) *Single-leg flight:* Bookings are made on the basis of a single departure and landing. No allowance is made for the possibility that bookings may be part of larger trip itineraries.

(2) *Nested fare classes;* any fare class can be booked into seats not taken by bookings in lower fare classes. The fare classes within a nest are ordered by fare value (highest ranked class has highest fare value). The lowest fare reservation requests arrive first, followed by the next lowest, etc.

(3) *There are no cancellations:* Cancellations, no-shows and overbooking are not considered.

(4) *Independent demands:* The demands for the different fare classes are stochastically independent (demand in one class does not contain information about demand in other classes).

(5) *A denied request is revenue lost to the airline:* We do not consider that a passenger who is denied a request will buy a higher value ticket (passenger sell-up) or take another flight on the same airline.

Theorem 1. If the performance index is given by (7), (8), then the optimal protection levels have to satisfy the following system of equations:

$$
\begin{aligned}
c_k &= c_{k-1}\overline{F}_{k-1}(u_{k-1}) \\
&+ c_{k-2}\int_0^{\langle u_{k-1}\rangle}\overline{F}_{k-2}\left(\sum_{i=k-2}^{k-1}u_i - x_{k-1}\right)f_{k-1}(x_{k-1})dx_{k-1} \\
&+ c_{k-3}\int_0^{\langle u_{k-1}\rangle}\int_0^{\left\langle\sum_{i=k-2}^{k-1}u_i - x_{k-1}\right\rangle}\overline{F}_{k-3}\left(\sum_{i=k-3}^{k-1}u_i - \sum_{i=k-2}^{k-1}x_i\right)\prod_{i=k-2}^{k-1}f_i(x_i)dx_i \\
&\vdots \\
&+ c_{k-(m-1)}\int_0^{\langle u_{k-1}\rangle}\int_0^{\left\langle\sum_{i=k-2}^{k-1}u_i - x_{k-1}\right\rangle}\cdots\int_0^{\left\langle\sum_{i=k-(m-2)}^{k-1}u_i - \sum_{i=k-(m-3)}^{k-1}x_i\right\rangle}\overline{F}_{k-(m-1)} \\
&\left(\sum_{i=k-(m-1)}^{k-1}u_i - \sum_{i=k-(m-2)}^{k-1}x_i\right)\prod_{i=k-(m-2)}^{k-1}f_i(x_i)dx_i, \quad k = 2(1)m. \qquad (12)
\end{aligned}
$$

Proof. The proof follows by using the Lagrange multipliers technique and the method of mathematical induction.

Corollary 1.1. The system of equations (12) can be presented as follows:

$$
\begin{aligned}
c_k &= c_{k-1}\Pr(X_{k-1} > u_{k-1}) \\
&+ c_{k-2}\Pr\left(X_{k-2} > \sum_{i=k-2}^{k-1}u_i - X_{k-1} \mid X_{k-1} \le \langle u_{k-1}\rangle\right) \\
&+ c_{k-3}\Pr\left(\begin{array}{l} X_{k-3} > \sum_{i=k-3}^{k-1}u_i - \sum_{i=k-2}^{k-1}X_i \mid X_{k-2} \\ \le \left\langle\sum_{i=k-2}^{k-1}u_i - X_{k-1}\right\rangle, X_{k-1} \le \langle u_{k-1}\rangle\end{array}\right) \\
&\vdots \\
&+ c_{k-(m-1)}\Pr\left(X_{k-(m-1)} > \sum_{i=k-(m-1)}^{k-1}u_i - \sum_{i=k-(m-2)}^{k-1}X_i \mid X_{k-(m-2)}\right. \\
&\le \left\langle\sum_{i=k-(m-2)}^{k-1}u_i - \sum_{i=k-(m-3)}^{k-1}X_i\right\rangle, \ \ldots, \ X_{k-2} \\
&\left.\le \left\langle\sum_{i=k-2}^{k-1}u_i - X_{k-1}\right\rangle, X_{k-1} \le \langle u_{k-1}\rangle\right), \quad k = 2(1)m. \qquad (13)
\end{aligned}
$$

The conditions given by (13) apply whether demands are viewed as continuous random variables as in Curry [5] or as discrete random variables as in Wollmer [6].

4 Illustrative Example

Consider a single-leg flight with m=3 nested fare classes. It follows from (12) that the optimal protection levels u_1^*, u_2^* have to satisfy the following system of equations:

$$
\begin{aligned}
c_2 &= c_1\overline{F}_1(u_1^*), \\
c_3 &= c_2\overline{F}_2(u_2^*) + c_1\int_0^{u_2^*}\overline{F}_1\left(\sum_{i=1}^{2}u_i^* - x_2\right)f_2(x_2)dx_2. \qquad (14)
\end{aligned}
$$

The system of two equations (14) can be reduced to

$$
\begin{aligned}
c_2 &= c_1\overline{F}_1(u_1^*), \\
c_3 &= c_1\left[\overline{F}_1(u_1^*)\overline{F}_2(u_2^*) + \int_0^{u_2^*}\overline{F}_1\left(\sum_{i=1}^{2}u_i^* - x_2\right)f_2(x_2)dx_2\right]. \qquad (15)
\end{aligned}
$$

Since

$$
\begin{aligned}
\int_0^{u_2^*}\overline{F}_1\left(\sum_{i=1}^{2}u_i^* - x_2\right)f_2(x_2)dx_2 &= -\overline{F}_1(u_1^*)\overline{F}_2(u_2^*) + \overline{F}_1(u_1^* + u_2^*) \\
&+ \int_{u_1^*}^{u_1^*+u_2^*}\overline{F}_2\left(\sum_{i=1}^{2}u_i^* - x_1\right)f_1(x_1)dx_1, \qquad (16)
\end{aligned}
$$

it follows from (16) that the system of two equations (15) can be reduced to

$$
\begin{aligned}
c_2 &= c_1\overline{F}_1(u_1^*), \\
c_3 &= c_1\left[\overline{F}_1(u_1^* + u_2^*) + \int_{u_1^*}^{u_1^*+u_2^*}\overline{F}_2\left(\sum_{i=1}^{2}u_i^* - x_1\right)f_1(x_1)dx_1\right]. \qquad (17)
\end{aligned}
$$

Brumelle and McGill [7] show that (for the case of this example) the conditions for the optimal nested protection levels reduce to the following set of probability statements:

$$c_2 = c_1 \Pr(X_1 > u_1^*),$$
$$c_3 = c_1 \Pr\left(X_1 > u_1^* \bigcap X_1 + X_2 > u_1^* + u_2^*\right), \qquad (18)$$

where

$$\Pr(X_1 > u_1^*) = \bar{F}_1(u_1^*), \qquad (19)$$
$$\Pr\left(X_1 > u_1^* \bigcap X_1 + X_2 > u_1^* + u_2^*\right)$$
$$= \Pr\left(X_1 > u_1^* + u_2^*\right)$$
$$+ \Pr\left(u_1^* < X_1 \le u_1^* + u_2^* \bigcap X_2 > u_1^* + u_2^* - X_1\right)$$
$$= \bar{F}_1(u_1^* + u_2^*) + \int_{u_1^*}^{u_1^*+u_2^*} \bar{F}_2\left(\sum_{i=1}^{2} u_i^* - x_1\right) f_1(x_1)\,dx_1. \qquad (20)$$

Now (17) follows from (18), (19), and (20).

5 Conclusions

Thus, taking into account the set of probability statements (18) and complex empirical transformations (20) in order to determine optimal protection levels for m nested fare classes, we can conclude that the EMSRb method [7] is not very suitable for practical applications if the number of nested fare classes $m \ge 4$.

A new methodology proposed in this abstract to determine optimal protection levels for m nested fare classes, which is based on the results of Theorem 1, makes it possible to simply and directly (without complex empirical transformations) find the optimal solutions for any specified number $m(\ge 2)$ of nested fare classes.

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Authors	
	**Nicholas A. Nechval, Dr.Habil.Sc., LU Emeritus Professor** **Affiliation: BVEF Research Institute, University of Latvia** **Current position: Lead Researcher (Vadošais pētnieks)**
	**Konstantin N. Nechval, Dr.Sc., Associate Professor** **Affiliation: Aviation Department, TSI** **Current position: Associate Professor**
Publications	Database: **Scopus** **(Publications: 110; Total citations: 289; h-index: 9** **https://www.scopus.com/authid/detail.uri?authorId=6701740819** Database: **Research Gate** **(Publications: 136; Total citations: 318** **HTTPS://WWW.RESEARCHGATE.NET/SCIENTIFIC-CONTRIBUTIONS/31721937_NICHOLAS_A_NECHVAL**

DEDICATED TO THE 100TH ANNIVERSARY OF THE RCAII AND THE 25TH ANNIVERSARY OF ISMA

Applications of theorems of elementary geometry in mathematical analysis

Alexandr Kovantsov, Aiga Andrijanova

Riga Technical university, Kalku iela 1

Abstract

In mathematics, when solving complex problems, researchers often look for non-standard methods. Such methods originate from much simpler ones, nevertheless, they are not used by scientists.

How, for example, to connect school planimetry and the mathematical analysis? And in the solution of tasks not to use differential and integral calculus. How to apply what did not draw attention in centuries? We tried to find an answer to these questions, and as it seems to us, received rather interesting results.

Keywords: rectangular triangle, similarity, tangent, secant proportionality

1 Content

It is hard to find an application for the theorems about planimetry that are taught in the school course of geometry. The central theorem of planimetry is the Pythagorean theorem. Each school student not only knows the theorem but also if necessary, can find an application for it. There was an idea to find applications for other theorems and not only in geometry but also in other mathematical disciplines. We noticed that the similarity of triangles can be easily applied in the mathematical analysis. Using at drawing graphs of various functions only tools which mathematicians of Ancient Greece used, namely – compasses and a ruler. Compasses are understood as the tool by which means it is possible to describe circles of any radius, and ruler – just a lath by means of which it is possible to draw straight lines. Why Greeks used these tools – it is still authentically unknown. Most likely, because they were the easiest to use. So, given the function graph of $y = f(x)$ and we managed to build graphs of functions $y = f^2(x)$,

$$y = \sqrt{f(x)}, \qquad y = \frac{1}{f^2(x)} \ , y = \frac{1}{f(x)}$$

and many others. Interesting was a theorem of a circle and a tangent and a secant drawn to this circle from an external point. Since the tangent is equal to the square root of product of secant on her external part and itself. This gave the chance to build y function graphs $y = f^n(x)$ where n is even number,

$$y = \frac{1}{\sqrt{f(x)}}$$

and a number of graphs of other functions. At the moment we suggest to use Thales' theorem which sounds so: suppose S is the intersection point of two lines and A, B are the intersections of the first line with the two parallels, such that B is further away from S than A, and similarly C, D are the intersections of the second line with the two parallels such that D is further away from S than C. Using this theorem, it is possible to draw the following graphs:

$$y = xf(x), \ y = \frac{f(x)}{x} \ , y = f_1(x)f_2(x), \ y = \frac{f_1(x)}{f_2(x)},$$

where two functions $y = f_1(x)$ and $y = f_2(x)$ and a number of similar functions.

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Algorithm for solving the inverse problem of kinematics by the position of the gripper of a manipulation robot using R-functions

Akambay Beisembayev[1], Petro Pavlenko[2], Anargul Yerbossynova[1*]

Satpayev University, Satpayev Str.22, 050013, Almaty, Kazakhstan[1]
National Aviation University, Cosmonaut Komarov Ave.1, 03680, Kyiv, Ukraine[2]

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

Abstract

The paper deals with the solution of the inverse problem of kinematics on the position of the gripper of a manipulation robot. The inverse problem of kinematics according to the position of a gripper is formulated as a problem for a conditional extremum, with a quadratic criterion and restrictions on the values of the generalized coordinates and R-functions describing the working space and subspaces of the manipulation robot. To solve this problem, a step-by-step algorithm has been developed.

Keywords: manipulation robot, kinematic system, workspace, inverse problem of kinematics in position

1 Introduction

Let the manipulation robot (MR) is an open-ended kinematic system [1], consisting of links and their sequentially connecting joints. MP articulations are kinematic pairs of the 5th class and can be given by the logical variables p_i

$$p_i = \begin{cases} 1, \text{if the articulation of the species is progressive displacement,} \\ 0, \text{if the joint is a kind of rotational movement.} \end{cases} \quad (1)$$

On the basis of the logical expression (1), it is possible to form a vector of joint types of the considered MR, $P(p_1, p_2, \cdots p_n)^T$. The amount of displacement is determined by the values of the generalized coordinates in degrees of mobility. MP, q_i *i=1,2,…,n*.

Control of MR in the space of coordinates associated with the base of MR is almost always associated with the need to solve the inverse problem of kinematics [1, 2]. To solve the inverse problem by position, it is necessary to specify the trajectory of movement, which is determined by the set of points $A_j(x_j, y_j, z_j)$, *j=1,2,…,m*, where m is the number of points approximating the trajectory.

It is necessary to minimize (maximize) the kinematic quality criterion of the species. [2]:

$$J = \sum_{j=1}^{m-1} \sum_{i=1}^{n} C_i \left(q_i^j - q_i^{j+1}\right)^2 \to \min\,(max), \quad (2)$$

under restrictions:

$$\forall A_j(x_j, y_j, z_j), j = \overline{1,m}: (D_1(x,y,z) \le 0) L^R (D_2(x,y,z) \le 0) L^R \cdots L^R (D_m(x,y,z) \le 0) = 1, \quad (3)$$

$$q_i^{\text{H}} \le q_i \le q_i^{\text{B}}, \quad (4)$$

where $D_k(x,y,z) \le 0$, (*k=1,2,…,m*) – inequality that specifies or approximates a part of the working space;
m – number of inequalities approximating workspace;
L^R – signs of logical operations R - conjunctions, R - disjunctions or R - negations.
C_i – the coefficient characterizing the dynamic performance of the drive i-the degree of mobility for a predetermined parameter, we will assume that $C_1 > C_2 > \cdots > C_n$;
q_i^j, q_i^{j+1} – the elements of Q^j and Q^{j+1}, respectively.
q_i^{H}, q_i^{B} – the lower and upper values of the generalized coordinate of the *i* - the degree of mobility.

We describe the workspace MP L_0 as a logical expression (3), and the values of all the generalized coordinates $q_1, q_2, \cdots, q_n$ vary according to the degrees of mobility of the MP. Next, we describe the working subspace MP L_1 for a given value of the generalized coordinate q_1 of the first degree of mobility and the change of the generalized coordinates $q_2, q_3, \cdots, q_n$ of the second and following degrees of mobility. In a similar way, we obtain working subspaces $L_2, L_3, \cdots, L_{n-2}$.

The search step for solving the problem $\Delta q_1, \Delta q_2, \cdots, \Delta q_n$ in the degrees of mobility of the MP must satisfy the inequality $\Delta q_i < |q_i^{\text{B}} - q_i^{\text{H}}|$ and determined by the type of the degree of mobility p_i

$$\Delta q_i = \begin{cases} \Delta q_{\text{п}}, \ if\ p_i = 1, \\ \Delta q_{\text{в}}, \ if\ p_i = 0. \end{cases} \quad (5)$$

Let the initial position of the kinematic system MP is given by the vector $Q^j\left(q_1^j, q_2^j, \cdots q_n^j\right)^T$, the starting position of the grab position $A_j(x_j, y_j, z_j)$, and the required positioning point $A_{j+1}(x_{j+1}, y_{j+1}, z_{j+1})$, we define the

parameters of these vectors, depending on the logical variables p_i, specifying the type of junction *i* - that degree of mobility

$$\exists p_i = 1: S_j = Sign\left(|\bar{a}_j| - |\bar{a}_{j-1}|\right), \exists p_i = 0: S_j = Sign\left(Arg\bar{a}_j - Arg\bar{a}_{j-1}\right), \quad (6)$$

where $|\bar{a}_j| = \sqrt{x_j^2 + y_j^2 + z_j^2}$, $Arg\bar{a}_j = arcsin\frac{z_j}{\sqrt{y_j^2+z_j^2}}$.

With this in mind, the above solution of problem (2), taking into account constraints (3), (4) and expressions (5), (6), the algorithm for solving the inverse problem on the MP position can be represented in the following steps.

2 Decision

START.

Step 1. Input of initial values: coordinates of points approximating the trajectory of the gripper $A_j(x_j, y_j, z_j)$, *j=1,2,…,m,*, logical expressions $L_1, L_2, \cdots, L_{n-2}$, describing the working space and the subspaces MP, $\Delta q_1, \Delta q_2, \cdots, \Delta q_n$, the magnitude of the solution search steps, the initial position of the configuration of MP MP $Q^0(q_1^0, q_2^0, \cdots q_n^0)^T$, the initial position of the gripper at the point $A_0(x_0, y_0, z_0)$.

If the condition $\forall A_j(x_j, y_j, z_j), j = \overline{1,m}: L_1 = 1$, then go to step 3, otherwise it is concluded that the task is unsolvable and go to the END.

Step 3. *j=1*.

Step 4. *i=1*.

Step 5. For a given value of q_i^j, we determine the type of logical expression L_i^{j-1}.

Step 6. If the coordinates of the point $A_j(x_j, y_j, z_j)$ do not satisfy the logical condition $L_i^{j-1} = 1$, then determine the sign according to the logical expression (6) and go to step 7, otherwise go to step 8.

Step 7. $q_i^j = q_i^{j-1} + S_j \cdot \Delta q_i$, go to step 6.

Step 8. *i=i+1*.

Step 9. If $i \leq n-2$, then go to step 5, otherwise assign j = j + 1 and go to step 10.

Step 10. To determine analytically the values of the generalized coordinates are q_{n-1}^j, q_n^j.

Step 11. If j≤m, then go to step 4, otherwise go to step 12.

Step 12. Output matrix values $Q(q_i^j)$.

END.

3 Conclusion

As can be seen from the above algorithm, at each step a single value of the generalized coordinate is determined from the condition of the coverage of a given work subspace of a given point of the motion path. For the last 2 degrees of mobility, the inverse problem is solved analytically by position.

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To the issue of efficiency of the heat generating installations

Baxyt Mykhanov, Asem Ibrasheva, Gulmira Iskakova*

Satpayev University

**Corresponding author's e-mail: iskakova.gulmira00@mail.ru*

Abstract

In this work presented the review of articles on the efficiency of heat-generating equipment of a CHP, comparisons of energy and exergy analysis, as well as the achievements of using information technologies to increase efficiency.

Keywords: Neat power equipment, efficiency, operational processing, exergy analysis, intelligent technology, thermodynamic data

1 Introduction

Improving the efficiency of energy production has always been a priority area of research in the energy sector. The economic downturn, the transition to market relations negatively affect the development of the energy sector, do not allow the full updating of production assets. The depreciation of the equipment used in the power plant is very high, they are morally and physically obsolete, and have low economic and environmental characteristics.

2 Overview

Today, there is growing interest in improving the performance of existing power plants and their equipment. A significant proportion of the generating equipment is represented by steam boilers, turbine units installed at CHP plants that make up the power supply complex, which includes the manufacturer, supplier and consumers of energy.

The efficiency of the CHP is characterized by various technical and economic indicators, which reflect the efficiency, reliability and durability of the equipment during its operation. Technical and economic indicators characterize the actual, nominal, regulatory, predictive work of CHP, which are determined for a certain point of the elapsed time, under the influence of certain external conditions, under the predicted external conditions, when troubleshooting.

To improve the efficiency of CHP, studies have been conducted on various aspects of this task. For example, a comparative analysis [1] suggests that the performance of a CHP at full load improves efficiency, rather than partial load.

Many studies to improve the efficiency of CHP show that this can be achieved by solving problems of optimizing the composition of equipment and operating modes of CHP [2,3], as well as optimizing the operation of boiler equipment and turbine generators.

There are a large number of methods that evaluate the efficiency of heat and power plants based on various indicators, coefficients, etc.

A number of articles have analyzed the energy efficiency [4], exergy analysis of heat generating plants, and showed the disadvantages of the traditional approach to power plant efficiency analysis, which is based solely on the principle of energy conservation [5]. Evaluation of the efficiency of power plants exclusively on a technical basis, regardless of cost, leads to exergic analysis, which is able to calculate the true technical efficiency and is its advantage. The analysis done in this paper shows that the heat-generating installations that are at the forefront of energy efficiency are not the best in exergy terms.

The method of exergic analysis allows to compare different energy systems based on exergy balance, which is more accurate with respect to the classical thermal method [6, 7, 8].

It is known [9] that to assess the effectiveness of the complex, the main value is a technical and economic indicator, which is determined by the following parameters: 1 - exergy efficiency of a CHP plant; 2 - full-relative efficiency of CHP; 3 - specific fuel consumption (efficiency) for electricity generation; 4 - specific fuel consumption (efficiency) for the production of exergy / or heat released.

The rapid development of modern methods of developing and creating man-machine and intelligent systems has led to a significant development of science in building control systems. Information technologies make it possible to create various systems for evaluating CHP processes and their thermodynamic indicators. Along with the development of technology, the amount of data to be processed is also growing.

The system of on-line data processing created with the help of information technology serves as a tool for increasing production efficiency, will allow to more effectively conduct the technological process, which, with a sufficiently high price for heat carrier and electricity, can produce a significant economic and environmental effect.

Today, at most of the country's CHPs, the calculation of technical and economic indicators (TEI) is carried out using traditional methods. Reporting on TEI is usually made only in large intervals of a decade / month. With

this system, it is possible to obtain an assessment of TEI

in a short time interval daily / weekly.

The set of data on thermodynamic parameters of heat engineering processes of a heat-generating installation is very voluminous and requires the application of certain statistical tools for processing. The data obtained in the real mode of operation are used as criteria for evaluating the control of the thermal installation. Evaluation of thermodynamic data allows you to make a forecast and select the optimal mode of operation of the installation, monitor its status and plan the work.

The online data processing system allows the upper level of production management: to quickly gather information from existing information systems, which allows to perform the calculation of key performance indicators in real time; composition of equipment for the established mode of operation.

Therefore, the most effective is the use of intelligent technologies in conjunction with classical methods of monitoring the status and control of technological processes. When creating systems for operational control and data processing, the advantages of traditional methods, techniques and algorithms are combined with the mathematical apparatus of the theory of artificial intelligence. The application of a modern instrumental basis and methods of control theory will allow creating a system of assessments of the state of thermophysical processes and outlining a mechanism for improving management efficiency.

3 Conclusions

Thus, the reviewed review of articles shows the effectiveness of various methods for analyzing the efficiency of heat-generating installations. The use of information technology as a tool for evaluating performance based on thermodynamic indicators of heat exchange processes is most productive.

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Development of intelligent control algorithms for the phosphorus anhydride production process

Bakytzhan Doshtaev[1*], Lyazzat Boleeva[2]

[1]*Kazakh National Research Technical University named after K.I. Satpayev, Kazakhstan, Almaty*
[2]*Taraz State University named after M.Kh. Dulati, Kazakhstan, Taraz*

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

Abstract

The aim of the research is to develop an optimal system for dry phosphoric anhydride P_2O_5 obtaining process control using artificial intelligence methods. The conducted researches allowed to obtain the following results:

- there was proposed the concept of intelligent control algorithms synthesis for the process of obtaining phosphoric anhydride;
- there were formed the planning matrices of the full factorial experiment (FFE) for the synthesis of the first in the phosphorus industry of the world intelligent models for phosphorus settling processes control, burning yellow phosphorus to P_2O_5, cooling and precipitation of dry phosphoric anhydride.

Keywords: Phosphoric anhydride, intellectual technology, neural network models

1 Introduction

Systems of optimal control of technological processes allow rationally to use mineral resources, to save heat energy and electricity, to solve environmental problems, to increase economic returns. However, nowadays Kazakhstan has not introduced an optimal control system [1, 2]. This is due to the extreme complexity of modern technological processes.

2 Overview

Traditional synthesis technology of the optimal control system: development of the structure of the process model → experimental researches on the object → identification of the model → formulation of the optimization problem → selection of the optimization method → development of the optimal control algorithm.

The concept of intelligent control algorithms synthesis for the phosphoric anhydride production processes control. The use of IT allows to solve similar problems immediately. The fact is that artificial intelligence methods involve the use of knowledge, experience and intuition of experts who are familiar with the subject area. That is, the so-called "ready knowledge" effect is used here. In contrast, the development of a mathematical model (the main component of the system) is the process of creation of "new knowledge", and therefore requires quite a long time to conduct theoretical researches, as well as large material and labor costs for experimental researches and for the identification of the model.

In addition, experienced operators and technologists during their long work learned how to conduct the technological process in optimal conditions for various initial situations (and they often succeed in this). Transferring of "ready knowledge" from experts to the knowledge base of an intelligent system greatly simplifies the creation of intelligent systems, and their operation eliminates the "human factor" effect during control.

3 Decision

Formation *of a full factorial experiment planning matrix (FFE) for the combustion process in the combustion chamber.* Oxidation of phosphorus in air is a chain reaction and can take place with an explosion: $P_4+5O_2 \rightarrow 2P_2O_5$

Interviewing experienced technologists, there were determined the following main input variables: X_1 - recirculation gases consumption; X_2 - compressed air consumption; X_3 - technical oxygen consumption - O_2; X_4 - consumption of yellow phosphorus from the dispenser.

The main output variable on which the completeness of phosphorus combustion depends is the temperature in the burner, therefore, as the output variable of the combustion process we selected the temperature at the output of the burner (or at the boiler input) - Y_1.

TABLE 1 Planning matrix (FFE)

	Input variables				**Output variables**
№ of exp.	X_1	X_2	X_3	X_4	Y_1
1	0.0	0.5	0.0	0.5	0,76
2	0.5	0.5	0.0	0.5	0,53
…	…	…	…	…	…
80	0.5	1.0	1.0	1	0,63
81	1.0	1.0	1.0	1	0,07

Through a survey of experienced process engineers, there was created a FFE planning matrix for the of yellow phosphorus burning process (Table 1).

The formation of the FFE planning matrix for the cooling process. As input variables we (with the help of experienced technologists-operators) selected the following input variables for the cooling process: X_5 - the consumption of the gases leaving the combustion chamber. Since this consumption is extremely difficult to be measured, we can indirectly determine it by the total amount of consumption of: recirculation gases, compressed air and technical oxygen, i.e. we will assume that $X_5 = X_1 + X_2 + X_3$; X_6 - the temperature at the input to the waste-heat boiler, which is equal to the temperature at the output from the combustion chamber, i.e. $X_6 = Y_1$; X_7 - the consumption of cooling water. Due to the fact that water consumption is not measured - indirectly it can be estimated by the water pressure at the input to the waste-heat boiler, i.e. $X_7 = P_{вк}$.

The output variables of the cooling process in the waste-heat boiler are: the temperature at the output of the boiler - Y_2 and the consumption of the formed steam - Y_3. Due to the fact that steam consumption is not measured - indirectly it can be estimated by its pressure - $P_д$.

With the help of technologists there was formed a FFE matrix for the cooling process from 27 experimental points.

The formation of the FFE matrix for the precipitation process. The precipitation process, or crystallization of P_2O_5, occurs in the economizer with its further cooling to a temperature below 160°C, and in the cyclone only the crystalline P_2O_5 separates from the recirculation gases. We have identified the following input variables: X_8 - the consumption of waste gases from waste heat boiler, while $X_8 = X_1 + X_2 + X_3$; X_9 - the temperature at the input to the economizer, which is equal to the temperature at the output from the waste heat boiler, i.e. $X_9 = Y_2$; X_{10} - the consumption of economizer cooling water. Due to the fact that water consumption is not measured - indirectly it can be estimated by the water pressure at the input to the economizer, i.e. $X_{10} = P_{вэ}$.

The output variables of the waste gases cooling process in the economizer are: the temperature at the output of the economizer - Y_4 and the consumption of the formed solid phosphorus anhydride - Y_5.

With the help of technologists there was formed a FFE matrix for the precipitation process from 27 experiments.

4 Conclusion

Therefore, the proposed synthesis concept of intelligent models of phosphorus anhydride process control allowed to identify 10 input and 5 output variables for the processes: combustion, cooling, and precipitation of solid P_2O_5.

The final result of the project will be intelligent algorithms for P_2O_5 obtaining process control.

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Heating system for natural gas heating at gas distribution station

Marat Orynbet, Assylbek Kaiyrbekov, Venera Bigaliyeva*

Satpaev University, Almaty

**Corresponding author's e-mail: vh_93_kz@mail.ru*

Abstract

A system has been developed for automatic control of temperature maintenance after the heating unit and a program-logic control for switching on and off additional and backup heaters according to the temperature sensor readings.

Keywords: Natural gas, heating unit, heater, temperature, program-logic control

1 Introduction

As a control object according to the results of the GDSs technological process survey, a heating unit and existing automation systems are considered [1, 2]. An experiment was conducted at the automation facility to determine the dynamic characteristics of the control channel "the degree of opening of the valve on the bypass line - gas temperature". The transient response of the channel when changing the degree of opening of the valve from 5 to 35% is shown in figure 1. Data is recorded with a period of 90s.

The processing of experimental data was done. Experimental transient response is approximated by the transfer function:

$$W(p) = \frac{-0.22}{1 + 326p} \times e^{-90p}$$

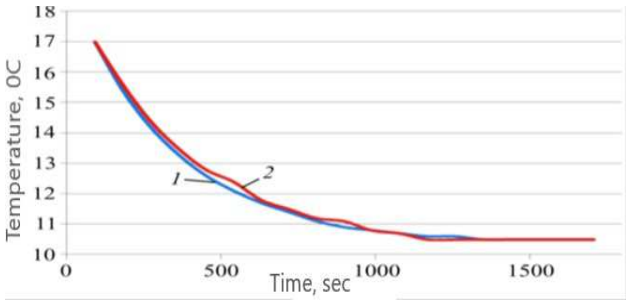

FIGURE 1 Experimental (1) and calculated (2) transient characteristics "gas temperature - degree of valve opening"

Perform the calculation of the tuning parameters of the PID controller according to the minimum linear integral criterion with a restriction on the frequency index of oscillation (attenuation degree ψ = 0,9) [8, 9].

The resulting settings: *K*p = 16; *T*i = 120; *T*d = 54.

In figure 2 shows the model of the temperature control system implemented in Matlab + Simulink [10, 11].

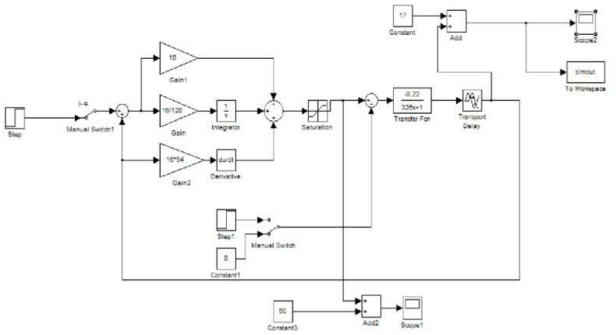

FIGURE 2 Model of temperature control system

In figure 3 shows the transition process of the regulation system on the step action along the channel of the task.

Regulatory Quality Indicators [1, 2]:

The steady-state value of the output value:

$$Y_{\text{уст}} = \lim_{t \to \infty} y(t) = 15{,}0$$

The degree of attenuation

$$\Psi = 1 - \frac{A_3}{A_1} = 0{,}92.$$

Overshoot

$$\sigma = \frac{A_1}{A_3} \times 100\% = 46\%$$

4. Regulation time *t*p = 388 s.
5. Flactutation period *T* = 912 s.

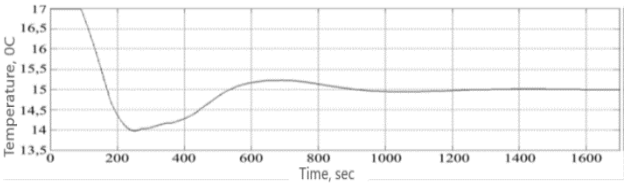

FIGURE 3 Transitional process of regulation system for step action along the channel of the task

2 Conclusion

In the process of doing this work developed:

1) Natural gas heating control system;

2) Natural gas temperature control algorithm;

3) The PLC algorithm enables / disables additional and backup heaters.

As a result, stabilization of the natural gas temperature in the range of 12–16° C has been achieved. Consequently, the consumption of natural gas per burner and its costs (the cost of the preheating process) will decrease.

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Modeling of physical and mechanical processes of precision complex electromechanical systems

Marat Orynbet, Venera Bigaliyeva*

Satpaev University, Almaty

**Corresponding auhtor's e-mail: vh_93_kz@mail.ru*

Abstract

The interaction of two surfaces is considered: an absolutely rigid and flexible surface. The task is to determine the carrier air layer between the surfaces and its change along the length of the coverage, depending on the speed of the air lubricant in each section.

Keywords: Gas dynamic lubrication, bearing capacity, belt bearing, velocity distribution

1 Introduction

In modern engineering, textile and instrumentation facilities, technical systems using gas-dynamic lubrication processes are widely used. Gas lubrication finds interesting and important applications in various types of bearings, and in particular so-called tape bearings (LP). LP, lubricated with air or other gas, provide a modern technical solution with significant advantages over other technical systems. In LP, lubricated with air, friction is much less. The friction temperature is so low that it can be neglected. Depreciation of LP, lubricated with gas, is much less. The use of external gas supply under pressure significantly expands the scope of the use of such bearings, since in this case they successfully operate at very low as well as at high speeds and forces.

The developed mathematical models of the LP of finite and infinite width of the tape, considering the tangential forces from the air lubricant and the stress-strain state of the tape, allow simulating various regimes taking place in the active contact zone of a flexible and rigid surface [4, 5].

The main disturbing effects on the tape arise due to the tangential viscosity forces acting on the tape from the air layer side. The latter vary in length of coverage and depend on the speed of air lubrication in each section. The velocity distribution in sections is the main factor influencing the stress-strain state of the tape in the zone of active contact and the carrier layer.

Since the process is considered to be isothermal and the air viscosity is constant, the equation of motion of an infinitely long cylindrical PL is reduced to the following system [1, 2].

$$\frac{\partial P}{\partial \varphi} = \mu R_0 \frac{\partial^2 u}{\partial y^2}, \quad \frac{\partial P}{\partial y} = 0, \quad \frac{\partial P}{\partial z} = 0. \tag{1-3}$$

If in system (1) - (3) pressure P is considered as a parameter, then the first equation of this system gives the velocity distribution u. This velocity distribution is easy to find, because the above equation contains only velocity derivatives with respect to φ, and the pressure does not depend on y and z.

Let us integrate the first equation twice in y, and we get

$$u = \frac{\partial P}{2\mu R_0 \partial \varphi} y^2 + C_1 y + C_2. \tag{4}$$

The integration constants C1 and C2 are determined from the following boundary conditions: for y = 0, u = V1, for y = h u = V2, and equal to

$$C_1 = -\frac{\partial P}{2\mu R_0 \partial \varphi} y^2 + C_1 y + C_2$$

$$C_2 = V_1$$

Thus, we have the speed distribution

$$u = -\frac{\partial P}{2\mu R_0 \partial \varphi} y(h - y) + \frac{V_2 - V_1}{h} y + V_1. \tag{5}$$

It should be noted that the actual velocity distribution U is known only if h and the derivative $\frac{\partial P}{\partial \varphi}$ are known. Due to the relative movement of surfaces in the lubricant layer, an overpressure occurs, and the distribution of velocities U in different sections is different. As the thickness h decreases, the speeds are redistributed so that the mass flow rate remains almost constant (in fact, this flow rate decreases in the direction of motion due to gas leaks through the ends of the bearing).

The redistribution of speed occurs in such a way that the average speed

$$\vartheta = \frac{1}{h} \int_0^h u dy$$

Increases with decreasing h and vice versa. Make the following change of variables

$$\bar{u} = \frac{u}{V_1}, \quad P = \frac{P}{P_0}, \quad \bar{y} = \frac{y}{R_0}, \quad \eta = \frac{h}{R_0}, \quad V = \frac{V}{V_1} \tag{6}$$

Formula (5) in a dimensionless form, considering (6), will be written in the following form:

$$u = -\frac{P_0 R_0 \partial \Pi}{2\mu V_1 \partial \varphi}\bar{y}(\eta - \bar{y}) + \frac{V_2 - 1}{\eta}\bar{y} + 1 \quad (7)$$

The velocity varies according to a parabolic law, and the quadratic term is proportional to ∂P / φ. In a section where the pressure gradient is zero, U depends linearly on y.

To plot the velocity profiles for various configurations in different sections of the LP, we use the simulation results for the example obtained in [4, 5].

2 Conclusion

The equilibrium state of the tape in the active contact zone depends on the boundary values of the main parameters of the LP in the entrance zone. It has been established that there is an optimum value for the tape tension in the input zone at which the tape configuration tends to a circular shape. This allows you to optimize the characteristics of the LP and create the maximum possible carrying capacity of the lubricating layer. It is shown that as the control parameters of the LP can be used the tension of the tape and the thickness of the air film in the entrance zone of the LP.

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Introduction to loose coupling approach towards deep learning

Maksat Bilimzhanuly*

Satbayev University, Kazakhstan

**Corresponding author's e-mail: m.bilimzhanuly@iitu.kz*

Abstract

Deep learning algorithms are an emerging methods of machine learning, that aim to tackle a wide variety of applied problems especially related to artificial intelligence, neural networks, natural language processing and it is used at discovering multiple levels of distributed representations. Similarly, to machine learning algorithms, the mentioned deep learning algorithms have been applied by using supervised, semi-supervised and unsupervised learning strategies in order to learn multi-agent systems and features in distributed architectures for clustering, classification, and pattern recognition tasks.

This paper aims to review the main key features of deep learning algorithms by using loose coupling approach. Firstly, it illustrates an overview of deep learning applications, and then describes their key features in diverse applied problems. In conclusion, the given paper summarizes the emerging developings and challenges in designing and training deep neural networks.

Keywords: Data Science, Machine Learning, Deep Learning, Algorithms, Neural Network, Artificial Intelligence

1 Introduction

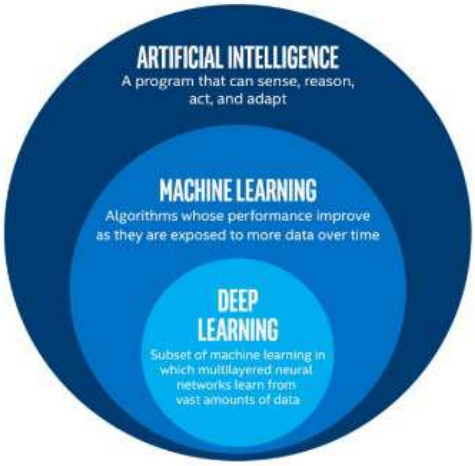

FIGURE 1 The realtion between ML DL and AI [5]

As shown in the graph above, Deep Learning has been applied mostly to model deeply and process neural networks and lying on Machine Learning algorithms.

According to Herbert Simon (1970), "Learning is any process by which a system improves performance from experience".

Deep Learning is a set of Machine Learning (ML) algorithms that based on a learning of multi layer newral networks, graphical probability models. Additionally, Deep Learning (DL) can be served as one of the main methods of Machine Learning (ML).

By Kwang Gi Kim, **"**Deep learning enables computers to learn from experience and understand the world in terms of a hierarchy of concepts [7]."

The term of "Deep Learning" appeared in the 1980s, but until 2012 for the implementation of this technology was not enough capacity in the field of artificial intelligence. After a series of articles by famous scientists, publications in scientific journals, the technology quickly became popular.

Deep learning mimics the abstract thinking of a person, also it is able to generalize. For instance, a neural network that is machine-trained does not recognize handwritten letters very well and so that it does not get confused in different spellings, they must all be loaded into it. Moreover, deep learning is used in the case of multilayer artificial neural networks and will be able to cope with this task.

2 Overview

Most projects with deep learning are used in photo recognition or audio, diagnostics of diseases. For example, it is already used in Google translations from the image: Deep Learning technology allows you to determine if there are letters in the picture and then translate them.

Another project that works with photos is a face recognition system called "DeepFace". Moreover, it can recognize human faces with an accuracy of about 97.25% the same accuracy as a person.

"WaveNet" system has been released in 2016 by Google company that can imitate human speech. In order to do this, the company downloaded millions of minutes of recorded voice requests into the system, which were used in the project called "OK Google", and after studying, the neural network was able to make sentences with proper accents, accent and without illogical pauses.

At the same time, deep learning can semantically segment an image or video - that is, it is not just to designate

that there is an object in the picture, but also to perfectly highlight its contours. This technology is used in unmanned vehicles, which determine whether there is interference on the road, marking and read information from traffic signs to avoid accidents. The neural network is also used in medicine in order to determine diabetic retinopathy from photographs of the eyes of patients.

A system based on deep learning called "Let there be color! [4]", for example, helps to give color to a black-white photo and even video. Ultra precise neural networks compute all the nuances of an image and divide it into layers to determine color depth and transitions. As photos are processed, the system is being trained by deep learning and can now process old photos and even video materials as shown below [3].

FIGURE 2 Photos have been processed by deep learning algorithms [4]

A neural network is a trainable system, and it acts not only on the basis of the given algorithms, but also on its own experience.

A neuron in deep learning can be thought of as a “black box” with many input holes and one output. At the input, the neuron receives signals and forms an output based on them.

Any neural network consists of multiple layers. Each next layer creates new attributes based on those that the previous layer gave it. For example, it is necessary for the computer to recognize the cat in the photo. We collect data millions of photos of cats and give (feed) this data to the algorithm.

There can be a lot of layers, but imagine that you need only 4 to solve the problem. Each input of the first layer of neurons receives an incoming pixel of the picture [2].

In addition, each subsequent layer combines the information obtained at the previous levels. The first layer of neurons can recognize only lines, points and circles, when the first layer of neurons understands where these objects are in the photo, it transfers the information to the next layer. Based on this data, the algorithm claims that the second layer will be able to distinguish triangles and squares, for example, to understand where a cat has ears, when the third layer finds out about it, it might understand where the image is, and where the body of the given cat [2].

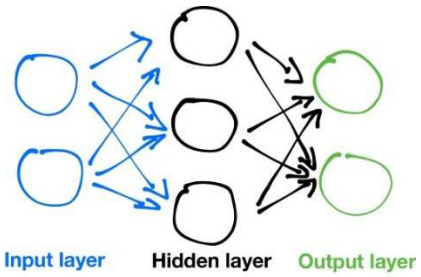

FIGURE 3 Neural Networks [2]

According to Carlos E. Perez [1], the numerous methods that lead to weak communication (loose coupling approach) between neurons are divided into the three main categories such as mediation, decomposition and late binding. The mentioned categories usually reduce the dependence of the signal, computational dependence and temporal dependence.

The first type leads to decompasition of one component into several components of neural network. The second type leads to mediation that intermediate component of neural network can be placed between two interacting components. Finally, there is a late binding method among neurons.

3 Conclusion

Statement by Andrew Yeng says [6], “If the human mind is able to find a solution to a problem in a few seconds, there is a high probability of speeding up the process.” This developer calls Deep Learning as the "new electricity", comparing with the main breakthrough of humanity. Most likely, those companies that will not introduce deep learning will soon feel themselves far behind competing companies.

Deep learning, in fact, has widely introduced machine learning into practice. It breaks up tasks so that all kinds of machine assistance seem possible such as cars without drivers, the best preventive health care, film recommendations - all this is already have been implemented.

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Automation of business processes using a scalable resource management information system

Tilivaldi Amrayev, Rassul Yunusov

Sabayev University, Kazakhstan

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

Abstract

The organization of a fault-tolerant and productive resource management system using models of distributed computing systems is an important task in the conditions of high competition and growing data volumes and intensity of operations performed on them. This paper discusses various approaches to solving the problem of providing enterprise resource management services. A comparison of widely known architectures with the "Monolithic" organization of the application and service-oriented architecture as "Microservices" is made. The disadvantages and advantages of those and other approaches are considered. The purpose of this article is to determine the optimal approach in solving the problem of building scalable information systems.

Keywords: Orleans, Monolith system, Redis, Microservices

1 Introduction

Paper covers well-known problems of high-load. The main goal is to determine the optimal solution for scalable software, that can be used in very high load conditions and maintain availability and resilience. For current businesses it is a very crucial question to provide such a service, that can handle millions of requests in reasonable time. As an example – the ability to have flexible hardware architecture, that allows to use only adequate amount of processing powers for existing demand, and being able to scale up horizontally if needed. Such a situation is common for nowadays – and well known as Black Friday issue, when millions of customers try to buy merchandize under discount from all around the world in short period of time. And it is very important for a business owner not to lose a single transaction. The business process of providing services to individuals, a company with a large number of service points and a high intensity of operations performed is considered. Selection of the optimal architecture for the organization of such a business process is critical to the success of the enterprise. The wrong choice of information system architecture can have negative factors, such as: financial, reputational, production risks of the company.

Therefore, this article reviews the existing approaches and technologies for solving typical problems of automating business processes. At the same time, modern problems of organizing high-performance services in the context of dynamically changing resource use intensity are considered.

The paper proposes to consider two approaches in solving such problems:

- "Monolith";
- "Microservices" - as a Service Oriented Architecture.

Monolith system - a control system or application implemented as a single unit, including the application interface, database, and systems for interaction between them. A lot of software has been made using such an approach. And this approach proved itself as a great solution, that helps to determine quickly business needs and implement the solution as ready to use solution with full coverage of required functions.

Distributed system - a system in which there is no main data processing center, and also differs in ease of scaling and scanning the system in "combat" production conditions. The main difference of the system is the location on different physical servers of parts of the application (database, interface, and other software components).

Each type of architectural solution has its pros and cons. Advantages of the Monolith concept: low cost and high speed of development, an application and database that are clearly interconnected, a large choice of developers. The disadvantages of the concept are: the difficulty in adding a new functional, limited physical characteristics, poor fault tolerance, the inability to reuse a component.

Advantages of the "Distributed Systems" architecture: scalability, fault tolerance, high speed of adding new functionality. The main disadvantages include the high cost of initial development, as well as a small number of developers who have experience with this architecture. Microservice architecture is oriented to use distributed architecture from the start. And it is concentrated to split a complex task into small subtasks with its own business context and business data. Such an approach provides and ability to select appropriate storage system for each kind of a business process. Provide an ability to chose a better technology stack to solve a problem, including programming language, storage system, existing libraries and specialized software.

2 Existing solutions

One of the projects implemented on the basis of the Monolith architecture is the project "Optimization of evacuation plans for people based on wireless sensor networks". In the project, a relational model was chosen as a database management model. The relational model allows for easy integration of information systems and applications. When implementing the project separately from the database, a file storage system is implemented, where command signals are stored. The language used is C# and ASP.NET technology, for a server application for managing a dynamic evacuation process, and C++ for signal processing [1]. The biggest problem of such a monolithic approach – is difficulty in scaling of a solution if it would have to deal with billions of sensors.

One of the projects implemented on the basis of microservice architecture is the project "Kolesa-Krisha-Market", a local company in Kazakhstan, that provides an online service of real estate market and automobile market and now also the merchandize online store. One of the main factors showing the need for implementation through microservices is customer focus, namely, fast and high-quality implementation of recording ad views. "Kolesa-Krisha-Market", while working on their own project, faced the main problem, lack of speed, as well as possible duplication of information. Work in one database is limited by the physical characteristics of the media, thereby limiting the scalability of the project. And also during the work of any project the failure of the database is possible. It is in connection with these restrictions on the project that the Go language bundle and the Redis data warehouse are used. Redis is a data warehouse, the main advantage of which is the fast processing of information due to the delayed recording of information in the database. Redis is used as a cache that creates a queue of tasks. Creating a queue of tasks, using Redis, writing to the database (Mongo DB) was carried out asynchronously, which allows the use of fast processing of information loaded on the service. One of the project's solutions was an approach to information processing, namely the understanding of the shortcomings of Mongo DB, the periodic delays in recording information on physical media. Nevertheless, there was a risk of information loss, not only because of the disconnection of the physical media on which Redis is deployed, but also in connection with the transfer of the counter from the Redis cache to the Mongo DB database. The solution to this problem is carried out using the "secure queue" template. Using this solution allows you to reduce losses due to the creation of copies of processed items in the queue, separate from the main one. A queue of copies will exist until they are permanently stored in the database. As a result of this solution, microservice based on the Go, Redis and Mongo DB bundles successfully working under load, and is ready for periodic unavailability of one of the data stores.

In addition to fast data processing due to the lack of writing to physical media, Redis has several advantages in contrast to traditional DBMS. The flexibility of the data structure allows you to maintain multiple data structures, such as: strings, lists, sets, hash tables, and others. Redis also allows you to simplify writing code using fewer lines for storage, due to the built-in structures for data processing. Improving the read operation, by distributing requests between servers, is achieved using a master-slave architecture and supporting asynchronous replication [2].

Ceph is the open source software used as a distributed file system. The CRUSH algorithm used in the Ceph framework allows the storage clusters to be freed from the limitations of centralized data storage tables. The algorithm is used in addition to traditional file systems, allowing you not to change the entire infrastructure and does not require the operation of additional equipment. The algorithm makes it possible to uniquely determine the location of an object based on the hash of the name of the object and a specific map, which is formed based on the physical and logical structures of the cluster [3].

RabbitMQ is a lightweight message broker that allows queuing between applications for data exchange [4]. In turn, this brings benefits in the form of load balancing and work sharing among applications. RabbitMQ comes with several interfaces, so that applications between which the exchange is carried out can be written in different program languages. RabbitMQ is implemented on the Actor model conceptual model, where each entity is an actor. The actors are separated from each other and do not share the memory, so that one actor cannot directly change the status of another actor [5].

Hadoop Apache is an open source project supported by the Apache Software Foundation. Hadoop is used to manage scalable, distributed computing, or as a general-purpose file storage. The distributed file system (HDFS) and the MapReduce system are two key components of Hadoop [6]. HDFS is the main data storage system that repeatedly copies blocks of data and distributes these copies among the computing nodes of the cluster, ensuring high reliability and speed of calculations. MapReduce is a framework for writing applications for high-speed processing of large amounts of data on parallel clusters of computational nodes.

Apache Spark is a platform for distributed data processing that uses distributed memory to efficiently process large amounts of data. Apache Spark performs calculations in RAM, bypassing the disadvantage of Apache Hadoop, namely, the expectation of building a map [7]. Thanks to RDD (resilent distributed dataset) technology, Apache Spark performs calculations only when it is necessary to output the finished result. In this case, the use of RAM, limits the amount of data processed. Limiting the amount of data performed does not allow Apache Spark to be considered a more advanced system than Apache Hadoop.

Storm is a fault-tolerant computing system focused on distributed processing of large data streams, similar in functionality to Apache Hadoop, but operating in real time [8]. The advantage of using Storm is solutions focused on several languages: Java, C #, Python, thereby simplifying the development of the system. Storm works by using network topologies, rather than special tasks like in Apache Hadoop. Using Storm ensures that each incoming message will be fully processed even if the analysis is distributed among hundreds of nodes.

When using Storm, only three abstractions are applied: spout, bolts, topologies. Spout is the source of computing threads (figure 1). Spout read messages from queue brokers such as RabbitMQ, Kafka, but can also create its stream, or read from the streaming API. Spout implementations already exist for most queue systems. Bolt processes any number of

inputs streams and creates a series of new streams. Most of the computational logic comes in bolts, such as functions, filters, streaming connections, streaming aggregations, connecting to databases, and so on. Topology is a network of spouts and bolts, with each edge in the network representing a bolt subscribed to the output stream of another spout or bolt. Topology is an arbitrarily complex multi-stage flow computation. Topologies run indefinitely when deployed.

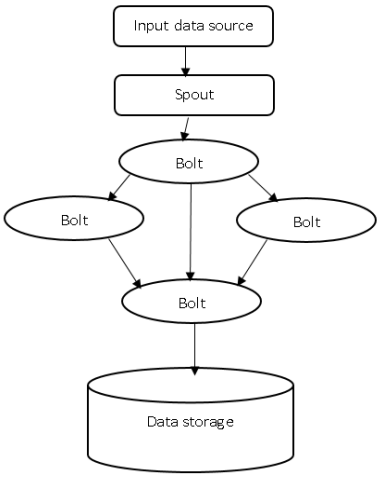

FIGURE 1 Basic concepts of Apache Storm

As a conclusion of different solutions that are aimed to solve a different problems, according to demand for the business process, it is much more easy to build a scalable solution now than ever before. But usage of them requires additional experience and competences in questions of building the resilient business processes within an integration of small Microservices, taking in consideration their asynchronous nature.

3 Orleans frameworks

Orleans is a software environment for creating scalable and flexible cloud applications. It is based on .Net Framework and now available for Dotnet Core plaftorm as an open source solution. Thus, it has all the benefits of multi-platform software. Initially created by Sergey Bykov and evolved at Microsoft into a mature solution, that have proved its efficiency in many active projects including online gaming platform Halo. One of the main concepts of the framework is the use of simple templates of parallelism. Its basis is the Actor model. The actor-like component is called Grain (grain), which is an isolated unit of computational state, the interaction of which is carried out through asynchronous messages [9]. Each Grain has a unique identifier, which is composed of its type and primary key (128-bit GUID)

The isolated state of the grain and the limited execution model allows Orleans to save, transfer, replicate, and reconcile the state of the grain. One of the main aspects of Grain, is a permanent existence, since the "grain" is a purely logical entity, and exists virtually. Grain cannot be explicitly created or destroyed. Grain will carry out its work and influence the application only from the moment of its activation, until its deactivation [10] (Figure 1).

Grain activation is always done one move at a time. The step-by-step model of asynchronous execution allows you to create queues for multiple activation requests. Deactivation of Grain, occurs not only when the deactivation method is called directly, but also in the state when the system does not address this Grain for a long time [11]. Thus, the system, even when there are many Grain, in working condition uses only a small part of the total. Figure 2 shows the structure of the work of Orleans, in which only a part of the “grains” (highlighted in red) are in the active state.

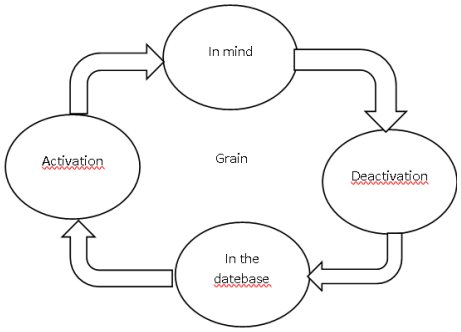

FIGURE 2 Grain operation diagram

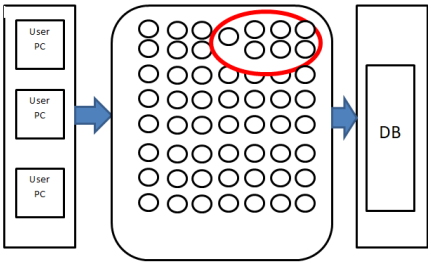

FIGURE 3 Structure of the Orleans and Grain

Orleans is currently being used as a platform for building and launching cloud services, thanks to the scaling capabilities of the framework.

The next advantage of Orleans, is a constant view of the server cluster failures, thus, when one of the servers is disconnected, server recovery and cluster reconfiguration are provided. When shutting down the server, Orleans (Figure 4), knows which grain, did not complete its work at the time of shutdown, thus the grain that worked at the time of shutdown on the server is automatically restored on another server from this cluster.

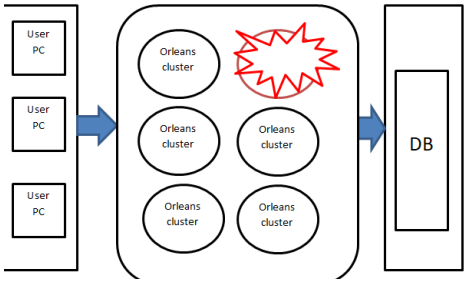

FIGURE 4 Failure of the Orleans cluster

4 Conclusion

Thus, in the course of the work were studied:

1) Advantages and disadvantages of distributed systems and systems architecture "Monolith"

2) Existing solutions based on microservice architecture are considered.

3) Orleans framework

As a result of the analysis of existing architectures, microservice architecture was chosen as the main architecture, based on the Orleans framework. The Orleans framework uses the Actor model, through isolated grains that exchange data through asynchronous messages. The isolated state and constraint in the runtime environment allow Orleans to save, transfer, and reconcile the state of the grains without programmer intervention.

It is intended to use Orleans to simplify the development of the application, due to design patterns that ensure the scalability and reliability of the project.

Usage of Orleans framework simplifies the process of building distributed software. But it is still require understanding of distributed computations concepts to build efficient solution. It is crucial to keep the balance between entities that have to be Grains and that don't have to be grains. It is also important to state that there are still open crucial problems that we have to solve – such as building resilent diestributed transactions, that are already a part of Microsoft Research Team endeavors, and distributed indexing of grains by different criterias

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Automation of the wind energy complex based on the Bolotov rotary turbine (WRTB)

K Mussilimov*

Satbayev University, Almaty, Kazakhstan

**Corresponding author's e-mail: k-u-a@mail.ru*

Abstract

Modern societies are based almost exclusively on fossil fuels to meet their electrical energy needs. Over the past thirty years, the security of energy supply and environmental problems have fueled interest in wind power applications. Among the types of wind turbines that can be used, it is very promising that the Bolotov wind rotary turbine (WRTB) is very promising, which in its technical characteristics is superior to traditional propeller and other installations that use wind energy in the generation of electrical energy. Among the problems associated with the industrial manufacture of WRTBs is the need to equip them with modern systems of technical diagnostics and automatic control.

Keywords: Wind energy, technological evolution, environmental impact, future prospects, wind rotary turbine Bolotov (WRTB), automation WRTB.

1 Introduction

Among the types of wind power plants that can be used, there is a rotary turbine based on the scientific idea of academician A. Bolotov. The Bolotov wind rotor turbine (WRTB) surpasses in its technical characteristics the traditional propeller and other installations using wind energy in the generation of electrical energy. Firstly, propeller wind installations are capable of receiving wind power at speeds from 5 to 18 m / s since, if the wind speed exceeds 18 m / s, up to 22 m / s, an aerodynamic traction force occurs, which forces the system to pull out from under wind, because, otherwise, the propeller and the nacelle can break down, which naturally reduces the effectiveness and efficiency of the complex of such installations. Secondly, the need for continuous installation orientation perpendicular to the wind flow leads to a decrease in its efficiency, since in the geographical conditions of the Republic of Kazakhstan, wind capacity is characterized by gustiness and frequently changing directions. Thirdly, propeller wind installations are capable of receiving surface wind energy only within the diameter of the propeller and their efficiency is no more than 0.2 - 0.25%. When using WRTB, the above mentioned negative factors are excluded. A distinctive feature of traditional and other installations of WRTB is the use of wind energy around its axis at 360 degrees and wind speeds from 2 to 45 m / s and the efficiency is more than 0.62% of the wind used [2].

WRTB is a complex cylindrical design with a vertical arrangement of guides. A power plant designed to generate electrical energy using wind power to rotate the turbine rotor, which is mechanically connected to the generator rotor and consists of three parts: the turbine stator, the turbine rotor and the generator for generating electrical energy.

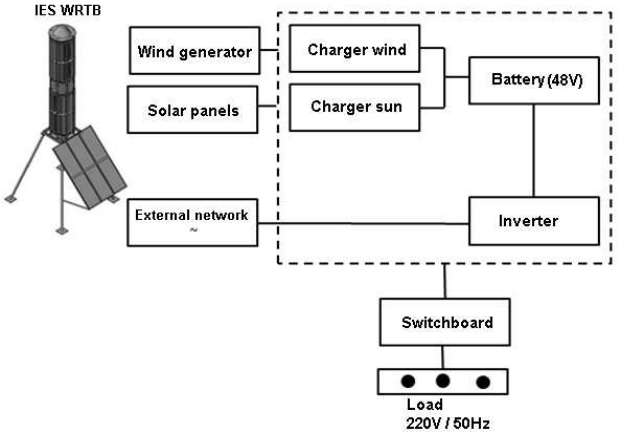

FIGURE 1 Block diagram of the autonomous power supply system

An anemometer is used to obtain information on wind speed, and voltmeters and ammeters are used for electrical variables. The values of all measured variables are transferred to the PLC. The automation scheme provides for the control of hydropushers and magnetic starters.

To provide the consumer with high-quality and stable power, automatic switching on (switching off) of individual generators is provided.

The technical support of the automated process control system WPC includes:

- means of collecting information (measuring transducers, counters, etc.);
- actuators, including starters, limit switches, etc.;
- programmable logic controllers;
- programmers;
- communication cables [4].

Intelligent monitoring and analysis of turbines.

Wind turbines are generating units without the need for the constant presence of personnel. Often, they are located in remote places where you can make full use of the wind

energy potential. Given the size and complexity of modern wind farms, remote monitoring and modern diagnostic tools are becoming an urgent need [4].

24-hour monitoring of turbine operation.

Wind turbines are equipped with a unique Genesis64 SCADA system. This system provides remote control, as well as the issuance of a variety of options for reports on the status of the turbine, viewed in a normal Internet browser. View status displays information about the electrical and mechanical parameters of the turbine, its operation, failures, meteorological data, as well as the parameters of the electrical substation. SCADA-system is connected to wind turbines and meteorum on the internal data network. Depending on the needs, additional external equipment can be connected to the system. It regulates the output active power of wind turbines and acts as a think tank of a wind power plant.

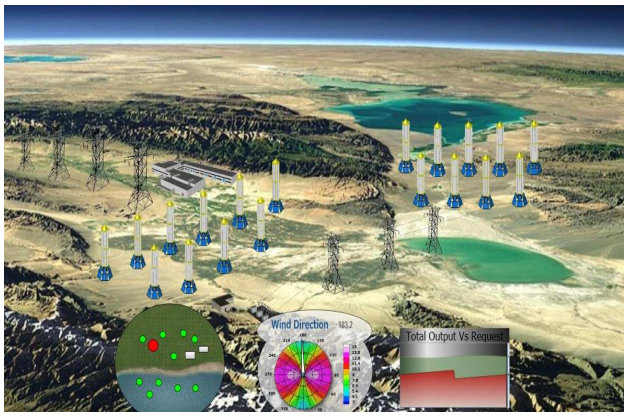

FIGURE 2 SCADA-system for the visualization of wind power complex

2 Overview

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

- Wind Turbine Overview and Application
- Development of automation systems WRTB
- Intelligent monitoring and analysis of turbines

The need to equip VRTB modern systems of technical diagnostics and automatic control.

3 Decision

The developed automation system is designed for automatic control and dispatching control of a wind power complex (WPC). Automation objects covered by the automation system include both individual WRTB installations and the complex as a whole. Automated activities are the monitoring of mechanical and electrical variable installations of the WRTB, the status and position of equipment nodes, the signaling of variable deviations and state changes, centralized storage and presentation automatically and upon request of information to personnel, automatic and dispatch control.

4 Conclusion

In this article, special attention is paid to the main issues related to market facts, technologies, environmental indicators, prospects for research and development in the field of wind energy, which provides some information and presents the main points for each of the areas. In accordance with the goals set, the prospect of increasing the capacity of wind power plants in the future seems feasible, especially considering the problems arising from the need to ensure security of supply and promote clean energy technologies, and its ability to largely replace fossil fuel generation. The article also discusses the automation systems for technical diagnostics and automatic control of the wind power complex WRTB.

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About the development of an intelligent flotation process control system in metallurgical production

Zhanar Lukmanova*, Shamil Koshimbayev

Kazakh National Research Technical University named after K. I. Satpayev, Institute of Information and Telecommunication Technologies, Kazakhstan, Almaty

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

Abstract

In this article there were obtained the results of consideration of the possibility of intelligent control systems applying to the flotation processes of the metallurgical industry. The analysis of the processes occurring in flotation machines is presented. The main input, output parameters, as well as disturbing influences that constitute the expert base for the formation of a control action using a neural network are considered. It is shown how to control and visualize, diagnose and monitor the flotation process based on intelligent methods using the platform Experion PKS.

Keywords: Intellectual control system, foam flotation, flotation technology, experion PKS software package.

1 Introduction

Nowadays, the tasks of control systems development for flotation processes — mineral processing based on selective adherence of mineral particles in an aqueous environment to air bubbles are urgent tasks. The processes of foam flotation include the process in which hydrophobic (not wetted by water) mineral particles adhere to air bubbles entered the pulp and rise with them to the top, forming an enriched foam layer on the pulp surface, and hydrophilic (water-wetted) rock particles remain suspended in pulp and move to the chamber product. The foam layer is separated from the pulp and, thus, the separation of minerals is occurred. The basis of the flotation process is the property of selectively fixing of the mineral particles treated with flotation reagents on air bubbles. The action of the reagents is aimed at increasing the flotation activity in some particles and lowering it in others. As a result, mineralized foam is formed on the pulp surface, which is moved for recycling. The main technological equipment is flotation machines [1].

2 Overview

The flotation receives the pulp, characterized by an amount of properties that determine its behavior in the flotation chamber. These properties are determined by both the mineralogical composition and the previous treatment in the processes of crushing, grinding, as well as in contact tank. At least several dozens of factors affecting the flotation process can be distinguished [2].

3 Decision

Analysis of the processes occurring in flotation machines, allows to select the main input, output parameters, as well as disturbing influences.

Input parameters are pulp density, copper ion concentration in the pulp, xanthate consumption, copper sulfate consumption, compressed air consumption, pulp level, pulp aeration rate.

Disturbing influences are: α - the metal content in the ore, the floatability of the raw material, the particle size distribution of the crushed enrichment product.

Output parameters are: β - metal content in the concentrate, γ - metal content in the tails, plant capacity, concentrate output, tails output. As an output indicators there can be taken, which are more complex functions calculated by simple indicators. This function is called extraction:

$$\xi = \frac{\alpha-\gamma}{\beta-\gamma} \cdot \frac{\beta}{\alpha} \quad (1)$$

During the process these parameters change and are stationary random functions. Input parameters can vary significantly. In this regard, the output parameters during manual control also change.

In order to obtain the statistical characteristics of the flotation process is very difficult and is possible due to the use of statistical methods. This leads to an interest to the use of the methods of intelligent systems. In particular, to the use of neural networks (Figure 1).

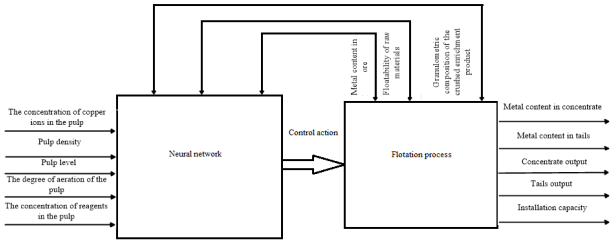

FIGURE 1 Intelligent flotation control system

An expert database of statistical characteristics of the flotation process was developed for this intelligent flotation control system.

In order to maintain the input and output parameters at a given level, it is necessary to automate an intelligent flotation process control system. A block diagram of the Experion PKS system is shown on Figure 2.

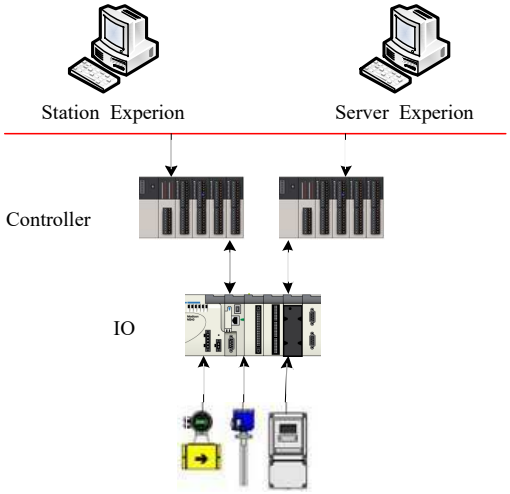

FIGURE 2 Experion PKS system block diagram

In order to control and visualize, diagnose and monitor the process at the centralized control center, which provides quick access to all data and allows global settings, there is used the Experion PKS platform, which is a multi-layered architecture for solving complex tasks from information collection and processing to optimization of operating modes of technological processes [3].

The program complex includes the ACS development mode and the execution mode (real time). Distributed creation control system on the OPC – OLE for Process Control standard (mechanism of linking and embedding objects for data collection and control in industrial automation systems), which is the most common way of organization of interaction between various sources and receivers of data, such as: devices, databases and systems for information visualization about a controlled automation object. The use of a fault-tolerant industrial network (FTE) provides the ability to connect all control nodes, but at the same time has a number of characteristics that allow a high level of reliability and security, as well as connection of equipment from third-party manufacturers. During the connection of the field devices via digital interfaces, not only the measurement channel error decreases, but also provides extended information [4].

4 Conclusion

The considered flotation process control system solves the problem of ensuring the maximum efficiency of useful components extraction, reduction of wastes and losses. These measures lead to an improvement of the products quality and of the working conditions of the staff.

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Computer research of the influence of the replacement circuit parameters in transient processes in a twin-engine electric drive

Nurlan Sarsenbayev

Satpayev University, Satpayev Str.22, 050013, Almaty, Kazakhstan

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

Abstract

There is investigated the influence of the parameters of the rotor motor windings on the duration of transient processes during the start. As it is known, one of the main requirements imposed on multi-engine electric drives in order to ensure synchronous rotation of two or more mechanical uncoupled shafts are the even distribution of loads between them and the identity of engine parameters.

Keywords: energy-saving electric drive, asynchronous valve cascade, dual-power machine, transient processes, simulation modeling

1 Introduction

The purpose of this work is the development and research of an energy-saving automated electric drive with improved energy characteristics for regulation of the performance of calcar blower fans.

Nowadays, depending on the requirements for accuracy of rotation frequency coincidence and simultaneous regulation in the mode of consistency, as well as other indicators, there are applied various systems of two-engine electric drives (TEED).

TEED systems with AC electric drives can be divided into two main groups:

1) TEED adjustable according to the stator circuit;

2) TEED adjustable according to the rotor circuit.

On the basis of a review and analysis of the properties of existing systems of coordinated rotation, it can be noted that one of the promising areas for the development of TEED based on AC machines for medium and high-power mechanisms are systems based on dual-power machines (DPM) with the best dynamic and energy characteristics [1, 2].

Therefore, for the medium and high-power mechanisms there have been proposed new various solutions of TEED systems based on a dual-power machine.

In order to study transient processes in a twin-engine electric drive based on dual-power machines, there was considered the most common type of twin-engine electric drive, where the engines operate on a common load, for example, double-drum conveyor electric drives, parallel or sequential operation of turbomechanisms on a common turbine, etc.

The most appropriate and effective way to solve the problem of coordinated rotation is the use of asynchronous valve cascade (AVC) and dual-power machines (DPM), which have wider capabilities and high energy performance. The functional diagram of the twin-engine electric drive of the coordinated rotation is shown on Figure 1.

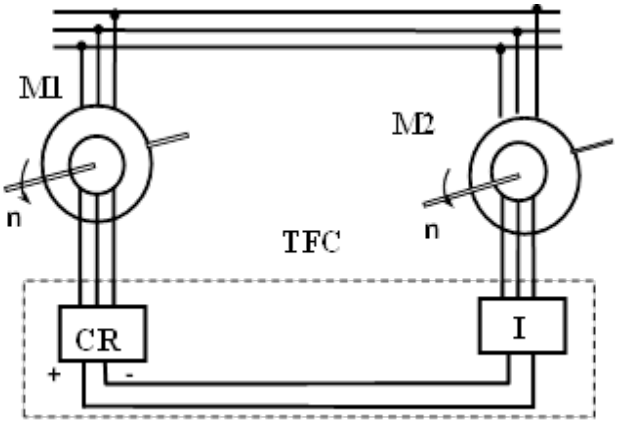

FIGURE 1 Functional diagram of the twin-engine electric drive

The high energy performance of the drive is explained by the fact that by using the slip energy of the first asynchronous engine as the power source for the thyristor frequency converter in the rotor circuit of the second engine the efficiency of the electric drive increases significantly, and with increasing of the engine capacity the system efficiency will be even higher [3,4].

The transient processes equations for each engine of a two-engine electric drive in a system of axes of coordinates with an arbitrary rotational speed ω_k , with generally accepted assumptions, were written using well-known Park-Gorev equations.

The transient processes equations for engines with a capacity of 200 kW of the AKN355S6U3 type with a rotational speed of 1000 r/m were modeled using the MATLAB software at starting under nominal load and under condition that the load on the engine shaft is evenly distributed.

For this electric drive, a graph of the electromagnetic moment versus time is obtained under the following conditions, where the given active resistance of the rotor

windings of the second engine is 15% less than the corresponding parameter of the first engine, i.e. $\frac{r_{2r}}{r_{1r}} = 0.85$. As can be seen from the graph, the transient process time of the first engine is less than of the second one.

In case when the inductance of the rotor windings of the second engine will be 15% less than the corresponding parameter of the first engine, i.e. $\frac{L_{2r}}{L_{1r}} = 0.85$, then the transient process time of the first engine is longer than of the second one.

2 Research results

As the analysis of graphs shows, the transient process time is shorter, if the resistance of the rotor is greater and the inductance of the rotor windings is lower. This is explained by the fact that when an asynchronous engine is turned on, in addition to steady-state currents, there are occurred free currents, which decay with a constant time. The amplitude of these currents, as well as the amplitude of the steady-state currents, is smaller, if the resistance is greater and the inductance is lower. Since the asynchronous engine with a phase rotor operates in dual-power mode, the damping speed of free currents also depends on the rotor parameters, i.e. it is greater, if the resistance is greater and the inductance of the rotor windings is smaller; therefore, in an engine with a relatively large resistance and lower inductance, the transient processes proceed faster.

3 Conclusion

So, the analysis of the simulation results implies that at even distributed load on the machine shaft, the machine parameters have a significant impact on the transient processes, therefore, at designing electric drives based on dual-power machines special attention should be paid to the identity of the rotor circuit parameters.

In order to analyze the properties of the system during transient processes, there was created a computer model of a two-engine electric drive according to the scheme of asynchronous valve cascade and a dual-power machine in the MATLAB environment, which allows to investigate electric drive transient processes. On the basis of computer simulation, results were obtained that confirm the accuracy of the above theoretical conclusions.

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Features of the Smart-technologies application to the synthesis of MIMO-systems in oil and gas industry

Olga Shiryayeva*

Satbaev University, Kazakhstan

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

Abstract

This paper presents the results of the Smart-technologies application to the synthesis of MIMO-systems in oil and gas industry. In particular, there is considered a multidimensional multiply connected system for gas distillation process control through a distillation column with regulators configured on the basis of Smart-technologies: genetic algorithm (GA), ant colony optimization algorithm (ACO); clonal selection algorithm of an artificial immune system (AIS).

Keywords: Smart-technologies, genetic algorithm, ant colony algorithm, artificial immune system

1 Introduction

Nowadays, algorithms for finding optimal values based on bioinspired algorithms are of particular relevance [1]. Genetic algorithms (GA), ant colony algorithms (ACO), particle swarm algorithms (PSO), artificial immune systems (AIS), etc. are widely used [2–4]. The considered algorithms have the following distinctive features: high accuracy of calculations, speed, the ability of the algorithms to work in the conditions of information completeness absence about the control object, etc. These algorithms are of particular relevance for MIMO- systems of oil and gas industry [5]. This paper presents a comparative analysis of the adjusting results of the regulators parameters of a multidimensional multiply connected system for gas distillation process control through a distillation column based on bioinspired algorithms that are related to Smart-technologies.

2 Overview

For isolated subsystems of a multidimensional multiply connected system for gas distillation process control through a distillation column (Figure 1), it is necessary to synthesize a controller based on bioinspired algorithms in order to achieve the desired modes as quickly as possible.

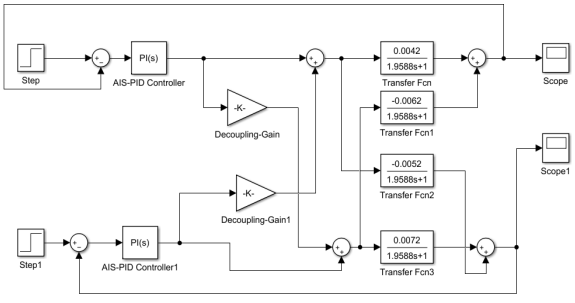

FIGURE 1 The simulation scheme of a complex gas distillation process control system through a distillation column in MATLAB

Comparative analysis of the simulation results of isolated control subsystems of a multidimensional multiply connected system for gas distillation process control through a distillation column with regulators configured on the basis of Smart-technologies (Figure 2):

- genetic algorithm (GA);
- ant colony method of optimisation (ACO);
- clonal selection algorithm of the artificial immune system (AIS).

3 Decision

During the comparison of the algorithms structure the following conclusions were made (Table 1).

TABLE 1

Component	GA	ACO	AIS
Components	Chromosome set	Set of colony members	Attribute Set
Component location	Dynamic	Dynamic	Dynamic
Structure	Discrete components	Discrete components	Discrete components
Knowledge storage	Chromosome set	Pheromone set	Component affinity
Driving forces	Evolution	Self-organization	Learning and evolution
Driving force description	Generation and selection of components	Set of components	Generation, selection of components
Components interaction	Exchange	Exchange	Recognition
Interaction with the environment	Fitness function	Recognition function	Recognition function

4 Conclusion

During the comparison of the algorithms application results the following specifications were obtained (Table 2).

TABLE 2

Simulation results: 1 - the best result; 2 - average result; 3 - the worst result	GA	ACO	AIS
Settling time	1	2	1
Overshoot	2	1	1
Oscillation	2	1	1
Steady-state error	2	1	3

In accordance with the obtained results there were obtained conclusions on the use of the artificial immune systems application in order to solve optimal control problems for MIMO-systems.

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Integration of Kazakhstan architecture into the international space on the basis of new technologies

Raushan Kabilova, Aliya Kusherbaeva*

Kazakh leading academy of architecture and civil engineering (kazgasa)

**Corresponding author's e-mail: kusherbaeva_1989@mail.ru*

Abstract

In this article is considered how today among professionals-architects research is increasingly popular, aimed at studying and developing technologies in architecture. What is the role of digital technology in architecture? Is it possible to say that the architecture created with the help of digital technologies automatically becomes digital? The boundaries of these concepts are blurred, everyone understands them in their own way. Therefore, it is expedient to define a digital architecture and propose a classification of its possible directions. The concept of a modern house includes not only interior design, competently organized interior space and the availability of a variety of household appliances. A full house is, above all, a comfortable living environment that allows you to enjoy a cozy rest of your beloved home. As a result, the engineering equipment of apartments and cottages is steadily becoming more complicated, and the number of devices participating in the formation of this environment is growing. It is inconvenient and unsafe to manage all systems with the host. Integrated management system "Smart House" can take all the routine work to solve this problem, leaving the person only the adoption of the main, determining decisions.

Keywords: Smart House, digital technology, architecture, integrated management

1 Introduction

Today among professionals-architects, research aimed at studying and developing technologies in architecture is becoming increasingly popular. What is the role of digital technology in architecture? Is it possible to say that the architecture created with the help of digital technologies automatically becomes digital? The boundaries of these concepts are blurred, everyone understands them in his own way. Therefore, it is expedient to define the digital architecture and propose a classification of its possible directions.

Four categories were taken as a basis, meaningful for the definition of digital architecture: Issue (the architect's ownership of the digital-virtual architecture flow), Concept, Form, Technology, considered in the article by Yevgeny Khilkevich "Virtual architecture: an attempt systematization". In our opinion, this approach allows us to approach the definition of the digital architecture quite accurately, but for a more detailed analysis of the concept of "digital architecture" it is necessary to determine the hierarchy of these criteria and clarify their characteristics.

First of all, the Issue category is not significant for referring the project to a particular stream, because, firstly, not every author positions himself as a representative of one or another direction, and secondly, at this stage of the architecture development it is impossible to draw a clear framework between the directions. Therefore, for the definition, we propose to rely only on the categories "idea", "technology", "form". So, the idea is understood as the leading design, the constructive principle of various types of activity, under technology - technological design methods, means of realization and functioning of the object, under the form - geometric forms of space and their spatial characteristics.

The most obvious examples of the use of digital technologies in architecture are smart house and smart city systems.

The concept of a modern house includes not only interior design, competently organized interior space and the availability of a variety of household appliances. A full house is, above all, a comfortable living environment that allows you to enjoy a cozy rest of your beloved home. As a result, the engineering equipment of apartments and cottages is steadily becoming more complicated, and the number of devices participating in the formation of this environment is growing. It is inconvenient and unsafe to manage all systems with the host. Integrated management system "Smart House" can take all the routine work to solve this problem, leaving the person only the adoption of the main, determining decisions.

Systems for integration into Smart House:

Lighting can take into account the time of day, sunset / sunrise, information about illumination in the room and on the street, movement and presence of a person. Light scene "Guests" allows you to include several groups of lamps in the living room at full brightness, and the scene "I'm going out" turns off all the lights in the house right away; Climate It is controlled on the basis of data from temperature and humidity sensors inside and outside the premises with the help of heating systems, air conditioning, exhaust fan and outdoor air supply, floor heating system, air humidifiers and other devices; Security Systems include visual control of the object at a distance, a video surveillance system, an imitation of presence inside and outside the dwelling, a warning about entering the room, protection against fire, water and gas leaks; Curtains,

blinds, blinds, gates, awnings are controlled both by pushbutton switches and automatically, using information about the illumination and temperature. The rollers on the windows will be automatically lowered if the room is armed; Pool maintaining the microclimate in the aquarium; Comfort security of housing inside and outside full automation of all processes remote and stationary control of all systems at home control of all automation of the house "from one remote control" automation and control of all processes high degree of autonomy duplication of control over all systems manually /1/.

The accumulation of these "smart houses" compiles the city, which represents the highest sample of culture with developed construction and architecture as a whole.

For the first time seriously about the concept of Smart City began talking in the 90's, when they realized that the future is development in the context of the IT sector. It is interesting that in the first place Smart City was considered as an opportunity to protect the environment from the harmful influence of a person. It is clear that at first the idea needed to be popularized in order to interest the state, investors and ordinary citizens, as the technologies were still too imperfect. Twenty years have passed and today the Smart city is a reality.

For the first time seriously about the concept of Smart City began talking in the 90's, when they realized that the future is development in the context of the IT sector. It is interesting that in the first place Smart City was considered as an opportunity to protect the environment from the harmful influence of a person. It is clear that at first the idea needed to be popularized in order to interest the state, investors and ordinary citizens, as the technologies were still too imperfect. Twenty years have passed and today the Smart city is a reality.

A smart city must:

- To regulate traffic;
- To help you find parking;
- To turn on street lighting;
- To provide emergency telephones;
- To create a platform for the urban population to work together.

In Kazakhstan there are also examples of the introduction of a smart city system.

November 30, 2006 at the joint session of the city government of Aktau city with the participation of majors of all levels the concept of the architectural project "Aktau-City" was approved. the perspective development of the city of Aktau is determined by the desire of the Republic of Kazakhstan to join the list of the 50 most developed countries of the world, as well as to ensure the policy of accelerated economic growth in the light of the Head of State's message to the people of Kazakhstan in the forecast period, related to the growth of oil production, the creation of a large industrial complex, restoration and further the development of the construction complex, the improvement of the education and healthcare system, as well as the development of the tourism, recreation and entertainment industrytion.

"The project is based on the experience of construction carried out in the United Arab Emirates and examples of urban development in developed European countries. Leading engineering and engineering companies such as "Millennium" and "Saraya" are involved in the design and preparation of the master plan" said B. Tuganbaev.

Next on the list is G4 City. One of the most ambitious investment projects is housing construction.

The project for the construction of satellite cities from Almaty to Kapshagay was developed in 2006, soon after the authorities decided to concentrate on the right coast of the Kapshagay reservoir a good half of the gambling establishments of the republic.

Officially, the beginning of construction work was announced seven times - in 2007, 2008, 2010, 2011, 2012, 2013 and 2017.

Also, other cities take up the idea of realizing the cities of the future. According to the Minister of Information and Communications Dauren Abayev, one of the main indicators of the state program Digital Kazakhstan is the development of Smart City in the five largest cities of the country - Smart Astana, Smart Karaganda, Smart Ontystuk, Smart Almaty, Smart Aktobe" /2/.

In conclusion, it should be noted that the world of architecture has a close relationship with the economy. The economics of architectural design belongs to the field of applied science, which by its status is designed to analyze, prove and search for feasible options and rational directions in architecture and urban planning. Therefore, it is possible to believe that architecture in a certain sense forms an economy, and architecture creates economic value.

It is not necessary to guess what profits smart cities will bring, because we have a very good opportunity to determine the approximate yield by the example of the recently forged EXPO-2017 (115 countries and 22 international organizations participated, the exhibition was visited by 3 977 545 people) /3/.

Despite the fact that the goals of these spheres are different, in many respects they come into contact with each other. After all, the construction of a new site gives a lot of areas for payback and profit.

Workplaces for construction; Entrepreneurship (Orders for small and medium businesses); Taxes; Tourism; Transformation of the transport system;

Because this is a smart city, energy costs and environmental costs are reduced.

Thus, a smart city is not just a technologically well-equipped metropolis, but first of all a city that meets the main challenges of our time, also acting as an economic platform.

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Development of a decision support system based on machine learning

Alexandr Savchenko[1], Sanzhar Kenzhekhanuly[2], Zhanar Omirbekova[3*]

[1]Creative Team" LLP, Kazakhstan
[2]Bilim Media Group", LLP, Kazakhstan
[3]Satpayev University, Kazakhstan

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

Abstract

This article is devoted to the development of a decision support system based on machine learning. As a learning algorithm, classification and clustering algorithms is used. The results show that the role of DSS in the field of education makes it possible to make effective decisions as one big step in the implementation of artificial intelligence in the system

Keywords: classification, clustering, learning without a teacher, supervised learning, binary classification, multidimensional classification, process attribute, k-means, Decision Support System.

1 Introduction

The main task of the information and analytical portal (sitcen.kz) is aimed at developing an intelligent decision-making support system. Decision Support System (DSS) The purpose of the DSS development is to help users who make decisions in difficult conditions for a complete and objective analysis of the subject activity. The system distribution of the studied subjects, phenomena, processes by gender, species, types, by any essential features for the convenience of their research; grouping of the initial concepts and their arrangement in a certain order, reflecting the degree of this similarity [1].

2 Problem formulation

The decision support system of the DSS solves two main tasks:

- selection of the best solution from a variety of possible (optimization),
- streamlining possible decisions by preference (ranking).

In both tasks, the first and most fundamental point is the selection of a set of criteria, on the basis of which, in the future, possible solutions will be evaluated and compared (we will call them alternatives). The DSS system helps the user to make such a choice.

For the analysis and development of proposals in the DSS uses different methods. These can be:

- information retrieval,
- data mining,
- search for knowledge in databases,
- reasoning based on precedents,
- simulation,
- evolutionary computation and genetic algorithms,
- neural networks,
- situational analysis,
- cognitive modeling, etc.

3 Modeling

Great practical importance are the methods of data analysis associated with the theory of recognition. These include methods of cluster analysis and methods for visualizing multi-dimensional data. The purpose of cluster analysis methods is to partition the samples of multidimensional data into groups of objects close in the sense of some given measure of similarity. Such compact groups are called clusters, classes, or taxons [2, 3]. Cluster analysis methods are also called teaching methods without a teacher, automatic grouping or taxonomy. Cluster analysis methods can be used as auxiliary tools in solving problems of prediction or recognition. So, using clustering, reference objects can be selected. However, clustering can often be independent. We can distinguish cluster analysis problems for which the number of clusters is given (figure 1), as well as tasks in which the number of clusters should be determined during the clustering solution.

4 Discussion and conclusion

Applying this model allows you to build predictive models of key indicators, this article has developed a model for occupancy of data fields, which reflects the trend of digitalization in the field of education, identifies errors in occupancy, allows you to find the novelty of data use, and using the model you can determine data anomalies, shows adaptation speed, application of technical skills of users, contributes to analytics, integration of education management systems, data consolidation, which allows an automated reporting system management, decision-making.

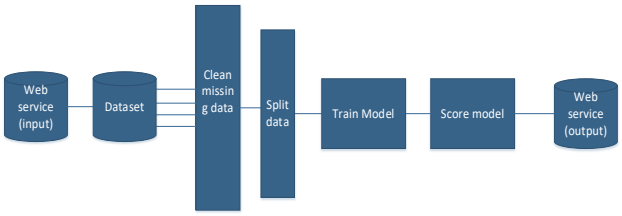

FIGURE 1 Model structure

Unified models allow replication of such management processes, subject-based evaluations can be carried out on the basis of the model.

The results show that the role of DSS in the field of education makes it possible to make effective decisions as one big step in the implementation of artificial intelligence in the system.

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Computer vision in object detection task

Kim Dmitriy

Satbaev University, Almaty, Kazakhstan

Corresponding author's e-mail: expendebles125@gmail.com

Abstract

This work is a result of computer vision research in the tasks of detecting objects on graphic images. The paper presents a general algorithm of the program for the detection of various objects and the principles of working with the OpenCV library in the Python language. There are various cases in attempts to detect the human hand.

Keywords: Image processing, objects detection, computer vision.

1 Introduction

The tasks of processing graphic information in our time are among the most important in the field of machine learning and computer vision. These tasks are applicable to all areas of science in which you need to detect, recognize or identify an object in the image. Methods for solving such problems can be divided into 2 groups: methods using machine learning (neural networks) and methods using machine vision (the OpenCV library).

With the improvement of technology, questions like "How to simplify the process of information processing?" and "How to automate machine processes?" have appeared. These questions are the main today in the field of machine learning. Recognition tasks are designed to answer these questions.

All machine learning methods for object detection uses common landmarks, either object is human face [1] or something else. The main difference between neural networks and OpenCV library is that computer vision doesn't need to learn network and also it doesn't need to keep landmarks as a data array. This is undisputed advantage of computer vision method. However, neural networks have their advantage – the accuracy of results and upper speed of processing in compare with OpenCV methods.

2 Decision

Main algorithm of OpenCV program:

- Image processing
- Finding edges
- Finding contours
- Closing contours
- Finding wanted objects
- Common algorithm of neural network:
- Collecting data examples
- Extracting all landmarks by using program
- Work with datasets
- Find to compare landmarks with input datasets and make decision

Image processing includes making photo, using blur to make it less noisy, cutting or decreasing size of image to make it more comfortable to process, converting color scheme.

Finding edges means finding borders between pixels with different color and bright definition. It could be done by OpenCV function Canny. This function is a main stage of this algorithm. It has 2 parameters and manipulate them is a way to find edges. Object need to have a clear visible border on CannyEdge scheme (Figure 1).

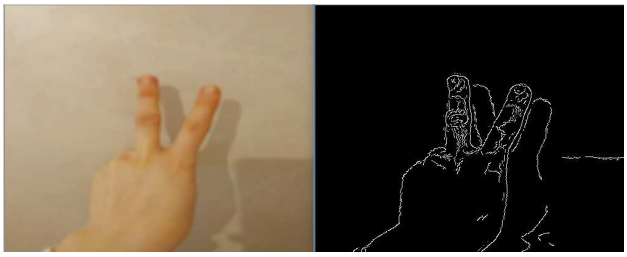

FIGURE 1 Canny edge detection

Next step of algorithm is to find contours and close any unfinished of them (Figure 2). It could be done by CV.findcontours() function.

FIGURE 2 Drawing contours

As a result, we got next (Figure 3):

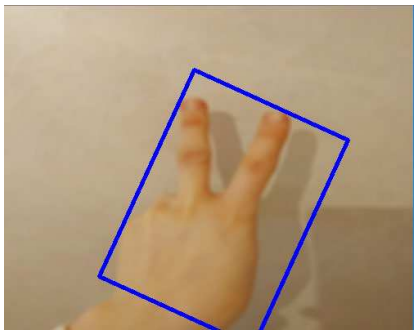

FIGURE 3 Result of detection

Algorithm finds the biggest found contour based on close contours, found via cv.findcontours function.

3 Conclusion

As a conclusion I would like to say that this algorithm, in comparison with machine learning, has its own advantages, like low processor and other resource expenses. But machine learning algorithms gives more precisely results based on comparison with array of signs.

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Development of a simulator based on virtual and augmented reality

Konstantin Dyomin, Zhanar Omirbekova*

Satpayev University, Satpayev Str.22, 050013, Almaty, Kazakhstan

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

Abstract

This article is devoted to the development of virtual reality in emergencies, the use of the latest achievements of computer simulation of emergency response actions in the professional training of firefighters and rescuers is one of the priorities. Realization of this direction with the help of the "virtual reality" technology allows to achieve the effect of the full presence of a simulated emergency situation in a three-dimensional scene.

Keywords: virtual reality, computer simulators, personnel training, emergency situation, civilian equipment.

1 Introduction

The problem of training new qualified specialists within a short period of time has always been very acute. This is connected with various changes that occur in our daily life, social and technological environment. This is one of the reasons for the development of virtual reality (VR), since our brain absorbs visually acquired information three times better, which in turn improves the quality of learning.

A great advantage of virtual reality is the student's involvement in the process, besides VR allows you to change scenarios, influence the course of an experiment, or solve a mathematical task while playing and in easy-to-understand form. It should also be noted that the student's focus increases significantly and allows to concentrate on the material due to the full immersion.

2 Overview

Today, virtual reality is called an important branch of the technology industry. By the way, in the USA they consider this direction to be the third most important one, after atomic and space. In the past, VR success was prevented by two main elements: developer support and input devices. All these obstacles were overcome with occurrence of new, more compact and simpler production processes, and also as a result of increased interest of consumers.

Virtual reality is also used in civil defense for police training. At the same time, the Pentagon has been long investing funds in the development and use of virtual reality systems for its own purposes, and it should be said, successfully. Even now, some elements of contactless war were demonstrated in the course of hostilities in Iraq, when the US Army, using high-precision weaponry and remotely controlled vehicles, attacked Iraqi troops without direct contact.

Today, VR industry is accumulating huge investments to create unique products. VR glasses and OculusRift already exist. Every year more and more new gadgets for the VR industry appear [1].

It is essential to recall that the range of application of virtual reality is very wide, which excites investors who see it changing everything, from online education to corporate meetings and video games. Investments stimulate big bets on VR from Google, Microsoft and Sony.

It would be useful to say a few words about the future of virtual reality, namely, about the forecasts for the development of this sphere. For example, LETA Capital prepared a report on the future of virtual reality.

The report contains information that games will have become the largest sources of revenue for VR by 2020. To be more precise, approximately 4.5% is spent on the gaming industry, 2% on technology, 1.7% on film industry, 1% on theme parks and 0.8% on niche market [2].

Moreover, according to the company's specialists, it is planned to invest 30 billion dollars in this industry until 2020. Although this is not the entire report, it is clear even from this point that this sphere will gain momentum in the near future. If there is a demand, there will be an offer. And it is commonly known that many people are looking forward to the development of this sphere.

3 Decision

Analysts predict that by 2025 the potential of using VR-devices will reach its peak, and the number of users will exceed 100 million people only within the United States. If today most of the latest glasses and helmets are used by gamers and cinema lovers, then in a decade, improved glasses will become a common devise, like today's mobile phones. Virtual reality will allow people to educate without leaving their homes, make deals, conduct business with foreign partners, attend any concerts and public events. A new round awaits cinema and visual arts, which will have more opportunities for implementation of new projects. Today, the largest companies such as Facebook, Microsoft, Google and Sony are actively working on the development

of VR devices [3].

The technology applied is widely used in various simulators for training pilots of airplanes, drivers, ship captains, rescuers' training, and allowing placing a trainee in appropriate simulated situations (including emergency ones). In devices that simulate human interaction with a virtual environment, several basic types of systems are used to form and output an image: Virtual reality helmet or glasses, retinal monitor, MotionParallax 3D displays.

Interaction with the surrounding objects of the virtual world is carried out with the help of various manipulators, for example gloves, which can be a set of virtual reality suit tracking change in the position of the entire body and besides transmitting tactile, temperature and vibration sensations. A freely rotating ball may serve as the device for tracking movements of the user, into which the user is placed, or it may be carried out only with the help of a virtual reality suit hanging in the air or immersed in liquid. Technical tools are also used to simulate odors, smoke and sound. Finding a position and orientation of the user in space is carried out using special sensors and markers. Sensors remove a signal from a real object when it is moved and transmit the received information to a computer.

Three-dimensional objects for modeling an emergency situation are created in automated design systems, such as: AutoCAD, ArchiCAD, 3DMax, etc.

Completed 3D-models can be combined into an information model of a specific part of the city. Using a single information model of a specific part of the city, it is possible to carry out analysis, modeling, forecasting of accidental and emergency situations and to work out actions to eliminate them. In the process of preparing firefighters and rescuers, virtual reality technology allows to immerse in the three-dimensional world, in which it is possible to move and interact with what is happening around and make decisions while being in safe conditions. This technology is recommended to be used to practice actions in emergency situations at highly dangerous facilities, this will allow to prepare firefighters and rescuers emotionally for an emergency situation and reduce the death of rescuers in a real emergency situation.

In general, virtual reality systems are used in the industry where it is necessary to work with three-dimensional data, that is, almost everywhere; there are plenty of examples, and this industry will be systematically and differentially developed.

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Graph model of robotized technological operations of non-ferrous metallurgy

Muhit Sh Baybatshayev, Aidana K Akberdiyeva*

Satbayev University, Kazakhstan

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

Abstract

The paper discusses the importance of manual operations in non-ferrous metallurgy. Based on the various signs of manual operations there was highlighted their classification. After analyzing manual operations, it is possible to construct a graph model of the classification characteristics of manual operations.

Keywords: technological process, manual operation, non-ferrous metallurgy, classification of manual operations.

1 Introduction

Technological processes of non-ferrous metallurgy (TPNFM) are characterized by widespread use of service operations performed manually, this circumstance greatly holds back the technological progress of the industry and has profound social consequences.

The survey and analysis of manual operations (MO) revealed a number of characteristic properties:

1. The content, the sequence of actions and the cyclical nature of manual operations are unchanged and are determined by the characteristics, parameters of the technological processes for servicing of which manual operations of technological equipment are used in which they take place;
2. There may be a drift in the technological process parameters, leading to a drift in the MO characteristics. For example, the drift of the spatial position of the positioning points and (or) movement trajectories, positioning time points or speeds and accelerations of movement along the trajectories of the working tool or load, force-moment characteristics necessary to perform the MO;
3. There may be different modes of conducting the technological process, affecting the characteristics of the MO. For example, change of the spatial position of the positioning points and/or trajectories, the moments of positioning or speed and acceleration of the movement of the working tool or load, changes in the force-moment characteristics necessary to perform the MO;
4. There may be adverse conditions (aggressive environment, fire and explosion hazard conditions, the presence of high temperature and other conditions) in the technological space where the MO are performed.

The above-mentioned features of technological processes make it possible to identify the main features, according to which MO requiring robotization are classified.

Classification of manual operations. By the possession of various characters, from the listed series there can be selected many classes of MO. Let consider these classes. As can be seen from the description of the classification features, they can be divided into eight groups.

The first group includes signs 1-3, reflecting the types of action components of the MO. The second group includes signs 4-6, they reflect the spatial characteristics of the MO. The third group includes signs 7-8, reflecting the relationship between the spatial positions of the positioning points and the MO trajectories with the drift of the parameters of the technological equipment (TE). The fourth group includes signs 9-11, they reflect the time characteristics of the MO. The fifth group includes signs 12-13, reflecting the relationship of the time characteristics of the MO with the drift of the TE parameters. Signs 14-15 belong to the sixth group, they display the force-moment characteristics of the MO. Signs 16–17 belong to the seventh group; they reflect the characteristics of the environment in which the MO take place. The eighth group includes signs 18-19, they reflect the existence of any other factors that are not included in the previously listed signs that affect the performance of the MO.

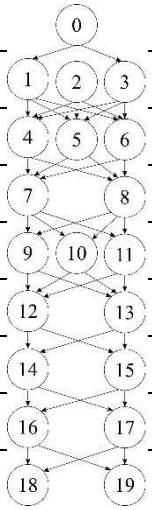
2 Conclusion

Classifying the MO, each class is characterized by eight main features according to one of the selected groups.

Therefore, in total, during the signs possession, from each group there can be distinguished 864 MO classes.

At the same time, the regulation or control of the technological process parameters or technological equipment can be used to control the classification characteristics of the MO and to provide the conditions under which it is possible to solve the problem of their automation or robotization, using standard means of robotics or developing special or specialized industrial robots.

TABLE 1 Graph model of classification signs of manual operations

Classification signs		MO nomination
1st level		
2nd level		Types of actions required to perform manual operations;
3rd level		Spatial characteristics of manual operations and their relationship with the characteristics and parameters of the technological process
4th level		Spatial characteristics of manual operations and their relationship with the characteristics and parameters of the technological process
5th level		Temporary characteristics of manual operations and their relationship with the characteristics and parameters of the technological process
6th level		Temporary characteristics of manual operations and their relationship with the characteristics and parameters of the technological process
7th level		Force-moment characteristics of manual operations and their relationship with the characteristics and parameters of the technological process
8th level		Characteristics of the production conditions in which manual operation is performed
9th level		The existence or absence of other unrecorded factors affecting the performance of a manual operation

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Assessment of exposure to high-frequency imposition noise generators

Nurzhigit Smailov, Askhat Batyrgaliyev*

The Kazakh National Research Technical University name after K.I. Satbayev (Satbayev University), Satbayev Str. 22, 050013, Almaty, Republic of Kazakhstan

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

Abstract

The paper considers the assessment of the susceptibility of noise generators to a technical channel of information leakage due to high-frequency imposition using the example of jammers "Barrier". Describes the need to use active information security tools. The technical characteristics and functionality of the considered noise generators and the causes of the information leakage channel due to high-frequency imposing are indicated. The results of practical experiments to determine the performance of noise generators and their exposure to high-frequency imposition are given. According to the results of the study, relevant conclusions were made indicating the specific reasons for the absence of information leakage in the jammers of the channel in question.

Keywords: spatial noise generator, high frequency imposition, means of active protection, technical channel of information leakage

1 Introduction

In the 21st century, widespread informatization and the introduction of digital technology are the key of importance in all sectors of human life. The transition to new technologies occurs in a matter of years, and not in decades, as before. Anticipating such a situation in the republic, the State Program "Digital Kazakhstan", the Roadmap for the development of the electronic industry and other documents aimed for accelerating the pace of economic development of the republic and improving the quality of life of the population through the use of digital technologies were adopted.

Electronic equipment is used in almost all spheres of human activity, ranging from the use of communication equipment to medical equipment and ensuring safety in general. However, the use of electronic devices and computer technology carries a large number of information security threats.

One of such threats is the presence of technical channels of information leakage, arising as a result of informative (dangerous) side electromagnetic emissions (EMI) of technical means for its processing, storage and transmission. The physics of this phenomenon is the occurrence of an electromagnetic field when an alternating electric current flows through electrical circuits and other conductors. This field contains information that is transmitted over data buses, circuits and interface conductors or circulates in nodes, blocks and components of electronic devices. Thus, all processed and transmitted information to a greater or lesser extent can be radiated in the air. However, there is information, such as personal data, research and development, or state security, which may be classified as confidential information or other secrets protected by law, the free distribution of which may be harmful if unauthorized information is received or distributed.

2 Overview

The protection of restricted access information from leakage through the EMI channel is decided by organizational or technical measures, using passive or active means of protection. Active means of protecting information from EMP are spatial electromagnetic noise generator (NG) [1-4].

Currently, a large number of different NG, both foreign and domestic production, represents the market. Noise generators are manufactured as separate devices or as a PCI card for a personal computer. NGs typically consist of a wideband signal generator and one or more antennas.

In addition to the characteristics directly related to the generated noise (the range of the generated noise frequencies, the spectral density of the noise power, the structure of the noise, etc.), as well as mass-dimensional parameters, the NG should not be subject to acoustoelectric transformations [1]. This is because NG, as information security tools, must themselves be protected. Considering that the NG is not intended for processing information, they can be a source of leakage of other protected information. Such information may include human speech. For example, confidential talks or audio or video playback in the room where the NG is installed.

At the same time, with the specified property, the NG should also not be susceptible to high frequency imposition (HFI). The information leakage technical channel (LCH) due to the HFI can be realized by unauthorized contact injection of high frequency currents from a special generator into the power supply line of the NG, on nonlinear and parametric elements of which the information signal will be modulated. The informative signal in the specified elements of the NG occurs due to the conversion of acoustic (speech) signals into electrical ones ("microphone effect"). Due to

the fact that the nonlinear or parametric elements of the NG for a high frequency signal represent an unmatched load, the modulated high frequency signal will be reflected in the opposite direction or reemitted on the air. In this case, the interception of the reflected signal will be carried out by special highly sensitive equipment [3-5].

3 Decision

To determine the susceptibility of NG LCH at the expense of HFI along the power line, measurements were made of noise generators (jammers) "Barrier" (produced by "Granit" Special Design and Technology Bureau" LLP (Almaty, Kazakhstan), figure 1) designed to disguise EMI personal computers, workstations, computer networks and complexes at computer facilities, the suppression of low power radio tabs ("Barrier-01") and ultra-wideband radio tabs ("Barrier-M").

The studies of jammers "Barrier" on the subject of exposure to HFI were carried out in accordance with the measuring stand, the general scheme of which is shown in Figure 1.

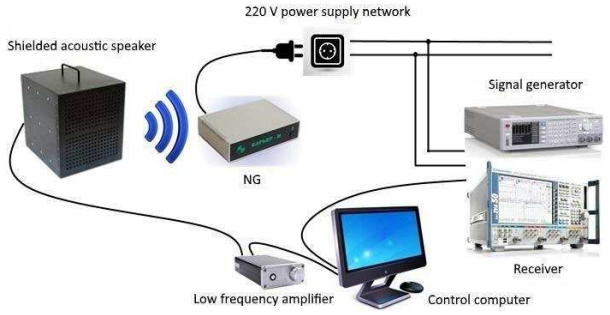

FIGURE 1 Measurement scheme

NG were connected to the power supply network (telephone line), but were not in the mode of generating interference in the air and / or in the line, as in this case the interferences induced on the line would not allow detecting signals of small amplitude modulated by acoustic test signals. A specialized automated complex was used as a signal generator and receiver.

The measurements were carried out with the following parameters:

- frequency of the probing high-frequency signal from 50 kHz to 30 MHz;
- frequency of sounding with test acoustic signals in accordance with [5];
- sound pressure level of 70 dB which corresponds to loud speech [6-8].

4 Conclusion

According to the results of the studies, the susceptibility of the indicated HFI interference operators was not identified. This may be due to:

- small amplitude (power) of the probing signal at the output of the high-frequency generator;
- attenuation of the signal in the cable (taking into account its length);
- the minimum acceptable signal-to-noise ratio at the input of the receiving device (its sensitivity);
- possible absorption (scattering) of the energy of the probing signal inside the NG;
- the fact that a high-pass filter is installed on the power transmission line;
- the mismatch of the input terminals of the power supply cable NG with a line of 220 V (from the position of the electromagnetic wave) in a very significant degree of high frequency.

The first three reasons can be excluded, taking into account that the power of the probing signal was set independently, and the distance to connect the monitoring equipment from the NG is minimal.

In the fourth embodiment, it can be assumed that there was a mismatch of the NG terminal with the power supply line to some extent. Therefore, part of the energy should be reflected, and the other to get into NG. This part has penetrated into the NG, and could cause the appearance of LCH due to the HFI. However, due to the absorption or dissipation of the energy of the probing signal in the nodes, blocks, circuits and components of NG, its reflection back to the terminals did not occur.

In the fifth version, the manufacturer provided protection of the NG from information leakage due to the HFI. However, this option is unlikely, since the product description does not provide such information.

In the sixth case, the electromagnetic wave is almost completely reflected from the terminal back to the power line. The maximum possible energy of the probing signal is returned to the control device. In this case, the electromagnetic energy does not penetrate into the NG, the modulation of the probe signal is not carried out, and accordingly, the LCH due to the HFI is not formed.

In conclusion, I would like to note that the main purpose of the NG is to protect information from its leakage due to EMI. However, despite the quality of the electromagnetic noise generated by the NG and all its effectiveness as a means of protecting information, they should not be a source of information leakage.

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Application of machine learning "black boxes" explainers in the development of a recommendatory system for improving the quality of school education

Kirill Yakunin[1]*, Bek Kasymzhanov[1], Yan Kuchin[1], Adilkhan Symagulov[1,2], Sanzhar Murzakhmetov[1,2], Timur Buldybayev[3], Ravil Mukhamedyev[1,2,4]

[1]Institute of Information and Computational Technologies SC MES, Almaty, The Republic of Kazakhstan
[2]The Kazakh National Research Technical University named after K.I. Satpaev, Almaty, The Republic of Kazakhstan
[3]JSC Information Analytical Center, MoES. Astana, The Republic of Kazakhstan
[4]ISMA, Riga, Latvia

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

Abstract

The article considers the method of using interpreters of machine learning models for developing a recommendation system for improving the quality of school education. A system of indicators Q-edu was developed based on data on the quality of education. Each secondary school is described by a set of parameters in the regression model. Evaluation of the influence of these parameters allows us to develop recommendations for improving the quality of an individual educational institution within the framework of this model. Several interpreters were analyzed, including Treeinterpreter, LIME and SHAP. The latter is applied in practice. The obtained results demonstrate the possibility of using this interpreter as the basis of a recommendatory system for secondary education.

Keywords: secondary education, SHAP, education quality, machine learning

1 Introduction

In 2015, at the UNESCO World Education Forum more than 180 countries of the world including Kazakhstan adopted a new education development concept until 2030. The essence of this new concept is reflected in the United Nations Sustainable Development Goal 4, "Quality Education for All" - to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (Incheon Declaration and Framework for Action for the Implementation of Sustainable Development Goal 4, UNESCO, 2015). To achieve SDG-4, 7 targets are to be accomplished: universal primary and secondary education, early childhood development and universal pre-primary education, equal access to technical/vocational and higher education, relevant skills for decent work, gender equality and inclusion, universal youth literacy, education for sustainable development and global citizenship. The countries around the world should exert every effort to achieve this Sustainable Development Goal by 2030.

The new concept of education was fully reflected in the strategic documents for the development of education in Kazakhstan.

Today, there are over 7 thousand schools in Kazakhstan. They enrol 3.2 million students. 340 thousand teachers are employed. For the timely identification of problems, educational monitoring is conducted within the National Educational Database (NEDB). The NEDB contains over 10 million data records for all educational institutions.

At that the opportunity of machine learning methods application to identify the most influential parameters for each school, to identify regional discrepancies in education quality have emerged.

To assess the subject areas described by the data arrays it is possible to use machine learning methods. In particular, it is useful to use cluster analysis methods, among which are isometric mapping (ISOMAP) [1], locally linear embedding (LLE) [2], t-distributed stochastic neighbor embedding (t-SNE) [3], kernel principal component analysis (KPCA) [4], and multidimensional scaling (MDS) [5]. These methods help to assess the regional imbalance, "overestimation" or "underestimation" of students' grades, to identify organizations with abnormal values of parameters.

On the other hand, supervised learning methods, in particular, regression models [6] also allow to identify anomalous objects, but, in addition, the constructed model can be analyzed from the point of view of identifying the most influential parameters. That is, it is desirable to interpret the model in order to answer the question "Why this certain result was the output of the trained model?".

In particular, there are examples of models, when some features of the dataset led to the correct classification results for a specific case, while the model itself was in general completely wrong and the results were based on illogical features from the dataset [7]. This work describes the task of test classification between atheistic and religious content, when it turned out that the model correctly distinguished the former from the latter, but not based on content of the texts, but based on the presence of the word "posting", which occurred only 2 times in texts of religious content, although

it was very common (21%) in the training set.

In other words, an algorithm is needed that will help answer the question "Which variables and within what limits affect the prediction?" This allows us to make sure that the model does not overfit and that it does not generate a result in a random way.

The ideal interpretation may be, for example, when the general response of the model is the sum of the values of the parameters (X) multiplied by the model coefficients (Theta): S = theta0 * x0 + theta1 * x1 + ... + thetai * xi

In this case, it is easy to understand how individual features influence the result. In terms of explaining the result, linear regression models are easily interpretable.

However, this approach is not always possible. In the case of complex non-linear dependencies and significant correlation of properties, the model is a so-called "black box", that is, a kind of closed system that receives data as input, "secretly" processes them and outputs the result. What is being done inside the “black box”, how the model has linked the input data with the result remains incomprehensible.

To turn such a “black box” into a “white” one, that is, to understand how individual parameters influence model prediction in regression and classification problems, the Treeinterpreter for decision trees, LIME (Local Interpretable Model-agnostic), DeepLIFT, similar to Layer-Wise Relevance Propagation and the most recent method described in 2017 - SHAP (SHapley Additive exPlanations) can be applied.

Information about LIME is given in [8, 9]. There is a project on Github [10]. Applications of the method are described in [11, 12]. LIME is model-agnostic and can be applied to any model that supports the predict_proba method in sklearn, or which results can be represented in form of probability (for example, softmax). In short, the essence of the method is that the model assumes a local linear dependence of the classifier's output on changes in the properties of an object in a small range. An interpretable model is created, which is trained on small perturbations of the parameters of the object being evaluated (“noise” is added), achieving a good approximation of the original model in this small range. Noise is created differently for different types of tasks, for example, by adding noise to continuous functions, deleting words or hiding parts of images. However, this relative simplicity of the LIME interpreter is the cause of its main disadvantage. For complex, difficult to interpret models, linear approximations may be inadequate even if a small local area around the parameter values is analyzed. In such cases, LIME may produce erroneous explanations.

In turn, SHAP [13, 14] is qualitatively different from the simple search for correlations, in view of the fact that it uses the model for gaining knowledge about nonlinear and non-monotonic interdependencies of parameters that influence the final result. The method is designed to work in the case of a significant relationship between the parameters. In general, the method requires over-training of the model on all subsets of S ⊆ n, where n is the set of all features. The method assigns a value of importance to each property, which reflects the effect on the model prediction when this property is enabled. To calculate this effect, the model f (S∪ {i}) is trained with this property, and the other model f (S) is trained with the excluded property. Then, the predictions of these two models are compared at the current input signal f (S∪ {i} (xS∪ {i})) - fS (xS), where xS represents the values of the input properties in set S. Because the effect of excluding a feature depends on other features in model, then the difference is calculated for all possible subsets of S ⊆ n \ {i}. Then, the weighted average of all possible differences is calculated:

$$\varphi_i = \sum_{S \subseteq \{1,2,\ldots,n\} \setminus \{i\}} \frac{|S|!(n-|S|-1)!}{n!} (f(S \cup \{i\}) - f(S)), \quad (1)$$

This is the assessment of the importance (influence) of the properties (parameters) on the assessment of the model. In general, this is an approach based on game theory, which, according to the conclusions of the authors of the algorithm, provides a common interpretation and suitability for a wide range of machine learning methods.

The latter method is applied in the development of a prototype of a recommendation system for improving the quality of school education.

2 Data

The source for the selection of indicators of general secondary education was the administrative data of the MoES RK. In Kazakhstan, administrative data collection in the field of education is carried out within the National Education Database (NEDB). The NEDB contains data on more than 20 thousand educational organizations. The source of data on the final learning outcomes and scholarship (grants) allocation is the National Testing Center (NTC). The data collection was carried out for the 2018-2019 academic year, the data on the results of training for the 2017-2018 academic year.

The NEDB contains the following data for each school:

- Location, type, internal structure
- Material provisioning (library, power, heating, repair, floor space, etc.)
- Staff (number, rank, experience, quality staff etc.)
- Contingent (language of instruction, children with special needs, gender and ethnic composition, etc.)
- accessibility of school education (clubs, activity groups, transportation, catering, etc.)
- learning outcomes (academic performance).

Considering the available variables in the databases, about 200 variables of general secondary education were identified and collected, including about 10 obtained as a result of feature engineering.

Based on the data, 4 education quality indicators Q-Edu were predicted and calculated:

- Q-Edu-1 - Percentage of graduates enrolled in top specialties in top universities
- Q-Edu-2 - The number of elite achievements (Altyn Belgi, republican and international competitions)
- Q-Edu-3 - The share of graduates who scored the passing score on the ENT
- Q-Edu-4 - Percentage of graduates who have continued their studies
- Q-Edu-1,2,3 were calculated on the basis of available data, and for the formation of Q-Edu-1 (the proportion of graduates who entered the top specialty in top-universities) the following additional data was used:
  1) National ranking of universities - http://egov.kz/cms/ru/articles/2Fbestuniinkz30

2) Grant passing points for specialties for 2017 - https://univision.kz/prohodnye-bally-na-grant-2018.html

As a result, 9 universities have been selected that are well-placed in the national rankings:

- KazGU
- KBTU
- MUIT
- SDU
- KazNMU Asfendiyarov
- Eurasian National University Gumilyov
- KazNRTU named after Satpayev
- Karaganda Economic University of Kazpotrebsoyuz
- KazNPU named after Abay.

3 Results

On the basis of available data and calculated Q-edu-1-4 quality indicators, machine learning models were built and trained to predict quality indicators based on the available preprocessed data. As a result of the experiments, a model based on decision trees GradientBoosting, implemented in the scikit-learn package, was applied. The constructed models consisted of 100 trees, each with a maximum depth of 5.

As a result, models were obtained with the coefficients of determination shown below. The coefficient of determination is a quality indicator that compares a trained model with a model that always predicts the mathematical expectation, for which the value 0 corresponds to the model predicting the mathematical expectation, and the value 1 corresponds to the ideal model.

- Q-Edu-1 - 0.98
- Q-Edu-2 - 0.84
- Q-Edu-3 - 0.77
- Q-Edu-4 - 0.94

Then, the SHAP algorithm described above was used to explain the resulting models and rank the importance of the factors. As a result, the results were obtained in the form shown in Figure 1.

Let us consider Figure 1 and give its interpretation. Each row in the figure reflects a certain factor, the factors are sorted by significance in descending order. Each point represents a separate school, and its position along the horizontal axis shows how negative (to the left) or positive (to the right) this factor had an effect on (in this case) indicator Q_edu 3 of this school. At the same time, the color of the dot indicates the value of the factor - the red dots have a high value of this factor (higher than the mean of the sample), with blue, respectively, a low value. For categorical/binary factors, the color of the dots means respectively belonging to a category, or the presence/absence of a factor.

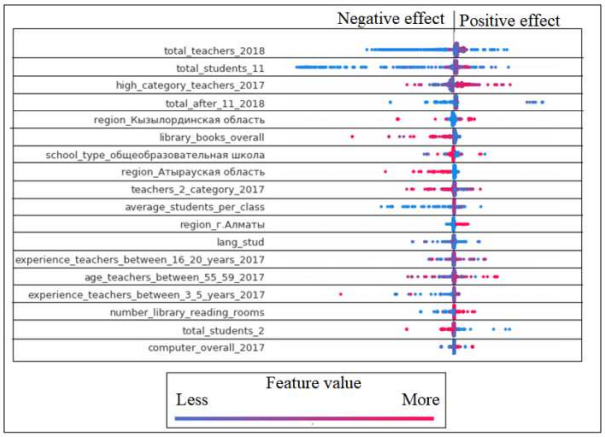

FIGURE 1 The influence of factors on the indicator Q-edu 3 (the number of graduates who scored a passing score on the ENT)

Consider an example of the factor "Region_Almaty" - belonging to this region introduces a positive influence on the indicator Q-edu 3 in the trained model, and, accordingly, the lack of belonging to this region in some cases brings a smaller negative value in absolute value.

It should be noted that a high degree of influence does not automatically mean the existence of causal relationships, but only indicates that the model uses one or another factor as the most suitable for statistical separation by target indicators, or, in other words, as the factor having the greatest information entropy for the task.

4 Conclusions

A multidimensional assessment of the quality of the Q_edu school has been proposed.

The proposed recommender system identifies key parameters affecting key quality indicators, including regional imbalances and regional features. There are opportunities to analyze the most important parameters for the entire sample, individual schools, as well as the analysis of the interdependence of various factors. The number of Q-edu indicators can be increased, and their content should be coordinated with experts in the field of secondary education. In order to more closely match the indicators with the realities of school education, it is proposed to introduce an expert assessment of the weight of the parameters. Expansion of the data set (by annual cuts) will allow to evaluate the dynamics of changes in the indicators Q-edu.

Acknowledgments

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On a method of multimodal media ranking using corpus based topic modelling

Rustam Musabaev, Ravil Muhamedyev*, Yan Kuchin, Adilkhan Symagulov, Kirill Yakunin

Institute of Information and Computational Technologies, Pushkin Street 125, Almaty 050010, Kazakhstan

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

Abstract

A method for calculating the probabilities of the distribution of mass media by topics, characteristics and classes based on a thematic model of the corpus of media texts is proposed. The essence of the method is to use a thematic model, represented by a matrix of conditional probabilities of distribution of media documents by topic, to obtain the distribution of conditional probabilities of the media by topic, as well as classes and characteristics, determined by experts. A calculation algorithm is based on Bayesian rules and the result of its work on a small model example is described.

Keywords: natural language processing, topic modeling, Bayesian rules

1 Introduction

Currently, there has been significant progress in the models and methods of natural language processing. Natural language processing (NLP) as a research area includes a wide range of applied sections:

- the automatic translation [1],
- the automatic summarization,
- the generation of responses to user requests (Question Answering) [2].
- the information extraction (IE) [3],
- the information retrieval [4] [5].
- the sentiment analysis [6],
- the other areas, which are related one way or another to the processing of oral and written natural speech.

The needs to solve the practical problems of NLP served the development of many methods of Computer Science, among which we can mention machine learning, neural networks, deep learning [7], fuzzy logic, first order logic, semantic networks and others.

Recently, the scientific research, which are supported by the growth of computing power, led to a number of breakthrough results in NLP, among which are the successes in the field of machine translation, automatic summarization, information retrieval, question answering, sentiment analysis, information extraction [8], authorship verification [9].

The key aspects that allowed to obtain the impressive results in the field of automatic processing of natural language texts are, according to [10], the advances in the development of machine learning methods, the multiple increase in computing power, the availability of a large amount of linguistic data and the development in understanding of the structure of natural language in the application to the social context.

NLP as a field of research is changing extremely dynamically. Since the time of work [11], the qualitatively new results have been obtained in the development of statistical models of the language. The large volumes of available social media texts and the usage of deep neural networks [12] lead to the formulation of pattern extraction tasks from the huge amounts of unstructured information on the base of the modern methods of distributive linguistics and the so-called distantly supervised learning [10].

One of the methods productively applied in the field of NLP is thematic analysis or thematic modeling. Thematic modeling is a method based on the statistical characteristics of collections of documents, which is used in the tasks of automatic summarization, information extraction, information retrieval and classification [13]. The meaning of this approach is based on the intuitive understanding that the documents in the collection form groups in which the frequency of occurrence of words or combinations of words differs.

The heyday of this area of research came in 2012–2013, after which in 2018 the number of publications with the term "thematic modeling" was more than halved (166,000 in 2012 and 61800 in 2018) according to google scholar [14].

Using clusters of documents related to a set of topics allows solving problems of synonymy and polysemy of terms [15]. Probabilistic thematic models describe documents (M) by a discrete distribution on a set of topics (T), and topics by a discrete distribution on a set of terms [16]. As a result of building a thematic model, a matrix of conditional probabilities is formed, hereinafter referred to as p2(k|m), where $k \in T$, $m \in M$.

In this paper, the thematic model is used to calculate the conditional probability distributions of the media by themes, classes and attributes. In other words, a multimodal evaluation of the media, based on the initial distribution of documents by topic is proposed. The proposed approach is remarkable in that the thematic model created by cluster analysis (unsupervised learning) is then applied in conjunction with expertly defined classes and attributes. In

other words, the user sets the semantics of the required distribution, although the initial thematic analysis depends only on the corpus of documents.

2 Algorithm of Multimodal Mass-Media Assessment

Goal: using the distribution of the likelihood of corpus documents, aggregate the indicators of compliance of an article with topics, attributes (dictionaries) and classes to obtain conformity assessments of the media in three modalities: topics, attributes and classes.

Method: To assess these mentioned correspondences, probabilistic and Bayesian approaches are used under the assumption that the probabilities of articles, topics, classes, and attributes are mutually independent.

Expected result: Assessment of media "belonging" to topics, attributes and classes in the form of probability distributions.

Brief description: Using a variety of topics of the corpus, firstly, we obtain a discrete distribution of the probability of articles on topics (p2). Secondly, we obtain the distribution of dictionaries by topics (p1), that is, we determine the extent to which the dictionary describes a specific topic. Thirdly, using the analytical hierarchical process (AHP), we calculate the importance of dictionaries for classes (separately for each class) (p3). Then, using p1 and p3, we calculate the conditional distribution of topics across classes (p4). Knowing the probability distribution of topics across classes (p4) and the probability distribution of an article by topics (p2), one can calculate the distribution of an article by classes (p5). In turn, the distribution of the article by attributes or dictionaries (p6) depends on p1 and p2. The initial data and the resulting matrices of conditional probabilities are shown in the figure. The corpus of documents is described by the dictionary (Corpus Dictionary). Media (MMS) are the source of m documents (Fig 1).

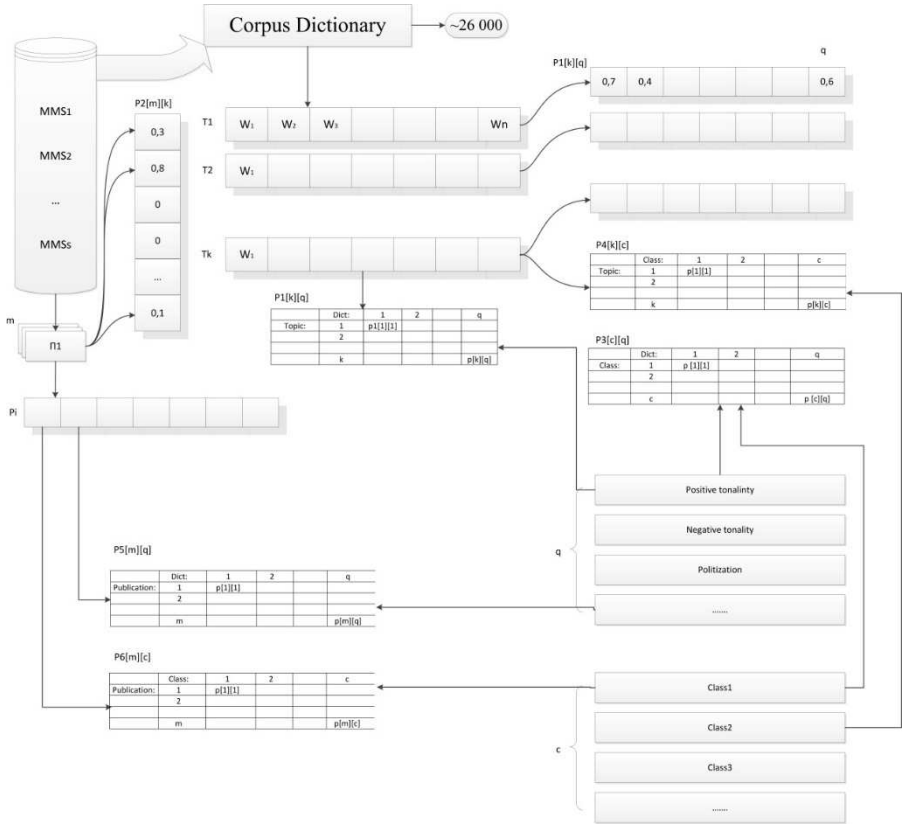

FIGURE 1. Processes for determining conditional probabilities

After receiving these estimates for each publication, the media is assessed using the Bayesian rules chain.

In accordance with the Bayes formula, we can express the conditional probability of the validity of hypothesis h when the e event occurs in the form

$$p(h|e) = \frac{p(e|h)\times p(h)}{p(e|h)\times p(h)+p(e|\backsim h)\times p(\backsim h)}, \quad \text{(B1)}$$

where $p(e|h)$ – the conditional probability of occurrence of an event e at fair h, $p(h)$ – prior probability of hypothesis h, $p(e|\backsim h)$ - the conditional probability of occurrence of an event e at unfair h, $p(\backsim h)$ - the probability that the event h is not true, which, according to the formula for the total probability, can be calculated as

$$p(\backsim h) = 1 - p(h). \quad \text{(B2)}$$

Thus, of calculate the conditional probability $p(h|e)$ it's enough to know the probabilities$p(e|h)$, $p(e|\backsim h)$ and a priori probability$p(h)$.

In terms of the media assessment task, conditional probabilities $p(e|h)$ can be interpreted as the probabilities of the appearance of some article in e ∈E (where E is set of articles of specific media) under the condition of validity of the hypotheses of three types (each hypothesis for its modality):

h1: The media works in one of the topics from a variety of topics T: H1={h1[1],...,h1[k]}

h2: The media publishes articles belonging to a class

from set C: H2={h2[1],...,h2[c]}

h3: The media differs by attributes from Q: H2={h3[1],...,h3[q]}

Consider the first task, which is to determine the preferred topics of the media.

Thematic focus of the media is expressed in published articles. Article e_i appears depending on whether the media works in topic $t_j \in T$, где $t_j = (1,\ldots,k)$

Let's assume that $p(e_i|h1(t_j)) = p2[t_j][e_i]$, where p2 – discrete distribution of conditional probabilities of topics according to corpus documents.

In turn, the probability of appearance of an article on this topic with the validity of the hypothesis that the media does not work in the topic of k_j, we assume equal to $\mathbf{p(e_i|\sim h1)=0.5}$, which essentially means that we have no information. The prior probability $p(h1(t_j))$ is taken to be equally probable for all topics. $p(h1(t_j))=1/k$, and according to the expression (B2) $p(\sim h1(t_j)=1- p(h1(t_j)$

Similarly, let's assume $p(ei|h2(c_j)) = p5[e_i][c_j]$, where p5 - conditional probabilities of publication distribution by classes $p(h2(c_j)=1/c_j$, $p(\sim h2(c_j)=1- p(h2(c_j)$, $p(e_i|\sim h2(c_j))=0.5$.

Also $p(e_i|h3(q_j)) = p6[e_i][q_j]$, where p6 - conditional probabilities of publication distribution by attributes $p(h3(qj)=1/q$, $p(\sim h3(q_j)=1- p(h3(q_j))$. $p(e_i|\sim h3(q_j))=0.5$

Omitting the number of a specific subject (t_j), class (c_j) and attribute (q_j) for the indicated hypotheses h1 $\in$ H1, h2 $\in$ H2, h3 $\in$ H3, we can get the following

3 Algorithm of Multimodal Media Assessment

For all $h1 \in H1$

For all $e_i \in E$

$$p(h1|e_i) = \frac{p(e_i|h1) \times p(h1)}{p(e_i|h1) \times p(h1) + p(e_i| \backsim h1) \times p(\backsim h1)}$$

$$p(h1) := p(h1|e_i)$$

$$p(\sim h1) := 1 - p(h1|e_i)$$

For all $h2 \in H2$

For all $e_i \in E$

$$p(h2|e_i) = \frac{p(e_i|h2) \times p(h2)}{p(e_i|h2) \times p(h2) + p(e_i| \backsim h2) \times p(\backsim h2)}$$

$$p(h2) := p(h2|e_i)$$

$$p(\sim h2) := 1 - p(h2|e_i)$$

For all $h3 \in H3$

For all $e_i \in E$

$$p(h3|e_i) = \frac{p(e_i|h3) \times p(h3)}{p(e_i|h3) \times p(h3) + p(e_i| \backsim h3) \times p(\backsim h3)}$$

$$p(h3) := p(h3|e_i)$$

$$p(\sim h3) := 1 - p(h3|e_i)$$

As a result of the algorithm, we get a set $Psi(H) = \{Psi(H1), Psi(H2), Psi(H3)\}$, for a specific media s_i where
Psi(H1)={ p(h1[1]), ... p(h1[k])}
Psi(H2)={ p(h2[1]), ... p(h2[c])}
Psi(H3)={ p(h3[1]), ... p(h3[q])}

4 Experimental Corpus

In order to assess the applicability of the described algorithm, a very small corpus of documents was formed, conditionally distributed between the two media. For the described case, the matrices p1, ..., p6 were calculated using the Jacquard measure, which is often used as a measure of the proximity of documents in clustering algorithms [17,18]. Briefly, the initial data for the algorithm operation are as follows:

We have m = 5 articles of the following orientation:

- economics,
- sport (boxing),
- politics,
- show business,
- education and science.

Corpus of texts is divided into the following thematic clusters. (k=4)

- politics,
- sport,
- show business,
- economics and finance.

Two classes of articles and media are considered. (c=2)

- socially significant
- objective

The following attributes are defined (q = 4), each of which has its own dictionary.

- manipulativeness,
- politicization,
- negative tonality,
- positive tonality.

The matrix of conditional distributions of topics for articles is defined in the form of a matrix p2 [1..k] [1..m], where k is the number of topics (line by line), m- articles (by columns)

p2 = [[0.03, 0, 0.03, 0.004, 0.005]
[0, 0.01, 0, 0.008, 0.005],
[0, 0.007, 0.004, 0.03, 0.005],
[0.04, 0, 0.007, 0, 0.005]]

Using the analytical hierarchical process (AHP), weights of each attribute are obtained for classes in the form of the matrix p3 [1..c] [1..q], where c is the classes, q are the attributes

p3 = [[0.55, 0.27, 0.18, 0.18],
[0.23, 0.43, 0.34, 0.34]]

The following results were obtained for calculating the matrices p4 [1..k] [1..c] (conditional probabilities of the distribution of topics across classes), p5 [1..m] [1..c] (conditional probabilities of articles distribution by classes), p6 [1..m] [1..q] (conditional probabilities of the distribution of articles by attributes):

p4= [[0.1967 0.2239]
[0.0371 0.0531]
[0.0316 0.0508]
[0.0427 0.0443]]

p5= [[0.007609 0.008489]
[0.0005922 0.0008866]
[0.0063263 0.0072303]
[0.0020316 0.0028444]
[0.0015405 0.0018605]]

p6= [[0.0058 0.0149 0.0014 0.0008]

[0.00027 0.00017 0.00055 0.00166]
[0.00452 0.01329 0.00094 0.00046]
[0.00102 0.0021 0.00174 0.00328]
[0.00105 0.0025 0.00055 0.00105]]

Note that the processes of formation of attributes dictionaries, the choice of classes for attributes, the formation of AHP tables, etc. are not given in this paper.

5 Results

Based on the given values using the multimodal media assessment algorithm mass media distribution by topics, classes and grounds was calculated assuming that the available articles are provided by two media, the first of which published articles #1 and #3 (economical and political orientation), the second is the source of articles #2,4,5 ("sport (boxing)", "Show business", "education and science").

6 The distribution of media on topics

Media/Topics:	Politics	Sport	Show business	Economics and finance	Articles
Media0	0.047109	0.000000	0.003012	0.036757	[economical, political]
Media1	0.001514	0.006877	0.014395	0.000000	[sport (boxing), show business, education and science]

7 The distribution of media on topics

Media/Classes:	Socially significant	Objective	Articles
Media0	0.0	0.000456	[economical, political]
Media1	0.0	0.000180	[sport (boxing), show business, education and science]

8 The distribution of media on attributes

Media/Attributes:	Manipulativeness	Politicization	Negative tonality	Positive tonality	Articles
Media0	0.006855	0.020653	0.000812	0.000000	[economical, political]
Media1	0.000000	0.000916	0.000188	0.001377	[sport (boxing), show business, education and science]

9 Conclusion

The described multimodal media estimation algorithm based on published articles showed logical results in a small model example briefly described in the paper. The results obtained allow us to expect that on large corpuses the algorithm will allow obtaining the required media estimates by aggregating the estimates of the array of articles belonging to them. Obviously, the accuracy of the algorithm depends critically on the algorithm for obtaining conditional distributions of articles by topic, topic by dictionaries and classes. Methods for obtaining these distributions will be considered in the next work.

Acknowledgments

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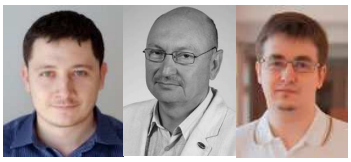
Expert assessment as critical factor for uranium mines log data classification

Yan Kuchin*, Ravil Muhkamediev, Kirill Yakunin

Institute of Information and Computational Technologies, Pushkin Street 125, Almaty 050010, Kazakhstan

**Corresponding authors's email: ykuchin@mail.ru*



Abstract

Based on statistics from the World Nuclear Association, Kazakhstan has the highest uranium production in the world. Most of the uranium in the country is mined via in-situ leaching and the accurate classification of lithologic composition using electric logging data is economically crucial for this type of mining. In general, this classification is done manually, which is both inefficient and erroneous. Information technology tools, such as predictive analytics with Supervised Machine Learning (SML) algorithms and Artificial Neural Networks (ANN) models, are nowadays widely used to automate geophysical processes, but little is known about their application for uranium mines.

Here, we demonstrate applicability of predictive analytics (SML and ANN) for geophysical data from uranium mines in Kazakhstan and identify basic steps for industry's transition from manual to automatic lithologic composition classification and its readout. Importantly, we identified 'expert assessment' as key parameter that affects the accuracy of classification.

The model allowed for improvement of results' accuracy by 5% and recall – by 20%, when metric 'expert ID' is used as a learning parameter.

Keywords: Machine Learning (ML), Supervised Machine Learning (SML), expert assessment, accuracy, precision, recall, artificial neural network (ANN).

1 Introduction

Since 2009 Kazakhstan is the world leader in uranium mine production generating over 1/3 of the total uranium global volume. The uranium production has grown 3.5 times in the last seven years in Kazakhstan, demonstrating strong and compelling need in applying novel ideas and technologies for uranium mining. Optimization of uranium commercial production processes from mining ores to nuclear power, is a cornerstone requirement for KazAtomProm, for example, which is an effective and sustainable Nationwide organization.

Automation of production processes, e.g. Geophysical Data Interpretation for Boreholes (GDIB) in uranium mines, is just one of many ways this optimization can be achieved. Erroneous and inaccurate results from geophysical data analysis may lead to serious financial loses on different levels: from overall decrease of active boreholes to unjustified labor cost and low volume production. GDIB processes can specifically be used for analyzing lithological composition of the borehole, while predictive analytics with SML algorithms and ANN models - for automation and streamlining the overall analytical process.

The success of data interpretation processes depends on properly prepared input data. Quality, content and format of the input data directly affect the machine learning processes, and subsequently – the final accuracy of classification. The accuracy of automated log data classification to a great extent depends on expert's manual assessment, because it is used as input for training ML automatic classifiers. However, cross-comparison of assessments for core sampling provided by different experts shows significant discrepancies. Specifically, the difference between assessments grow higher with decreased value of geological samples (e.g. sandstones have more deviations in manual classification than claystones). Here, we aim to capture the nature of this phenomenon and to define the limits of automatic classification while applying ANN that are trained on expert assessment input data.

Here, we used historically generated classifications from two minefields (~ 200 boreholes) to train our ANN model with ML algorithms.

In general ANN models are capable of resolving poorly formalized tasks [1] however in our case, this approach is predisposed to several challenges:

Inconsistency of experts' opinion in data assessment;

Requirement for equal and large number of examples from each class of data;

ANN inability to interpret resulting outcome;

Requirement for thorough preparation of input data prior to analysis (e.g. outliers' removal, normalization, data smoothing).

There is a number of publications focused on tasks and issues related to automatic interpretation of log data from uranium deposits. For example, results of analytical testing with ANN as an approach for log data classification can be found in publications [2-4], while several ML methods and their comparative results - described in publications [5-6]. There, it was shown that feedforward neural network demonstrates a much better classification's quality when compared to k-nearest neighbor (k-NN) or support vector machine (SVM) algorithms. Furthermore, results from a

combination of ML algorithms applied to a similar underlaying task was reviewed in publications [7-8]. The above-mentioned challenges 2 and 4 were addressed during our analytical experiments.

Our earlier experiments demonstrated that on average, the automatic classification with feedforward neural network performs with ~ 60% accuracy. It was also shown that ambiguity of expert assessment has negative effect on auto-classification accuracy. Therefore, this particular work is focused on challenge #1: evaluation of the impact the expert assessment of electric logging has on auto-classifiers, and more specifically on neural networks - during ML training.

2 Analysis of expert assessment inconsistency

Inconsistency of expert assessment introduces additional challenges into the process of ML system training. Despite the fact that expert assessments are used for training, each expert does classification differently. Three boreholes with identification numbers 2100, 2104, and 4939 were used for expert assessment quality comparison. Log-data for these boreholes were assigned to three independent experts, named here D, L, and T. Moreover, boreholes 2100 and 4939 have actual core sampling data. Four main indicators of quality (accuracy, recall, precision, and Kappa) were calculated based on the assessment data for lithologic differentiation and core sampling received from experts D, L, and T. It was done as pair-wise comparison, when one of the experts was considered as a standard and the other one – variable (Table 1). The average value for experts' accuracy is 0.67 with scatter score T1 = 0.6. When similar comparison is done between core sampling and expert's assessment, the accuracy is 0.5 and T1 score is 0.27. At the same time, taking into consideration expert's biases, assessment of boreholes 2100 and 2104 done by experts D and L have the highest agreement (accuracy > 0.8).

Experts	Accuracy	Kappa	Recall	Precision	T1 Score
		2100			
D vs L	0.81	0.70	0.63	0.61	0.6180
D vs T	0.71	0.54	0.42	0.49	0.4553
L vs T	0.80	0.67	0.46	0.52	0.4930
		4939			
D vs L	0.3317	0.16	0.5979	0.4975	0.5430
D vs T	0.7706	0.66	0.7941	0.6879	0.7371
L vs T	0.3762	0.19	0.6086	0.5495	0.5775
		2104			
D vs L	0.8409	0.76	0.8445	0.8205	0.8323
D vs T	0.6551	0.49	0.5493	0.5424	0.5458
L vs T	0.7213	0.57	0.5845	0.6011	0.5926
Experts average	**0.67**	**0.53**	**0.61**	**0.59**	**0.60**
		2100			
Core vs D	0.693	0.39	0.3624	0.3487	0.3554
Core vs L	0.6444	0.23	0.2775	0.2423	0.2587
Core vs T	0.6505	0.21	0.274	0.2441	0.2581
		4939			
Core vs D	0.1749	0.04	0.2011	0.2295	0.2143
Core vs L	0.6089	0.37	0.3066	0.3986	0.3465
Core vs T	0.2096	0.04	0.2004	0.2231	0.2111
Core average	**0.50**	**0.21**	**0.27**	**0.28**	**0.27**

Expert D has the highest accuracy when compared with average core value for borehole 2100 (accuracy =0.69), and experts D and T are in good agreement for borehole 4939 assessment (accuracy =0.77). For borehole 4939, the average core value is well aligned with assessment by expert L (accuracy = 0.60). When comparison is done between experts' assessment and core sampling, the quality values are significantly lower than comparison is done between experts. Our analysis showed that for some critical lithotypes (e.g. claystone) experts' assessments aligned in 70-95%, yet they much less agree with core sampling data. For claystone extraction the core and expert's assessment correlate in 30-50%.

This is largely due to critical requirement for in-situ leaching processing to define impenetrable lithotypes, because uranium fields in Kazakhstan comprised primarily by claystone, siltstones, and sandstones.

It is known that clay exhibits minimal AR and maximal SP, which simplifies its identification. On the other hand, definition of various sub-layers in penetrable lithologic types (e.g. sub-layers of mixed sand in medium sands layer) is not as critical from technology point of view and can easily be substituted by the biased opinion of individual expert.

Comparison of experts' assessments suggests several options for observed inconsistency minimization. One of them could be grouping boreholes data assessed by the one and the same expert only. Another option is to use one of the experts as identification (ID) parameter for ML training.

The same three boreholes were interpreted with feedforward ANN with 26 input neurons (depth, coordinates, floating windows for AR and SP curves) and two hidden layers: 52 and 78 neurons, from Keras library.

Borehole number	Accuracy	Precision	Recall	T1 Score
2100	0.4273	0.4623	0.2701	0.3409
2104	0.7053	0.7961	0.6053	0.6877
4939	0.3277	0.2573	0.1181	0.1619
Average	**0.5092**	**0.5069**	**0.3409**	**0.4076**

Log curves, after preliminary normalization, were presented as floating windows, because for the accurate lithotype definition not only the value in a given point is important, but the curve shape itself (extremes, curvatures) is a key criterium. In addition, it was decided to add geographic coordinates of boreholes as training parameters, because lithologic cuts of neighboring boreholes are well correlated (this fact is also used by experts in defining lithotypes). This approach allowed us to achieve accuracy of identification comparable to the experts' assessment of core sampling (Table 2). However, for impenetrable layers (claystone, siltstone) in core boreholes the accuracy of ANN algorithm is lower than experts' assessment: precision = 0.30, and Recall = 0.22. That is, the majority of impenetrable layers, critical from technology point of view, are still poorly identifies.

Overall, low accuracy of assessment for these boreholes by both experts and ANN model can be explained by the fact that data interpretation was performed not based on log curve shapes as per regular procedure, but based on core sampling (description, laboratory samples), that is – the required input information was not available neither to experts nor for ANN model.

The outcome of this experiment led us to an assumption that quality metrics for automatic classification will largely depend on the data analysis method used by an expert.

To test this hypothesis, we performed experiments with data from "Budennovskoe" mine field: 57 boreholes were interpreted/assessed by expert C, and 40 boreholes - by expert E. Methodology of data processing and neural

network architecture was used without any modification. Results are presented in Table 3 below.

Methods	Train	Test	Acc.	Prec.	Recall	F1
Expert C	45	12	0,5869	0,6491	0,4751	0,5486
Expert E	35	5	0,4722	0,5409	0,1963	0,2880
C&E (w/o ID)	77	20	0,4401	0,4078	0,1365	0,2045
C&E (with ID)	77	20	0,4996	0,5157	0,3529	0,4190

Based on our experimental results we made the following suggestions:

The accuracy of lithotype identification (accuracy, precision и recall) significantly varies from expert to expert, and this fact should be taken seriously;

The input data from each individual expert provides a much better ANN output (accuracy of lithotype identification), when compared with a mixed dataset of boreholes (manual classification, multiple experts);

Introduction of parameter 'expert ID' for ML training increases overall quality of classification, especially for recall values.

3 Conclusion

Accurate interpretation of electric log data is vital for uranium production needs, specifically for selecting filter installation location when using method of uranium extraction via sub-surface in-situ leaching of boreholes. In the process of data interpretation an expert identifies bedding layers of lithotypes and practically performs lithologic classification by describing borehole structure throughout its depth. Historically acquired classification data were used for ML training of synthetic systems. The feedforward ANN output for electric log data classification from earlier experiments on uranium deposition show only 65% accuracy with the proposed automatic classification.

It was shown that discrepancies between experts' assessments for one and the same log data may lead to low quality automatic classification. In practice, the assessment is performed by individual experts independently, one time only, and results of assessments are not compared. To confirm inconsistency in experts' opinions three experts took part in a small experiment. Each expert assessed log data for the same set of three boreholes. A cross-comparison of their independent assessments showed significant (up to 30%) discrepancies between experts. Due to limited size of experimental data, we cannot reliably confirm that this discrepancy takes place regularly. However, since quality of classification for synthetic conditions is also by 30% better than for real data, we may assume that this phenomenon happens not by mere chance. Additional experiments showed that accuracy of identification (accuracy, precision, and recall) for different experts may vary significantly. Proposed by us utilization of parameter "expert ID" in ANN training, significantly improved quality of classification in accuracy (by 5%) and recall (by 20%).

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The studies of dynamics' changes in publication activity in the field of natural language processing

Vladimir Barakhnin[1,2], Assemgul Duisenbayeva[4], Olga Kozhemyakina[1], Yan Kuchin[3], Kirill Yakunin[3,4], Ravil Muhamedyev[3,4]

[1]*Institute of Computational Technologies of SB RAS, Lavrentiev av., 6, 630090, Novosibirsk, Russia*
[2]*Novosibirsk State University, Pirogov str.,1, 630090, Novosibirsk, Russia*
[3]*Institute of Information and Computational Technologies, Pushkin Street 125, Almaty 050010, Kazakhstan*
[4]*Kazakh National Research Technical University, Almaty, Kazakhstan*

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

Abstract

The Natural Language Processing (NLP) is a rapidly developing research area. To assess the dynamics of the development of NLP sections, the publication activity (annual number of publications and citations) is considered according to the bibliometric databases Science direct and E-library. The differential indicators were used to identify the speed and acceleration of the increase of the number of publications. NLP is considered from the point of view of both solved problems and used methods. The calculations were performed for the following NLP tasks: Grammar Checking, Information Extraction, Text Categorization, etc. The areas with a high growth rate (Grammar Checking, Information Extraction, Machine Translation, Question Answering) and the areas that have lost the previously existing dynamics of the growth of publication activity (Information Retrieval, Opinion Mining, Text Categorization) were identified. As the methods of NLP we consider Machine Learning, Neural networks, Deep Learning, etc. The most dynamically developing methods are those which are related with Machine Learning, Deep Learning and Neural Networks. The publication activity in solving of the NLP problems with the usage of machine learning is considered separately. It is revealed that the Machine Learning is most intensively used in speech recognition, automatic translation and question-answer systems.

Keywords: Natural language processing, Machine Learning, Bibliometric Indicators, Scientometrics, Deep Learning

1 Introduction

The field of Natural Language Processing (NLP) is characterized by a wide range of methods and tasks, some of which already have acceptable solutions implemented in the form of software, while others require the intensive research.

The evolution of each scientific direction, including the processing of natural language texts, is accompanied by an increase or decrease of the interest of researchers, which is reflected in the change of bibliometric indicators. The latter includes the number of publications, the citation index, the number of co-authors, the Hirsch index and others. The identification of "hot" areas in which these indicators are more important allows us to understand better the situation in science and, if possible, to concentrate the efforts on breakthrough areas.

In order to identify the logic of changes in publication activity the differential indicators are implemented in [1]. Their application allows to estimate the speed and acceleration of changes in bibliometric indicators. The implemented indicators can thus more obviously show the growth or decline of the researchers' interest in certain sections of the NLP, characterized by certain key words.

In this paper, the number of publications and the number of citations of articles with selected key terms are considered as analyzed indicators. The differential metrics allow to evaluate the dynamics of changes in the usage of selected key terms by the authors of scientific publications, what indirectly indicates the growth or decrease of the interest of researchers in the scientific field designated by this term.

2 Objectives of the Study

As part of this work, we have identified the following areas of analysis.

First, we consider the field of NLP from the point of view of the tasks to be solved, among which, based on the above review and taxonomy of NLP in [2], we include the following (group of "NLP tasks" or "tasks"): Grammar Checking, Information Extraction, Text Categorization, Dialog Systems, Speech Recognition, Machine Translation, Information Retrieval, Question Answering, Opinion Mining & Sentiment Analysis, Smart Advisors, Automatic Summarization, Information Retrieval.

Secondly, the field of NLP is characterized by a rapid growth of technologies and methods that contribute to the solution of the above tasks. We include the following methods (group "scientific methods of NLP" or "technique"): Machine Learning, Neural networks, Deep Learning, Fuzzy Logic, First Order Logic, Knowledge Representation, Evolutionary computation & Genetic programming, Rule Based System, Unsupervised Learning, Clustering, Supervised Learning, Statistical Methods, Bayesian Networks, Semantic Networks, Keyword Spotting,

Lexical Affinity, Ontology, Information Fusion, Taxonomy.

3 Research Methodology

To assess the dynamics of changes in publication activity, we will, as in [1], use the indicators of the aggregate annual growth rate (Compound Annual Growth Rate - CAGR), D1 and D2, which are calculated as follows:

$$\text{CAGR} = \left(\frac{\text{Ending Value}}{\text{Beginning Value}} \right)^{\frac{1}{\text{T}-1}} - 1, \qquad (1)$$

where T is a number of periods.

$$D1_i^j(t_k) = \beta \times \frac{dn_i^j(t_k)}{dt} + \gamma \times \frac{dc_i^j(t_k)}{dt}, \qquad (2)$$

$$D2_i^j(t_k) = \beta' \times \frac{d(dn_i^j(t_k)/dt)}{dt} + \gamma' \times \frac{d(dc_i^j(t_k)/dt)}{dt}, \qquad (3)$$

where n_i and c_i are the number of publications and the number of citations which are determined by the search term number i, and $\beta, \gamma, \beta', \gamma'$ are some empirical coefficients that regulate the "weight" of the contribution of the number of publications, the speed and the acceleration of the change in the number of publications n_i and the speed and the acceleration of the change in the number of citations c_i, respectively.

One of the largest bibliometric databases – Science Direct, which contains about 2500 scientific journals and 26000 e-books [3], was used to analyze English language publications.

The leading Russian scientific electronic library eLIBRARY.ru was used to study the dynamics of publications on the subject in Russian. As of middle of 2018 in the database eLIBRARY.ru there are more than 30.7 million articles, including the publications of the last decades of the XX century. According to our requests, some publications of the mentioned period were found, but their number was very small, so the statistics in the tables are given since 2005. We emphasize that although in the database eLIBRARY.ru there are many English language publications from foreign editions, we were limited to queries only in Russian language, since the study of English language publications was conducted separately for the database ScienceDirect.

For each bibliometric database, the relevant search queries were formed, including the above terms in combination with NLP, NLP and ML, etc. The results of the queries were the annual volumes of publications and citations since 2005. The data of 2018 are not used due to their incompleteness.

On the basis of the results obtained for each search query the indicators CAGR, D1, D2 were calculated. The constants $\beta, \gamma, \beta', \gamma'$ are assumed to be 0.95.

4 Data Analysis and Interpretation

The analysis of the statistical data described above revealed the following tendencies.

Currently, the number of publications and citations in almost all (with a few exceptions) of the considered areas shows an increase. The usage of differential indicators D1 and D2 makes it possible to more clearly imagine the dynamics of this growth.

In the Russian-language segment, the Natural Language Processing appears to have reached a saturation level, where the two periods of explosive growth in the number of publications are followed by a slowdown in growth practically in all of the considered research areas under.

The Figure 1 identifies the sections of the group "tasks of NLP" with the growth of the index D2 (acceleration).

Similarly, the Figure 2 reveals the sections of the group "NLP&ML", which demonstrate the positive value of the indicator D2 (acceleration).

Finally, the Figure 3 identifies the sections of the «NLP scientific methods» group that can be attributed to the most popular, with a large and increasing positive value of D2 (acceleration).

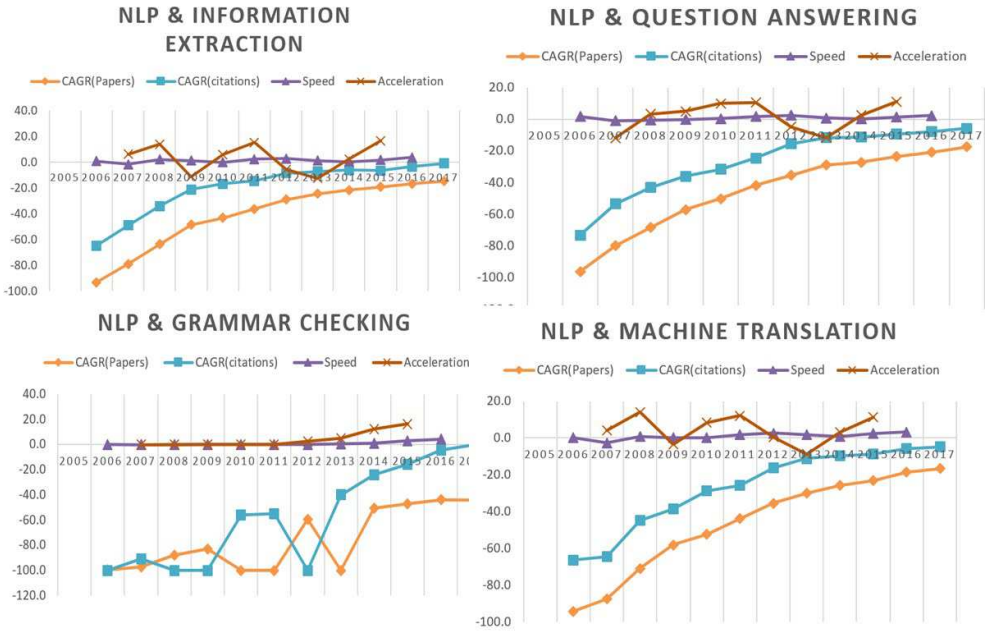

FIGURE 1 The sections of the group "NLP tasks" with the growth of the indicator D2 (acceleration)

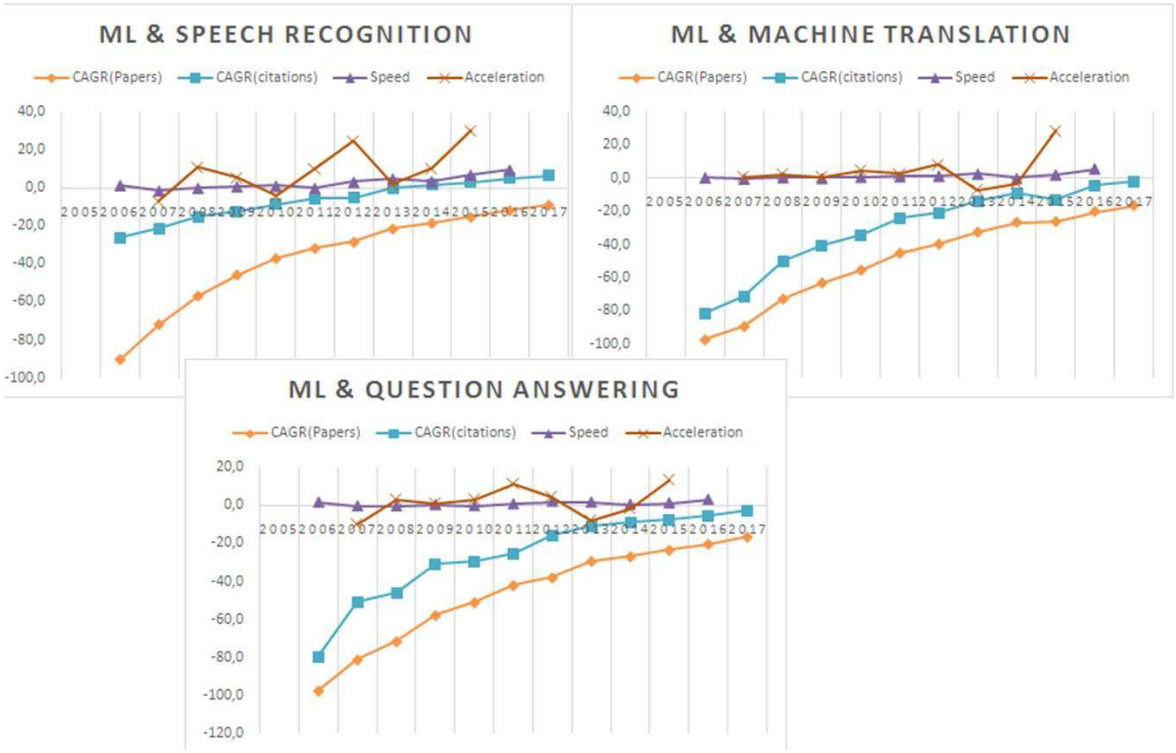

FIGURE 2 The sections of the «NLP&ML» group which demonstrate a positive value of D2 (acceleration)

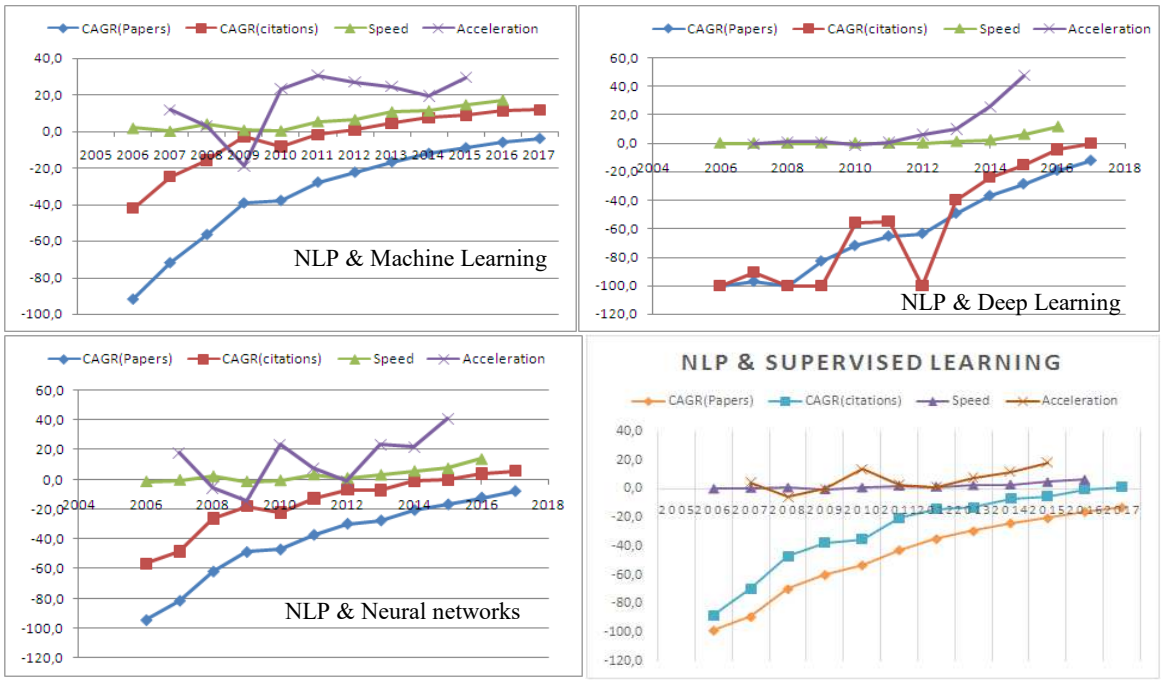

FIGURE 3 The group "scientific methods of NLP", which can be attributed to the most popular, with a large and increasing positive value of D2 (acceleration)

5 Conclusion

The data show an interesting picture of change for most sections, where the period of initial growth is followed by a decrease, and then there is a re-acceleration (question answering, speech recognition). The reasons for this phenomenon should be investigated, but it can be assumed that this dynamic characterizes, on the one hand, the intensity of development in the field of research, and on the other − the understanding of the new concept by researchers and its application in the researches. Only some of the presented research areas (grammar checking, NLP&Deep Learning) are characterized by a constant growth of citations and publications (indicator D2 has only positive values for the entire considered period under) (figures 1, 3).

In general, the analysis of NLP research area shows significant dynamics of growth of the publication activity in the sections of Grammar Checking, Information Extraction,

Machine Translation and Question answer (positive value of D2) (figures 1,2).

In the field of scientific methods, a high positive value of D2 is belong to the research areas related to Machine Learning, Deep Learning, Neural Networks and, as a consequence, to the so-called Supervised Learning. In this case, Machine Learning is especially intensively used in solving problems of Speech Recognition, Automatic Translation and Question-Answer Systems. (figure 3). A moderately positive value of D2 is noted for the sections of Evolutionary computation & Genetic programming, Unsupervised learning, Bayesian Networks, Semantic Networks. Fuzzy logic, Knowledge representation, Rule based system, Statistical methods, Lexical affinity, Ontology have a negative value of D2.

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The generalized criterion of the efficiency of data transmission in information and communication networks

Viktor Kosenko[1*], Nataliia Demska[2], Elena Persiyanova[3]

[1]*State Enterprise "Kharkiv Research Institute of Mechanical Engineering", Kharkiv, Ukraine*
[2]*Kharkiv National University of Radio Electronics, Kharkiv, Ukraine*
[3]*State Enterprise "Southern National Design & Research Institute of Aerospace Industries", Kharkiv, Ukraine*

[*]*Corresponding author's e-mail: kosvv@ukr.net*

Abstract

The work deals with the increase in data processing efficiency information communication networks. The task of formulating the generalized criterion of data transmission in the information communication network, which is an indicator of the quality of the network structure, is solved. Solving the optimization task ensures a more efficient network operation without allocating redundant resources.

Keywords: information communication network, efficiency criteria, data streams

1 Introduction

Information communication network (ICN) is designed to solve applied tasks that have certain requirements for the quality of the results. Providing comprehensive requirements for the quality solution of applied tasks is one of the important goals of managing data streams of the ICM. The following tasks should be solved:

- the complex criterion of the network quality operation should be developed;
- particular goals for managing data streams should be formed;
- particular goals should be matched while solving applied tasks in the ICN;
- management goals should be matched with the capabilities of technical support;
- processes of network development that are related to new applied tasks or network equipment, new users should be taken into consideration;
- various task requests received from users should be taken into consideration;
- networking technology should be efficiently used.

Thus, the complex criterion of the quality structure of the information communication network should take into consideration:

- ways of organizing information exchange;
- the parameters of network nodes;
- network applied tasks.

2 Basic material

To assess the efficiency of network protocol operation, the following indicators are usually used [1]:

- average delay time while sending informational messages;
- average time when informational messages (IM) are available in the network;
- average network traffic and network performance;
- indicators of reliability, cost and so on.

Moreover, most of the indicators are interrelated but among them, there are those that contradict and complement each other [2]. Consequently, the performance assessment function which establishes the relationship between the efficiency criterion and the values of particular indicators of the network protocol efficiency of is a multi-parameter, that is why to simplify its calculation, the minimum required number of most important noncontroversial indicators is selected [3].

Let the set of such indicators be

$$M = \left\{ M^{(1)}, ..., M^{(i)}, ..., M^{(I)} \right\}, \ \dim M = I, \tag{1}$$

Each indicator, in its turn, is determined by a set of particular indicators:

$$M^{(i)} = \left\{ M_1^{(i)}, ..., M_j^{(i)}, ..., M_{J_i}^{(i)} \right\}, \dim M^{(i)} = J_i; i = \overline{1, I}; \ j = \overline{1, J_i}. \tag{2}$$

Let us denote the function of the network protocol efficiency evaluation at a subset of indicators:

$$L = L(M_0), M_0 \subseteq M, \tag{3}$$

where M_0 is a subset of indicators that are critical for the ICN operation.

The indicators for the subset $M_{HK} = M \backslash M_0$ that are not critical will be assessed using the following functions:

$$L_k = L_k(M_0; M_{\text{HK}}), k = \overline{1, K}. \tag{4}$$

Then, the criterion for selecting the best ICN protocol will be the requirement to optimize a subset of indicators M_0 that are critical while operating the network $L(M_0) \to \sup$.

At the same time, the assessments of non-critical

indicators M_{HK} will determine the constraints of the corresponding optimization task: $L_k\left(M_0;M_{HK}\right)\ \Re\ F_k$, where $\Re$ is a relation that can be of both strict and non-strict order and take values from the set $\{"\geq","\leq",">","<"\}$; $k=\overline{1,K}$, F_k is the limiting assessment for the k-th non-critical indicator.

Taking into consideration the fact that to meet the requirements for the network efficiency, time indicators are critical, the following requirements should be taken into account [4]:

- high reliability;
- low cost;
- high security;
- high network bandwidth requirements;
- high performance;
- the reliability of the transmitted data;
- immunity to interference and so on.

Such a set of indicators of data transmission efficiency can be considered as an example:

$$M=\{M_1,M_2,M_3,M_4\}, \tag{5}$$

where M_1 is the information message (IM) delay time;
M_2 is switching time;
M_3 is IM dimension;
M_4 is the bandwidth of communication lines allocated for IM transmission.

For the n-th information message ($n=\overline{1,N}$) which is processed by the m-th channel of the network ($m=\overline{1,M}$), the Boolean function is introduced:

$$B_{nm}=\begin{cases}1, & \text{if } m \text{ channel is maintaining IM } n;\\ 0, & \text{otherwise.}\end{cases} \tag{6}$$

Denote

$$M_1=\left\{t_{nm}^{(з)}\right\};\ M_2=\left\{t_{nm}^{(k)}\right\};\ M_3=\{V_n\};\ M_4=\{C_{nm}\}. \tag{7}$$

Moreover, let us denote time constraints for delivering an IM as T_n and available network bandwidth as F_m.

Particular indicators from the sets M1, M2 and M4 depend on the choice of the network protocol S, they can be considered as functions at the set of network protocols that are being analyzed. Then, the optimization task of selecting the most efficient network protocol can be formulated as minimizing the generalized efficiency indicator – total time for processing information messages within the fixed time interval:

$$L\left(M_0\right)=\sum_{m=1}^{M}\sum_{n=1}^{N}B_{nm}\left(t_{nm}^{(з)}+t_{nm}^{(k)}+\frac{V_n}{C_{nm}}\right)\ \underset{S}{\rightarrow}\ \min. \tag{8}$$

(S is the network protocol) under the constraints that are imposed by the ICN characteristics:

$$\sum_{n=1}^{N}B_{nm}C_{nm}(S)\leq F_m,\ m=\overline{1,M}, \tag{9}$$

$$\sum_{m=1}^{M}B_{nm}\left(t_{nm}^{(з)}(S)+t_{nm}^{(k)}(S)+\frac{V_n}{C_{nm}(S)}\right)\leq T_n,\ n=\overline{1,N}. \tag{10}$$

3 Conclusions

The solution of the formulated optimization task ensures more efficient operation of the network without allocating redundant resources. Further researching in this area is related to the development of network management methods that consider the peculiarities of the information structure of a particular information communication network.

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Artificial intelligence

Girts Rimicans, Daniels Aleksandrs Beigarts, Deivs Kevins Gutmanis*, Natallia Karatun

Vocational Education Competence Centre "Riga technical college", Braslas street 16, Riga, LV-1038, Latvia

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

Abstract

Artificial intelligence is getting better and better by the day, so we wanted to see what is it how it evolved, where we can see it in everyday day life, and our age favourite, video games.

Keywords: Artificial intelligence (AI), Neuron network, Advertisement(ad)

1 Introduction

What is intelligence? It is the capacity to acquire new knowledge andskills, as well as the ability to acquire that knowledge; and apply skills. People have high intelligence, we have been able to createamazing technology and revealing many secrets of nature, but whether we have ahigh enough the intelligence for the reclamation of all the secrets of nature? We candiscuss this, but it is unquestionable, that we can create what nature secrets will reveal for us, it is artificialintelligence.

2 What is artificial intelligence

Without a doubt the pioneer of artificial intelligence is Alan Mathison Turing and his famous Turing test, which determines or has created artificial intelligence.

The test shall take place as follows:

1. A judge gives questions to a machine and a human, the juge does not know which is wich
2. A judge receives back two answers, one from a man, the other from an artificial intelligence, but he, the judge, doesn't know who has given any answer
3. A judge shall decide which answer is human and artificial intelligence.
4. If the judge decides that the answer of artificial intelligence is what a person could have written and that the human answer is what artificial intelligence could write, thenartificial intelligence has overcome the Turing test.

The first AI to overcome the Turingr Test was ELIZA in 1966.

Artificial intelligence is also classified in different categories and canoperate on the basis of different principles.

Artificial intelligence is classified as follows:

- Weak artificial intelligence – it is AI specialised to resolve certain problem or one specific task, such as playing chess, or customize your ads to your user's interests.
- strong artificial intelligence – it is AI that is capable of thinking like a human (This kind of AI is not yet an example that could be mentioned, but industry leaders are heavy on working to create such an AI).

Principles of artificial intelligence: Artificial intelligence is our future and we will not change it because itis wonderful and we need us to be able to focus on the world.

3 Everyday life

In everyday life the AI is as profound as in computer games but they do a more of a money-making tool. For example, they are extensively used in ad, where a robot picks the most relevant and the highest paying ad.

But it isn't the only place where we can see AI peek its head. For example, many ads where there is a lottery could be generated by an AI. Or in multi storey car parks your car number will be photographed and recognised and you're allowed time will be started automatically.

Nowadays there are new ways of implementing AIs into everyday life such as smart assistants such as Google assistant, siri, bixby or amazon alexa. They all will help you with everyday situations. Which is the best being your preference.

The AIs are so well integrated that we don't feel it.

The most controversial subject is whether or not AI will replace our jobs and the short answer is yes, but the long answer is no quite. You see an AI, if not taught, is dumb. It needs a lot of computing power and a large data field where it can gather data. If not, the thing it will do are funny. For example, take our translators. It can make a sensible text into a minefield of jokes. At the least they are grammatically correct.

4 Video games

AI uses the Neuron Network, it's a system which simulates choices, first of all it uses the input, information that the AI is provided, it uses the information to think about different choices which lead up to the most common or the most logical decision.

The most known AI against Human match in a competitive

game called dota is a 1v1 game between a well-known player "Dendi" and Open AI bot that was sponsored by Elon Musk.

In this game the machine has won the human but that does not mean that it was stronger. Dendi was forced to play 1 hero and couldn't buy some items. So, if your grandma reads in an article that machines will take over humanity, it isn't so bad.

There was also a 5v5 match hosted but the machines lost since it was harder for them to cooperate but everyone is waiting for The International 2019 to include a 5v5 match where bots would become even stronger.

5 Conclusion

AI is getting stronger day by day, it will change our lifestyle and the way we think about certain things.

It currently doesn't have the power to take humans over but it might do it eventually. Right now, it has impact on all aspects of our life and it will take over even more.

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Virtual Reality systems in Latvian Police

Viktors Gopejenko[1, 2]*, Kristians Kondakovs[1]

[1]*ISMA, Riga, Latvia*
[2]*Ventspils University College, Ventspils, Latvia*

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

Abstract

This article is devoted to the use of virtual reality systems in the modern Latvian Police. These systems have passed a long way full of research since the moment of their invention. Now, these systems allow us to bring to a completely new level the degree of knowledge in such areas as education or military affairs. In addition, using these systems leads to huge savings of time and money resources, which by itself exceeds the costs of developing and implementing these systems.

Keywords: virtual reality, law enforcement, information technology

1 Introduction

This paper explores the possibilities of using virtual reality systems in government structures, namely, in law enforcement. The aim of this work is to develop a system for training cadets and raising the level of skills of existing personnel using virtual reality technologies. Today, such systems as virtual reality allows us to put the quality of staff training and their work to a completely new level. Currently, they are still training at the landfills, where the full range of possible situations is not fully covered. It comes to the fact that the catastrophic lack of funding even puts specialists in the Republic of Latvia in a better light to foreign experts in international exercises, not to mention working at training grounds, with imagination rather than knowledge and skills.

The relevance of this work is to optimize the processes taking place in the police units. The current level of training of graduates does not give them the confidence that they can fulfill their direct duties without any problems. Having a great responsibility and lack of practical experience, it is possible to make a mistake in work very easily, which might result in a delay of the investigation of the case for a large amount of time, while innocent people can become suspicious and key points can slip out of the spotlight.

2 Overview

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

- Training without the use of modern technologies
- Underfinancing of landfill equipment
- The unsatisfactory image of the Republic of Latvia in the international arena

3 Decision

Create a platform where the trainee will be able to acquire such skills and knowledge that it is not possible to acquire at an ordinary training ground. To create such platform in any game engine that supports the implementation of applications using virtual reality systems, like Unreal Engine or Unity. A student immersed in virtual reality will be able to choose any pre-created environment. This approach will be able to accelerate training and education, reduce the financial costs of the equipment for the landfill, and eliminate the interference of the human factor in the determination of the results. The system does not need a separate landfill to operate (required area is 5x5 square meters).

4 Conclusion

Virtual reality systems are gaining popularity in all areas of activities. This extremely flexible implementation can be adapted to any situation that may occur in the real world. Implementing these systems in the police is just one example of many possible uses.

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Algorithmic methods for increasing security of autonomous operations of robotic research station

Vladimirs Scigolevs[1], Roberts Gordins[1], Arturs Maslenkovs[2]

[1]SIA "HelloGroup", Skolas iela 11, Rīga, LV-1010, Latvia
[2]SIA "Progmeistars", Pulkveža Brieža 6-1, Rīga, LV-1010, Latvia

Abstract

By exploring further space and running more complex space missions, scientists, programmers, and engineers face problems that cause them to make space devices more independent and intelligent. Stable data transmission and remote control are critical tasks for robotic systems, because the collected, yet unsent, scientific data or interrupted connection to the robot eliminates all the effort taken to develop and launch the device. Thus, computer science and its application are important in the development of scientific robotic devices. In this work algorithms of action of robotic stations during the interruption of communication with control the center are considered. Algorithm efficiency evaluation method with two parameters with different priorities is proposed. During the work a prototype robot was designed, developed and applied during testing of algorithms. Proposed algorithms can be used as a basis for more complex algorithm development for future space research stations.

Keywords: intelligent systems, remote control, asynchronous robot control, space systems, unmanned spacecraft sustainable activity algorithms

1 Introduction

Since ancient times mankind has been trying to systematically explore the world, step by step attempting to expand the scope of its research. After studying the depths of volcanoes, seas, mountains, caves, Antarctic glaciers, people crossed the Earth's borders and sent research apparatus to remote areas of the solar system. By obtaining scientific data from distant places and in extreme physical conditions scientists increasingly began to use automatic robotic devices that were not affected by acceleration, temperature, radiation, pressure, and other conditions in which a person could not operate safely.

Researching more isolated points on Earth and beyond, researchers are more frequently confronted with the need to provide robots, satellites, cosmic rovers or other research devices with autonomy. Unsafe communication, cosmic distances that cause significant delays during robot control raise complex issues for researchers, engineers, and programmers. How not to stop communication with the device? How to create effective algorithms for device autonomous operation? What are the efficiency criteria?

Currently, automatic stations operate in close and distant space, collecting data for multiple space missions. In February 2019 there were about 50 active scientific missions: 28 – NASA [1], 14 - ESA [2], 5 - Japan [3], some scientific missions by RosCosmos [4, 5] and China [6]. Each mission is not only an apparatus with scientific equipment, but also auxiliary devices and Earth stations. There is a reason to believe that almost all the elements contain programmable blocks.

3 Overview

The research is devoted to the safety of space robotic stations and with the algorithms that provide it. The study reviewed the algorithms of action of robotic stations during the interruption of communication. In this paper, both existing methods for evaluating the effectiveness of algorithms are considered, and the authors' method for evaluating efficiency, which includes the physical properties of a robot with different priorities, is developed. Algorithms, the use of which allows restoring connection between a robot and the control center in session mode were created. Thus, it becomes possible to save the robot from becoming an uncontrolled and unattainable apparatus. The developed algorithms and their combinations were compared, evaluated and a method for their evaluation was proposed. During the work, a prototype robot was designed, developed and applied, as well as the software of the robot and the control center. This allows the created robot to be used to collect physical data anywhere in the world where an Internet connection is available.

4 Conclusion

In most of the literature describing the operation of the spacecraft the operating scenario of the device in case of loss of connection is mentioned, but there is no action to move the station to reach the place where the connection is available (energy saving scenarios, but no algorithms to return connection). Thus, algorithms that are based on the idea of robotic research station moving to a place where connection is available are needed in case the research station appears to be in a place where no connection is available. The proposed algorithm evaluation method can be used to estimate connection recovery algorithm efficiency. Other advantages and disadvantages of algorithms are considered and an effective combination of developed algorithms is proposed. On the basis of proposed algorithms many variations can be developed and in the future integrated space research stations.

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Choosing microservices over monolithic architecture in HTTP APIs

Gustavs Racenajs*, Natallia Karatun

Vocational Education Competence Centre "Riga Technical College", Braslas str. 18, LV-1084, Riga, Latvia

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

Abstract

HTTP APIs are everywhere - our devices use them to communicate to different services all the time. To do anything online, our devices are bound to send requests to external APIs, to get some data or perform specific tasks. For consumers, APIs looks like "magic" - you give it a request and it sends you back a response. However, under the hood, the way how software providing the API functions can be written and structured varies between each API. The most common ways are monolithic application and microservices. Since microservices have gained popularity in the past years, this paper compares the two architectures to see what an API could gain when choosing one over the other.

Keywords: software architecture, HTTP API, microservices

1 Introduction

HTTP APIs simplify the way how devices communicate with different services by abstracting certain functions into endpoints. APIs are all around us - whether you are sending a message to your colleague on Slack or searching for something on Google, your device is communicating with the service through an API. An HTTP API server accepts a request, does the necessary tasks and sends you back a response. However, there are multiple ways an API server could be designed, but the most commonly used types are microservices and monolithic architecture. With microservices being sort of a trend in the past couple years, we need to compare the two in order to find the key differences between them and see why choosing microservices could be beneficial.

2 The differences

A monolithic application is self-contained and tightly couples together all the layers needed for it to work. Usually, this kind of applications are contained in large repositories, therefore it is very easy to manage and test the code [1]. In other words, a single application, written in one programming language, will be performing multiple tasks while passing the data between the layers.

On the other hand, microservices is an architecture, where each of the tasks an application has to perform is split up into its own application, namely, a microservice [2]. Each of the microservices has its own environment and is fully independent and isolated from other microservices, hence it is easier to scale and maintain the whole ecosystem. Because of that, this architecture does not limit the whole product to just one programming language, and allows each service to be structured completely differently, as long they can communicate with each other [3].

3 Real life testing

While building a microservice ecosystem is much more complex and time-consuming process than writing a single monolithic application, if done right, there are real performance benefits. A performance test was conducted for a simple application - one being a monolith written in JavaScript and the other - a stack of two microservices built in Go and JavaScript, which in the end, under the same load, scored much better, consuming more than 4 times less CPU resources than the monolithic application and multiple times less RAM.

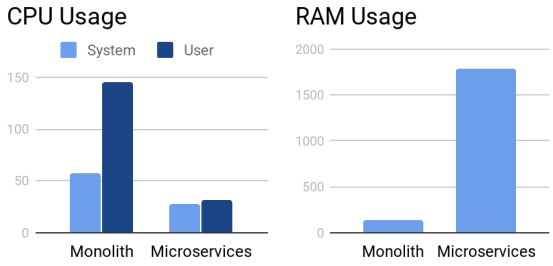

FIGURE 1 CPU and RAM usage of the test application

4 Conclusions

The work presented in this paper shows a comparison between the two architectures, how each of them changes development and maintenance workflow and performance in real life testing, advantages and disadvantages of monolithic architecture.

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Using convolutional neural network for Android malware detection

Isil Karabey Aksakalli*

Erzurum Technical University, Faculty of Engineering and Architecture, Department of Computer Engineering, ERZURUM

**Corresponding author's e-mail: isil.karabey@erzurum.edu.tr*

Abstract

With the increasing usage of smart mobile devices, the number of applications developed for these devices is already increasing day by day. Nearly all functionalities (sending e-mails, searching the internet, messaging via internet, making bank account transactions etc.) performed by using computer are carried out on mobile devices anymore. However, misuse of personal information emerges through malicious applications in the devices and these applications render the devices unusable. In the literature and industry, new methodologies have been proposed for mobile malware detection; however, there is still a research challenge to identify malwares on mobile applications and take precautions. In this paper, a permission-based model is implemented to detection of malware applications in mobile devices which have Android operating system. Permission-based features have been extracted from the apk files in the AndroTracker[1] data set which is previously created in the literature. The results of classification techniques have been evaluated by applying four types of machine learning techniques (Support Vector Machine, k-Nearest Neighbor, Back Propagation) and these techniques have been compared with Convolutional Neural Network. The experimental results show that the permission-based model is highly successful using both machine learning technique and deep learning in the AndroTracker data set. Back Propagation gives the best result among the other machine learning techniques by 96.1% acurracy rate. Also, Convolutional Neural Network has achieved success rate of 96.71%. This demonstrates that the accuracy rates of CNN and classical machine learning techniques close to each other and they have high accuracy rate because of small number of targets which are benign and malware.

Keywords: Android, permission-based malware detection, convolutional neural network, machine learning

1 Introduction

Nowadays, computers have been replaced by more portable devices such as wristbands, smart mobile devices, tablets etc. with the advancement of the technology. Android Operation System (OS) is among the most popular OS' used in these devices. There are millions of applications on the Android operating system, and users can easily upload their applications to their mobile devices via the Android market. Although the mobile devices make life easier, malicious software developers try to access personal information through these apps that make life easier. They can access to users' devices by injecting malware such as virus, trojan into an apk file which is an extension of Android-based applications.

In this study, AndroTracker (http://ocslab.hksecurity.net/andro-tracker) dataset is used to identify whether Android based applications are malicious or not. The apk files are passed through the ApkReader tool and the application permissions are extracted from these files. Using this permission information, the data set is arranged as the learning algorithm can handle. In our study, Convolutional Neural Network (CNN) is used as a learning algorithm. Besides, the performance of the CNN algorithm is compared to some popular machine learning algorithms namely k-Nearest Neighbor (k-NN), Naive Bayes (NB), Back Propagation (BP) and Support Vector Machine (SVM).

The rest of this paper is structured as follows: Section 2 reviews the techniques used in malware detection field. Section 3 explains methods used in this work. Section 4 describes our evaluation dataset. Section 5 outlines the experimental results and discussions. Finally, the last section provides our conclusions.

2 Method

Android OS based devices have applications with apk extension. Besides some parameters such as application versions, package name etc. specified by the developers along with some information such as camera access, SMS sending, microphone access photo album, vibration, internet access, etc. are operated depending on the user's permission. This information is stored in AndroidManifest.xml in each apk file and is prepared by the developer.

Permissions are reported when downloading applications from the market, but users usually download the application that they want to use by giving approval because they don't care the permission data or don't have any information about these permissions. This situation causes installing malware to device and to access the personal information with the consent of the user.

Determining whether apk files are malicious during operation cannot prevent malware from infecting the device. Therefore, in this study, malware detection is performed automatically by static analysis method without running the application.

3 Conclusions

In Android malware analysis using the static analysis method, it is proved with the experimental result that the permission-based model works effectively both in machine learning methods and

in deep learning. However, while the accuracy of these methods is very close to each other, some differences were observed in terms of running times of algorithms. Although the BP algorithm using the artificial neural network works very slowly, it is observed that convolutional neural network, which performs BP (back propagation) method for each layer through multiple intermediate layers, provides a much faster and more accurate rate than all other algorithms. In addition, machine learning methods were classified using 80% training, 20% test data, even in convolutional neural network (epoch), and vice versa (20% training, 80% test) accuracy was found to be around 90%. Since the number of data used in the study is high and the dataset has only two targets consist of malicious and benign, it is observed that the level of accuracy is 96.71%.

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Effective substituents of perylenediimides. Quantum chemical study

Alytis Gruodis*

Institute of Chemical Physics, Faculty of Physics, Vilnius university, Saulėtekio 9, korp. 3, Vilnius, Lithuania

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

Abstract

This work is devoted for perylenediimides (PDIs) with halogenic substituents in order to estimate the possible application as novel sensitizers. Simulations using DFT methods allow estimating the ground state molecular geometry.

Large bathochromic shift in absorption spectra is related to the substitute effect.

Keywords: perylenediimide, PDI; substituents

1 Introduction

Perylenediimides (PDIs) belong to the class of effective and stable fluorophores which could be used for long-lived sensor purposes. Traditionally, unsubstituted PDIs are known as pigments for car industry [1]. Also, due to well-expressed electron accepting properties PDIs could be treated as perspective photosensitizers in dye-sensitized solar cells [2]. This work is devoted for PDIs with halogenic substituents in order to estimate the possible application as novel sensitizers [3].

2 Quantum chemical simulations

Several structures of PDIs (core and core with substituents of bromine, methylphenyl, etc) were investigated using quantum chemical routines. Simulations have been performed using the density functional theory (DFT) by means of *Gaussian09* [4] software. Ground state geometry was optimized using the CAM-B3LYP/6-311G(d) method. The Polarizable Continuum Model (PCM) was used in order to simulate the solvent interactions (ε=4.7, chloroform). Fig. 1 represents the ground state optimized structures (in X0Z and X0Y projections) of PDI compounds. For PDI, core fragment is planar. Two and four additional substituents of bromine are placed out of plane. Moreover, the left and right base fragments are twisted until about 30 deg. due to the steric interactions of large bromine (for PDI-Br_4 interfragmental twist by 33 deg.).

Singlet and triplet transition energies, corresponding oscillator strengths and charge redistribution (as spatial distribution of electron density) were obtained by means of a semiempirical TD routine including PCM model. Figs. 2 and 3 represent the electronic charge distribution (in framework of HOMO-LUMO) of unsubstituted PDI and PDI-Br_4, respectively. Presence of bromine substituents and following twisting of core fragments significantly changes the HOMO and LUMO orbitals.

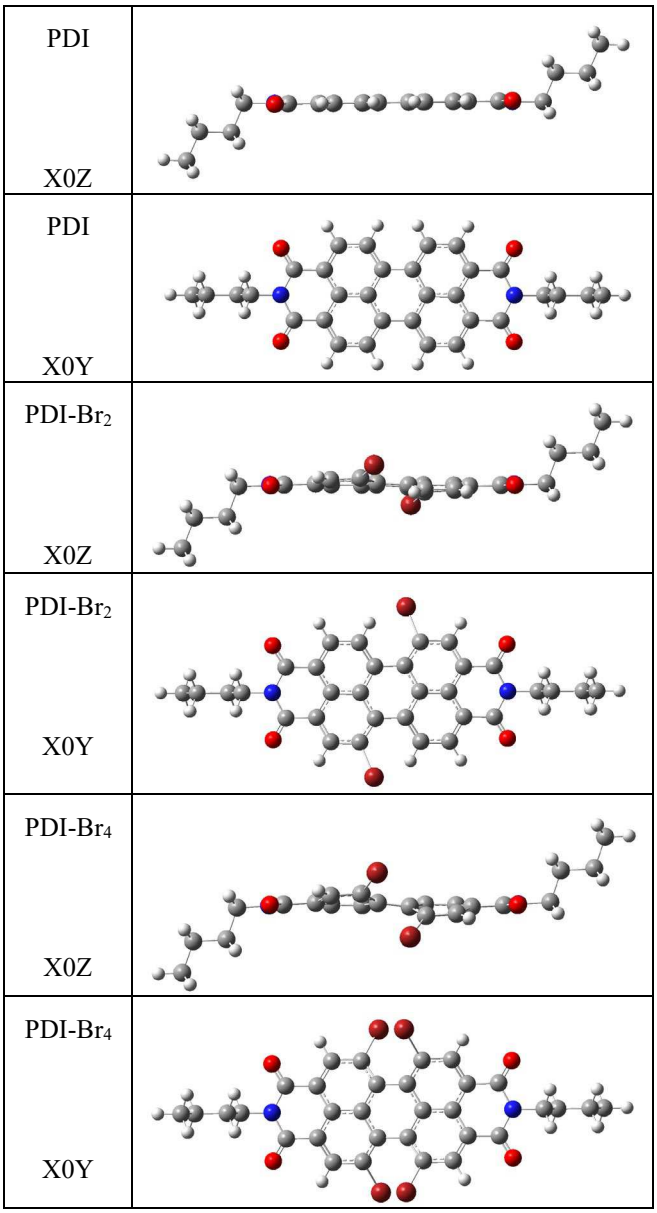

FIGURE 1 PDI compounds in X0Z and X0Y projections

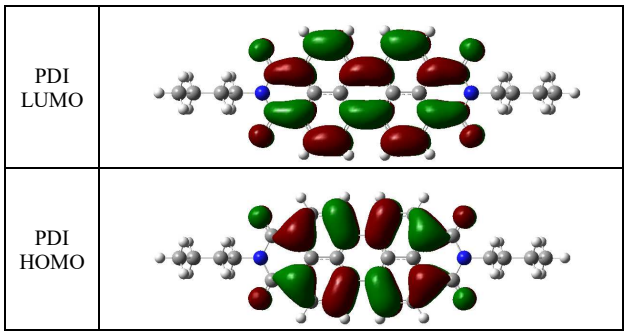

FIGURE 2 Electronic charge distribution (in framework of HOMO-LUMO) of unsubstituted PDI

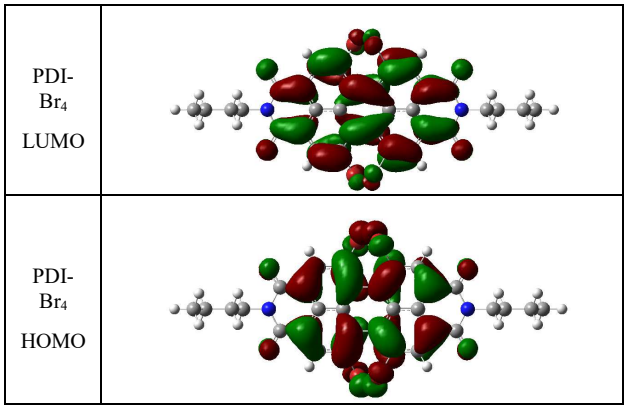

FIGURE 3 Electronic charge distribution (in framework of HOMO-LUMO) of PDI-Br_4

Quantum chemical simulations allow estimating the behaviour of charge redistribution. For PDI-Br_4, charge density of HOMO is partially concentrated into bromine substituents, while charge density of LUMO partly deconcentrate to the PDI core. Interfragmental twisting decreases the wavefunction overlap reducing the transition dipole moments and, thus, the radiative decay rates. Similar cases were described in Refs. [5, 6]. Mentioned effect is absent for unsubstituted PDI compound which has perfectly flat core.

3 Conclusion

Quantum chemical simulations using DFT technique allow to estimate the ground state molecular configuration of different PDIs with several substituents. Behaviour of molecular charge redistribution allows explaining the luminescence properties.

Acknowledgements

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Continuous integration and delivery

Anton Muzichkin*, Alexander Mrochko

ISMA, Riga, Latvia

**Corresponding author's e-mail: anton997@inbox.lv*

Abstract

At the present time there are a lot of actively developing tools that allow to automate the process of testing and deployment of a software. Continuous integration and delivery is one of the practices used in DevOps - a set of software development practices to shorten the systems development life cycle while delivering features, fixes, and updates frequently. However, it is not always clear which tools to use in specific projects. This work describes what are advantages of Continuous integration and which tool can be used to achieve it.

Keywords: DevOps, automation, testing, development

1 Introduction

In the current rapidly growing and highly competitive IT industry it is very important for companies to have reliable and bug free product.

In the past, it was common situation that developers on a team were working separately for long time and only testing their code changes together after work was completed. This approach makes code merging difficult and time-consuming as well as leads to bugs accumulation. Moreover, it was harder to deliver updates to customers quickly.

Not a long time ago DevOps methodology was formed to provide list of best practices for rapid and automated development. A lot of modern IT companies has adopted DevOps practices and use them to enhance development of their products. One of the DevOps practices that allows to ensure high quality development process is Continuous integration and delivery (CI/CD).

On the Figure 1 [3] you can see an example of Continuous integration process.

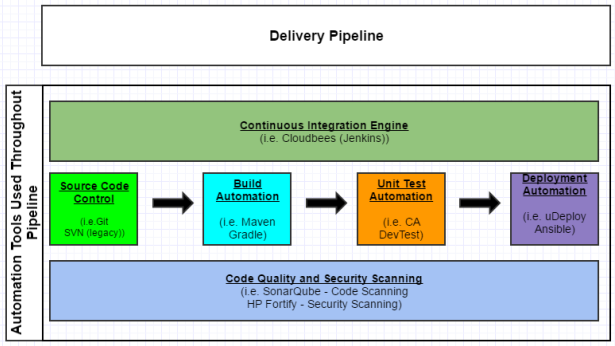

FIGURE 1 Continuous Integration Delivery Pipeline

With Continuous Integration, developers frequently commit and push their changes to a shared repository using a version control system such as Git. Prior to each commit, developers may choose to run local unit tests on their code as an extra verification layer before integrating or it can be a part of a pipeline as well. A continuous integration service automatically builds and runs unit tests on the new code changes to immediately surface any errors.

With continuous delivery, code changes are automatically built, tested, and prepared for a release to production. Continuous delivery expands upon continuous integration by deploying all code changes to a testing environment and/or a production environment after the build stage.

2 Overview

This work discusses the positive and negative points on the next subjects:

- Old approach to software development with manual testing and big gaps between releases.
- Commercial CI/CD tools
- Open source tools, such as Jenkins and Concourse.

3 Decision

As an example of a real project a Concourse CI/CD tool will be considered. A project already had number of unit and smoke tests and some scripts to deploy a software to a server, but still there were a lot of manual steps in this process. Concourse allowed to build a pipeline, that is able automatically run tests and deploy a new version of a software on every developer commit to a remote Git repository. The building of a pipeline helped to reduce time of testing and deployment and make them more reliable in general. In general, the only downside of using open source tools is lack of official support from tool developers and the fact that it is required to make pipelines almost from scratch. But in this situation, it helped to make a pipeline that perfectly meets the project requirements.

4 Conclusion

Development automation with open source tools is gaining more and more popularity among small and big companies.

This is due to more reliable and faster development and wide range of available tools.

The IT industry more and more go to the way of using DevOps methodology, because it brings a lot of advantages for companies that can fully adopt this concept.

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Modelling of the subsystem of estimation of navigational parameters in automatic vehicle control systems

Alexander Mrochko*

ISMA, Riga, Latvia

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

Abstract

The information systems of Automatic Vehicle Location solve the task of controlling and guiding transport means. Employing modern telecommunication technologies along with satellite navigation systems (SNS) facilitates and improves controlling of the mobile objects (MO). Modelling of the work and analysis of these systems' efficiency indicators sufficiently reduces the periods and costs of their testing and introducing in a particular region.

Keywords: Information technology, information system, satellite navigation systems, mobile objects controlling, AVL systems

1 Introduction

Active development of transport systems all over the world and a great increase of the variety of the provided services have led to the formation of an applied complex area of transport-dispatch information technologies, which basics are the following:

- satellite navigation systems that measure the main navigation parameters of the MO (coordinates, speed and direction of movement);
- modern telecommunication systems that transmit the necessary information to the dispatch centre and other traffic participants;
- cartographic and special software solving the problem of accumulation, conversion, storage and submission of information on board the mobile object and dispatch centre;
- on board sensors of information and information mapping equipment.

The main indicators of the efficiency of the mobile objects surveillance systems are characteristics of accuracy and reliability (integrity, availability and continuity of service). The increased requirements to these systems' characteristics are achieved by means of employing, particularly, the technologies of global satellite navigation systems.

2 General

The navigation task to be solved in the user's equipment (UE) SNS, in its simplest case, lies in defining space – time coordinates $P(t) = \left| x; y; z; W \right|^T$. At the stage of primary procession, they perform those measurements of navigation parameters (distance - D, speed of distance change - $\dot{D}$, etc.), which are functionally connected with the state vector P(t) of MO. At the stage of secondary procession, the received parameters are subjected to transformation based on navigation algorithms with the purpose of calculating vector P(t).

The main sources of these measurements' errors are connected with adopted in GPS and GLONASS distance estimated method. The expression of the measured distance to the i-satellite Di in this case will look as follows:

$$Di = D0i + \delta DNS + \delta DRL + \delta DUE,$$

where D0i – true value of the distance to the i-satellite; δDNS – errors introduced in navigation satellites (NS) and control measuring set (CMS); δDRL – errors introduced in the radio line "NS - user"; δDUE – errors introduced by UE SNS.

Besides accuracy properties of SRNS we should also regard reliability indicators of NTD as the indicators of efficiency of SRNS functioning.

The problem of integrity control and development of algorithms and methods of detecting the failures are of great practical interest. The analysis of SNS errors is the basis for the optimizing methods of estimating the efficiency of the AVL systems.

3 Conclusions

Analysis of sources of errors and estimation methods of navigation parameters sufficiently reduces the periods and costs of testing and introducing the *automatic vehicle control* systems in a particular region.

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Theoretical underpinning and development integration of the PIM system into business processes of retail network

Nika Almar*

ISMA, Riga, Latvia

**Corresponding author's e-mail: nika@almar.pro*

Abstract

In this article, the theoretical foundations of automated control are considered, the concept of complex automated systems, from types, is described. The choice of the type of PIM-system (information management system for the product), its structure and system of hierarchies is justified. The integration of the system into the company's business processes was carried out, and a system of system documentation was developed. After the system was launched, a report on its operation was created.

Keywords: Product Information Management, system PIM, distance management, automated control.

1 Introduction

Integration of product information management system can simplify work with the brand catalog, increase the efficiency of interaction between different departments of the company, reduce errors.

The present study of the automated control system is based on the following disciplines: the general theory of communication, complex systems science, automatic control theory, decision science. System analysis techniques were used in this research. System analysis requires tracking internal and external connections as much as possible. It scopes significant factors and connections to and to estimate their effects.

Goals of research of this article: theoretical underpinning, integration policy design, and launch of a PIM system. **Target of research** is the PIM system and all integration processes to corporate infrastructure, integration policy design, watching system launch processes and analysis of final results. **Scope of research:** the theoretical basis of the control system and ACS development and functionality principles.

2 Research tasks

1. Research the theoretical and methodological underpinning of integration policy design.
2. Justify the need for PIM system integration.
3. Concept formulation for the PIM system development project.
4. Delivering the PIM system to the production area, configuration PIM system to meet stakeholder's requirements.
5. Post delivering production state, developing the report system.
6. Writing the final account of the production system running results.

3 Key terminology

Management is the organizational process which provides achieve certain goals.

Control System (CS) combines all equipment and devices which provide control of an object. Automated Control System (ACS) is the CS where people are decision makers and automated equipment and devices collect, process and displays the tasks information, summaries, results and analyze data for decision-making processes.

Automated Process Control Systems are ACS which generate and implement control activity on the controlled technological object by the current level of quality standard.

Technological Subjects of Control is a combination of technological equipment and implemented instructions and standards of the technological processes.

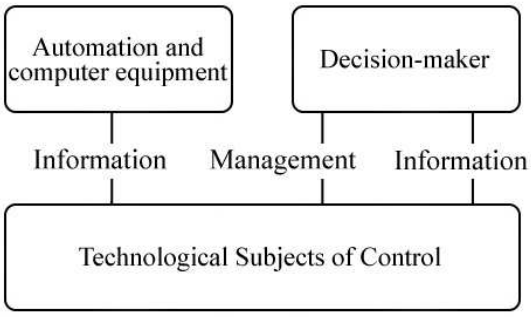

FIGURE 1 The structure of centralized APCS

We talk about Product Information Management (PIM) as APCS in the present study.

4 Overview

The criteria for optimality (efficiency) of the operation of technological objects include achieving the greatest

economic effect: reducing the time and financial costs, reducing errors, increasing the total profit.

A set of elements can be called a **System** if they have the following features: a) connections that allow connecting any two elements of the set by navigating through from element to element; b) property (purpose, function) different from the properties of individual elements of the set.

4.1 THE MAIN TASK OF QUEUING THEORY

Queuing system (model) is called the mathematical model of the system that is designed to service requirements that arrive at random time intervals, and the servicing durability in the general case is also random. *Units* are meant to be different types of queries in the present study: to import and uploading, requests from business partners active in the system, malfunction and troubleshooting alerts, to add and delete users, commodity items, group of commodity items, etc.

4.2 SYSTEM TYPES

Loss system – units which cannot find no one available appliance are loosed. Waiting system – allow waiting for any number of units that cannot be served immediately. They are collected in the query and selected to serve in order that determined in accordance with some discipline. Priority systems – arriving units have different priorities. Arriving high priority unit push out from serving devices low priority units or terminate them.

- Integrated PIM system is priority system.
- System design.
- General Systems Theory Concepts.

System structure is decomposition of the system to groups of determined connected elements, permanent on continuous processing time and provides an indication about the whole system.

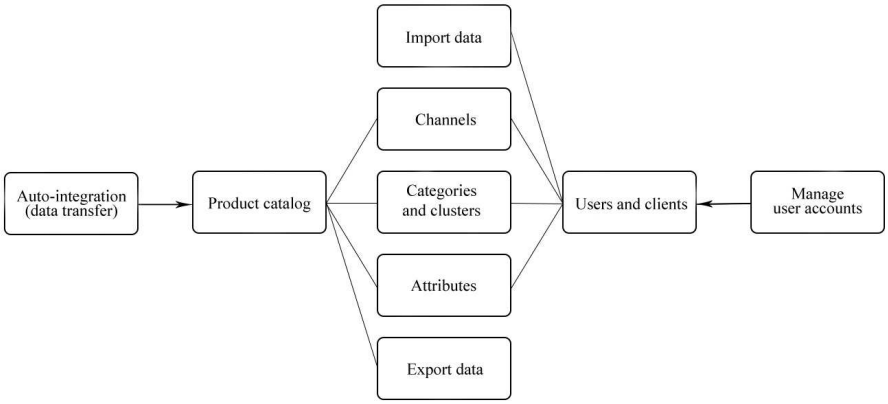

FIGURE 2 Integrated PIM system structure in the present study

The degree of system sophistication is associated with the number of recognizable parts and their interconnections. So, the degree of system *sophistication* is measured by the quantity of information of the real system design.

We can use two main concepts in the struggle with sophistication.

The first is independence. We should maximize the independence of system units to minimize sophistication in terms of that conception. It means system decomposition where high frequency dynamic of that system would contain in single units and interunit interconnections would realize low-frequency system dynamic.

Decomposition means system division to parts which are usable at some processing on that system. The simplicity of the system is an important stimulus and main idea of decomposition the system too sophisticated for analysis. The traditional method of controlling sophistication is "divide et impera" principle also called modularization.

A module is a group of system units which are described by inputs and outputs and keep solidity. To minimize complexity and sophistication of the system we should decompose it to multiple "small then the smallest" independent modules. This can meet a high level of independence by two optimization methods: increasing internal communications for each module and decrease interconnections between modules. We should try to implement a single function at a single module (high module strength) and decrease interconnections between modules by using formal parameters passing (low coupling modules).

We decided in present study to develop system with maximum modularization level. PIM system contains:

1. Goods Catalog (GC)
2. Goods Directory (GD). It provides ability to edit high level information without focus on goods detailed attributes.
3. Digital Asset Management (DAM). Independent media store: goods images, logos and brand stories, image-building media files (images, GIF and videos).
4. Batch Upload (BU). Provides an ability to import to PIM bunch of goods attributes in single large file (hundreds SKU)

So, all subsystems are independent of each other. Using of the PIM system is easy. Users can find failure alerts, view version changing and process large amount of bunch of goods.

The second conception is a **hierarchical structure**. Hierarchy is a structure with depended subordination and one-way connected relations between elements. Action in one way takes much effect than in another way.

PIM user access management system is built on hierarchical concepts.

One of the principal tasks of ACS analysis is designing of the appearance model which shows interconnect processes between elements and subsystems, the interoperability with an external environment.

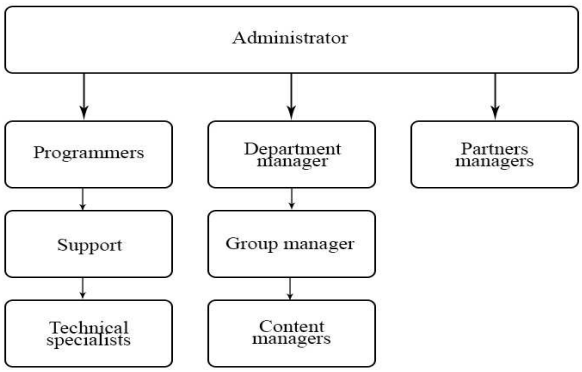

FIGURE 3 Hierarchical structure (interoperability) of the PIM system

5 Decision

PIM system management.

Management PIM system should be operable, answer correct data on command actions to access the maximum efficiency of the PIM system. A command is one of the management actions which should support system state otherwise change the system by applying concrete regulation rules.

PIM system integration.

Taber Trade Ltd. is a retail network which contains more than 230 shops. The assortment matrix of the network is ever-expanding. Near 1000 new SKU are added monthly.

Taber Trade Ltd. has a content management system (CMS). CMS meets following goals: automated daily integration to company IT infrastructure, automatic data migration from brand PIM system such as LOREAL, UNILEVER, RECKITT BENCKISER, KIMBERLY-CLARK; two-way import/export procedures, reduce human hand labor, minimize human mistake factor, data storage optimization, integration of algorithms to reduce time spending to add information, validate and keep information consistency.

First integration step (3 months) had the following tasks: configure automated data import from brand PIM systems, configure integration processes to company IT infrastructure (daily uploads and data updates), upload all data of the assortment matrix (15000 SKU), design company procedures and rules, business processes for adding new data, inserting and dropping SKU, interoperations with business partners, company managers, test data implementation procedures and uploading images from PIM system to CMS and company website, optimization of communication and storage data procedures.

After progress review and data finalization desired result was performed: all SKU information (images, characteristics, video review, articles, webinars) was added to the company website and CMS; PIM system integrated to company IT infrastructure and all company IT services; all business partners and stakeholders was added to the PIM system as users and was trained for work in PIM; detected and corrected all knowing errors and fails at PIM; integration business processes was jointly agreed upon BrandQuad Ltd. (PIM framework cloud provider) and Taber Trade Ltd; was launched the automatic informing of partners about new products in the system, about the expiration of the terms of filling, about changes in the work with the system, updates of the functionality; automated data chacking.

6 Conclusions

The result of the coordinated work and timely integration was a trial launch of an online store in September 2017 and a full launch in October 2017.

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Global value chains in China's innovation development system

Larysa Antoniuk*, Olena Khlystova

Kyiv National Economic University named Vadym Hetman, 54/1 Peremohy Avenue, Kyiv, Ukraine 03680

**Corresponding author's e-mail: antoniuk@kneu.edu.ua*

Abstract

The rapid growth of the global value chains (GVCs) has become an important factor in the development of globalization over the past decades. In times of global network economy, fundamental changes in international production fragmentation arise. They result in significant transformations of global production networks (GPNs). China, as a global steamer of GVCs development has gone from labor-intensive tasks to the delivery high value-added services that have changed its role in the international production fragmentation.

Keywords: global value chains, global innovation networks, globalization, China, internationalization, innovation competitiveness.

In 2018 Experts of the Global Federation of Competitiveness Council defined the following key Global Competitiveness Principles: to build coalitions and public-private platforms to nurture innovation ecosystems and support innovative companies; to make innovation the centerpiece of growth strategies, deploying concrete initiatives across industries, sectors and borders; to invest in developing the business and technology skills needed for companies to be started-up, grown and expanded globally; to build strong, resilient, adaptive and globally connected local innovation ecosystems. etc [1]. Recently, one of the drivers of economic growth is the creation by governments of such conditions and incentives that enable a business to integrate into new forms of international division of labor and to take an active part in global value chains.

Benchmarking China's position in global value chains enables the authors to acknowledge its leadership. It is confirmed by the experts of the World Economic Forum, Deloitte, the Brookings Institution, who used different methods to asses the production environment and countries involvement in GVCs [2;3;4]. Since 2010 China has secured the status of a competitive leader in the manufacturing sector, which today is the largest in the world, generating a quarter of global value-added production. According to UNIDO experts, China has the largest share of world added value, which doubled during the period of 10 years from 12.6% in 2006 to 24.4% in 2016 [5]. China has rapidly become a key stakeholder in the international trade. During the period from 1995 to 2017 its share in the world trade increased from 3.5% to 30% respectively. China's manufacturing activity is characterized by sustainable growth, allowing commodity producers to flexibly respond to market conditions (figure 1).

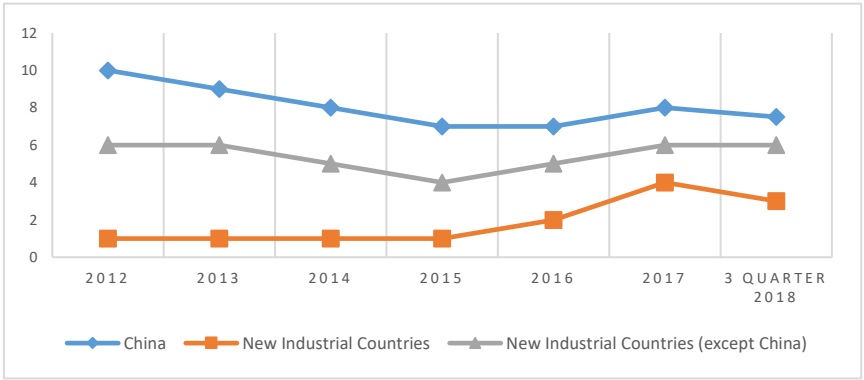

FIGURE 1 The growth rate of production of developing countries, % [6]

Such results have become achievable due to the favorable production and political environment, which allows the largest multinational companies to be attracted to the Chinese markets; a systemic government innovation and industrial policy that provides comprehensive mechanisms for stimulating the development of SMEs in high-tech industries; low cost of resources and labor, which are the key factors for companies to choose a manufacturing base in a foreign country; the expansion of the country's economic presence and the development of cross-border cooperation with governments and companies.

China is boosting its international scientific and technological cooperation within global innovation networks (GINs). This is confirmed by the country's leadership position in terms of R&D expenditures (2.1% in 2017), patent activity, as well as joint international

inventions that increased from 690 in 2006 to 1973 in 2016 units, joint international scientific publications that have increased by 10 times over the past 10 years, as well as the number of PhD students in the field of natural and technical sciences from 8 thousand in 2000 to more than 34 thousand in 2014 [7]. The development of national innovation networks and value chains implies that the Chinese enterprises get more knowledge-intensive tasks, which generate higher added value. It dramatically changes China's role in the international production fragmentation. Over the past 16 years, China's labor productivity has increased by 9 times [8]. As for the export structure, the share of services has tripled from 4% in 2000 to 13% in 2017 [9]. The government has created favorable conditions for changing China's role in GVCs and is rapidly expanding its competitive advantage in high-tech sectors, increasing the share of added value in high-tech goods. For example, from 2005 to 2015, the technological intensity of value-added production in medium-high and high-tech sectors increased by almost 1.5 times.

The correlation analysis ($r^2 = 0.82$) shows the strong positive interrelation between technological readiness and the value chain breadth evaluated by the experts of the World Economic Forum (figure 2).

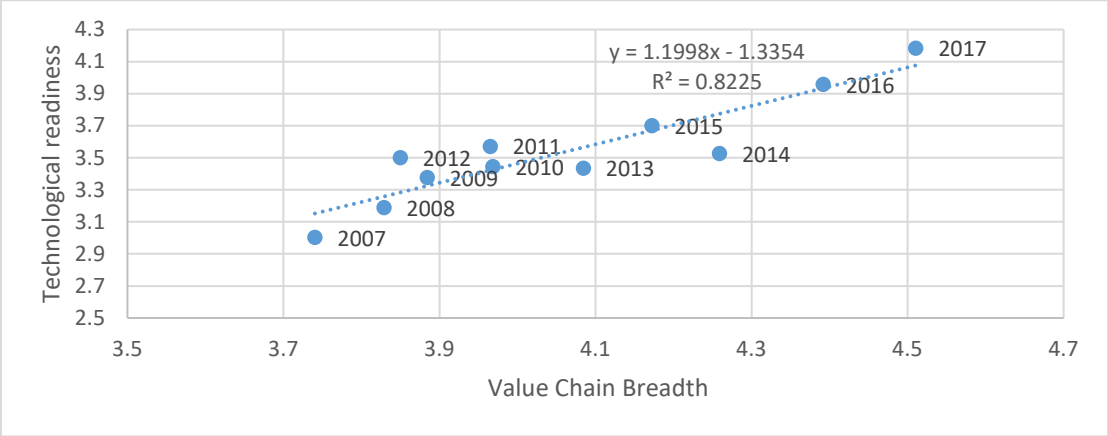

FIGURE 2 Interconnection of the value chain breadth and technological readiness of China

International competitiveness of China in the GVCs is ensured by the development of an effective National Innovation System (NIS), which, according to our assessment, has 3 stages of its development. The first stage (1953-1990) is characterized by the beginning of systemic reforms and the definition of national priorities in science and technology as well as industrialization. The second stage (1991-2015) - deepening of reforms and realization of innovative potential by increasing the spending on science (in 2019, USD 390 billion), integration of NIS on a global scale. The basis of the third phase (2016 – till present) has been reformed to achieve global innovation leadership through the effective implementation of the innovative potential embodied in the 13 Five-Year Plan, Made China 2025, China 2030, Road map of science and technology 2050.

Thus, China's technological leadership in GVCs is ensured by implementation of key technologies in all sectors, enabling Chinese enterprises to be integrated into GVCs of high-tech goods and services and innovative networks. The innovative leadership of China in the 21st century is provided by comprehensive mechanisms for the implementation of scientific and technological potential, increasing labor productivity through government incentives and the development of effective tools for building a national innovation system on the basis of public-private partnerships.

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Global supply chain formation factors

Rustam Aslanzade

Student PhD, ISMA, Riga, Latvia

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

Abstract

The article systematizes the main factors contributing to the formation of global supply chains. Consistently analyzed the global, industrial, economic and technological factors in the formation of global supply chains. The role of environmental factors in the formation of SustainabilityGSC is noted.

Keywords: supply chain, global supply chains, global value chains.

Since the beginning of the XXI century, under the influence of globalization, informatization, virtualization, and deep transformation processes in the global economy have taken place. These global changes are reflected both in the economies of all countries of the world, and in the activities of all economic entities, and, of course, in the system of all relations developing between them.

The formation of global supply chains, as well as global value chains, occurs under the influence of a whole set of factors. To conduct a system analysis, we consider it appropriate to consider the following groups of factors: global, industrial, technological, and economic.

Global factors affect the growth of the integration of national economies in the international economic community, increasing global interdependence, changing the structure, organizational forms and concepts of enterprise development. Modern companies are facing not only increasing profitability and ensuring competitiveness in the global competitive space. Effective integration into global value chains, global production chains is becoming a necessary tool for this.

Production factors are closely related to globalization, but, above all, come from the features of the development of modern processes of production specialization. The increasing complexity of products produced by modern industry, leads to the fact that the final product is the result of a multitude of separate production, assembly, transport, supply and marketing processes combined into a single system throughout the world. Accordingly, this product consists of a set of components: components, components, parts, etc.

Economic factors lie in the fact that it is economically advantageous to produce all these individual fragments in countries where the costs are the least and the risks are the least. It is also important to have the appropriate production capacity, qualified personnel, developed infrastructure.

Technological factors, in turn, have a very strong transformational impact on the formation of global supply chains. On the one hand, modern ICTs fundamentally facilitate and accelerate all processes within global chains, and undoubtedly reduce transaction costs at all stages of the chain. Coordination of increasingly complex and dispersed global production networks would not have been possible without a corresponding improvement in communication capabilities. On the other hand, the emergence of digital technologies in global supply chains can lead to reconfiguration of relationships with suppliers in host countries, as well as new partnership opportunities. Thus, the emergence of production capabilities based on 3D printing can lead to reorientation, as well as to outsourcing of additional services. [1].

In addition, the growing importance of the social responsibility of all public actors, including business, is an equally important imperative of the current millennium. The spread of social responsibility in global value chains and global supply chains is the result of environmental and social factors. That is why Sustainability is a key trend in the development of business and society in the XX1 century.

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What Employment is in Demand in the Labor Market: Digital or Creative?

Nadiya Azmuk*

Cherkasy State Business-College, **Ukraine,**

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

Abstract

Currently, information technology is changing the process of work and changing the place of the employee in it. The digital economy requires employees with new skills and leads to the formation of new types of employment. At the moment, there are many approaches to defining requirements for staff skills and employment classification in the digital economy. This paper is an attempt to classify occupation according to the skills of employees.

Keywords: employment, digitalization of work, creativity of work

1 Introduction

Information and computer technologies are increasingly penetrating into the labor sphere, changing the structure of employment, increasing the level of labor mobility, increasing demands for the educational and professional level of employees, as well as the level of skills in the use of information and computer technologies (ICT).

This is supported by the following global trends in the information society as the Internet of Things, big data analytic, cloud technologies and Artificial Intelligence. (ITU, 2017) [1].

These trends shape the need for the employees who have digital skills. In addition, there is a need for the employees with communication skills and capable of generating new ideas, products, etc.

"Algorithms, the proliferation of bots, and a shift to the Internet of Things and Artificial Intelligence, augment the need for critical information and advanced content-creation skills." (ITU, 2018) [2].

The creativity of human capital is an important factor in the development of economy. Creative employment is typical for those who, in the process of professional activity, are able to create new products, services and knowledge.

The combination of digital and creative skills of the staff and their constant updating are important for economic development.

Overview

On the one hand, digitalization of business leads to the need for staff`s digital skills. On the other hand, the ability of employees to generate new ideas, products and services makes business competitive.

At the present time labor market has a significant diversity of types of work requiring various types of personnel's creativity and digital skills combination.

Therefore, I offer the classification of employment based on the combination of two key components: creative work and digital work.

Five main types of employment are distinguished depending on the level of creativity necessary for solving problems of different complexity levels and digitalization of work. They are a performer, artist, professional, digital, innovator (Figure 1).

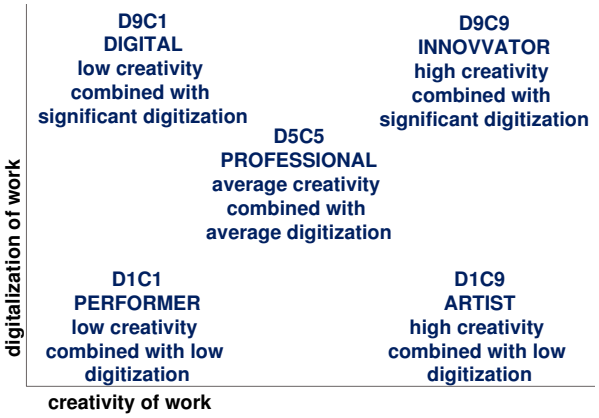

Figure 1. The combination of creative and digital work

Below there are examples of the following types of employment:

- D1C1 - **Performer** (cashier, seller);
- D1C9 - **Artist** (potter, embroiderer, artist);
- D5C5 - **Professional** (managers, consultants, auditors)
- D9C1 - **Digital** (test program);
- D9C9 - **Innovator** (architect, designer, engineer, researcher).

The most effective type of employment is an innovator with a high level of creativity alongside with topical and complex digital skills.

The predominance of some form of employment in different countries depends mainly on the level of information and computer technologies development.

At the end of 2018, the Internet was used by 51.2 % of individuals or 3.9 billion people. Four out of five people use the Internet in developed countries and vice versa, only one out of five people has this opportunity in the least-developed countries (ITU, 2018) [2].

The existing inequality in the access of the population to the Internet between the countries results in a digital skills gap. The high level of ICT development in the country implies the predominance of such types of creative and digital employment as digital and innovator. Performer and artist prevail in the countries with a low level of ICT development.

Conclusion

Modern economy faces the formation of a new type of employment, which combines employees' creativity and digital skills. The proposed classification allows distinguishing five types of employment: performers, artists, professionals, innovators and digitals.

Employment with different levels of staff creativity and a low level of work digital prevails in the countries with a low level of digital technologies development. Therefore, employment with high digitalization of labor prevails in the countries with a developed digital infrastructure.

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Authors

Nadiya Azmuk, 1970, Cherkasy, Ukraine.

Current position, grades: Ph.D in Economics, Vice Director of the Cherkasy State Business-College (Ukraine).
University studies: Kyiv National Economics University (Ukraine), PhD in Economics, 2003.
Scientific interests: digital labour market; artificial intelligence; digital employment; innovative human capital.
Publications: 57
Experience: 3 international educational projects, 23 years of teaching experience.

Testing automatisation in modern web-applications

Nadejda V Bakalo*

Tourism and Administration Department Poltava National Technical Yuri Kondratyuk University, Pershotravnevyi avenue, 24, Poltava, Ukraine, 36011

**Corresponding author's e-mail: bakalo1605@gmail.com*

Abstract

Major strategic opportunities for the development industry as well as disadvantages are specified. The competitiveness indices of the countries, which are formed in the components and are consolidated into the subindex, are singled out. The changes in the positions of Ukraine and some countries of the world in the competitiveness index in the tourism sector are analyzed. The properties of competitive advantages are considered and divided into internal and external ones.

Keywords: competitiveness, development, industry, management, tourism

1 Introduction

The main purpose of the tourism industry is: to expand the volume of domestic tourism and increase the scale of inbound tourism, on this basis to ensure the integrated development of resort areas and tourist centers, considering the population socio-economic interests, conservation and restoration of natural areas and historical and cultural heritage.

2 Overview

The competitiveness of the subjects of the tourist business lies in their ability to use effectively their potential and resources aimed at a successful commercial result, while respecting the balanced development of the territories. The entire territory of the state is characterized by favorable conditions for carrying out various types of tourism activities and the availability of a variety of recreational resources that provide rest and treatment to the population. Natural reserves form the coasts of the Black and Azov Seas, relief, water (about 70 000 rivers, 3 thousand natural lakes and 22 thousand artificial reservoirs), plant, animals and forest resources. Ukraine occupies the leading place in the world in terms of the level of provision with unique tourist (about 150 000 monuments of culture, history and nature, 39 cities, over one thousand years old) and resort and recreational resources (about 500 sources of various mineral waters). On the territory of the state there are about 3 thousand rest and recreation institutions, about 4,600 collective accommodation facilities. Deposits of mineral and radon waters, as well as therapeutic muds that are part of the recreational potential of Ukraine, have not only domestic but also international significance. In Ukraine, 11 national natural parks, 15 state reserves, aboretums, and monuments of landscape art belonging to nature protection territories have been created.

The competitiveness index of countries in the sphere of travel is compiled according to a number of indicators, is formed from 14 components and is combined into 4 subindex, characterizing the favorable environment in the country for tourism development, public policy, infrastructure and available natural and cultural resources (Table 1).

TABLE 1 Subindex of the competitiveness of countries in tourism

Subindex name	Characteristics, which the subindex includes
Subindex "Favorable environment"	business environment; health and hygiene; security level; infrastructure of information and communication technologies.
Subindex "Infrastructure"	infrastructure of air transport; infrastructure of land and water transport; tourist infrastructure.
Subindex "State policy and the creation of favorable conditions"	prioritization of the sphere; international openness; environmental sustainability; price competitiveness.
Subindex "Natural and cultural resources"	natural resources; cultural resources and business trips.

Rating analysis provides an opportunity to assess competitiveness in the tourism industry and identifies obstacles that hamper the sphere sustainable development.

All these factors make it independent in its choice and, therefore, more rational.

3 Decision

Currently in Ukraine it is advisable to develop domestic tourism, offering inexpensive short-term tours. In order to increase the volume of entry flows of foreign citizens to the territory of Ukraine, it is necessary to conduct explanatory work on the travel safety. The systematic approach to the implementation of public policy in the field under investigation is important. A stable hryvnia and a growing economy are the guarantee of a well-coordinated and effective work and domestic tourism industry development.

The essence of competitive advantages is more fully manifested through their properties. The first property is their comparative, relative nature, so the competitive

advantages of enterprises should be determined by comparing the most significant characteristics of their activities. The second property of competitive advantages is their attachment to specific conditions and reasons (geographical, temporary). So, a product that has an advantage in price in one geographic market may not have this advantage on the other. Another property of competitive advantages is their vulnerability to the influence of heterogeneous factors. Competitive advantages inherent dynamism, that is, a change in time, which is described by the concept of the life cycle, according to which the development process and the subsequent decline of competitive advantages is divided into several stages (becoming, gaining, disappearing). Competitive potential is a set of parameters that determine the ability of an enterprise to function effectively in the market in the future. To ensure the competitiveness of tourist enterprises, it is important to have the use and maintenance of a permanent competitive advantage over a long period of time, which have characteristic features: value for consumers, feature or uniqueness, duplication complexity for competitors.

Competitive advantages of the enterprise are such characteristics or properties that provide the enterprise with an advantage over visible competitors. Components of competitive advantages of tourist enterprises are the advantages of a tourist product, which can be connected either with high quality of tourist services or with lower prices for them, which is consistent with the accepted enterprise market strategy. Priority factors determining the competitiveness of the tourist product, utility for the potential buyer, price and innovation, and the evaluation criteria are the result of production and implementation, the conditions and culture of service, as well as the availability of services for the buyer [1].

4 Conclusion

Country competitiveness was assessed through factor analysis. The index of competitiveness of countries in the travel sphere is determined by indicators formed by 14 components and combined into 4 subindex. Subindexa characterizes the favorable environment in the country for the development of tourism, public policy, infrastructure and available natural and cultural resources. The definition of four integrated subindeces is an important step in understanding the perception of the tourism competitiveness.

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Collaboration as a form of joint tourism activity in Ukraine

Yanina Barybina, Olena Bilinska*

Poltava University of economic and trade

**Corresponding author's e-mail: belinska-lena@rambler.ru*

Abstract

Tourism made a significant contribution to the economies of many countries. Last years tourism in Ukraine is rapidly grows, which makes it necessary to research this field more. In the process of the research was formed the author's vision of clarifying the essence and nature of collaboration. We understand the collaboration in tourism has diffusion of knowledge and innovations. We are generalized approaches to understanding the collaboration in tourism, namely, organizational, project, network and ecosystem.

Keywords: tourism, tourist destination, collaboration, management

1 Introduction

Today tourism is one of the most developing industries in the world. So, the development of the tourism industry both in Ukraine and in the world as a whole, requires the intensification and significant expansion of the scope of its research.

Tourism as an important socio-economic phenomenon of our time is inextricably linked to the management of tourist destinations.

2 Overview

The beginnings of collaboration are buried deep in American life. The are different definitions of this category. The terms "cooperation" and "collaboration" are frequently used in the tourism sector.

As described in a seminal work by Gray (1989) collaboration is "a process of joint decision making among key stakeholders of a problem domain about the future of that domain" [3].

Thomson discover collaboration as a process in which autonomous actors interact through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; it is a process involving shared norms and mutually beneficial interactions. [2]

Under the conditions of integration and globalization, cooperation between different subjects over the solution of one task is widespread. Such cooperation is common in other areas. Collaboration is also called a set of participants in the process of collaboration. The collaboration in the field of fashion is marketing, economic and design cooperation.

An example of collaboration in tourism at tourist destinations association (for geospatial feature) is the National Tourism Organization. Its goal is to create a permanent network-platform for the association of regional, city and industry tourism organizations to improve the quality of the national tourist product, develop the system of professional knowledge and training of specialists, as well as the entire complex of marketing of the tourist brand of Ukraine in the domestic and global markets.

The tourist destinations, which use the collaboration as a form of joint activity, have stronger joint actions and better prospects for the realization of their goals. List some importatnt factors influence this:

- permanent location in the information and communication environment;
- regional tourism organizations are developing in a healthy competition;
- tourist destinations aim to achieve common goals and benefits of collaborative work, not competitive advantages.

3 Decision

Based on an examination of the literature, the authors posit that collaboration of tourist destinations is a process joint activity (economic at the level of separate economic entities such as accommodation establishments, catering, etc.; management organizations - regional tourist organizations, cluster associations).

4 Conclusion

The natural process is taking place in the tourism sector requires a modern vision to the development of tourist destination management. We have proposed such a tool for the formation of the competitiveness of tourist destination, which will form a new quality of tourist services.

But at the same time, the defining condition is an understanding of the goals of collaboration with full identification of tourist destinations (for geospatial, culturological, economic grounds).

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Competitive advantages and challenges of Islamic banking in international business

Adilia Batorshyna*, Volodymyr Tokar

Kyiv National Economic University named Vadym Hetman, 54/1 Peremohy Avenue, Kyiv, Ukraine 03057

**Corresponding author's e-mail: abatorshina@kneu.edu.ua*

Abstract

Islamic banking provides businesses and individuals with supplementary and sometimes the only source for financing projects and current expenses. It has the more social-oriented principles for supporting debtors and guaranteeing interests of creditors compared with conventional types of banking. The authors disclose the roadmap for Islamic banks aimed at enhancing their international competitiveness.

Keywords: Islamic banking, international business, principles of banking, financial risks, social benefits.

1 Introduction

The capital of Islamic banks increased from 200 billion US dollars to 2.2 trillion US dollars in 2003-2016 with estimation of 3.8 trillion US dollars in 2022 [5]. The average annual growth of Islamic capital market equals 19.7 exceeding the tempo for traditional banks. It influences on conventional commercial banks forcing them to diversify their activity by providing their clients with Sharia compatible Islamic financial services. The increasing interest to Islamic finance observed among consumers from countries, where Muslims are not the majority of population, also stimulates the development of Islamic banking market.

The litmus test for Islamic banking utility is its ability to stimulate growth and decrease the poverty via its main feature – risk sharing [2]. Islamic banks have social duties going far beyond the goal to maximize profits.

As the main component of Islamic finance, Islamic banking fosters the common prosperity influencing the economic growth as the supplier of capital for business activities and thanks to the specificities of its products. The key Islamic principles are sharing risks instead of transferring them; the ban of social and economic exploitation; enrooting moral and social values; unification of risks and profits.

Sharia laws require that resource should be used to satisfy needs of the society as a whole and be supplemented by the productive economic activity creating the real capital.

The positive impact of Islamic banking is due to the specificity of distributing of risks and specific financial stability and resilience of Islamic banks.

Islamic financial instrument protects from the impact of the initial fund of financial resources of individuals on the process of distribution of incomes generated from the economic activity. Besides, the ban on banking interests and usury aims at creating favorable conditions for social prosperity and protecting the fair acquiring of property and values by economic subjects. Islamic banking follows strict rules in financing the real economic activity avoiding the over-borrowing [3] and shifts the economy from the debt-based type with transferring risks to the economy with risk-sharing [2].

Due to its essence Islamic banking enables countries to mobilize resources from individuals (population) and increase the share of capital investments in business, facilitates the risk sharing in entrepreneurship.

Islamic methods of financial activity connect finance to the real economic activity. Islamic methods of acquiring profit and sharing losses are essential to partnership (musharaka), trust-financing contracts (mudaraba), trade contracts, such as sales with postponed payments (murabaha), sales of goods to be produced (istisna) and sales with postponed delivery (salam). This concept fosters the growth of financial sector simultaneously with the real sector of economy.

Risk sharing guarantees that banks profoundly evaluate business offers as it creates the impetus for financial institutions to internalize expenses connected with bankruptcy. Moreover, risk sharing is carried out via financing based on equality This type of financing facilitates the development of cooperation, interdependence, as well as the universal brotherhood bringing together everyone in production and investments.

The number of supporters for transiting from financing based on debt to financing based on own capital grows in developed economies. The emphasis on own capital creates the demand from investors in securities. The International Monetary Fund in the World Economic Outlook of reasons and indicators of financial crises recognizes the advantages of financing own capital in ensuring financial stability and admits foreign investments in contrast to debt financing guarantee more secure and stable financing for development [4].

Even though the Islamic banking is not the only recipe for enhancing social and economic justice, as well as public welfare, but ethical aspects enrooted in Islamic banking principles enable the increasing transparency and social responsibility fostering national economic growth and prosperity.

The pervasive feature of Islamic banking eliminates the discrepancy between assets and liabilities inherent to the traditional banking sector, therefore, ensuring the stability

of financial systems. Investment portfolio are balanced automatically during financial crises, thus, there is no need for governmental intrusion [1]. The embedded stabilizing feature of Islamic banking may protect poor layers of population from financing anti-crisis measures via additional taxes and expenses. Therefore, the burden on poorest citizens is lessen and public prosperity is protected.

The Islamic banking system is sufficiently capitalized and liquid, but the level of liquidity depends on regions and share of Islamic banks in banking systems. The capital adequacy ratio of Islamic banks often exceeds official requirements. The main part of this indicator considering risks consists of capital of the first level.

The high level of nonperforming loans share in the Middle East and Asia highlights the problem of credit risk in these regions and draws attention to the necessity to implement the state supervision and self-governing of a better quality. The regulatory thresholds should be more severe. We also insist on founding the Corporation for Asset Restoring and Management to deal with bad debts.

2 Conclusions

The key challenges to Islamic banking development are: overcoming the discrepancy between theory and practice of conducting Islamic banking business; expanding the scales of Islamic banking via granting the access to its services for different social groups; entering new markets; ensuring the reliability and efficiency of Islamic banking; managing the liquidity; elaborating of the Sharia regulation on non-stop basis; and appropriate training for qualified personnel engaged in Islamic banking.

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The assessing of science contribution to the state economy

Alexandr Belov[1]*, Lyudmyla Svistun[2]

[1]*Poltava University of Economics and Trade, Ukraine*
[2]*Poltava National Technical Yuri Kondratyuk University, Ukraine*

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

Abstract

The suggested author's approach to estimation the science impact on the economic growth. The authors carried out modeling of estimation the role of science in the country's economic development on the example of Great Britain. According to the models obtained, the volume of R&D expenditures has the most significant influence on the country's economic development, and in the long outlook this impact is almost twice as high as in the short-term one. The conclusion contains advantages and limitations of author's approach to assessing the science contribution to the state economy.

Keywords: science, science contribution, state economy, economic development, modelling

1 Introduction

Current rapid development taking place in the world is bases on knowledge. Information becomes an important factor of production at the same level with capital and labor. The main producer of the information which then becomes an important factor of production is a country's scientific sector.

Comparing analyses of such indices as GDP per capita in different Europe countries (Figure 1) and amount of R&D expenditure (Figure 2) reveals a certain connection between them in a long-term period. Among the chosen countries are the EU leaders – Germany, Great Britain, France; the countries that are leaders by the standard of living – Finland, Sweden, Netherlands, Austria; the countries that are going through hard time due to the crisis – Portugal, Greece, Italy, and neighboring to Ukraine countries – Poland, Lithuania, Latvia, the Russian Federation and Hungary.

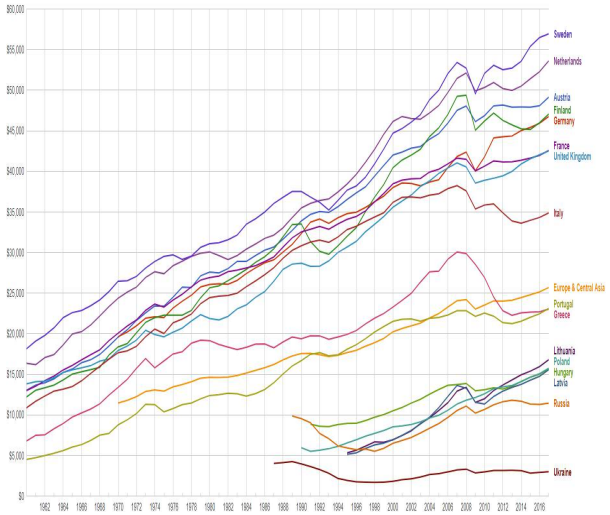

FIGURE 1 GDP per capita (expressed in US dollars in 2000) in some European [1]

The countries that provide their own economy with considerable level of the science expenditure and accordingly the majority of them have the analogue level of economic development. A conclusion can be made as follows: a low level of expenditure for their own R&D development by countries placed in the bottom part of graph 2 defines equal places in the bottom part of graph 1. And vice versa, the countries with high level of their own R&D development expenditure have higher indicator of their economic development (Figure 1).

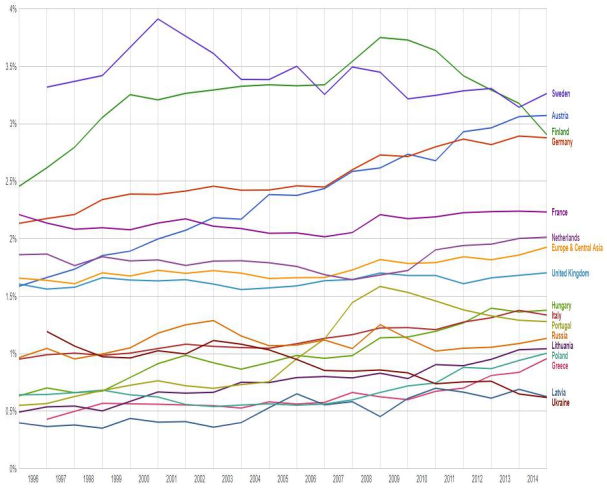

FIGURE 2 Research and development expenditure in some European countries (% of GDP) [1]

2 Overview

In the some works Cobb-Douglas production function was applied for estimation the production factors influence on the country's economy in general. Thus, the aim of the paper is developing author's approach to estimating the production factors influence on the country's economy in general.

3 Decision

In order to evaluate the information factor influence, we will take, firstly, because the main "producer" of such information is science, and secondly, the generally accepted methodology for evaluating the activities of science has not yet been adopted, we will make such an assessment on the level of the cost of this information, which can be determined as the amount of funding for science in the country. Consequently, Cobb-Douglas production function

will look as follows:

$$Y = A \cdot K^{\alpha} \cdot L^{\beta} \cdot S^{\gamma}. \quad (1)$$

The function defines the dependence of created social product value from total living labor expenses L and the volume of productive assets being used K. α and β are coefficients that consider influence of each of the K and L factors on the production of a social product. A is a coefficient that considers influence of factors that are not included in this equation, or factors that make up the external technological level of the economy (according to Solow [2]).

S is amount of R&D expenditures in monetary units (Gross domestic **expenditure** on research and development – GERD. The given indicator includes **expenditure** on **research and development** by business enterprises, higher education institutions, as well as government and private non-profit organizations.), γ is a coefficient considering impact of information on social product production.

Provided α +β + γ = z, then in case of all the resources increases in n times we will receive:

$$A \cdot (nK)^{\alpha} \cdot (nL)^{\beta} \cdot (nS)^{\gamma} = An^{\alpha+\beta+\gamma} \cdot K^{\alpha} \cdot L^{\beta} \cdot S^{\gamma} = Y_n. \quad (2)$$

That is $Y_n = n^z \cdot Y$ is a new index of GDP amount.

Thus, if z=1, то $Y_n = n \cdot Y$, then proportional increase in all the resources by n times will lead to GDP increase in n times.

Provided z>1, то $Y_n > n \cdot Y$, then GDP increase will outrun the resources increase pace, which is characterized as a positive effect of economy stepping-up.

If z<1, то $Y_n < n \cdot Y$, then increase in resources will occur faster than GDP increase. That is characterizing for negative effect of economy stepping-up.

Each of the production factors is characterized by average and marginal values. If the equality is divided (2) by L, we will obtain the average labor productivity:

$$\frac{Y}{L} = A \cdot K^{\alpha} \cdot L^{\beta-1} \cdot S^{\gamma}. \quad (3)$$

Average labor productivity reflects the amount of GDP for the unit of the labor used.

As an example, for modeling we suppose Great Britain as a modern European developed country. Initial data are represented by GDP in millions of US dollars – Y, amount of Gross fixed capital formation in millions of US dollars – K, number of labor force, total in thousands of people – L and amount of R&D expenditure (GERD – Gross domestic expenditure on R&D) in millions of US dollars were chosen as new information value – S. The period under investigation covers 16 years from 2000 to 2015.

The model coefficients calculation was carried out with the help of spreadsheet Excel 2016 built-in functions. In the short-term outlook the model has the following equation:

$$Y=1,01K^{0,449} \cdot L^{-0,361} \cdot S^{0,44}. \quad (4)$$

The model for long-term outlook:

$$Y=1,03K^{0,223} \cdot L^{-0,166} \cdot S^{0,818}. \quad (5)$$

It should be noted that checking for statistical criteria confirms the adequacy and reliability of the models obtained by us.

Considering the global crisis, which significantly reduced the country's development rate, our models' indices enable noticing the following: that the country is in the stage of t crisis recovering, because it has a negative outcome from all the factors under consideration.

According to the models obtained, the volume of R&D expenditures has the most significant influence on the country's economic development, and in the long outlook this impact is almost twice as high as in the short-term one. Also, a negative impact of the labor factor is observed, which, in our opinion, can be explained by the steady tendency for relocating most of the manufacturing enterprises to low-wage countries and use of emigrants' labor.

4 Conclusion

The carried out modeling of estimation the role of science in the country's economic development showed on the example of Great Britain that such impact is real and it is significant. For 2000-2015 period it shows that GERD growth rate increases by 1% will enable GDP increase by up to 4,4% in the short-term outlook and by up to 8,2% in a long-term one.

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Anti-crisis management service of the enterprise

Raisa Bilovol*

Poltava National Technical Yuri Kondratyuk University, Management and Logistics Department, Pershotravneviy avenue, 24, Poltava, Ukraine

**Corresponding author's e-mail: bilovolri@ukr.net*

Abstract

The creation of a certain structure for crisis management should depend on the volume of activities and the size of the enterprise, as well as the phases of the crisis: a light, deep, disaster.
As a result of the study, the authors found that the issues of organizational design of the service of crisis management of the enterprise and the mechanism of its functional support remain insufficiently studied today.
The principles considered by the authors on the crisis management service proposed for implementation justify the fact that it should always be ready to overcome the crisis or critical pre-crisis situation that may arise due to the clash of interests of business owners in the market and the influence of factors of the internal and external environment.

Keywords: management, enterprise, crisis, crisis management system.

1 Introduction

The necessity of introducing crisis management at enterprises as a permanent component of the general economic mechanism, aimed at preventing and overcoming the development of crisis subsidence, is designated.

Anti-crisis management is a management of the state of corporate resources (capital, personnel, information and technology, technology and equipment, rights) and entrepreneurial capabilities, which guarantees their most efficient use for the stable functioning and dynamic scientific, technical and social development, prevention internal and external negative influences.

2 Overview

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

- crisis
- crisis management system

3 Decision

Anti-crisis management is a management of the state of corporate resources (capital, personnel, information and technology, technology and equipment, rights) and entrepreneurial capabilities, which guarantees their most efficient use for the stable functioning and dynamic scientific, technical and social development, prevention internal and external negative influences (threats, crises). The issue of organizational design of the company's anti-crisis management services and the mechanism for its functional provision remain insufficiently investigated.

The organizational approach to the creation of a crisis management service (CMS) requires management of modern enterprises to adhere to the following principles:

- functional integration and coordination of the actions of responsible specialists of the main departments of the management of the enterprise;
- a combination of centralization and decentralization of management, horizontal and vertical links, allowing more efficient and rapid involvement of management personnel in the development and implementation of anti-crisis measures;
- professionalism based on experience of work, organizational skills, initiative, creative approach to making non-standard decisions in the conditions of limited information and time, high responsibility for the given task, ability to work in a team, moral and ethical qualities of specialists;
- responsibility for the consequences of unreasonable managerial decisions on the adoption and implementation of the anti-crisis strategy.

The necessity of creating an CMS in enterprises affected by the crisis is due to the following reasons:

- presence of an object, research tasks and methodological basis for it carrying out;
- quite large and functionally diversified sphere of occurrence of crisis phenomena in the enterprise (finance, marketing, production, personnel, etc.), which require system management [1. p.165].

The head of the company's CMS should then clearly identify all the functional components, considering their role, and the specifics of the localization of crisis phenomena, their elimination and ensuring the stable management of the enterprise.

The main purpose of the creation of the CMS is to ensure the stability of the operation and achievement of the main objective of the activity for each entity, since its level of security depends on how effective the management and the employees of the CMS will be able to avoid potential threats, crises and eliminate the harmful the consequences of certain negative phenomena caused by the influence of factors of the external and internal environment, to guarantee its stable and maximally effective functioning in modern conditions and to ensure high potential of an enterprise development in the future.

4 Conclusion

Consequently, the proposed crisis management or crisis management service, which we are proposing to introduce, must always be ready to overcome, which may arise due to the collision of the interests of the owners of the enterprises in the market and the influence of the factors of the internal and external environment. Producer companies will not voluntarily do this because such measures require additional costs for wastewater treatment plants and related efficient clean technologies. The only factor that prompts enterprises to properly ecologize production is the use of tangible fines for violating the national environmental legislation of Ukraine. Studies have shown that the plan for the provision of the environmental component is part of the overall anti-crisis concept of the enterprise, which looks like a logical scenario of the implementation of the necessary set of measures in a calendar sequence, with the addition of the calculation of the effectiveness of the practical implementation of these measures.

Benchmarking in the tourism sphere

Iryna Chernysh*

Poltava National Technical Yuri Kondratyuk University, Tourism and Administration Department, Pershotravneviy avenue, 24, Poltava, Ukraine

**Corresponding author's e-mail: mahovkavika@ukr.net*

Abstract

Benchmarking is a research and analytical type of activity that involves finding and studying the best of well-known business practices, helping to improve business processes relatively quickly and at the lowest cost. The main features of modern benchmarking are described and analyzed in the article.

Keywords: administration, benchmarking, tourism

1 Introduction

The conducted studies indicate that the usage of benchmarking could be rather successful in touristic areas. With the term benchmarking in contemporary theory and in the practice of management it is marked the research and observation of the best business of concurrency. Benchmark represents the etalon, quality standard that serves as a basis for comparing [1]. There is a question of continuing and systematic process of comparison of proper business with business of the companies (destinations) which achieve the best results.

2 Overview

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

- tourism destinations development;
- benchmarking of touristic areas.

3 Decision

After deep research of existing studies we are able to summarize the main features of benchmarking:

- systematic activities aimed at the search, evaluation, comparison, training and use of the best performance characteristics of enterprises to develop their own competitive strategic decisions and plans;
- a global approach to gathering information about the best examples of organizations regardless of their size, business, geographic location, destination, industry;
- quantification of elements and management tools as components of a universal management system for the accelerated development of any organization based on the use of the most effective management experience in world experience;
- planning and implementation of competitive strategies of enterprises in conditions of uncertainty and entrepreneurial risk, growth of the pace of scientific and technological process, the needs of consumers, informatization of production and distribution of products.

In our work the chronological order of introduction of benchmarking is defined:

- definition of processes requiring improvement;
- the choice of team members or partners;
- data collection;
- data analysis, identification of differences between what is in the enterprise and those that offer comparisons for comparison;
- selection of best practices;
- development of possible solutions for implementation;
- implementation of the implementation procedure itself.

Benchmarking is defined as the main tool for improving the economic profile of the region:

- assessment of the socio-economic status of the territory
- analysis of the main trends of development
- SWOT analysis
- formation of the economic profile of the territory
- selection of analogue region
- creation of the economic profile of the analogue region
- comparing the economic profiles of the region with the analogue region
- evaluation and analysis of profile parameters breaks
- development of a program of managerial decisions to improve the economic profile of the territory under consideration.

General common features of successful tourist destinations that used benchmarking:

- presence of leadership;
- optimal structure, clear distribution of functions and responsibilities
- "Correct" business model;
- share participation in financing;
- strategic planning (formation of strategic councils / committees with participation of representatives of the private sector);
- pronounced orientation to the market;
- transparency;

- condominium";
- the activity of the organizations is directed by enterprises of the tourism industry, focused on the market and is based on the results of research.

4 Conclusion

It should be noted that the management system of a recreation area will depend on the following factors:

- own history and conditions (economic, organizational and cultural);
- structural and financial opportunities for participation of representatives of the public and private sectors;
- the willingness of potential partners to assume additional responsibilities related to the management of the deployment.

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Brand platforming of the enterprise

Andrii Chuzhykov*

Kyiv National Economic University named Vadym Hetman, 54/1 Peremohy Avenue, Kyiv, Ukraine 03057

**Corresponding author's e-mail: no.dsgn@gmail.com*

Abstract

Nowadays enterprise needs to understand that it's enough to be present in the market only by the fact. Branding is the platform from which every successful marketing campaign is launched. Any marketing effort that hopes to be on target needs a well-designed brand strategy behind it. When you devise your brand strategy, you're actually making a business case for why your business, product, service, event, campaign or project – whatever it is – should be positioned in a particular way. So next in the abstract author tries to explain main connections between enterprise and final costumer. The main connection form will be called "The brand platdform".

Keywords: Brand platform, brand values, enterprise benefits

1 Introduction

A brand platform, or corporate image, is the set of associations that customers make with your company. Some of these associations may be quite obvious and strong, like the brand Volvo is associated with safety. In other cases, the associations can be weak; BMW, for instance, may be associated with safety but only in a very weak manner.

The possible associations that a brand may want to have actually comes from many sources. For example, it may come from the benefits the customers in a target market may care the most about. But it can also come from various descriptors or the self-image of the target audience. It can also come from a company's history or core competency. So now we are trying to build a schematic strategy board for bacis brand platform of business that goes digital (Figure 1):

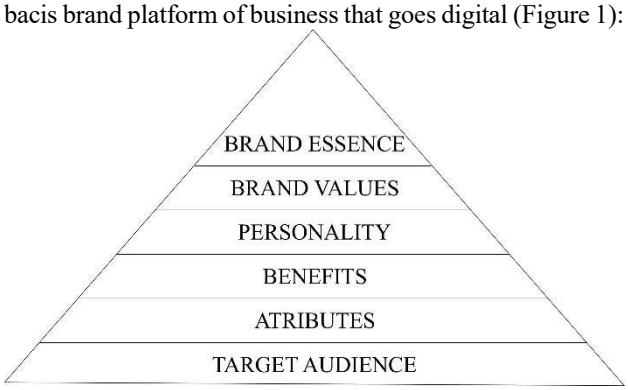

FIGURE 1 The brand platform structure

Stage 1. Brand essence. Other words you need to find the emotional sense of your brand. Most part of the strong brands can be summed up in few simple words or memorable phrases. Also, in passage the market recall for the enterprise should be more definable. Your market is more than just your customers. It is more than just your clients. Your market is composed of every group whose perceptions of your brand is important to its future success. So yes, that means customers, employees, vendors, etc. But it also means financiers, boards of directors, competitors and more. Some businesses even have to concern themselves with how they appear to regulatory agencies.

Stage 2. Brand values. Usualy strong brands have a clear mission in life that they fight for. By the values also comes the purpose statement of the brand. Every viable business is born to meet an existing need within the market. To get to your deeper, true purpose, conduct some one-on-one interviews with sample members of each group that forms your market. They'll give you the insights you need. For instance, FedEx learned their purpose was not to deliver packages at all, but to *remove the anxiety* their customers experienced when sending or waiting for packages.

Stage 3. Personality. Strong brands have clear and appealing personality thet differentiate them from the competition. Also, the personality of your brand can form the step called *brand promise*. Your competitive advantage has to be concrete – something you can point to and demonstrate as real. Many businesses actually balk at contemplating their brand promise, afraid it may turn out to be unneeded by a big chunk of their market. But that's actually marketing focus. If 90% of your market turns away from your offering, it's a safe bet the remaining 10% will be dedicated, repeat customers.

Stage 4. Benefits. Strong brands usually provide a clear costumer benefit. A strong brand offers many advantages for marketers including: Enhances Product Recognition – Brands provide multiple sensory stimuli to enhance customer recognition.

Stage 5. Attributes. Strong brands are credible with unique attributes that supports their positioning (that could be both current behavior of relevant details from the past). The attributes define how you want your brand to be perceived by the market. More to the point, the Positioning Statement defines how you want your market to *feel* about you. When people are asked to describe what they like or dislike about a brand, they often begin their sentences with, "I feel …". Think about how you feel about the brands that matter to you.

Stage 6. Target audience and brad strategy. Strong

brands don't try to be all things to all people. They have a clear idea of who their target audience is, how they leave their lives and what make them tick. The above are the six must-have planks in any brand platform. It's conceivable that, depending on some unusual business model and/or competitive environment, a few brands might require an additional plank or two.

2 Conclusions

To sum the abstract Some business owners overlook the importance of a brand. They think that because they don't manufacture a unique, ground breaking product, they can't be considered a "brand". Any business out there can be a brand though – right through from massive names like Coca Cola and Nike, to Wholefoods and Tesco. To put this in perspective, the majority of the items sold by Wholefoods and Tesco are purchased from other companies and brands, but those two supermarkets are still brands within their own right. Your business can be its very own brand too with a carefully constructed brand platform behind it.

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Global modernization of business education

Viktoria Chuzhykova*

Kyiv National Economic University named Vadym Hetman, 54/1 Peremohy Avenue, Kyiv, Ukraine 03057

**Corresponding authors e-mail: victory.post@ukr.net*

Abstract

The ways and directions of modernization of business education in Ukraine are considered. Particular attention is paid to training models. The necessity of introducing the pattern-models in the teaching of business disciplines has been emphasized.

Keywords: business education, model of teaching, intellectual and practical training

1 Introduction

Integration of any country into the global educational space requires radical changes in the interpretation of the essence of the learning process, and, consequently, the emergence of a new educational paradigm. First of all, it concerns business education. In our time barriers between business and education are rapidly disappearing and this becomes an important proof of the breakthrough changes in society. Modern scholars often offer a variety of upgraded models of innovative education: "Model of Managing a Company" (USA), "Model of Accreditation" (Sweden), Model "Business – Teacher – Multimedia" (New Zealand), "Model of Foundation" (UK) "International Conference Model" (Singapore), "Model of Learning Organization" (Norway), "Grouping Model" (USA). Also worthy of note is the Chinese model "Return to the roots," which is organizational and structurally different from the previous ones [1, c. 501-505].

It is logical that the learning process requires a radical transformation, based on a deep understanding of innovation technology, identifying possible obstacles and strategic design of innovation, which contribute to the goals set at the very beginning [2, c. 314-315]. Consequently, there may be a false idea of the possible antagonism between the practical and intellectual learning. However, even a superficial overview of the interactive methods, which proved, according to J. Dewey, their perfection in the learning process, once again confirm the benefits of intellectual learning [3, c. 218-219], which not only opposes practical activity, but, on the contrary, brings it to a higher level. However, in order to do this, it is necessary to continuously support this process, as well as to create conditions under which educational work can be transformed into an intellectually productive activity, and not just an outwardly useful activity model. It should also be noted that active and interactive learning involves stimulating the group interaction between participants in the process, which is a significant factor in achieving high predicted outcomes in accordance with the goal.

In the process of enhancement of cognitive activity, participants learn the information, comprehend it, learn to solve problems that arise in the business environment. The experience gained in this process, both preliminary and new, is extremely important. It should be noted that interactive learning is based on the motivation of participants and direct interaction with new achievements which need to be obtained within a certain time. Own practical experience is nothing more than a prerequisite for beginning the search for new information, and if, if we create the right conditions for its analysis, diagnostics and forecasting, it will definitely contribute to the enrichment of everything acquired earlier, first of all when it comes to combining new ideas with stable ones that have been tested sometimes. The main advantage of active and interactive technologies is that they all combine different motivations of active cognitive interaction. A striking example of what is described above may be that in the learning process, some listeners actively develop their analytical potential and logic of thinking, so they favor business games, game design, simulation. Others develop their own creativity and use methods of generating ideas and simulations, while the rest ones prefer specific skills and therefore, choose trainings and role-playing games.

It should be understood that in the process of modernizing business education the development of systemic thinking, which is absolutely necessary for the effective management of business projects, becomes extremely important. It should be noted, however, that it is precisely in conducting entrepreneurial activity that formed thinking allows one to create teams and direct their team work to achievement of concrete results. Usually it is the group, the team, the stakeholders [4, c. 72-73], who work as an integral system that has a common goal. All participants of the process are deeply interested in teamwork and its results. That is why, the growing popularity of the construction of mental models of thinking is observed within the framework of modern socio - economic and psychological - pedagogical sciences, in which one of the four mechanisms is used: "design", "generalization", "distortion", "striking out". In order to learn how to think in a new way, in the practice of business teaching, the process is often viewed as an action, and at the same time, as the intended changes. It should be remembered, and this is

particularly stressed by J. O'Connor, that systematic thinking is never formed linearly, it is constantly modeled using cycles, contours, within which the direct and indirect connections are clearly traced. Those connections are involved in the creation of a new pattern-model (drawing in the manifestation of events) [5, c. 49-50], mastering of which allows to predict, model, creatively think, and solve complex problem situations more effectively.

2 Conclusions

The new competitive model of business education significantly influences the forms of organization of higher education institutions in any country and requires radical changes. Modernized training models, which represent a hybrid form of the combination of intellectual and applied education, can be an important element of success.

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Marketing Mix as a tool to ensure sustainable competitiveness for a private higher education institution in Latvia

Jevgenija Dehtjare*, Victoriia Riashchenko

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

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

Abstract

The paper gives a review of current tools of marketing mix complex applied in a context higher education services in the market of the Baltic States and Poland. These countries have much common characteristics and features that make them almost equally attractive for incoming applicants interested in obtaining a degree there. Due to these circumstances higher education institutions (HEIs) are currently operating in unstable and highly competitive environment, besides private HEIs in Latvia are experiencing even harder pressure due to the lack of state financing and tightening legislative measures. It seems the only weapon able to help a private HEI to ensure sustainable competitiveness is the complex of marketing mix. The aim of the paper is to analyze modern elements of marketing mix in education and to offer its improvement measures that should lead to increase of the competitiveness. The object of the research is the market of higher education institutions of the Baltic States. The subject of the research is the process of an educational activity and its development on the market of the Baltic States with the application of modern marketing mix complex tools. Marketing mix traditional complex including four known elements as product, price, place and promotion are analyzed in the paper with its application possibilities exactly in the field of higher education. Additional marketing mix element – the personnel is especially important when the object of the research relates to educational services and is considered in the research as well. As a result of the research conclusions are obtained and the recommendations how to ensure sustainability and competitiveness for the services provided by a higher education institution in Latvia are given.

Keywords: HEI, academic marketing, marketing mix

The problem of the research should be defined as following: the system of higher education in Latvia is currently functioning under the pressure of following factors- the lack of domestic applicants due to demographic decrease of the 90s and current migration, according shortage of financing especially for private higher education establishments, legislation pressure for private institutions related to a limitation of application of non EU languages as a tool of education, growing interest of international markets, especially Central Asian and Asian, increase of competitiveness of the neighboring region, such as Lithuania, Estonia and Poland.

These conditions require special attention while the Higher Education Institution`s (HEI) marketing mix formation, development and modernization as it is quite obvious the only implementation of the modern marketing complex ensures sustainable development on a market of educational services. Traditional approach of marketing mix includes the development of 4 elements, such as product, price, place and promotion. Due to the highest personification of the provided educational services it is necessary to enlarge the line of the elements with the 5th factor, such as the personal. Qualified administrative and especially academic staff of a HEI is a background of successful institution presentation on a market of educational services. The aim of the paper is to analyze modern elements of marketing mix in education and to offer its improvement measures that should lead to increase of the competitiveness. The object of the research is the market of higher education institutions of the Baltic States. The subject of the research is the process of an educational activity and its development on the market of the Baltic States with the application of modern marketing mix complex tools.

The market of higher education institutions in Latvia, the Baltic States at large and Poland is highly competitive. Latvian private educational institutions are under high pressure also because of local legislation and lack of financing. Their survival is supported by own force mostly, so the only opportunity for such a HEI not only to survive but even to succeed on the international market of higher education is to ensure its competitiveness at a maximum level. Marketing mix with its practical and easy applied tools is a key to establish sustainable competitiveness and to keep it. The enhancement of marketing mix and continuous modernization of its elements will ensure secure HEI`s operation in the conditions of unstable and dynamic environment and will lead to increase of educational service realization effectiveness.

Qualitative education obtained in a country of origin by the graduates helps to increase national gross domestic product, to ensure wealthy rate of the population, to decrease migration and to increase manufactory. The same education, obtained in Latvia by international students from Central Asia and South Asia countries helps to increase multicultural level in the country of origin that leads to many related factors, such as morality, creativity, acceptance and others.

Nowadays mostly used pricing policies for HEIs are flexible combinations of costs plus, customer oriented, oriented on competitors, oriented on the "perceived value" of

the educational services. A constant combination of pricing methods in a mix with continuous analysis of marketing demand and other offers presented on a market is the only key to success in such a field of entrepreneurship as education is. An institution of higher education should have clearly structured multichannel distribution network that includes schools, colleges, businesses interested in obtaining of qualified graduates, non-profit organizations, public services; educational services should be also delivered on a remote basis. Creation of joint programs, double diplomas, providing internship and study abroad possibilities also leads to enlargement of education service dissemination network. Regarding promotion of education services, there should be used well know traditional tools such as direct intake, visits, fairs, open days etc. but the role of social media is increasing rapidly as well. The personnel structure in a HEI should be diverse and include both representatives of an academic area and related business representatives.

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Modern universities: the main directions of development strategies

Victoriia Riashchenko*, Jevgenija Dehtjare

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

**Corresponding author's e-mail: viktoriia.riashchenko@isma.lv*

Abstract

The instability of the development of a market economy causes constant changes in the activities of higher educational institutions. The article is devoted to consideration of the processes occurring in recent decades in the system of higher education in Europe and in particular Latvia. The main global trends in the development of higher professional education have been revealed: an increase in the demand for higher education, which led to its mass supply (at the same time, the growth of quantitative indicators is not always accompanied by an increase in the quality of higher education); decrease in the total number of students due to the deterioration of the demographic situation; changes in the structure of specialties and areas of training of specialists with higher professional education in connection with the restructuring of the economy and the needs of the labor market; aggravation of competition. The selected trends lead to the emergence of demographic, political and economic risks.

Keywords: university, education system, trends in the development of higher education, continuing education

1 Introduction

In recent years, higher education systems in various countries have been developing under the influence of three global factors:

1. Mass character and increase of accessibility of higher education and, as a result, increase in the number of students;
2. The globalization of education and the strengthening of international competition of universities;
3. Internationalization.

In 2006, the United Nations published a forecast of demographic changes in the population of OECD countries [1]. From the point of view of changes in higher education, there are interesting changes in the population of the age group from 18 to 24 years (Fig. 1), since it is this group of the population that mainly forms the cohort of students.

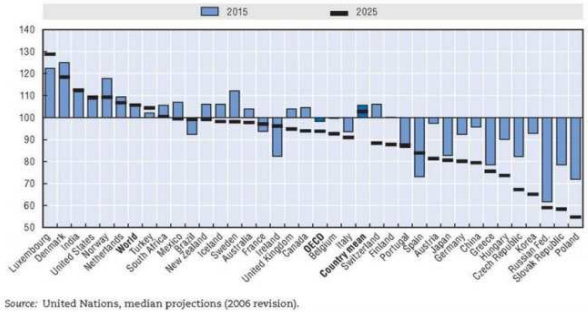
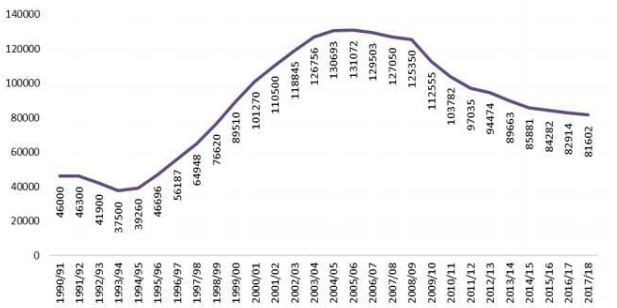


FIGURE 1 The forecast of quantitative changes in the age group from 18 to 24 years of age of the population of OECD countries in 2015 and in 2025

As can be seen from the diagram, in most countries a significant decrease in the number of young people who are potentially applying for higher education is predicted. Today, 80% of university students in OECD countries are under 25 years old, so demographic changes in this age group directly affect the change in demand for higher education.

In Latvia, the changes have the same character.



Ellen Hazelkorn in the article "What does global higher education mean for university leaders?". Provides data on the development of the UK higher education system. In 1950, only 3.4% of young people were studying at universities. Today this figure is approaching 49%. At the same time, students attend universities, more than two thirds of which were established after 1950. It is expected that the population of Great Britain will steadily increase until 2026. However, the share of the working-age population from 16 to 64 years old, which has remained relatively stable over the past 40 years, according to research forecasts, will decrease.

Similar forecasts are made by researchers for Latvia. Since 1990, the number of Latvian residents has declined by more than 20%, and 40% of Latvia's population is over 50 years old, besides this age group forms 30% of the total working-age population, the report says "Active aging strategies for longer and better work experience in Of Latvia [2].

Future projections show that the population will continue to shrink and age. By 2030, the share of people of working age will decrease by almost 7 percentage points.

The low birth rate also affects the demographic situation. A World Bank study suggests that there are few families in Latvia without children - only 16% of women aged 39–45 years have no children.

To support economic development, European countries will have to attract qualified specialists from other countries. Even today, leading universities have a strategy of attracting talented foreign students and graduate students from foreign countries, as well as an internationalization development strategy.

For example, to reduce the impact of demographic changes, universities can avoid reducing the demand for educational services by expanding the range of educational services:

- Introduction of distance education in countries where it is not common, as well as other forms of dual education, when the student spends part of the time at the university and part of the time at the workplace;
- Actively attracting foreign students, whose number has increased in recent years;
- Development of various retraining, advanced training programs, etc. to attract additional learners;
- Development of targeted retraining programs for employees of enterprises and organizations;
- Expanding the range of educational programs for retirees. These services are actively offered by European universities. Many pensioners enjoy attending university classes and gain knowledge that they could not get due to employment at work. For many, this new knowledge becomes the realization of an old dream, for many they open up the possibility of continuing to evolve in tune with the times and not feel that life has ended in retirement [4]. For various reasons, such educational programs are very popular among the elderly. And considering the increase in life expectancy and the increase in the share of retirees in the population of most developed countries, programs for the elderly are increasingly popular.

2 Overview

The data of the Organization for Economic Cooperation and Development indicates that by 2030 half of all university graduates in the world (aged 25–34 years) will be in India and China, and less than 25% in Europe and the United States. Thus, graduates of European and American universities will most likely work either with representatives of other cultures or within these cultures. Global changes lead to the fact that in the future intercultural interaction will cease to be the exception and will become the norm. This means that the skills and knowledge necessary for effective intercultural communication will become more important than ever for students [3].

3 Decision

Universities should ensure that their graduates are well prepared for new conditions. Knowledge and skills that are relevant to them, including a broad understanding of the world and intercultural competences, can be developed precisely through the internationalization of higher education. Increasing international mobility is an added bonus in the process of developing the so-called "skills of the 21st century".

4 Conclusion

In our opinion, the 21st century is the epoch of the information society, the epoch of technological culture. The formation of a global information society brings to the fore the problem of the spread of knowledge. Distance education brings knowledge closer to the consumer, allows you to offer educational services to everyone, regardless of geographic, state, time or other factors. The strategic goal of distance education is to ensure the right to receive education at any level at the place of their residence or professional activity. This goal is achieved in line with the global trend of mobile knowledge dissemination through the exchange of educational resources.

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Qualification profile of human resources in the security sector

S Dimitrova, S Stoykov, R Marinov

Keywords: management, strategic management, security knowledge management

The information age has changed the practice of existing security systems by making them operate in a rich information environment, creating and implementing a number of new complex policies, missions and tasks, and emphasizing on the growing complexity of management that bases the improvement of their organizational skills on a scientific ground. The institutions of the security system exhibit the moral and volitional qualities of the individual and, together with their structures, largely reflect the state of society, the country and even the nation.

Following the adoption of the European Security Strategy - A Secure Europe in a Better World, Member States defined the tasks for the development of the European Security and Defense Policy, updating the set objectives in the light of the development of the international security environment and the increased European ambitions for a leading world role. The European Union has agreed on a common threat assessment and has set clear goals for developing the security interests of the Union on the basis of "our most important values". These ambitions are evident in the first sentence: "The European Union is a global actor ready to share its responsibilities for global security" [2].

The European Union has as its primary objective, if need be, to be able to respond quickly and decisively to the full range of crisis management operations referred to in the Treaty on European Union, from humanitarian and rescue to peacekeeping. According to the European Security Strategy, such operations may also include disarmament operations, counter-terrorism support to third countries and security sector reforms. Moreover, it is paramount to find ways to create the resources, skills and capacities required to achieve the goals and carry out the tasks of problem solving in a new age where the management of hierarchical and network structures outlines the peculiarities characteristic of the training in the professional field 9.1. National Security.

Under the conditions of the rapidly changing economic environment, knowledge is becoming a major resource determining the effective functioning of all other areas. In the context of this new concept and of its future, Bulgaria has the task of finding the mechanism to integrate into the world's fastest-growing economies. This can only happen if the government, business and society are charged with the appropriate responsibilities and provided with measures for the successful development of the economy of knowledge [1].

The basis of our research is the Bologna process and the Lisbon Strategy requires.

The Bologna process, launched by 29 countries in 1999 and now covering a total of 46 (out of which 20 outside Europe), as an excellent example of a successful European initiative, demands that we develop flexible, broad-based curricula that are oriented towards learner mobility through the transfer of educational credits. A fundamental part of the Bologna Declaration is the issue of assessing the quality of higher education. The established European Register of Agencies for quality assurance and the development of national qualifications frameworks has increased transparency and facilitated academic recognition. Higher education has been modernized by adopting the structure of these three learning cycles within national contexts and intermediate qualification capabilities linked to the first cycle.

The Lisbon Strategy requires a critical analysis of the existing scientific potential both within the EU and for each country individually, as well as outlining the prospects for building a knowledge society through the effective development of the knowledge triangle - education, research and innovation.

If our society wants to follow modern laws of social development and governance, it should also instill, through its education and training system, in its youth values on whose basis to establish a public order in which responsibilities to others go hand in hand with the recognition of one's own rights.

Building knowledge-based security is not only a challenge for security system scientists, but also an opportunity to critically review what has been achieved in our science and education organizations [5].

In line with these needs, Bulgarian higher education is still lacking in building the proposed security competences for supporting the development of Euro-Atlantic security cooperation capacity (in view of the internal and external security of the European Union).

The qualification profile, structure and content of the new curricula should focus on security - global, Euro-Atlantic and national - in the context of the external risks and external borders of the European Union, and should be based on the Euro-Atlantic values [6,7]. A good practice in this regard is the updated model of the qualification profiles of international experts in the security system and experts on the security of citizens and property performing preventive and crisis activities as proposed by Angel Kanchev University of Ruse.

The qualification profile of the curriculum corresponding to the ISCED classifier (mentioned in the current higher education development strategy of the Republic of Bulgaria) is consistent with the internal risks to the security of citizens and property at the open internal borders of the European Union in a cross-border environment [3, 6].

The proposed profile of the qualification acquired in the specialty covers the specific and generally applicable competencies of experts on the security of citizens and property carrying out preventive and crisis activities in a cross-border context with regard to: state borders and border crossing points; military objects and critical infrastructure objects; production and transmission of energy and other natural resources; production activity in the industrial and agrarian sectors; transport infrastructure – railroad stations, airports, ports, roads, car parks, passenger and freight

transport; settlements, residential and public buildings; retail outlets and warehouses; construction sites; kindergartens, schools and universities; sports halls and facilities; hospitals, medical care facilities, emergency services; social housing; hotels and catering facilities; entertainment and tourist sights; corporate environment, including banking and other business services; events; emergencies; public figures protection; natural disasters; environmental catastrophes; terrorist attacks.

These competencies are relevant for: analytical activity related to identifying and solving problems related to the security of citizens and/or public and private property; communication and coordination activities related to the security of citizens and property; application of cutting-edge security technologies for preventive purposes and technological support in crisis management.

Their relevance pertains to: professional careers in public, private and non-governmental organizational security structures set up for preventive and crisis response; continuing the training towards a doctoral degree on the accredited doctoral programs. Their formation is the result of acquiring knowledge, skills and practical routines in the context of multi- and interdisciplinary training with duration compliant with the HEA requirements.

In conclusion, the security system (national and Union) in today's dynamically changing security environment is experiencing a transformation towards trans nationalization and internationalization in the context of the changing internal and external borders of the EU's expanding influence and globalization and migratory pressures. It urgently needs the support of higher education, which can and must provide appropriate education, training and relevant research to tackle not only today's (visible on the horizon) problems but also the future challenges and dangers that will need to be faced.

It is difficult to provide a common response to all security issues relevant to the European Union and the Member States. What is indisputable is that external and internal risks to the security system imperatively require its adaptation to new challenges and the Bulgarian higher education in the field of security has an extremely important role in this process.

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Cognitive science and technologies in economics and management: from mind-body and free will problems to semantic capital

Yuriy Dyachenko*

Volodymyr Dahl East Ukrainian National University, 59a Tsentral'nyi, Severodonetsk, 93406, Ukraine

**Corresponding author's e-mail: yuriy.y.dyachenko@gmail.com*

Abstract

In the conditions of rapid dissemination of intellectual and cognitive technologies it is important to understand the essence of a human thinking through solving of mind-body and free will problems for the development of economic theory as well as the effective, responsible management. We consider reproducing of human abilities in artificial system on this base as a mean of solving economic and social problems.

Keywords: cognitive science, free will, mind-body problem, artificial intelligence, cognitive technologies in economics and management, semantic spaces, semantic capital

1 Overview

These are the following achievements of the development of intellectual systems:

- creating speech synthesis systems that use brain activity;
- managing the public opinion and human behaviour;
- applying the game theory to create human opponent programs, in particular, to play the poker which is able to bluff and will be used in the defence sector;
- inventing the OpenAI GPT-2 algorithm which creates great essays on any pre-defined topics;
- using intelligent systems for optimal distribution of resources (material, financial, human) in marketing and management;
- applying artificial intelligence at enterprises: change of chains creating values (production, logistics, marketing); emergence of new sources of income (indirect monetization (advisory systems), direct monetization (applications with artificial intelligence)); increase of efficiency (optimization of supply, HR management, the use of client experience).

However, the following problems appear during this process:

1. Can we recreate a human type of behaviour? If yes, so, how?
2. How can we create, develop, manage agents with artificial intelligence?
3. What will be the consequences of saturating the economics with agents with artificial intelligence?
4. What will be the responsibility for the effects of the created artificial intelligence? How will its activities affect the future of mankind?

These ethical problems arise from the contradiction between the moral (unclear) criteria of a man's choice and the rational (which is being formed) criteria of choosing the artificial intelligence. Implementation of effective artificial intelligence will be faster without taking into consideration security-related issues. This may lead to artificial intelligence to become unmanageable and dangerous.

2 Decision

We believe that discovery and reproduction of the mechanisms of human thinking is the best way to create and safely develop more universal (for a wide range of environments and tasks) agents with artificial intelligence. The neuropsychologist Vilayanur Ramachandran emphasizes that "the question of how neurons encode meaning and evoke all the semantic associations of an object is the Holy Grail of neuroscience, whether you are studying memory, perception, art, or consciousness" [1]. The researches of mind-body and free will problems in the field of neuropsychology, epistemology, system theory, and philosophy of consciousness allow us to affirm that the basis of human free behaviour is self-reflected meaningful processing of information that is studied within the system of cognitive sciences [2].

Interdependence and mutual influence of cognitive sciences and economics have been noted by the sociologist Pierre Bourdieu: "classical economics is [historically] connected with the philosophy of consciousness" [3]. The economic approach can help create and effectively interact with artificial intelligence. To achieve this goal, the economic approach that studies mind (thinking) can offer the following principles and tools:

- axioms: maximizing behaviour, stable preferences, markets that coordinate actions of agents, distribution of scarce resources through prices;
- comparing expected benefits when choosing behaviour alternatives;
- minimizing costs / maximizing benefits;

- economics of energy of thinking (Friston's free energy principle).

3 Conclusion

The cognitive approach applied in economics can help deviate the inefficient mechanization of the economic agent through the consideration the freedom of choice of real economic agents. The tool for this can be the semantic capital [4] as a set of factors that can influence the values, meanings and hence the formation of preferences of market participants as a transformation in semantic spaces.

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Reforming the account of own capital of enterprises of the government sector

Alla Dmytrenko*

Poltava National Technical University named after Yuri Kondratyuk, Ukraine

**Corresponding author's e-mail: av_dmitrenko@ukr.net*

Abstract

Considered equity as one of the objects of accounting in the state enterprise. Different points of view of scientists regarding the characteristics of equity capital are presented. The basic tasks of accounting of own capital and necessity of creation of funds of budgetary institutions are revealed. Comparison of accounting of own capital in accounting accounts after reforming in the public sector.

Keywords: equity capital, public sector, accounting, equity capital, budgetary institution funds, state enterprise accounts, reform.

1 Introduction

The status of a budgetary institution is reflected in the accounting, which is part of the process of managing public finances. The proper management of accounting for business operations depends not only on the development of an institution but also on the state. Taking into account the above, the issue of accounting organization in budgetary institutions in the conditions of modernization of the system of public finances and its component - accounting in the public sector becomes of special urgency.

It should be noted that it is precisely with accounting in budgetary institutions that there are many unsolved and debatable questions, which, for example, concern accounting terminology in general and in relation to equity in particular.

2 Overview

Equity capital is the main component of its overall potential. The information necessary for the effective management of the company's own capital is accumulated by the accounting and financial reporting system.

The accounting of own capital is conducted in accordance with the Law of Ukraine "On Accounting and Financial Reporting in Ukraine", as well as accounting regulations (standards).

According to [1], equity is a part of the assets of a public entity the sector remaining after deducting liabilities. Commitment - debt of a public sector entity that arose as a result of past events and whose recovery in the future is expected to lead to a reduction in public sector resources that embody economic benefits or utility potential.

The main source of information about equity is financial statements, and detailed information about equity and its components is reflected in the balance sheet of the company and in the statement of equity.

Statement of equity - a report that reflects changes in the equity of a public sector entity during the reporting period. The statement of equity provides information on the amounts of the above articles, respectively, at the beginning and end of the reporting period, as well as data that reflect the increase or decrease of their balance at the beginning of the year as a result of changes in accounting policies, correction of errors and other changes [1].

The equity capital of budgetary institutions is the basis for the beginning and continuation of financial and economic activity of budgetary institutions, since:

1. The size of equity determines the degree of independence of budgetary institutions.
2. The equity capital is at the disposal of budgetary institutions for an indefinitely long period and fulfills, in essence, the function of long-term financing.

3 Decision

The plan of accounting for budget entities of 06/26/2013 No. 611 [2] accounting for equity is in Class 4, "Equity". Invoices of this class are used to account for funds in non-current assets, in low-value, high-value items and in financial investments.

Starting from January 1, 2017, the Plan of Accounts of Accounting in the Public Sector as of December 31, 2013, No. 1203 [3] becomes effective.

The chart of accounts is a list of accounts and sub-accounts to summarize information on the facts of activities of public sector entities in accounting, in particular for: budget funds managers; state trust funds; the state budget; local budgets, bodies of the State Treasury Service of Ukraine.

According to the Public Accountancy Account in the public sector as of December 31, 2013, No. 1203, for accounting in equity capital, there are provided accounts of class 5 "Capital and financial result", which are presented in Table 1 [4].

Accounts of this class are intended for generalization of the information on the state and movement of funds of paid-in capital, capital in enterprises, capital in surplus, reserve capital, targeted financing, as well as financial result.

The loan accounts show an increase in the paid-in capital, by debit, its reduction (withdrawal) and the attribution to the accumulated financial results of the value of non-current assets at their write-off, in the amount of which capital was increased in previous reporting periods [4].

4 Conclusion

Effective management of financial resources requires the availability of information about which part of the equity capital of an enterprise is invested separately in fixed assets, which - in intangible assets, in working capital and means

of circulation, as well as in financial investments. Only regarding the last fund (the fund of financial investments) is the fair statement that the value of the respective assets corresponds to the amount of their investment in their equity (implies long-term and short-term financial investments), because borrowing funds for these purposes are not used.

Conclusions The capital of a budgetary institution is not its property, but it is provided for use by the entity for the performance of the functions entrusted to him. The resulting financial result is not an indicator of the effectiveness of the activity (such as in commercial organizations), but is an indicator of the effectiveness of the development of the funding received.

The main objectives of accounting for equity are: control of the formation of funds by sources of education and their decrease in directions and reasons; determining the results of budget execution for the budget year; providing different levels of information management about the availability and movement of equity capital.

Reforming the accounting and reporting system in the public sector will contribute to improving public finance management; including improvement of planning and control of budget funds, transparency of management of public finances.

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Human capital development in higher education: peculiarities of functioning, current developing trends

Tatyana Fedartsova*

BSPU, Belarus

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

Abstract

The features of human resources and human capital of educational institutions and their difference from similar assets of manufacturing companies are disclosed. The current trends in the development of organizations of higher professional education are considered.

Keywords: human capital of the university, human resource management, investment in human capital

1 Introduction

The dynamic development of the modern post-industrial society, the information economy causes profound changes on all sides of social and economic life, thereby increasing the role of highly educated and creative human personality, which is able not only to perceive previously accumulated knowledge, but also to generalize, analyze, create new in the form of advanced information technologies, services and products.

2 General

The dynamic development of the modern post-industrial society, the information economy causes profound changes on all sides of social and economic life, thereby increasing the role of highly educated and creative human personality, which is able not only to perceive previously accumulated knowledge, but also to generalize, analyze, create new in the form of advanced information technologies, services and products.

In the context of the knowledge economy, the most valuable economic resource of a society and the most important source of competitive advantages of an organization is human capital. Increased attention to the human assets of the organization has become almost an axiom of the theory and practice of modern management.

In the process of integrating higher education into the global market for educational and scientific services, the significance of human capital for the innovative development of universities is increased, and the questions of managing this type of assets in higher education are becoming increasingly relevant.

Adam Smith first began to develop the idea of investing in people, but the main formation of the modern theory of human capital occurred in the late 50s - early 60s of the XX century. Almost all researchers take knowledge, skills and ability to reproduce and update them, that is, the educational factor, as the basis of human capital. Thus, the human capital of an organization is a combination of physical, intellectual and social qualities that are inherent in the human resources of the organization, are part of its human (including labor) capital, are realized in its innovative activities and provide income for the owners of these qualities, the organization, where they work, and society as a whole, by creating new values [1, pp.61-62].

In the modern paradigm of innovative development of higher education, orienting universities to commercial success, the search for new resources, penetration into new markets, and the main place is given to human capital. It includes the competencies, creativity and motivation of professors and teachers, researchers, university management, doctoral students, graduate students and students.

The Belarusian system of higher education has historically formed a multi-faceted educational process, which provides a broad outlook in various fields of science. From an organizational point of view, it's a combination of many functions by staff (pedagogical, scientific, administrative, social), therefore not only the professional level of a scientist or teacher is important, but also charisma, a variety of competencies, a culture of innovative entrepreneurship.

The main feature of human resources and human capital of educational institutions is that, unlike similar assets of production companies, they create not a tangible product, but a new human capital of society.

3 Conclusions

Modern trends in the development of higher professional education organizations and specific aspects of the functioning of their human capital make it possible to distinguish features of investments in human capital of universities: 1) duality of investment processes (on the one hand, the university and its employees develop their own human capital as a source of competitive advantages for the university, on the other - the purpose and at the same time the financial base of such investments are students' investments in their studies); 2) State control over the processes of investing in human capital (implemented through the state policy of certification and accreditation of universities); 3) "multi-profiling" investment in human capital is associated with the need for parallel development of several

competencies of the same employee (as a teacher, scientist); 4) non-commercial orientation of investments in human capital (the main goal is the accumulation and dissemination of knowledge, the development of human capital in society, and not the profit of a particular organization).

In the formation of the global human capital market, higher education plays an important role not only as a tool for training highly qualified personnel, but also as a kind of network that ensures the continuous accumulation of knowledge and the intensive exchange of them.

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Crowdfunding: mechanism of international financing innovative projects

Dmitry Frolov*

State Higher Educational Institution "Vadym Hetman Kyiv National Economic University", Ukraine, Kiev, 54/1, Peremohy Avenue

**Corresponding author's e-mail: 80505867591@rambler.ru*

Abstract

The article discusses the possibilities of a modern mechanism for financing innovative projects based on the use of Internet technologies.

Keywords: innovation projects, funding, management, crowdfunding

For a newly emerging economy of Ukraine, the introduction of innovation must in reality become a strategic, non-alternative vector of public administration. At present, this issue for our country is a fundamental challenge, as Ukraine is lagging behind in the formation of innovative potential due to all authoritative international ratings, which is a consequence of the negative dynamics of the development of the innovation sphere in the country.

According to statistical surveys on international methodology in Ukraine during 2014-2016, there were only 18.4% of enterprises that carried out innovations. Non-innovative enterprises - 81.6% [1]. Moreover, according to official statistics, there is a tendency in the industrial sector to decrease the number of innovative active enterprises in the industrial sector: in 2017, 16.2% of enterprises engaged in innovation activity, compared to 17.3% in 2015. As a result, the volume of sales of innovative products in the total volume of industrial products sold in 2017 was only 0.7%, compared with 1.3% in 2015 [2]. In Ukraine, the share of expenditures for research and development in GDP is decreasing: from 0.75% in 2010 to 0.45% in 2017, the number of scientific research executives in 2017 compared to 2010 decreased by almost 2 times [1].

Solving the urgent issue of Ukraine's innovation development lies in the sphere of many vectors, the main of which is the effective management of innovation activities, an important aspect of which is the financial support for the implementation of innovation projects. The implementation of the innovative idea consists of a series of successive stages, which form the innovative process - from idea to wide introduction into the public practice of innovative goods, works and services. It requires significant funding at each stage that is objectively related to certain risks and can not, however, be considered in isolation within each individual stage without taking into account the need to finance other stages to achieve the ultimate goal of the innovation project.

The traditional sources of investment for innovative projects in Ukraine are the support of the state and local self-government bodies, enterprises' own funds, sale of equity financial instruments, venture funds, commercial loans, sale of bonds and other debt securities. The weak development of the stock market, the high costs of servicing commercial loans, and the persistent deficit of state and local budgets cause a situation where enterprises' own funds become the main source of innovation projects (in industry they amounted to 84.5% in 2017 [3]). But the limited financial capacity of enterprises in times of crisis makes it necessary to find and use other sources and financial instruments for the implementation of innovative projects.

In today's world, more and more innovative organizational decisions and effective management are conditioned by the use of digital technologies, which form a new algorithm of socio-economic development, international relations, and interrelations in society, and also have potential opportunities to change production methods, processes of accumulation of knowledge, politics, etc. One of such financial mechanisms for attracting investments for innovation was crowdfunding, which, with the help of information technologies, allows to combine the contributions of people regardless of borders for the implementation of various projects. Crowdfanding - (from English crowdfunding, crowd – "community, group", funding – "finance") is literally translated as public funding, community funding, that is, the cooperation of people who voluntarily combine their money or other resources together, usually via the Internet, to support the efforts and ideas of other people.

The global market for crowdfunding has been actively developing since 2013. World Bank data also suggests that only a third of projects funded by crowdfunding are non-commercial. Thus, public investment has become an effective means of financing business projects, among which the most significant part is the most innovative projects.

At present, this method of public funding for ideas is being explored by many scholars. But the very concept of crowdfunding at the present stage has not yet been studied comprehensively, since scientific notions of this unique category are only being formed. Most scholars regard this category as a way of funding, a mechanism for attracting investment to implement various projects, which from a practical point of view is fully justified. But from the point of view of economic science, in our opinion, the definition of the

term "crowdfunding" should mean the newest economic relations that arise between the subjects of international financing, participants and authors of innovative projects on the basis of using Internet technologies.

The advantage of this way of financing the most innovative projects is that it allows the Internet to raise funds for financing the project from a large number of people, regardless of the borders and implement it as a whole, without division into stages: from the idea to the introduction and widespread distribution of the innovative product, which provides the achievement of the ultimate goal. This way of funding and implementing an innovation project is especially important for the stage of scientific research, which is decisive in the innovation process and the least attractive for investing.

Financing projects without involving banks, stock exchanges, venture funds, whose activities in Ukraine are not stable, increase the reliability of the implementation of the innovative idea in life and guarantees the necessary financing of all stages of the innovation process. Therefore, such a mechanism for the implementation of innovative projects is simple and most suitable for activating innovation activity and should become one of the main in Ukrainian realities. A prerequisite for the successful use of such a mechanism is the clear formulation of the idea, the description of the benefits of the expected product and the availability of competencies of the project authors in the use of IT technologies.

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The process of forming the development strategy of tourism development of the united territorial societies

Alla Glebova*

Poltava National Technical Yuri Kondratyuk University, Tourism and Administration Department, Pershotravneviy Avenue, 24, Poltava, Ukraine

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

Abstract

The article examines the process of forming a strategy for the development of tourism at the level of a united territorial community. It has been determined that the process of forming a tourism development strategy envisages the implementation of a number of organizational measures. Therefore, there was a need to develop documentation to ensure the development of tourism potential and develop a strategy. This will help not only to coordinate the actions of all participants (stakeholders), but also to provide a financial component. The strategy will allow the community to receive information that they (the state of tourist and recreational resources), to determine the potential and opportunities for further development. Set goals, objectives and performers, while taking into account the characteristics of the territories and their socio-economic situation.

Keywords: strategy, society, tourism, united territorial community, local self-government

1 Introduction

Since the beginning of the 90s, the European model of relations between state authorities and local self-government has been gradually built in Ukraine. On the way of decentralization and reforming of local self-government in Ukraine, the key guideline is the European Charter of Local Self-Government (hereinafter referred to as the Charter), which the state unconditionally ratified on July 15, 1997 [4, p.17]. As a result, 665 united territorial communities (UTC) were already created (in the 51 UTC - elections of 12/24/2017), which united 3118 communities (27.8% of the total number of local councils as of 01/01/2015) and 5,700,000 people (13.4 % of the total population of Ukraine). In the process of decentralization, communities received resources, finances, powers - significant tools and opportunities to ensure full local development.

2 Overview

Methodological aspects of strategic management are reflected in scientific works: M. Armstrong, I. Ansoff, G. Minzberg, A. Strickland, Z. Shershnova, L. Fedulova, V. Nemtsov. The theoretical foundations of the development of strategies for the development of territories are described in the works of M. Datsishin, S. Maksimenko, A. Cherevko, V. Parkhomenko, B. Shchukin, and others. Nevertheless, the issues of strategic regional management are not resolved, since Ukrainian practice lacks the practice of managing united territorial communities and communities in the context of decentralization.

3 Decision

The main strategic goal of the reform is to create a comfortable and safe environment for human life in Ukraine. This can be achieved by building an effective system of government at all levels (community - region - region), transferring the maximum possible number of powers to the level closest to the citizen - communities. And also - the creation of conditions for the dynamic development of regions and the provision of high-quality and affordable public services to citizens [12]. Thus, the community, in addition to resources, receives authority and a number of challenges. This necessitates the use of strategic approaches to management and the formation of strategies, has found support at the state level. In regulatory and legal documents: the Law of Ukraine "On the promotion of regional development" [5], the Law of Ukraine "On Planning and Development of Territories" [6] Ministries of Regional Development, Construction and Housing and Communal Services of Ukraine "Methods of developing, monitoring and evaluating the effectiveness of the implementation of regional development strategies and action plans for their implementation" [8] Resolution of the Cabinet of Ministers of Ukraine on " rhenium self-concept to improve the system of forecast and program documents on socio-economic development of Ukraine "[9], and so on. Today, cities, districts, regions, sectors, enterprises have development strategies that are used solely as a document. Dominates only a formal approach. While most European countries are currently showing economic growth due to the strengthening of communities, synergistic effect from the accumulation of resources and the interaction between government, society and business. This is achieved through the systematic implementation of strategic management.

Having significant tourist and recreational resources, as world experience shows, it is the united territorial communities that get the chance to create new jobs, solve a number of pressing infrastructure problems, increase

investment attractiveness and improve the quality of life of the population living in this territory.

In Poltava Region there is a potential for the development of the tourism industry, which will contribute to the preservation of cultural heritage. It will attract investment and turn into depressed areas in promising. However, there are both subjective factors that hinder the development of tourism and objective (imperfect accounting system of business entities providing accommodation services (hotels, motels, campgrounds) socio-economic instability of the economy, decrease in the real purchasing power of the population, military actions, disparity of the overwhelming number of international standards - a high degree of moral and physical deterioration of the material and technical base of enterprises, technological backwardness, low level of comfort of living and services offered).

Overcoming these shortcomings and further development will provide strategic management. The result will be the creation of an effective strategy that will allow:

- to provide resources with priority directions for the development of tourism in a particular territory
- will display priority problems and solutions;
- coordinate the actions of all participants;
- will display long-term development priorities.
- consequently, the tourism development strategy will ensure the sustainable development of the territorial community. Balance the interests of all stakeholders (government, public organizations, society and business.

The experience of Ukrainian cities confirms: the involvement of citizens in strategic planning is necessary and effective at various levels of this process, namely:

- the territorial community should be aware of what is happening (informational level of participation);
- the active part of the society should be able to make their proposals and have guarantees that these proposals will be heard (consultative level of participation);
- the competent part of the territorial community ("local elite") should be able to directly participate in the processes of developing and implementing a strategy (partnership level of participation).

Therefore, it became necessary to develop documentation to support the development of tourism potential and develop a strategy that will allow not only to coordinate the actions of all participants (stakeholders), but also to provide a financial component. Since it is the strategy that will allow the community to receive information that they (the state of tourist and recreational resources), determine the potential and possibilities for further development. Set goals, objectives and performers, while taking into account the characteristics of the territories and their socio-economic situation.

4 Conclusion

The peculiarity of the formation of a tourism development strategy at the community level is that it is necessary to take into account: regional development strategies, local development strategies; spatial programs (master plans of settlements), annual programs of socio-economic development and cultural development of the territory. The result of the first stage is the preparation and formation of organizational and informational support of the strategy, which will allow for further analysis. The formal result of this stage is the formation of a passport of a certain territory (community). Organizationally, this is the creation of a project team that will deal with issues of analysis and strategy formation. Thus, the formation of a strategy for the development of tourism of the united territorial communities will ensure the balanced development of the territorial community, the rational use of all available resources and sustainable development.

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Environmental responsibility management of nuclear energy: what is changing in Ukraine?

Olena Grishnova, Kateryna Bereziuk

Abstract

This article presents the latest tendencies of ecological responsibility management of Ukrainian nuclear energy sector and dynamics of the emissions in recent years. The problem of utilization of nuclear wastes and construction of the Central Spent Fuel Storage Facility (CSFSF) is highlighted. Analysis of positive changes in the system of environmental responsibility and the problems identification are steps of development a qualitative environmental policy for the nuclear energy sector.

Keywords: nuclear energy, ecological responsibility, ecological safety, green power generation, ecological audit, ISO - 14001

1 Introduction

In conditions of environmental deterioration, degradation of biodiversity, shortage of natural resources, climate change, and environmental safety of enterprises has paramount importance. According to the researches of Ukrainian scientists, the level of reflection in reports key environmental responsibility indicators for Ukrainian enterprises are extremely low (on average, 35.6%) [1; p. 15]. It demonstrates the need for an in-depth analysis of the problem. The issue of environmental safety is important for nuclear energy, which in Ukraine is represented by state enterprise "National Nuclear Energy Generating Company" Energoatom ". The Company operates four nuclear power plants with 15 power units and provides about 55% of Ukraine's need for electricity, during autumn-winter periods this figure reaches 70%. In accordance with the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety", NNEGC "Energoatom" is assigned the functions of the operating organization responsible for safe electricity production.

2 Overview of the study area

One of the Company's priorities is to reduce the environmental footprint of nuclear power units. NNEGC "Energoatom" adheres to Ukrainian environmental laws, principles of European environmental laws and EU Directives on environmental protection, as well as to international standards (IAEA) and Energoatom Environmental Action Programme 2017-2019.

In 2017, Energoatom was one of the first Ukrainian companies to certify its integrated management system in line with new ISO standards 2015, including ISO 14001:2015 "Environmental management systems". The level of nuclear, radiation and ecological safety at Ukrainian NPPs is fully in line with the national and international laws on nuclear power use, including European directives [3].

Environmental protection and minimisation of environmental footprint at all stages of nuclear energy production are among the key priorities of Energoatom. In 2017, the Company put in place a revised Energoatom Environmental Protection Action Programme 2017-2019. The document aims to improve the Company's activities in this area, in particular, to minimise the environmental footprint of non-radiation factors and ensure the rational use of natural resources [4].

The main methods of NNEGC "Energoatom" environmental policy implementing are:

- Conducting chemical control over the state of the environment;
- Conducting internal environmental audits (over 50);
- Setting the reference and technological levels of emissions and discharges of radioactive substances;
- Analysing causes of possible exceedance of the reference and technological levels in NPP operations;
- Using modern technologies and equipment to reduce emissions and discharges.

One of the positive change is a good emissions reduction trend. Compared with 2016, there was a significant decrease (almost twofold drop) in total emissions of sulfur compounds, from 6.43 tonnes to 3.37 tonnes. Total air emissions decreased by 4.09 tonnes. A vivid example of advantages of nuclear power plants over other sources of electricity is the comparison of air emissions by Zaporizhzhya NPP and Energodar CHPP located next to it: over the past five years, the gas emissions from Zaporizhzhya NPP made 78 tons, while those from the CHPP were 110,000 tonnes [3].

In 2018, NNEGC Energoatom entered the top five Energy Intelligence Group rating "Best Green Power Generation" (Top Green Power Generators: Carbon-Free Generation Capacity) [2].

Energoatom recognises its contribution to the low carbon future of the country and seeks to continue efforts to minimise greenhouse gas emissions at various production stages. One of such measures was a decision to build a 13.6 MW solar power plant at Zaporizhzhya NPP. The project area is 37 hectares, with the plant consisting of about 5,000 panels [4]. Following implementation of this pilot project, the Company will make a decision on the further action in the field of renewables.

An important element of the environmental policy of

NNEGC "Energoatom" is communication with the public. Among its communication channels are:

- Printed and online media, corporate newspapers and publications, informational brochures, leaflets, and booklets;
- Official and theme-based pages in social media (Facebook, Twitter, Google+, Slideshare), a YouTube channel;
- Public hearings and discussions, participation in conferences and roundtables, informal meetings with stakeholders, press tours, etc.

However, in spite of an effective environmental safety system, some issues require increased attention. It should be emphasized that the issue of reprocessing spent nuclear fuel one of the main problems. Ukraine has spent about 2 billion US dollars on spent fuel exports for temporary storage to the Russian Federation (200 million dollars annually). On July 6, 2017, "NNEGC Energoatom" received from the State Nuclear Regulatory Inspectorate of Ukraine a license for the construction and commissioning of the Centralized Storage for spent nuclear fuel (CSSNF) at the Exclusion Zone. The Central Spent Fuel Storage Facility (CSFSF) will give the Company its own capacities for long-term and safe storage of TVEL and Westinghouse spent fuel in Ukraine. The facility will be located in the Chernobyl Exclusion Zone. The facility is planned to be fully operational before 2065. The first start-up facility including all necessary infrastructure and four storage systems should be completed in 2019 [5].

3 Conclusion

Environmental safety management is a priority task for the Ukrainian nuclear energy industry and the main direction of its social responsibility. Increasing positive changes in the transformation of approaches to environmental policy, emission reductions, cooperation with specialized international organizations, and growing number of environmental projects and programs are observed in recent years. However, there are many opened issues, one of which is the construction of the Central Spent Fuel Storage Facility (CSFSF). Despite common agreement of necessity to national security and effective environmental policy of Ukraine's nuclear energy social responsibility, the project is currently in the process of implementation and still requires significant investment and technical support from foreign partners.

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Developing an effective strategy for managing the personnel potential of the company

Svitlana Ivanytska*, Tatiana Galayda

Poltava National Technical Yuri Kondratyuk University, Ukraine

**Corresponding author's e-mail: azz123z@meta.ua*

Abstract

The essence of modern problems in the field of human resource management is revealed. It is proved that the development of personnel strategy and its implementation allow the company to improve the efficiency of personnel use. The directions of the implementation of management activities for the effective formation and use of personnel potential have been developed.

Keywords: personnel, personnel potential, strategic management, personnel strategy, personnel management

1 Introduction

In modern conditions, the goal of any enterprise is to maximize profits while reducing costs, which makes it necessary to constantly improve business efficiency. At the same time, there is a constant increase in the cost of human resources, therefore, it is necessary to pay special attention to their rational use in the company. This implies certain actions to improve the quality of personnel potential, as well as to improve the training and use of personnel of various professional groups. On this basis, the development of an effective strategy for managing the personnel potential of a company is becoming increasingly relevant.

2 Overview

Development of personnel strategy and its implementation allow the company to increase the efficiency of using the labor potential of employees, their professional competencies, and more fully realize their competitive advantages, as well as ensure the economic development of the company.

Under the strategy of management of personnel potential it is proposed to understand the long-term, qualitatively defined direction of use and development of personnel, aimed at its improvement, meeting the needs of employees and the achievement of the goals of the enterprise [1].

Human resource management should be carried out on the basis of a strategic approach using modern methods of personnel management and innovative personnel technologies.

The formation of the goals of the personnel management strategy determines the choice of specific measures of personnel policy aimed at their achievement.

Human resources management strategy is an important element of a company management strategy.

The main goal of forming a personnel management strategy is to provide the necessary employees at the right time in the right quantity, that is, to form a single team, a solid team that will be the most competitive and efficient.

At the same time, it is necessary to ensure the interaction of all personnel management subsystems in the company within the framework of an effective personnel policy using innovative management methods, subject to the development of an appropriate personnel strategy.

3 Decision

On the basis of the conducted research, it is possible to formulate the main goals and objectives of the company's personnel management strategy:

1. The formation and effective use of human resources.
2. Marketing personnel, which will include: an analysis of the labour market and its changes, the formation of a system for hiring and using personnel, promoting employment, researching the subjects of this market, defining personnel requirements.
3. The formation of the forms and methods of selection, selection, evaluation and certification of enterprise personnel.
4. Development of the concept of development of personnel of the enterprise.
5. Improving the forms and methods of regulating labour relations in an enterprise by creating new organizational forms for using human resources using forms of flexible working time, temporary and part-time technologies, introducing non-standard organizational forms of employment; development of high-quality systems of interaction between management, structural divisions and employees; work with outsourcing organizations.
6. Formation of an effective system of motivation in the enterprise.
7. Formation of directions of social development of the enterprise.
8. Improving information support in the enterprise.

4 Conclusion

For the successful implementation of the human resource

management strategy for the company, it is important that the activities developed are carried out and supported by the whole team. In addition, in order to obtain a positive effect, it is necessary to observe a number of conditions: each employee must know his / her functional duties and fulfill them qualitatively; adapt quickly to new labor market conditions; flexible personnel management system; constantly learn and improve skills; adequate remuneration of the employee, the presence of a fair system of motivation and the development of communications.

Objective necessity is also timely monitoring of the company's personnel management system.

A flexible and adaptive personnel policy is a leading factor in successful economic activity, while ensuring the growth of the competitiveness of individual employees and the company as a whole.

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The directions of socialization of the national economy of Ukraine as an important condition for its socio-economic development

Tetiyana Yahno*

Lviv Trade and Economic University

**Corresponding author's e-mail: tetis74@gmail.com*

Abstract

The importance and main directions of socialization of the national economy of Ukraine are revealed. The relevance of research on these issues is proved. It is indicated that the socialization of the national economy of Ukraine is the main factor of its socio-economic development

Keywords: national economy, socialization, post-industrial society

1 Introduction

The well-known Ukrainian scientist A.M. Kolot said that «…the state's economic policy should be considered solely as a component of social policy, and a person should be the main value and purpose of socio-economic development» [2]. Therefore, agreeing with this statement it should be added that the achievement of this goal becomes possible due to the socialization of the economy, which simultaneously serves as an important condition for the socio-economic development of the national economy of the country.

2 Overview

As for Ukraine, in a case where it was constitutionally proclaimed that our country stood on the path of building a social state through the implementation of the people-centered concept of development, the most problematic is the question of the socialization of the economy itself. The analysis of a number of literary sources gives grounds to conclude that the socialization of the economy during the last century has even taken shape in the independent flow of socio-economic thought [1]. In particular, as far as Ukraine is concerned, a large number of scientific works by such scientists as O. Amosha, V. Besedin, I. Bondar, V. Heyets, A. Galchinsky, V. Gryshkin, A. Gritsenko, N. Deeva, S. Doroguntsov, E. Libanova, O. Novikov, L. Tymoshenko and others. Among the main issues raised in the works of the above-mentioned scholars, various proposals on social and economic transformations in the country can be distinguished, restructuring of the economy, provision of civilization bases of life, generation of sources of activity of economic entities, etc., are discussed. But the full realization of the social purpose of the state is still an unattainable ideal.

3 Decision

In our opinion, the application of the term "economic socialization" to the economy, including the national economy, is appropriate and disclosed through the strengthening of the elements of social regulation in economic reproduction with the emphasis on the reproduction of a person. In addition, it is important to understand that the socialization of the economy is a "cross-cutting" process that encompasses at once three levels of the economy: the nanosecond of the economy of individual individuals, the micro level of the economy of organizations, firms and macro levels of the economy - the state. At the same time, relations in the system of "economic system-society", "individual-society" qualitatively change during the deployment of the economic process under the influence of an infinite variety of cultural, political, informational, natural and other factors [3].

Postindustrial society is characterized by qualitative changes in the material conditions of society's life, while, to a large extent, it is due to the scientific and technological revolution (flexible technologies, automation of production, informatization and computerization, global transport and information networks, etc.), which is about It directly influences the socialization of the economy, in particular: through the growth of production, the quality of production, its conformity to modern requirements; due to changes in the content and nature of labor (it becomes creative, connected with the use mainly of spiritual abilities and intelligence of workers); because of the changes that take place in the social partnership between workers and employers in the process of fulfilling complex specific work by employees, which becomes an appropriate condition and an incentive to realize the social needs of workers.

Under these conditions, the socialization of the economy and its focus on human development is a process of constant search and improvement of the means of human realization, since the higher the economic potential of society, the more opportunities for the individual to reveal their creative potential, to join the growth of the economic sphere and social welfare We consider it expedient to highlight the following main areas of socialization of the Ukrainian economy (Table 1).

TABLE 1 Priority directions of socialization of the Ukrainian economy

Direction	Content
Increasing the social role of the state	through the strengthening of the social orientation of the budget of the country and the corresponding strengthening of state social protection and guarantees for low-income and disadvantaged sections of society
Social orientation of economic relations	through the embodiment of socialization and humanization into economic and production relations on the basis of the targeted orientation of economic instruments for the diversified development of the individual and the welfare of the population, a combination of interests of producers and consumers
Increasing the ability of individuals to realize their needs	through better access to education, health care, arts and more
Transformation of character and content of labor	through the reduction of contradictions between labor and capital
Changing the place and role of the employee in the decision-making system	through institutes of social partnership, social responsibility, social competition. development of intellectual capabilities and intellectual capital of workers in accordance with new needs and requirements of joint production
Significant and dynamic changes in the system of property relations	through the transformation of the forms of expression and functioning of private property, the emergence and development of new types and forms of ownership (in particular, such as intellectual property, property in the field of information, collective ownership of workers, etc.)
The development of the middle class	through the growth of his role in the economic environment, the system of property relations, etc.
Increase in the share of the total employee in the national income of the country	through the growth of individual incomes of citizens, including at the expense of wages increase; changes in the volume of consumption fund

4 Conclusion

Thus, "socialization of the economy" should be considered as a consistent and gradual inclusion of people in various sectors of the socio-economic process at all levels and in all sectors of the national economy, creating conditions for occupying it in this space of its own niche, which meets its needs, opportunities and level of culture, depending on the strategy and tactics of economic behavior. In turn, the main function of the socialized economic system is to serve the needs of society, and its main subject and object - a person.

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Scientometric indicators of science development

Iryna Kalenyuk[1]*, Oleg Kuklin[2]

[1]*Kyiv National Economic University named Vadym Hetman, 81 Melnikova Street, Kyiv, Ukraine 04050*
[2]*Cherkasy State Business-College, 243 Chornovola Street, Cherkasy, Ukraine 18028*

**Corresponding author's e-mail kalenuk@ukr.net*

Abstract

The article investigates the dynamics of scientific publications in the countries of the world for 20 years. The modern trends in the growth of the number of publications, positions of different countries of the world are described.

Keywords: science publications, globalization, research universities

The development of education and science is an important imperative for the development of countries in the modern world. An important characteristic of the development of science are indicators of volumes and dynamics of the number of scientific publications, as a whole, and in the cited publications. The well-known truth is that breakthrough development is only achieved by those countries that pay considerable attention to the system of science and education. And if education can boast some positive tendencies, then the situation in relation to science is not so optimistic. The transformation of strong positions into real competitive advantages requires focused efforts. In the modern world, the scientific recognition of the potential of each country is determined by the number of publications in science-editions.

The author summarizes the data on the dynamics of such publications, the statistics of which is led by the international network SCIMAGO since 1996 [1]. The general trends and dynamics of publications in the most advanced countries are as follows (table 1). Some countries show an extremely high rate of increase in the number of quoted publications (China is growing 1531.1%, Malaysia - 2747.2%, Brazil - 678.6%, Iran - 5116.5%, etc.), which, of course, is a realization purposeful state policy of these countries. In 2017, the top ten leaders in the number of publications in science-edited publications were: USA (1 st place), China (2), Great Britain (3), Germany (4), India (5), Japan (6), France (7), Italy (8), Canada (9), Australia (10). Unfortunately, Ukraine is on the 46th place with a total of 11,119 publications and a Hirsch index of 225. Nevertheless, the analysis showed that there is a great potential in the domestic higher education for increasing publications, which is confirmed by their rapid growth in recent years.

TABLE 1 The total number of publications in science-editions in some countries of the world, 1997-2017 [1]

Countries	1997		2017		H index	%, 2017 до 1997
	number of publications	*Rank*	*number of publications*	*Rank*		
USA	347 079	1	626 403	1	2 077	180,5
Chinaй	33 222	8	508 654	2	712	1 531,1
United Kingdom	93 103	3	191 830	3	1 281	206,0
Germany	82 769	4	170 114	4	1 131	205,5
India	21 939	13	147 537	5	521	672,5
Japan	93 779	2	123 043	6	920	131,2
France	59 918	5	115 747	7	1 023	193,2
Italy	40 571	7	110 402	8	898	272,1
Canada	42 453	6	100 810	9	1 033	237,5
Australia	25 644	11	94 065	10	848	366,8
Russia	32 035	9	83 358	12	503	260,2
Korea	12 951	16	80 743	13	576	623,5
Brazil	10 860	21	73 697	14	489	678,6
Iran	1 063	51	54 388	16	257	5 116,5
Poland	11 964	18	44 692	18	479	373,6
Turkey	6 107	27	42 405	19	368	694,4
Sweden	17 953	14	39 976	20	778	222,7
Taiwan	11 573	19	32 181	22	702	278,1
Malaysia	1 130	49	31 043	23	249	2 747,2
Ukraine	6 112	26	11 119	46	225	181,9
Estonia	604	60	3 118	68	234	516,2
Latvia	507	65	2 188	75	142	431,6

A common feature of all successful governments (whose strategies were very diverse) was the fundamental recognition of the priority of the intellectual factors of breakthrough social development, which manifested not only in significant consideration and financing of the field of education and science, but also - in attracting the intellectual elite to the development of state policy and strategy. It seems that the recognition of the priority of the sphere of education and science and the real rise of their role in the development of the country can be represented on the state level as a sign of genuine reforms. The transformation of research universities into an important factor in the country's innovation development should be through the mechanisms of program-targeted management, increased funding, expansion of autonomy and entrepreneurial functions in interaction with the real economy and business.

The strategic future of Ukraine depends on whether the government determines its key priority to strengthen the scientific potential of the country and create conditions for its effective use in the light of global trends. Key issues are: increasing the financing of education and science; increase of inflow of financial resources from entrepreneurial, non-profit and foreign sources; support of scientists, creation of conditions for realization of their potential; creation of powerful research universities as generators of innovation development.

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Obstacles to learning and knowledge sharing in organizations

Canan Nur KARABEY*

Ataturk University, Faculty of Economics and Administrative Sciences, Department of Business Administration, Erzurum, TURKEY

**Corresponding author's e-mail: ckarabey@atauni.edu.tr*

Abstract

This paper addresses the concepts of learning organization and knowledge sharing briefly. Then the obstacles to learning and knowledge sharing among employees in organizations are discussed. Last, some recommendations are made to help managers overcome these obstacles.

Keywords: organizational learning, employee's knowledge sharing behaviour, individual and organizational obsctacles to knowledge sharing.

1 Introduction

Human beings have faced grand and unique changes in their environment in recent years. There have been unprecedented changes in technological, economic, political, legal and socio-cultural environments. Indiviuals and organizations have faced some difficulties in responding to these changes in an appropriate way. The success of their response depends on their learning capabilities. In this context, the very concept of learning has a crucial role in choosing the right responses. Both people and organizations need to understand the nature of the changes in the environment, learn how to respond and act accordingly. Although organizations strive to foster learning and knowledge sharing, sometimes these efforts fail short of expectations. In this paper, the barriers to learning and knowledge sharing are discussed and some recommendations are made.

2 Concepts of organizational learning and knowledge sharing

The term learning organization refers to an organization which gathers information from its internal and external environments continuously to gain competitive advantage, analysis and evaluates it effectively, adapts to the demands of the changes and improves its processes. Empoyees' knowledge sharing behaviour is one of the main antecedents of learning in organizations.Knowledge sharing is defined as a process where individuals mutually exchange their implicit (tacit) and explicit knowledge to create new knowledge [1]. The reasons behing the need for learning in organizations could be listed as follows [2]:

- The production of goods and services requires the combination of complex information,
- As a resource knowledge has been recognized as important as raw materials,
- Many organizations lose their precious employees due to retirement, turnover or delayering,
- In order to use information technologies effectively, employees need to have comprehensive and complex knowledge,
- Some types of information becomes obsolete quickly and lose their value due to innovations,
- Flexibility and creativity are the foremost abilities rewarded in today's business life,
- Knowledge is regarded as one of the main sources of competitive advantage.

In order for an organization to learn, first, the people comprising the social structure need to learn, because if they can't gain new information and skills, they can't make a significant contribution. Individual learning is necessary, but not enough. Second, team learning is required. In teams, members always improve their capacity to achieve the goals. Through team learning, members recognize that team's mindset is superior to and more effective than individual mindsets. Members direct their activities in a cooperative and supportive way. Last, all the knowledge gained by people and teams should be added to all the processes in the organization.

3 Obstacles to learning and knowledge sharing in organizations

There are many obstacles to organizational learning. Bureaucratic organizational structure characterized with strict division of labour, routine work processes, mainly downward communication and poor cross-functional interaction and cooperation is one of the main issues. Bureaucratic organization's excessive focus on productivity has some features that hinder organizational learning.

The obstacles to knowledge sharing in organizations could be related to internal or external factors. Internal obstacles stem from individual behaviour or flaws of perception. External obstacles are connected to the relationships among individuals or working conditions. In general, obstacles to knowledge sharing in organizations could be classified in three categories: individual, organizational and technical. Potential individual barriers

are as follows [3]: "general lack of time to share knowledge, and time to identify colleagues in need of specific knowledge; apprehension of fear that sharing may reduce or jeopardise people's job security; low awareness and realisation of the value and benefit of possessed knowledge to others; dominance in sharing explicit over tacit knowledge; use of strong hierarchy, position-based status, and formal power; insufficient capture, evaluation, feedback, communication, and tolerance of past mistakes that would enhance individual and organisational learning effects; lack of contact time and interaction between knowledge sources and recipients; poor verbal/written communication and interpersonal skills;differences in age, gender, education and experience levels; lack of social network; taking ownership of intellectual property due to fear of not receiving just recognition and accreditation from managers and colleagues; lack of trust in people, personality differences, differences in national culture or ethnic background; and values and beliefs associated with it.

Organizational factors include the influence of the organizational culture, lack of proper integration between knowledge management activities and long-term goals of the organization, lack of proper leadership and appropriate rewards. Technical factors include the unavailability of necessary technological resources, including software and hardware in the implementation of knowledge management activities [4].

The barriers to develop a learning organization could be addressed in three groups [5]: First, the political behaviors can obstruct knowledge sharing between employees which emerge on the gorunds of trust and open communication. Since people regard knowledge as a significant resource for power, they might want to keep their information and avoid sharing it with others. Second, learning organization phenomenon assumes that everyone is willing to learn and improve continuously; but in fact some people prefer repetitive and unchallenging jobs. Third, shared vision which is included in learning organization concept necessitates the presence of a strong organizational culture. Learning organization usually has no rigid formal control mechanisms, but it has a strong culture which imposes the working standards on employees. Thus a stong organizational culture would act as a controlling instrument on views different from the shared vision.

4 Discussion and Suggestions

In order to make their organization gain the charactericstics of learning organization and foster knowledge sharing among employees, managers should attempt to do the tasks stated below [6, 7, 8]:

- Show their commitment to organizational development with their behaviours and encourage all employees in improvement,
- Articulate a strong vision with regards to growth, make everybody focus on learning and provide standards for future successes,
- Develop strategies and plans that will inspire all employess to make organization achieve its goals,
- Renew organizational structures and processes, foster a culture which supports flat and lean structures with cross-functional teamwork and free movement of knowledge between different hierarchical levels and departments,
- Adopt systems thinking to make organization focus on both internal and external environmental factors driving the changes,
- Involve all employees in the decision making process for finding new working styles and career paths,
- Establish self-managed teams,
- Establish feedback systems open to all employees that provide fast and reliable information with regards to organizational performance.

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Improving the structure of branch management of a commercial bank

Elena Koptseva, Ivars Linde*

ISMA, Riga, Latvia

**Corresponding author's e-mail: ivars.linde@isma.lv*

Abstract

The successful development of any large commercial bank depends on the efficiency of its branches.

This work is an attempt to find the clear and effective organizational structure of management of the bank branches, assessment and plans for its improvement.

Keywords: commercial bank, branch, management structure, value of the organizational structure, development and improvement of the management structure.

1 Introduction

Currently commercial banks constitute the main component of the financial and credit system of almost any country in the world. In recent years, almost every commercial bank can offer its client about two hundred types of different banking products and services.

One of the determining roles in banking is the organizational structure of the level, which directly determines the financial success of the bank in the market. The selection and construction of the organizational structure, based on a combination of external and internal factors, is one of the main and important tasks of banking management.

2 Decision

The main tool for the territorial development of a commercial bank is the creation of branches. The structure of the organization represents the main ways of interconnection between departments of a bank or its branch. A rationally formed banking structure enables clear work for bank personnel, helps the successful implementation of bank management functions and also meets the needs of banking clients.

One of the main characteristics of the organizational structure possesses are:

- Dividing into divisions;
- Relations of accountability
- Subordination of the lower to the higher management.

It should be noted that the organizational banking structure should reflect the specific goals and objectives of its subject. It should express the functions of the division of labour and the amount of authority of bank personnel.

To improve the management structure of a branch of a commercial bank, it is necessary to make changes to this organizational structure. This process is rather complicated, responsible and often painful. Nevertheless, the choice of the optimal structure for a bank branch is an important condition for an effective labour organization, successful commercial activity of a bank branch.

The main factors of change in the organizational structure can be considered:

- Changes in the economic content and volume of operations performed by the bank;
- Changing the requirements for the competence of specialists;
- The need for downsizing due to the crisis, a decrease in the volume of services;
- Reorganization of the bank.

Improving the organizational structure involves taking into account such criteria as the peculiarities of the internal culture of the bank, the obligations of top management, the needs of the bank to reduce costs, the requirement for replenishment and retraining of personnel, career growth of bank specialists.

One of the ongoing challenges is the further development and optimization of its organizational structure. A well-thought-out organizational structure ensures:

- An effective bank management system;
- Optimized workflow;
- Effective personnel management.

The bank should determine as well as establish the statutory status of the credit departments of the bank, client departments and deposit departments.

3 Conclusion

The need to improve the management system at the present stage is determined by many factors. This is the optimization of the number of the management apparatus, its functions, introduction of automated control systems and development of decision-making system.

The development and introduction of new management structures has become a feature of the work of organizations. In the course of such changes, various combinations of known types and types of structures are often used, which the bank adapts to the specific conditions of its operation.

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Service quality improvement in hospitality-related enterprises

Catherine Koryuhina[1], Tatyana Shamshina[2]

[1]*ISMA, Riga, Latvia*
[2]*TSI, Riga, Latvia*

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

Abstract

Compared to other sectors of the global economy, the industry is one of the fastest growing, accounting for more than one third of the total global services trade. The global hotel industry generates approximately between 400 and 500 billion U.S. dollars in revenue each year [1]. The constant appearance of new independent hotels and corporate groups of hotels in the capital of Latvia proves the constant growth of the hospitality market that shows the great demand. The article highlights the importance of continuous quality improvement for the enterprise and the importance of personnel trainings - the way of personnel development as its integral part. It formulates specific ways of improving quality management with the help of useful quality management tools.

Keywords: quality, hospitality, employee training, motivation, management

1 Introduction

Hospitality and Tourism Industry in Latvia shows positive tendency for development and it is not only good news for the sector but for the whole economy of the country. According to Eurostat among EU countries, Latvia recorded the greatest increase in nights spent in tourist accommodation establishments in 2017 [2]. According to the data by the Central Statistics Office, Latvia's tourism industry is growing steadily, with 2.3 million people having stayed at hotels and other types of accommodation in Latvia in 2016 [3]. Central Statistical Bureau (CSB) latest data shows that 2.58m visitors stayed at Latvian tourist accommodation establishments in 2017, which is 11.9% more than during 2016 [4]. Latvia has a lot of magnificent sights to display, including urban and rural areas together with its World Heritage site – the capital Riga that attracts tourists almost all over the world. Riga is the main transport node between the West and the East, providing access to the European Union and its Eastern markets in Russia and Asia as well. It is easy reachable and is popular not only among tourists but as business destination as well. According to the City Cost Barometer latest estimates, Riga continued to be one of the cheapest travel destinations among European cities in terms of overnight stay cost that only promotes the increase of visitor numbers [5]. Riga was mentioned the 7th of the world's top 10 "destinations on the rise" by the world's largest tourism website - Tripadvisor. Riga ranks second among the European cities mentioned in the list, behind Poland's Gdansk [6]. The constant appearance of new independent hotels and corporate groups of hotels in the capital proves the constant growth of the hospitality market that shows the great demand. Recently the 5 Star Kempinski Hotel Riga was opened followed by the opening of 2 new Radisson Park Inn hotels. And in 2019 the international hotel group Mariott International plans to open in the city center of Riga its AC Hotel Riga [7].

2 Overview

According to the Oxford Dictionary the quality is "the degree of excellence of something". This definition is too general and too vague. But in J.P. Russell's article the term quality has been defined as "fitness for use, conformance to requirements, and the pursuit of excellence" [8].

In the hospitality industry the quality is usually defined as "the consistent delivery of products and guest services according to expected standards" [9]. The more detailed definition can be used according to the Economic dictionary. The term quality there is a set of properties, characteristics of products, goods, services, works, labor, which determine their ability to satisfy the needs and demands of people, to meet their purpose and requirements. Quality is determined by the measure of the conformity of goods, works, services with the conditions and requirements of standards, contracts, contracts, customer requests. Quality needs to be a primary goal of any company. Quality is vital to successful organizations. It is a crucial parameter which differentiates an organization from its competitors [10].

3 Decision

The primary focus of quality management is to meet customer requirements and to strive for exceeding customer expectations [11]. So it is possible to conclude that for the effective operation of a modern hotel, a system of quality customer service is needed and its continuous improvement must be developed, which will not only increase the demand for hotel services, but also can create its permanent client base – loyal clients. The usage of quality management tools is of crucial importance for any company as they help to be competitive on the market through identifying and eliminating problems and their real cores in time.

Organizations deploying Six Sigma over a long term see the culture of the organization getting transformed to a more

systematic problem solving approach and more importantly, people making data driven decisions" [12].

Employee engagement is a workplace approach resulting in the right conditions for all members of an organisation to give of their best each day, committed to their organisation's goals and values, motivated to contribute to organisational success, with an enhanced sense of their own well-being [13]. No matter how big or small company is, employee engagement will determine how successful and competitive company is. Management of the company should get a feedback from employees regarding their thoughts about the company in general, whether they feel appreciated, would they prefer taking any courses to make them more productive and if there are any suggestions they can give to improve overall company's performance. Good way to make employees more engaged in the company, is by motivating them with extra training, helping them understand which are they strongest skills and abilities, which can be developed and utilised for better performance. There is not even one company, which wouldn't have any problem, thereby, communication between management and employees is so important. Employees should be able to see and understand where improvements can be implemented and what factors affect them and company's performance. Management has to listen and evaluate which suggestion can be used in future for quality management.

Right employee training and development is the way towards enhancing of company's performance and customer service level. However, this is not the only way to improve company's performance:

- Following the TQM principles will ensure the overall company's success, which also includes employee involvement and empowerment. Very often employees don't see any career progression, hence, their motivation level is really low, which impacts their performance. TQM principles to be followed are: be customer focused; insure total employee involvement; process centred; integrated system; strategic and systematic approach; continual improvement; fact based decision making and communication;
- Six sigma is suggested to help company focus on developing and delivering near-perfect products and services. This tool will improve all process level quality- fewer employee mistakes, hence, better performance; increased employee productivity, lower costs, higher revenues and reduced capital expenditures;
- 5 GAP model can be used to see the gap in-between customer expectations vs. experience. By using this tool, companies will understand what customers really expect from delivered services and products. It's important to know what customers expect from the company, and then adjust to that requirements so that company delivers exactly what customers expect, thus, make customers happy. Happy customers can turn into loyal customers, which means, bigger profit and more clients for business;
- PDCA (Plan - Do - Check - Act) cycle should be used for continuous improvements in business process management. By implementing this strategy, management could keep on eye on progress and improvements done in the company. This can be used in different processes, such as, employee training, different department and employee performance, and growth.

4 Conclusion

Employee training and company's performance goes hand in hand, which means, to improve company's performance, it's necessary to take care and improve employee skills and knowledge. The core purpose of involvement in training and employee's motivation is to improve employee's performance resulting in enhanced company's performance. There are various trainings available for employees, but its company's responsibility to recognize the need of training for particular situation. Companies should be more concerned about employee's motivation, teamwork, and retention than costs involved to train them. To keep employees motivated, perform better teamwork, and reduce employee turnover, they should be encouraged to participate in different training programs with possibility to build better understanding and connection between teammates, discover and develop their potential skills and abilities and support their career progression in future. Training is considered as a necessity rather than luxury, it's an investment, which will affect company's future success. As a result, of employee training and development, employees will become happier, self-confident and will be able to improve work performance, build stronger teamwork, hence, affecting overall company's performance level- higher quality services and products delivered by company.

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The corporate governance system

Anna Kornilyuk[1], Raisa Shynkarenko[2]*

[1]*Kyiv National Economic University, 54/1 Prospect Peremogy 03057 Kyiv Ukraine*
[2]*Poltava National Technical Yuri Kondratyuk University, Pershotravneviy avenue, 24, Poltava, Ukraine*

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

Abstract

As a result of the processes of globalization and the European integration of national stock markets, in economic science, methodological approaches to the process of corporate governance are changing. They are gradually transforming in accordance with the new challenges of international laws, standards and trends.

Keywords: corporate governance, joint-stock company, corporation

1 Introduction

Building effective corporate governance systems based on corporate social responsibility always contributes to the confidence of strategic and portfolio investors, stock markets and all interested parties. Therefore, research into the improvement of the corporate governance system in the context of globalization should be viewed as an important tool not only for the development of capital markets, but also for a sustainable institution of responsible corporate governance and business value growth in the long term.

2 Overview

Foreign scholars P. Drucker, A. Meyer and others made a major contribution to the study of problems and features of corporate governance. Among the domestic researchers of corporate governance processes are the achievements of such authors as A. Borsch, A. Bondar-Pidgurska, V. Evtushevsky, D. Zadykhaylo, A. Kozachenko, T. Mostetska, G. Nazarova, E. Palyga, S. Rumyantseva, etc. However, due to the diversity of research, the problem of forming an effective corporate governance system and its assessment in joint-stock companies remains insufficiently studied.

3 Decision

The analysis of modern approaches to the concept of "corporate governance" allows us to determine that at the present stage corporate governance is considered through the concept of "corporate governance system".

This concept is understood as a set of measures on the part of the management of a joint-stock company, aimed at forming management bodies and implementing their decisions in the process of managing the shareholder property of this company, and the relations between its participants within the framework of the current legislation.

Therefore, the corporate governance system should be considered through the relationship between the company's bodies and its owners (shareholders) to manage the company's activities (Figure 1).

In addition, the current stage of development of corporate governance has a number of features:

1) the stock market is recovering;
2) the role of professional managers is enhanced;
3) capitalization of domestic companies is increasing;
4) the need to improve the level of efficiency of the corporate sector in the national economy, which can act as a driving force in improving its competitiveness, is being actualized.

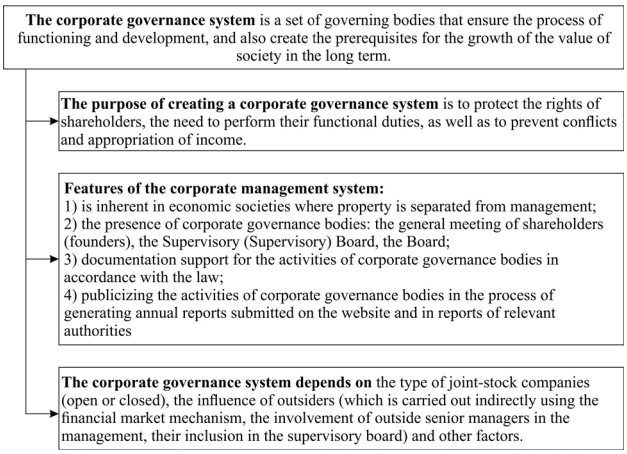

FIGURE 1 The essence of the concept of "corporate governance system"

The adopted Law of Ukraine in 2008 "On Joint Stock Companies" [1] led to structural changes in the corporate governance system. According to the law, all open and closed joint stock companies must undergo reorganization until 2015. In 2015, there should be public and private joint-stock companies.

4 Conclusion

Corporate social responsibility allows Ukrainian joint-stock companies to increase their investment attractiveness and reduce the number of corporate conflicts. Also streamline the information component of the corporate governance system of Ukrainian joint stock companies. And as world experience shows, the role and importance of information will constantly grow.

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The essence of adaptive personnel management

Mila Kozyk*

Poltava National Technical Yuri Kondratyuk University

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

Abstract

The current situation in our country is characterized by rapid changes in the political, economic, social and cultural spheres of human activity. This forces to change the approaches, methods, styles of industrial relations and gradually turn the rigid subordinate of modern organizations into mobile and flexible .Society and the state are created by man. Therefore, it is logical that the development of man, society and the state takes place in a coordinated manner, in cooperation and cooperation of actions, creates the ground for evolution. This can be achieved using the management paradigm, which is proposed for the transitional society and emphasizes the priority of the joint action of the first person and subordinates.

Keywords: adaptive, personnel, technology

1 Introduction

The philosophical justification of the transitional management paradigm is possible from the standpoint of the theory of instability, which is relevant to society.

The theory of instability is the basis of synergy and explains the processes of nonlinear development, due to the multifactorial multidirectional influence. It is this development of any processes that occurs when a system transitions from one steady state to another (for example, from a planned economy to a market economy) [4].

Nonlinear transformations require changing the permanent organizational management structures to mobile and flexible. In turn, flexible management structures contribute to the development of partnerships and interactive interaction between all participants in the management process, which certainly arise in the context of lack of information and uncertainty. That is why in these conditions the best way to control is to combine the efforts of the first person and the performers or management through self-management.

To optimize the ratio of management and self-management, you can use the managerial lattice of R. Blake and D. Mouton and the lattice derivative of the message of management and self-management processes.

It is possible to initiate self-government activities by involving a person in the development of a realistic goal and at the same time giving it a degree of freedom for self-development within the framework of this goal [2].

Three forces always direct activity, as the basis of development: external demands, one's own motive and existing circumstances. The activity itself is the one that is directed by its own motive. Therefore, it is necessary to coordinate your own motive with external requirements and take into account the existing situation. This will ensure the reality of performing actions and make them useful, both for a person who has internal requirements, and for society and the state, put forward external requirements in front of it.

2 Overview

This work discusses the nature and technology of adaptive management.

Consideration is given to monitoring the business, personal and professional qualities of staff.

3 Decision

Adaptive management should occur when necessary directed self-organization of man. This can be specially organized on the basis of creating, expanding and expanding the conditions for self-excitation of control objects within the limits established by all subjects and conscious requirements that always arise because of a transitional stage in the form of an objective need combining an evolutionary and revolutionary path of development [2].

If self-organization realizes the self-development of a person within the well-established limits of the requirements realized by him, then adaptive management provides the conditions for a person's self-development by combining its needs with the requirements of the environment. That is, with the help of adaptive management there is a connection, interrelation, harmonization of the needs of man, society and the state, which leads them to evolution.

Adaptive management is a process of interaction, which causes the mutual adaptation of the behaviour of stakeholders on a dia (poly) logical basis, which is provided by the general definition of a realistic goal with the subsequent combination of efforts and the movement itself to achieve it [1].

The leading feature of adaptive management is the mutual adaptation and the organic combination of the goal of the leader and the aspiration of the contractor based on developing flexible models of activity.

Adaptive management is characterized by content (functions), organizational structure (the direction of interaction and the order of interaction of participants in the management process) and technology (the order of

implementation and the mechanism of interconnection).

Adaptive management technology consists of the order of actions, methods, means and methods for its organization and implementation. The interoperability mechanism reveals the ways of directional influence (self-action) and simultaneous release of degrees of freedom for self-development of stakeholders [4].

It always harmonizes two phenomena that are opposite in nature, and therefore its systematization can be specified as follows: the subject of management - combines administrative and participative (partner) management; by the nature of the impact - combines external management with internal (self-government); orientation – process – target, because it focuses on the process, and the result.

Adaptive management has its own laws that underlie its emergence, and the corresponding principles.

The mechanism of adaptive personnel management is monitoring. This is an external or internal vector tracking of the development of stakeholders (staff), the activity itself, or any organizational structure.

4 Conclusion

Personnel management is seen as a strategically important area in the enterprise management system and reflects the level of business development of the company. Thus, at the stage of company formation, personnel management is chaotic in nature and is reduced to compliance with the norms of labor legislation, that is, to personnel records management. The management of the company's staff, medium-sized, is characterized by an increase in regulatory procedures, the appearance of documents on staffing, the creation and development of elements of corporate culture.

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Augmented reality in marketing

Daria Kravchenko*

Simon Kuznets KHNUE, Ukraine

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

Abstract

New technologies are used in a large number of areas. Marketing is no exception. A large number of companies have recently started using augmented reality in marketing. What solutions do companies for their promotion?

Augmented reality can be used in different ways for different types of goods, such projections make it possible to involve clients to the campaign, and with the right usage of this tool companies also can to collect data on which products are more popular etc.

Keywords: engagement, business, innovations, AR, marketing

1 Introduction

Nowadays many companies want to use new technologies in their marketing strategy. In this way, they are able not only to make a spectacular company, but also to collect data on consumers. With the help of which they can do research and increase sales.

There are a lot of methods how to use technologies for marketing and a lot of big companies try to use it in their campaigns.

And one of the most popular is to use augmented reality. This is the technology that expands our physical world, adding layers of digital information onto it. Unlike Virtual Reality (VR), AR does not create the whole artificial environments to replace real with a virtual one. AR appears in direct view of an existing environment and adds sounds, videos, graphics to it.

A view of the physical real-world environment with superimposed computer-generated images, thus changing the perception of reality, is the AR.

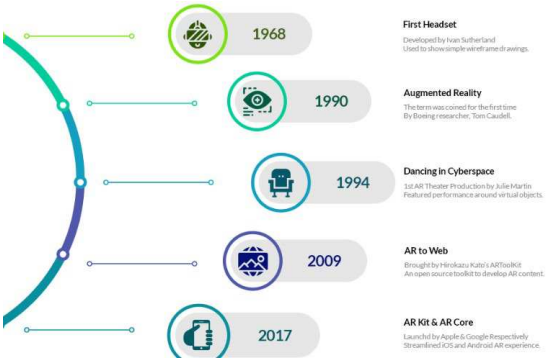
The term itself was coined back in 1990, and one of the first commercial uses were in television and military. With the rise of the Internet and smartphones, AR rolled out its second wave and nowadays is mostly related to the interactive concept. 3D models are directly projected onto physical things or fused together in real-time, various augmented reality apps impact our habits, social life, and the entertainment industry.

AR apps typically connect digital animation to a special 'marker', or with the help of GPS in phones pinpoint the location. Augmentation is happening in real time and within the context of the environment, for example, overlaying scores to a live feed sport events.

There are 4 types of augmented reality today:

- markerless AR
- marker-based AR
- projection-based AR
- superimposition-based AR [1]

As we can see the development of this technology started at 1990s and then it rapidly complemented with new features.



Augmented reality is one of the most important technology trends at this point. It's extremely important for marketing experts.

For businesses, the appeal of augmented reality lays in engagement. The interactive experiences lead users to develop closer relationships with your brand.

The forecast for the global augmented and virtual reality market size is pretty clear. We should expect to see massive growth by 2025. How massive? 215 billion dollars massive! [2]

2 Overview

This research made to show the usage of AR technologies in marketing and understand how to use this tool to collect an information from customers.

Also AR is good for increase the engagement of customers through interactivity of marketing decisions.

3 Decision

In some cases, brands offer AR options in the form of software as a service. Most of the time, the purpose of this technology is fun engagement. Sometimes it could play a role of shocking announcement to get customers attention. But hat shapes is AR technology taking in practical marketing projects?

Here is a list full of examples that bring the theory about AR to practice.

For example in March 2018, Porsche released an AR app that presents the concept for the brand new Mission E – the first ever purely electric Porsche. Just as this car presents the future, the app brings us into the future of marketing as well.

The fashion industry has been rather slow in adapting to the AR trend, but there's no lack of examples in the makeup world. Sephora, in particular, attracted tons of attention with its Visual Artist AR app. The users can try different products to see how they would look on their face before making the purchase.

Also AR using for creating virtual fitting room. Topshop, for instance, partnered with AR Door and used Kinect motion sensing technology to create a virtual fitting room for customers in their Moscow store. By standing in front of the camera, customers were able to see how clothing items looked on their bodies without physically trying anything on.

Similarly, Timberland created their own virtual fitting room in Moktow Gallery in 2014. Using Kinect, Timberland's fitting room allowed customers to see how their bodies looked in certain outfits. Ideally, AR can help you appeal to more customers, including shoppers who are rushed or frustrated by the crowds.

Good decision for furniture companies to make AR catalog as it did Ikea. Customers can browsing through the catalog of 2,000 chairs, sofas, tables, and other items, we can use the phone's camera to place them in a real room as augmented reality 3D objects. Re-positioning, moving closer or further away, different angle view is also possible. The app automatically scales items to real dimensions – Ikea is claiming a 98% rate of accuracy. All in all, a nice example of usability and marketing! [3]

As we can see AR can be used for any category of goods to create effective marketing strategy.

4 Conclusion

New technologies have changed the way in which marketing strategies are created. Now, to collect customer information and increase engagement, you need to come up with interesting and innovative solutions.

One of these solutions was the use of AR. Augmented reality very quickly found its niche in marketing and soon there will only be growth. At the moment, there are apps that will help small businesses to implement this technology without requiring development.

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Mortgage loan securitization in Europe and Ukraine

Iryna Krekoten, Oleh Maksymenko*

Poltava National Technical Yuri Kondratyuk University

**Corresponding author's e-mail: ikrekoten78@gmail.com*

Abstract

In this article mortgage lending in Ukraine as one of the most important sources of financing for the construction of residential real estate was investigated. The state of housing construction and sources of its financing in pre-crisis and post-crisis periods was analyzed by authors. The state of the mortgage market of Ukraine was examined, its comparison with the countries of Europe was conducted, and the main attention was focused on the affordability of mortgage loans for the population. The main problems, which restrain the development of mortgage lending in Ukraine, are revealed, and directions of its activation are offered.

Keywords: housing construction, construction companies, mortgage lending, banks, refinancing

1 Introduction

The problem of residential housing construction financing is widely investigated; the experts in given problem mainly focus on mortgage crediting as one of the principal sources for financing construction industry. Real estate and financial services promoting development, recovery of the stock market, mortgage lending can not only activate reforms in the economy but also gradually ensure solving housing problems of the population. The use of this tool will significantly reduce tension in the housing sector by providing an average citizen with the opportunity to acquire housing through a mortgage [1].

We have investigated specific aspects of European model of mortgage market as far as it revealed bigger soundness in terms of the global financial crisis.

With the basis of the works by the scientists investigating mortgage market functioning in European countries [3; 3], we have defined the most important peculiarities which have to be taken into account while implementing European experience in Ukraine. Thus the major attention is given to the possibility of mortgage debt securitization implementation in Ukraine, which proved to be an effective tool of cheapening financial resources at the real estate market and developing residential housing construction in European countries [1-5].

Financial institutions in Ukraine obtained a tool enabling crediting individuals and legal entities for real estate purchasing. Data concerning a number of real estate transactions bought with banking loans attracting proves importance of mortgage crediting development. Maximum amount of mortgage loans (267098) was given in 2007 [6]. In 2005 mortgage loans market indicated its worst result for the twelve years of its activity, 13716 mortgage loans were given, which is three times less than the initial index. Despite certain reduction of credit resources cost in the middle of 2016, their growth occurred later on, and currently the rates make average of 22-23% which cannot be compared to those in European Union (Table 1) and in fact makes them unaffordable for the major part of our country population. Thus, renewal and further development of mortgage market and consequent activation of constructing companies activity are especially important issues for Ukraine today.

TABLE 1 Residential mortgage lending in EU and Ukraine

Country	Total outstanding residential mortgage lending (million euro), III 2017	Gross residential mortgage lending (million euro), III 2017	Mortgage interest rates (%, weighted average), III 2017
Belgium	229,205	7,914	2.11
Czech Republic	39,012	2,618	2.17
Germany	1,365,975	55,700	1.85
Denmark	245,580	10,763	0.94
Estonia	525,899	9,117	1.99
Finland	95,672	7,687	1.02
France	938,340	43,663	1.56
Hungary	13,662	624	3.55
Italy	373,390	14,805	2.02
Netherlands	670,785	25,060	2.42
Poland	91,338	n/a	4.50
Portugal	94,378	2,132	1.48
Romania	13,948	764	3.60
Sweden	403,357	14,064	1.53
United Kingdom	1,536 954	77,491	1.98
Ukraine	34,000	3,739	24,1

Source: European Mortgage Federation, NBU

2 Overview

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

This paper discusses the advantages, disadvantages and conclusions of the following issues:

- Directions for increasing the availability of mortgage lending for the population of Ukraine;
- Comparison of the European and American experience of refinancing mortgage assets
- Prospects for using Mortgage covered bonds

3 Decision

With the regard to the above said, the following conclusions can be made. Assets securitization is one of the tools used for post-crisis renewal of European banking system; it can significantly widen abilities of real economy crediting and create alternative to banking lending. Using of this tool ensures reduction of bank dependency from both interbank lending and central bank refinancing. Besides, it has an important social role which consists in ability to reduce crediting resources cost.

4 Conclusion

At the same time the given mechanism poses a range of potential threats, since due to it banks liquidity indicators are deformed and non-liquid instruments are spread. Securitization mechanism usage is purposeful only in terms of used assets high quality. Under such conditions there is necessity in objective estimation of investment risks and assigning credit rating to securities issued as a result of assets securitization, as well as increase in information to potential investors transparency and availability. The Basel Committee on Banking Supervision and International Organization on Securities Commissions perform promotion of the concept of effective and transparent securitization in this direction and continue developing principles on adequate assessment of carrying such operations general risks. The concept effectiveness will be investigated in our further works.

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Implementation of European corporate social responsibility practice in Ukraine's enterprises

Svitlana Kulakova*

ISMA, Riga, Latvia

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

Abstract

The essence of the socially responsible business activities concept is considered in the article. Conditions of formation of socially responsible enterprises behavior in the EU. The examples of companies are considered with the high level of social responsibility. Investigated factors hindering the development of corporate social responsibility in Ukraine. Analyzed key factors supporting the development of socially responsible Ukrainian business are defined.

Keywords: social responsibility of business, economic responsibility, ecological responsibility, social responsibility.

1 Introduction

The issue of social responsibility in Ukraine is gaining more and more attention among scholars and educators of various fields of knowledge: lawyers, economists, philosophers, sociologists, political scientists, etc., as well as in the practice of management of international and Ukrainian companies. Over the past 5 years, 494 scientific articles on CSR have been published around the world [1].

It's no coincidence. The implementation of social responsibility in management activities and in social relations of international progressive social systems provides a successful, rational, sustainable human development, with the application of legal, socio-cultural, disciplinary and mental levers of influence. The presence of CSR is an element of competitive advantage and leadership in the market, as it can form the necessary image and reputation of the enterprise. It is not surprising that one of the key competencies of the head of the organization becomes the ability to promote CSR initiatives [2, c. 187].

In recent years, the study of KSV issues has been the subject of study by many Ukrainian scholars, namely N.V. Bibik, A.A. Glebova, M.E. Deich, A.M. Kolot, O.F. Novikova, O.V. Pankova, N.A. Sokol and others. Among foreign researchers, the founders of KSV is E. Carnegie, R. Owen. But, despite the great scientific progress on this issue, there remain issues that need to be researched and analyzed, especially in view of the lack of prevalence in Ukrainian enterprises. It is an analysis of the evolution of this concept and the experience of European companies that will enable us to invent possible ways for the spread of CSR in our state.

2 Overview

The purpose of the paper is to determine the essence of the current state of the Institute of Corporate Social Responsibility in Ukraine, the theoretical substantiation of its forms and principles, and the development of measures to increase the efficiency of this process for the Ukrainian business, taking into account the experience of the leading European companies.

3 Decision

Despite the many interpretations of the phenomenon of "corporate social responsibility" (Table 1), which, for the most part, have the right to exist and make it possible to expand and (or) deepen the intrinsic characteristics of this phenomenon, nevertheless most interpretations center around the very first formulated by G. Bowen definition , according to which the social responsibility of the businessman is to implement such a policy, to make such decisions or to adhere to a line of behavior that would be desirable for the purposes and values of society [3].

Modern experts V.V. Bozhkov, L.Yu. Sager [4], A.O. Hlebova, O.V. Bondar-Podgurskaya brings advantages and disadvantages of introducing social responsibility in business (Table 1), which can both enhance the strengths of the enterprise, region and state, and reduce their competitiveness.

In countries of Europe, as a rule, the work of companies in the implementation of CSR strategies is regulated by the state: the business organization has responsibilities for compulsory health insurance, pensions, and environmental protection. All these provisions are enshrined in the International Labor Organization, the Universal Declaration of Human Rights, the Organization for Economic Cooperation and Development, the decisions of the World Summits, and others [6]. The regulation of CSR in terms of rights is carried out at three levels: supranational, national and local, and the main principles of CSR are enshrined in such pan-European documents as Integrated Food Policy, Ten Principles of the UN Global Compact, Guiding Principles of the Organization for Economic Cooperation and Development for multinational companies, Standard from the social responsibility of ISO 26000, the United Nations Guidelines for Business and Human Rights, the Environmental Management and Audit Scheme.

Despite a large number of documents regulating CSR activities, many companies not only follow their provisions but also develop their own CSR programs and projects. In the ranking of the leaders of the industrial groups DJSI of 24 groups of European companies lead in 17, with most representing countries such as Switzerland, the Netherlands,

followed by Germany, France, Spain, followed by a Belgian company in one group and in one group – an Italian company.

In Ukraine, in recent times, more and more companies are shifting from the position: "We produce the product needed by the consumer, and we pay taxes, and this is our responsibility ends" to the position of open civil liability, and voluntary". There are two main reasons here. Firstly, the objectively growing dependence of companies-producers on the social conditions of their activities in the regions of presence. Regular surveys of the worl's leading corporate social responsibility companies show that these companies spend on average on a voluntary basis from 0.5% to 1.5% of their turnover on an annual basis.

Second, the company's motivation to invest in this «non-productive sphere» is the realization that in the case of a truly CSR implementation, companies actually manage to implement a non-financial risk management system, the core of which is managing the interaction with all stakeholders. These two main trends of social partnership change lead to the consistent improvement of corporate governance systems, which has a positive impact on the image, business reputation and, ultimately, on the capitalization of companies. That is, in the operating plan companies carry additional unproductive costs, but ultimately win due to the increase in the value of companies. And often the growth rate of capitalization significantly outstrips the growth of costs for CSR.

The social responsibility of business in Ukraine, as already noted above, is under construction. Social responsibility of Ukrainian companies and organizations is directed, first of all, to labor relations and measures to protect the health and safety of consumers. Less common are measures to protect natural resources and interact with the community. Several dozen, mostly large, companies have published policies and strategies for corporate social responsibility and implement relevant initiatives.

TABLE 1 Advantages and Disadvantages of Introducing Social Responsibility in Business*

<table>
<tr><th>For Business</th><th>For Society</th><th>For State</th><th>For the Region</th></tr>
<tr><td colspan="4">Advantages</td></tr>
<tr><td colspan="4">the possibility of establishing partnerships between business, government and the public</td></tr>
<tr><td>ensuring the public reputation of the organization, improving the image</td><td>improvement and development of social protection of the population</td><td>solving some of the key social problems</td><td>solving social problems, raising social standards of life</td></tr>
<tr><td>increasing of public confidence in the activities of the company, its goods and services</td><td>the possibility of attracting investment in certain social spheres</td><td>preserving and using the «intellectual resource» for the needs of the country, increasing its investment attractiveness</td><td>preserving and using the «intellectual resource» for the needs of the region, increasing its investment attractiveness</td></tr>
<tr><td>growing of professionalism and the maintenance of human resources</td><td>capacity to support of public initiatives, innovative projects</td><td>possibility of attracting investment in certain social spheres</td><td>possibility of solving and implementing social projects</td></tr>
<tr><td>providing loyalty to the company's staff</td><td colspan="3">development of social and creative activity of the population</td></tr>
<tr><td>the possibility of forming a safe environment and company development through its own corporate policy</td><td>creation of social resources of production activity</td><td colspan="2">the possibility of forming a safe environment of the population</td></tr>
<tr><td>increase in the value of intangible assets</td><td colspan="3">increasing the resource base that is taxed, and the tax payment</td></tr>
<tr><td>reduction of operating expenses</td><td colspan="3"></td></tr>
<tr><td colspan="4">compliance with regulations and standards of the global economic community</td></tr>
<tr><td colspan="4">Disadvantages</td></tr>
<tr><td>violation of the principle of maximizing profits (directing part of resources for social needs reduces the influence of this principle)</td><td>insufficient accountability to the public</td><td colspan="2">removing funds for social programs by reducing the budgets of economic programs</td></tr>
<tr><td>spending on social inclusion (funds allocated for social needs is for the enterprise cost)</td><td>transfer of costs for measures of social responsibility of consumers in the form of price increases</td><td colspan="2"></td></tr>
<tr><td>lack of ability to solve social problems (staff of enterprises is usually deprived of experience with these issues)</td><td>transfer of responsibility for solving social problems in the sphere of business</td><td colspan="2"></td></tr>
</table>

*Improved by the authors on the basis of working out literary sources [4, 5]

4 Conclusion

The study conducted in this section suggests that increasing the role of corporate social responsibility in Ukraine should be a significant factor in solving social and environmental problems and improving the competitiveness of the economy. The development of the Institute of Corporate Social Responsibility involves the transition to the systemic participation of the state in the field of stimulation of socially responsible behavior of business entities, which, in turn, both for the state as well as for society, is the basis for solving a number of key social problems, including the basis for growth of volumes of investments in public sphere, reduction of the outflow of "intellectual resources", improvement of the image of the state on the international scene as observing norms and standards of the world community. There is stability and conditions for investment.

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Competitiveness of goods and services: theoretical aspects

Volodymyr Kulynych*

Poltava National Technical Yuri Kondratyuk University, Ukraine

Abstract

The modern market economy is a complex organism, consisting of a variety of industrial, commercial, financial and information structures, which interact with the background of an extensive system of legal norms, and are united by a single concept - the market. The market is an organized structure where "producers" and consumers, sellers and buyers meet "where" as a result of the interaction of consumer demand (demand is the quantity of goods that consumers can buy at a certain price), and the manufacturers' proposals establish both the price of goods and sales. Competition is the most important part of the whole system of market economy. The incentive that forces a person to compete is the desire to surpass others. The subject of competitive rivalry in the markets is market shares controlled by those or other commodity producers.

Keywords: competitiveness, management, administration

1 Introduction

The competitiveness of the product on the market is seen as the degree of attractiveness of goods for consumers. When purchasing a product, the buyer justifies his choice based on the evaluation of the useful effect of his use, that is, the assessment of the costs associated with his purchase and operation.

2 Overview

It is widely known, entrepreneurship is the organization of production, works or services that have value and provide the profit of the subject of such activity.

Typical processes of entrepreneurial activity in a competitive market environment include:

1) the production of a new, that is, still unknown to the consumers of the good or the creation of a new quality of one or another existing good;
2) the introduction of a new production method;
3) the development of a new market;
4) use of a new source of raw materials or semi-finished products.

Considered business processes, but in essence, reflect the factors of competitiveness of goods (services). The main purpose of entrepreneurial activity is profit making. The main instrument for achieving this goal is the production and supply of a competitive product market.

3 Decision

The main criterion for the competitiveness of goods is the degree of satisfaction of real needs. However, the direct measurement of the degree of satisfaction of needs is impossible due to the psycho-physiological perception by consumers of certain goods. Sometimes, advertised products with low consumer properties are perceived more favorably by consumers than non-advertised products with the same and even higher consumer properties. Therefore, to assess competitiveness, indirect criteria are used that can be classified into two groups: consumer and economic.

Products are competitive if they have one or more consumer characteristics in a given consumer segment. better than those of analog products (with these characteristics recognized by consumers as leading). Consumers are not interested in absolutely the best in all characteristics of the product, but in that, which successfully combines the qualities most in demand in a given segment of the market, and are often ready to sacrifice certain product characteristics for the sake of improving others.

The competitiveness of a product on the market is determined by comparing its cost (taking into account the purchase price of the goods by the buyer and the cost of service during use or consumption) and consumer characteristics with the characteristics of other goods generated by market demand and the conditions of their supply on the market.

The competitiveness of the product is:

- a set of properties of the realized object, satisfying one or another human need in a given period of time in the conditions of competition in a free market;
- the ability of products to be attractive to the buyer compared with other products of the same type and purpose, due to the better compliance of its quality and cost characteristics with the requirements of this market and consumer ratings:
  - relative and generalized characteristics of the goods, reflecting its beneficial differences from the competitor's goods in the degree of satisfaction of needs and the cost of its satisfaction;
  - such a level of its economic-technical, operational parameters, which allows to withstand rivalry (competition) with other similar products on the market;
  - comparative characteristics of the goods, containing a comprehensive assessment of the totality of production, commercial, organizational and economic indicators regarding the identified market requirements or properties of another product and determined by the combination of consumer properties of this competitor product according to the degree of compliance with social needs, taking into account the costs of their satisfaction, delivery and operation in the process of production and (or) personal consumption;
- manifestation of product quality in the conditions of market relations, determined by the ability of products to be sold on a specific market, to the maximum extent possible and without loss for

the manufacturer;
- the property of an object estimated by a consumer to exceed at a certain point in time without harming the manufacturer in terms of quality and price characteristics in a specific market segment.

4 Conclusion

It should be noted that as a result of assessing the competitiveness of products, decisions can be made on changing:

- composition, structure of the materials used (raw materials, semi-finished products), components or product design:
- product design procedures;
- production technology, test methods, quality control system of manufacturing, storage, packaging, transportation, installation;
- prices for products, prices for services, maintenance and repair, prices for spare parts;
- the order of product sales on the market;
- the structure and amount of investment in the development, production and marketing of products:
- the structure and volume of cooperative supplies in the manufacture of products and prices for components and the composition of selected suppliers;
- supplier incentive systems;
- import structure and types of imported products.

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Organization of administrative account is on enterprises of tourist business

Galina Lebedyk*

Poltava National Technical Yuri Kondratyuk University, Ukraine

**Corresponding author's e-mail: glebedyk@ukr.net*

Abstract

Essence, specific and structure of costs of tourism companies are disclosed. Of reducing of costs of tourism enterprises and management methods (direct-cost, standard-cost, budgeting) are considered. method of budgeting is proposed to using and the composition of budgets of tourism company is directed. Development of budgets will help to plan costs, revenues and profits, as well as evaluate the business, eliminate the identified deficiencies.

Keywords: costs, tourism company, classification, management, budget, planning.

1 Introduction

Effective work of a modern enterprise is impossible without a well-established system of managerial accounting and reporting at all levels of management. In conditions of increasing competition in the domestic market, the question of the need to establish a system of managerial accounting at enterprises for many progressive leaders no longer poses. Increased attention to managerial accounting is conditioned by factors specific to modern business.

Management accounting plays a leading role in the entire management process, as it covers the complex management function and acts as a subsystem in providing information management solutions. The peculiarities of the management accounting organization at tourist business enterprises arise, first of all, from the specifics of this sphere, which determines the specifics of the main object of managerial accounting (expenses), defines the features of the structure and structure of costs, as well as the order of their formation.

In an unstable economic situation, effective management of tourism business should be based on the budgeting of its activities (Figure 1).

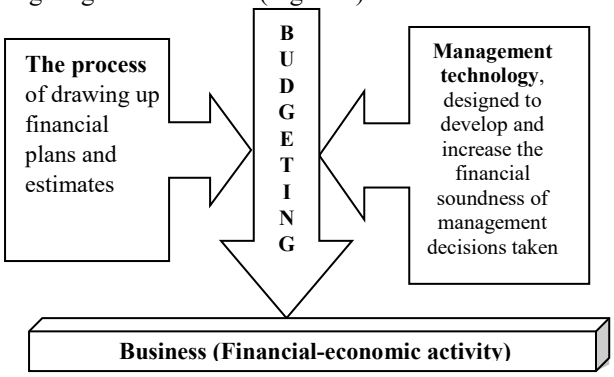

FIGURE 1 Management of tourism business

At the enterprises of tourism business budgeting is the basis:

- planning and making managerial decisions;
- assessment of all aspects of the financial condition of the enterprise;
- strengthening of financial discipline.

The practical introduction of a budgeting system, as a comprehensive program of planning and strict regulation of costs and incomes, will ensure not only break-even functioning, but also the development of tourism business enterprises.

2 Overview

The subjects of tourism business on the basis of indicators analyzes the relationship of costs, activities and profits. Such an instrument of managerial planning and control allows you to study the behaviour of the subject of tourism activity based on the interaction of prosperity, activity and profit.

With the introduction of more detailed indicators in the reporting of tourism operators and travel agents, disclosure of more meaningful accounting information can be achieved to make sound management decisions by managing and detailing information for external users.

In the mechanism of accounting policy of enterprises of tourism business, the following elements are of primary importance: the choice of the object of cost accounting and the optimal composition of costs, forming the cost price of the product; definition of the accounting and distribution of indirect costs; the choice of the method of cost accounting, as well as the definition of the composition of the costs of the future period; the possibility of organizing cost accounting for cost and liability centers.

3 Decision

In the system of managerial accounting, cost analysis is widely used to determine the value of travel firms' services. One of the methods of economic analysis that is effectively used in business practice is the analysis of the level of break-even activity of the enterprise. The analysis methodology is based on three indicators: profitability based on marginal profit, constant costs and sales volume. With these

indicators, you can define a "break point" indicator, which provides break-even work of a travel company.

The problem in calculating the level of break-even is the classification of costs with the distribution of them to the constant and variables. For the tourist industry variable costs may be related to the design of tours, the provision of visa services, relocation, accommodation, food for one tourist or group, depending on what is accepted per unit of payments, payment for services of attendants and guides-translators, costs for the implementation of tours or tours. The company's permanent expenses include the cost of advertising, the administrative costs of the central office, depreciation costs, the cost of acquiring and maintaining information bases, etc. When planning the activities of a travel company it is necessary to take into account the behaviour of costs when changing the volume of activity. Cost-based cost information is important for making various managerial decisions, such as the expediency of expanding the scope of services, conducting additional tours, increasing transportation volumes, etc.

In determining the impact of these or other factors on the cost of services, as well as looking for reserves to reduce the cost of services, it is necessary to adhere to the principle of differentiation, depending on the type of service. In conditions of market competition in determining the level of costs, special attention should be paid not only to the application of methods and systems of cost classification, but also to the correlation of costs with the organization's indicators, characterizing the type of service, the methods and forms of its delivery, organizational and managerial structure. It is such an analytical comparison possible with the help of systems of managerial accounting, which will be able to provide a selection of optimal strategy and tactics of the company.

4 Conclusion

It is expedient to control and regulate expenses of the company through the centers of expenses and responsibility. Selection of travel agencies in such zones has the purpose of expanding the costs, ensuring the relationship between costs, income and actions of specific individuals. Actually, the establishment of accounting, planning and costing in terms of cost centers and responsibilities will increase the effectiveness of control and regulation. The choice of cost centers and responsibilities is determined by the desire of managers to have an additional point of control over costs in structural units. In the work of travel agencies you can allocate cost centers for the types of tourist product. Accordingly, it is advisable to provide entertainment centers, the center for designing tours, the center for forming tourist routes, the center-campsite, the center transfer, the information center, which fully cover the diversity of services of travel companies and will help to effectively control the costs of these centers.

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Outsourcing and outstaffing: advantages and disadvantages for business

Oleh Levchenko*

Poltava National Technical Yuri Kondratyuk University, Ukraine

**Corresponding author's e-mail: v171@pntu.edu.ua*

Abstract

In the articles considered of question of outstaffing as one of modern methods of management a personnel which allows more effectively to utillize a personnel on an enterprise, advantages of outstaffing. As the financial crisis deepens, industrial enterprises are actively developing new methods for managing the efficient use of personnel, one of which is outstaffing, which allows you to regulate the number of employees (without changing the official staffing levels).

Keywords: outsourcing, outstaffing, development, administration

1 Introduction

Recently, the words "outsourcing" and "outstaffing" have begun to appear more and more often. And although Ukrainian legislation practically does not regulate such relations, nevertheless, in practice, many business entities successfully apply them, including with the aim of optimizing the accounting and expenses of the enterprise.

In this article, we consider the concept of "outsourcing", which literally means "external source". This type of employment involves the transfer of secondary functions of the company to a third-party specialized subcontractor firm. Outsourcing is based on the signing of a long-term contract and provides an opportunity to obtain professional support in a particular area in a prolonged period of time.

2 Overview

Outstaffing is often confused with outsourcing, or is mistakenly considered to be a "kind of" outsourcing. However, these are completely different services. The concept of "outstaffing" comes from the English words "out", which means "outside" and "staff", which means "staff". The peculiarity of this type of employment is that a part of the company's staff is taken out of the state and is legally formalized at an outstaffer company, however, it performs its duties as part of the tasks of the customer company. From a legal point of view, an employee's employment relationship occurs with an outstaffer company, not with a customer company. At the same time, the outstaffer renders services to the customer under a paid service agreement, and the latter pays for them. Thus, we can say that the main difference between the two types of services is that outsourcing is the transfer of certain company functions to the contractor, and outstaffing to the contractor's employees.

Our task is to consider the main differences and evaluate the possible positive and negative aspects of these phenomena in business.

3 Decision

Outstaffing is often confused with outsourcing, or is mistakenly considered to be a "kind of" outsourcing. However, these are completely different services. The concept of "outstaffing" comes from the English words "out", which means "outside" and "staff", which means "staff". The peculiarity of this type of employment is that a part of the company's staff is taken out of the state and is legally formalized at an outstaffer company, however, it performs its duties as part of the tasks of the customer company. From a legal point of view, an employee's employment relationship occurs with an outstaffer company, not with a customer company. At the same time, the outstaffer renders services to the customer under a paid service agreement, and the latter pays for them. Thus, we can say that the main difference between the two types of services is that outsourcing is the transfer of certain company functions to the contractor, and outstaffing to the contractor's employees.

Outsourcing and austaffing are two foreign terms that tightly entered the recruitment specialists. Both of them came from English quite recently.

The term "outsourcing" literally means "external source". This type of employment involves the transfer of secondary functions of the company to a third-party specialized subcontractor firm. Outsourcing is based on the signing of a long-term contract and provides an opportunity to obtain professional support in a particular area in a prolonged period of time.

Outsourcing allows you to improve the quality and effectiveness of core activities, as well as free up the human and financial resources of the company.

Outstaffing as a form of employment provides an opportunity to transfer certain company functions to an outstaffer to optimize financial and resource costs for non-core activities based on the signing of a long-term service contract. This form of attracting workforce is beneficial to a fairly wide range of companies, because almost any staff can be transferred to outstaffing.

Outstaffing services are most in demand among companies that have the need to maintain a large number of staff or whose activity is seasonal. For example, plants and factories can be classic representatives of this group. In the "hot" months, when production is gaining momentum, it often happens that there are not enough hands. An outstaffer company comes to the

rescue, which satisfies the customer's need for employees and sends its qualified personnel to production.

On the other hand, there may be a situation in which production is under pressure from the investor, therefore, it is forced to meet the standards for the number of products produced per workplace. Outstaffing here acts as an effective tool for solving the problem: some employees are taken out of the state and issued to an outstaffer company.

Outstaffing as a fairly new, but firmly entrenched in the personnel market service is aimed at reducing the cost of maintaining staff, optimizing taxes and reducing the number of full-time staff. The service gained its popularity due to its high competitiveness. However, outstaffing, like any other service, has its own specifics and features.

According to statistics on the basis of outstaffing, mainly representatives of such areas as restaurant business, trade, transportation and logistics, construction, security and cleaning work. Among office occupations on outstaffing, secretaries and translators are often found.

Employees of the restaurant business, provided to companies on the basis of outstaffing, are represented by waiters, bartenders, sommeliers, hostesses, hall managers, chefs and kitchen workers.

Employees in the austaffing business are represented by marchandisers, cashiers-sellers, consultants-sellers, supervisors, commodity specialists, packers, pickers, promoters, stickers, loaders, sales representatives and other professions.

Often, professions such as corporate and personal drivers, freight drivers are also outstaffed.

In construction there are quite a significant number of professions that are taken to outstaffing. Among them are bricklayers, painters, assemblers, tilers, carpenters, electricians, laborers and other professions.

Security is an important element in the work of any company. Therefore, companies often trust the recruitment of personnel in this field to outstaffers.

Cleaning staff is probably the most requested on market for outstaffing services. Cleaning staff is represented by cleaners, janitors, window cleaners and other professions.

4 Conclusion

It should be noted that the main common feature of outsourcing and outstaffing is that the task of both types of services is to minimize the risks, financial and resource costs of non-core business activities, tax optimization and reduction of personnel costs.

Very broad companies can use outstaffing services. The main condition for this is the presence of burdensome, but important for the company non-core activities. Among them are works on cleaning and improvement of territories and premises, work in large shopping centers or stores, such as merchandising, for example.

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Use of virtual and interactive technologies in the field of tourism

Viktoriia Makhovka*

Poltava National Technical Yuri Kondratyuk University, Tourism and Administration Department, Pershotravneviy Avenue, 24, Poltava, Ukraine

**Corresponding author's e-mail: mahovkavika@ukr.net*

Abstract

Today, the tourism sector has undergone significant changes in connection with the introduction of new computer technologies. Effective development and operation of tourism enterprises is impossible without the usage of modern information technologies, because the specificity of the formation, promotion and implementation of a new tourist product requires the use of such systems and technologies that, in the shortest possible time, allowed to obtain reliable information about the availability of vehicles, tourist accommodation, the formation of related tourist services. Modern information systems are used to promote and advertise tourism products, to form the image of companies providing services in the field of tourism, as well as to form a certain brand of tourist destination.

Keywords: tourism, information technology, virtual communities

1 Introduction

The conducted studies indicate that modern information technologies used in tourism can be divided into several categories, namely: reservation and reservation systems; information management systems (packages of financial management of tourist enterprises and hotels); tourist virtual communities; multimedia technologies; e-commerce; geographic information systems; system of support of tourist business in the Internet.

2 Overview

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

- Information technology used in tourism
- Forms of virtual communities in the field of tourism
- Features of the formation of virtual space in tourism

3 Decision

The development of informatization of the processes of management of enterprises of the tourism sector, which provide the subjects of tourism activity, the rapid processing, storage and transmission of information, which allows to provide a complete and accurate reference about hotels, railways, airlines throughout the world. The Global Distribution System (GDS), which provides automation of these processes, plays a key role in the development of international and domestic tourism.

Global Distribution System is a general information system that offers the most important distribution networks for the entire travel industry. Interaction of tourists is carried out through global reservation and reservation systems. One connection through a modem with servers that have a corresponding database, travel agencies get access to information about the availability of services, value, quality, arrival time and departure through a variety of tourist services from their suppliers. Also, tourism operators can contact these databases in order to make and confirm their order.

Tourism is one of the spheres of the economy, in which virtual communities are formed, which are used for the exchange of information, experience experiences. Most tour operators and agents use virtual communities to learn the tastes and preferences of tourist services (more and more successful travel companies create on-site online customer clubs where customers can get the support they need and share their experiences with other clients), sharing experience (in such communities are learning and developing professionals, creating alliances, finding new solutions for the development of the industry, forming brands of companies and products).

In addition to the above-mentioned factors in the formation of virtual communities, the active use of the Internet and modern technologies makes active use of their forms (web-forums, blogs and blog platforms, wikis, chats, mailing lists, social networks, etc.) for the promotion of tourism products, advertising services tourist establishments, accommodation and catering establishments, tourist attractions, placement of reference information.

Geoinformation technologies, which allow mapping the position of tourist objects, used as one of the methods of demonstrating the tourist attractiveness of a region, a separate tourist route or attraction, are popular with tourists. Geographic information technology is a convenient means of obtaining information by users and forms a visual form, the mutual placement of objects, which allows them to determine their spatial localization.

Practice shows that most users prefer mobile information technologies when planning, organizing, and traveling, especially mobile applications that are convenient and easy to use.

4 Conclusion

Consequently, the above-defined forms of virtual communities form the world of informational and cybernetic space, which, unlike geographic, allows us to combine culture and civilization that were historically formed in another space and time. The development of world trends in the expansion of the information space also affects the tourism sector and allows to distinguish a number of features: within the framework of the formed informational environment a new level of information transmission in real time and space has been achieved; the feature of modern tourism is that it develops at the junction, crossed the main sectors of the information economy-real, monetary and virtual; the formation of virtual culture, virtual tourist communities and the development of virtual travel.

Theoretical foundations of political management in the XX century

Georgi Manolov*

Higher school of security and economics, Plovdiv, Bulgaria

**Corresponding author's e-mail: manolovi@gmail.com; info@vusi.bg*

Abstract

The current report reviews some of the most important theories that relate to the development of political management in the 20th century. These theories have fundamental character; they have found a lasting place in the political management and of course, have had a tremendous influence on its modern state today. In this context there is a special focus on two groups of theories: the political ones, such as the theories of the elite of G. Mosca, V. Pareto and R. Michels as well as the theory of state and bureaucracy of M. Weber; and management theories such as the theory of strategic management and so on. Conclusions and summaries of their implementation in political management are also made.

Keywords: political management, political theories, management theories

1 Introduction

The deep roots of modern political management sprout at the end of the nineteenth and early twentieth centuries when the first conceptual views of political science began. It is then that, in addition to classical political theories (liberal, conservative, social-democratic), in the course of social development, increased the role of parties, electoral law, parliamentarism, constitutionalism and state governance as important levers (and mechanisms) for regulating political life in the state. Accordingly, various election campaigns begin to develop, which despite being a new social phenomenon, attract legitimate scientific interest in those times. Management theory unfolds similarly by gradually beginning to evolve over this period (from the beginning of the 20th century) with special emphasis first on the business economy and then on politics.

2 Overview

The paper examines the fundamental question of the theoretical sources (and foundations) of political management which still remains at the periphery of scientific political science. Therefore our focus is on studying the primary theoretical views (for political management) that arose more than a century ago. In doing so we will also examine the political and management theories that have the most powerful influence on the future formation of political management.

3 Political theories

3.1 THEORIES ABOUT THE ELITE: V. PARETO, G. MOSCA AND R. MICHELS

According to V. Pareto, the combination of "remnants" and "derivatives" attached to political power predetermines the ability of one or the other to belong to the power elite, to make political decisions, and to impose their will over their subordinate classes. As a result, **both types of ruling elite the elite of the "foxes" and the elite of "lions"** stand out in the political process. For their part each has its own essence: that of the "foxes" manifests more flexibility, cunning, resourcefulness, adaptability and usually manipulatively uses in its favor the giant political machine; and the other - the "lions" embodies the firmness, determination and power to realize its goals. That's what imposes the constant **"circulation of the elites"** through permanent change of one another because sooner or later they are merging with their power positions ("foxes" with compromises and "lions" with rigidity) and begin to degenerate [8].

The other classic of the elitist theory, **G. Mosca** (1856-1941) analyzed the essence of the question of political elites even more thoroughly. The basics of his conception are expressed by the fundamental methodological fact: in every social system there is a conglomerate (unification) of **a ruling minority and a subordinate majority** regardless of historical time and in spite of the specific socio-political conditions of one or another age. By justifying the question of the existence of the **ruling class** in his essay **"Elements of Political Science"** (1895), G. Mosca writes: "In all societies - from the societies that are inadequately developed and have barely reached the dawn of civilization to the most advanced and powerful societies there are two classes of people – the one that governs and the one which is governed. The first class, always smaller, performs all political functions, monopolizes power, and is controlled by the first more or less legitimate more or less arbitrary and violent" [16]. By virtue of its political functions – organizational and managerial, administrative, economic, military, etc. the ruling minority fully occupies the command of power, chooses its own leaders and becomes the dominant **political class.** Or for Mosca, the political class is also ruling and vice versa - the ruling class is also political.

As a classic of the elitist theory R. Michels remained in the analysis of political thought with his remarkable work **"Political Parties – a Sociological Study of the**

Oligarchical Trends in Modern Democracy" (1911). In this work the author develops his main thesis that with the increase of the need for a higher degree of social organization the forms of organization become more complicated which inexorably leads to the strengthening of the oligarchy in general. In this way, the organization gradually destroys democracy and degenerates it into an oligarchy. This is the essence of the notorious **"iron law of the oligarchy"** which according to Michels states: "This is the organization that creates the supremacy of those elected over the voters, those who received over those who gave mandates, the delegates over those who delegate. Whoever says organization then says oligarchy" [15]. The logic of this law is dictated both by the canons of political struggle and by the party organizational structure wherein certain situations it is required to make quick decisions by the leaders (and the party elite) without consulting the masses. This sharply strengthens the role of party leadership (and elitism) and the organizational and technical leadership which in addition to narrowing the horizons of democratic mechanisms increases the influence of the hierarchical pyramid structure.

3.2 MAX WEBER ON STATE AND BUREAUCRACY

For the development of the theory of political management Max Weber's work on the bureaucratic state, political parties and party funding is of great importance. These classical works have long ago taken a worthy place in sociological and political science but for some reason are still underestimated by certain researchers in the field of political management.

According to **Max Weber**, "the modern state can be defined ..." as "... the attitude of **domination** of people over people based on legitimate (ie considered as legitimate) violence. Consequently in order for the state to exist the ruled people must obey the authority claimed by the dominant ones at the time. "That is "the state is that human community which in a particular territory - and this "territory" is a distinguishing mark - pretends (successfully) to have **a monopoly on the legitimate physical violence**" [3].

Stepping on such a basic definition, Weber further develops his thesis about the state as he speaks of the modern bureaucratic state, of its distinctive features, and of the fact that it functions as one of the three types of legitimate power - traditional, charismatic and rational-legal. And something very important: here the rational-law power requires the existence of a professional state administration (and administrative staff) which in the form of a bureaucratic structure is able to fulfill its assigned functions.

4 Management theories

4.1 THEORIES "X", "Y", "Z"

Initially theory "X" is conceptualized as it continues to develop the basic ideas of the theory of scientific organization of labor, subsequently the "Y" theory developed focusing on the theory of human capital and lastly or since the early 1980s – "Z" theory emerged based entirely on Japanese experience in the management of the manufacturing sphere [2].

Regardless of the different nuances, these three theories are gradually being applied (through their own specificities) in the evolving political management especially in the relationship between leaders and the electorate, in the process of state governance and in the course of electoral campaign management.

4.2 THE THEORY OF STRATEGIC MANAGEMENT

The theory of strategic management in the public sphere should be based on both the public management theory, which gives the general knowledge of this management as well as on the practice of public organizations in the systems of public administrations in the different countries which creates the experience. Or, this theory should be more broadly covered by two basic concepts: the first that concerns the content of the strategy concept, and the second – its development [2].

Although there are many controversial and unresolved theoretical issues in the theory of strategic management, its importance for the theory and practice of political management is absolutely indisputable. Suffice to recall the fact that where this theory is not applied as part of governance, it is very difficult to solve any management issues. In other words, there is no scientific management of society without a strategic vision for the development of the state as a kind of governance (adoption of strategies, concepts, models of development, etc.). This is an axiom for leaders and politicians if they want to manage successfully and those who do not understand it do not fit in with the modern ideas of effective political management.

5 Conclusion

The overviewed contemporary theories in the sphere of political and managerial science are not only important for the development of political management. They are, among other things the basic foundation structure of the world's modern political management themes.

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Providing information security in the context of anti-crisis management of enterprises

Iryna Markina*, Olena Ovcharuk

Poltava State Agrarian Academy, Ukraine

**Corresponding author's e-mail: iriska7@ukr.net*

Abstract

The article presents the strategy of providing information security in the context of anti-crisis management. Implementation of strategic directions will allow enterprises to reduce possible material losses as well as to retain competitive advantages and positions on the market.

Keywords: information security, anti-crisis management, strategic directions, meat-processing enterprise, economic and organizational changes

1 Introduction

In modern economic conditions of instability of environment and risk it has been critical to perform diagnostics of crisis situations and define adaptation factors and internal resources of growth as well. The enterprises of the Ukrainian agri-food sector, in particular meat-processing, are no exception. Falling-off in domestic demand, exit from the Russian market, pseudo-reimbursement of this effect by inadequate EU market quotas, high migration rates of highly skilled employees, substantial reduction of raw material base and increase in prices of raw materials and electricity, high costs of transition to the European quality standards, etc. have led to the significant negative consequences for domestic meat-processing enterprises (even under the conditions of perfectly formed internal environment). Transformation of enterprise is a process of economic and organizational changes and transformations of the business entity from the current state to the desired one (from the modelling of enterprise future state to the introduction of economic models) [3].

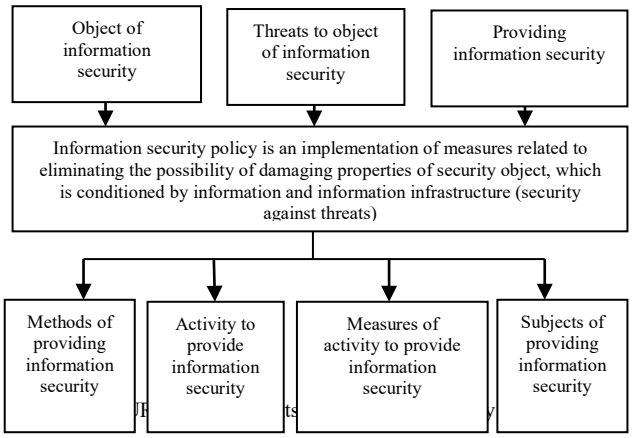
2 Overview

This work discusses the advantages, disadvantages of providing information security in the context of anti-crisis management of enterprises:

3 Decision

The implementation of these transformations becomes a necessary condition for the successful operation of enterprises. To solve them, there are the following modern information systems: information systems of financial management and accounting, marketing information systems, human resources information systems, etc. These systems automate various tasks: economic accounting of the released products, labor and salaries, production costs, fixed assets and intangible assets; management of production, inventories, orders, etc.

Scientists define the term "information security" in various ways [3-6]. We have analyzed the elements of information security policy on the basis of research results (Fig. 1).



Characterizing the elements given in figure 1, we should specify that the core of information security is the denial of the factors that cause damage and the possible future crisis of meat-processing enterprise.

Taking into consideration problems of the agri-food sector and meat processing in particular, we have proposed a strategy of providing information security in the context of anti-crisis management of meat-processing enterprises.

The main elements of the strategy are given in figure 2. We have singled out such strategic directions as organizational and engineering support of information security.

A strategic plan for providing information security in the context of anti-crisis management of meat-processing enterprises has been proposed. It consists of the following stages:

1. The development of purpose and strategic objectives of the maintenance of privacy, integrity and suitability of economic information for effective anti-crisis management of meat- processing enterprises.
2. Analysis of the external and internal environment, improvement of the strategic objectives of information support of anti-crisis management of meat-processing enterprises.
3. The development of strategic directions of

information security support in the system of anti-crisis management of meat-processing enterprises.

4. Analysis of the implementation of the strategic plan and improvement of strategic directions of information security support in the system of anti-crisis management of meat processing enterprises.

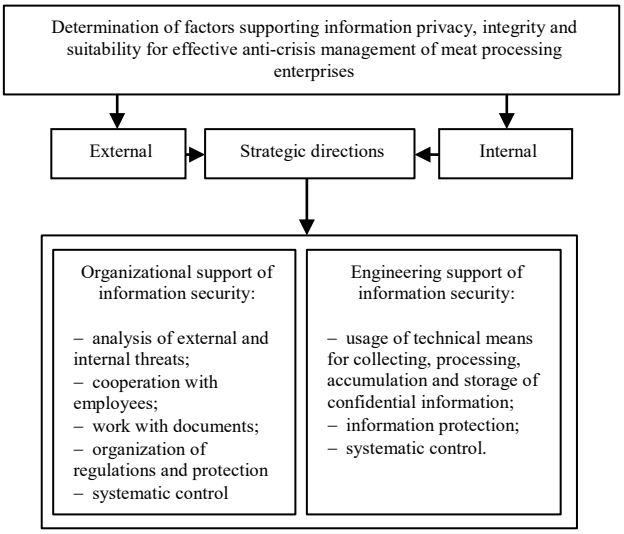


FIGURE 2 Content of the strategy of providing information security in the context of anti-crisis management of meat-processing enterprises

4 Conclusion

We have identified the following threats to information security: accidental threats and threats caused by deliberate people activities among the reasons for the strategy development. The official documentation of an enterprise, which contains misinformation and out-of-time or inaccurate information are considered to be the threats. Accidental threats are mistakes that arise as a result of the equipment operation or due to a lack of personnel qualifications. Threats caused by deliberate people activities comprise plundering, public disclosure, leakage of economic information, unauthorized access to information resources, failure of technical support, computer viruses.

Researches have proved that damage of enterprise intellectual property can result in loss of market positions, loss of continious and temporary competitive advantages or the reduction of trademark cost. That is why, it is necessary to make a decision on the basis of a qualitative assessment of the possible effects.

We have proved the efficiency of information technology usage in the process of anti-crisis management. The necessity of providing information security in the context of anti-crisis management of meat-processing enterprises has been emphasized due to the fact that information technologies themselves serve as a source of risk.

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Risks-management in the restaurant business of Latvia

Stanislavs Miscenko*

ISMA, Riga, Latvia

**Corresponding author's e-mail: stanislavs.miscenko@isma.lv*

Abstract

Modern management science embraces wide economic fields with the risks-management being one of its main sectors. The idea of organizing business and entrepreneurship, itself, cannot exist and develop without risks. At the period of origination of the management science there appeared a new direction of managing and controlling risks, and the new standards and stages of overcoming risks were developed. Unfortunately, such significant facilities as adaptation mechanisms as well as coordinating procedures for various branches of business have not been created yet.

Exactly now, at the present stage of business development, the situation with the risks-management is becoming especially strained.

The author paid special attention to the vital questions of risks-management in the Latvian restaurant business.

Keywords: adaptation mechanisms, catering enterprises, restaurant entrepreneurship, distinguish, moderate risk, embrace, joint efforts, volatility

1 Introduction

By the end of 2018 and the beginning of 2019 the perspectives of the world business development became quite gloomy. The main reasons of the market growth delay are aggravation of the political tension, the high volatility of raw materials prices and the limitations in the sphere of supply. Experts are forecasting that in 2019 the world Gross Domestic Product (GDP) will increase by 3% (after 3, 2% in 2018 and 2017). Worsening of the economic climate influenced Europe, in the first turn, and Latvia not being the exclusion [1, 2].

In can be said without any exaggeration that the food industry, in general, and catering enterprises, in particular, mostly suffered because of cruel economic sanctions. High competition, lack of investments, change of consumers' preferences, strict legislation system, all together, retard the development of the branch.

The difficulties of the business climate made the author investigate the situation on the world food market. Almost all countries of the Central, Eastern and Western Europe evaluated the catering enterprises business indices as "moderate" and "average" risk. As concerns Latvia, by the end of 2018 and beginning of 2019, its index was the "moderate risk". Due to these not very optimistic indices, the market of catering enterprises always has been in the zone of high risks and this fact was taken into consideration during developing the strategy of planning catering enterprises [1, 2].

The aim of the research work is to study the most considerable risks, which can emerge at the catering enterprises in the period of the contemporary development of Latvia and to suggest the consistent adaptation measures to possible changes with the following ways avoiding risks [3].

2 What is happening in the Latvian restaurant business now?

Despite of the seeming activity of the Latvian restaurant business in 2018 5-6 000 catering enterprises were registered, but only 3,700 enterprises were actively working (According to the Statistics State Department) [6]. More than 26000 employees were working at these enterprises. Approximately 300 CE (Catering Enterprises) are the members of the Association of Hotels and Restaurants of Latvia (AHRL) [4].

But at the same time, AHRL promoted the interests of hotels and could reach the reduced rates of the Value-Added Tax (VAT) (12%), which is the same for the hotels restaurants [4]; all the rest catering enterprises did not have such opportunities. In September of 2017 the Latvian Association of the Restaurateurs (LAR) was founded, and 70 catering enterprises became the members of this organization. The main advantage of LAR is that the members of the Association Board are the owners of the restaurants or the restaurants networks, who want to develop their business legally. 0ne of the main questions on the agenda of LAR is reducing the rate of the VAT from 21% to 5-7 %, following the example of some countries of the European Union. Such measures will increase the competitiveness in the Baltic Region. One of the important activities of LAR is the electronic account of the working time as well as inculcating Latvian ECO products to the markets [5].

Analysing the situation, the author pays attention to the qualification of the staff of enterprises. The problem of staff is very important and it is impossible to solve it independently. The question is connected not only with the cooks', bakers', waiters' and the oter members of the staff' skills. The experts of LAR declared that there was a lack of 3000 employees at their enterprises. Such situation is potentially dangerons and risky for the developing business [6, 7].

The problem of managing small catering enterprises is also rather hazardous, because the majority of these companies have not mastered the principles of management. Higher school "ISMA" with its program "Restaurant

Entrepreneurship" suggests several ways of solving these actual problems. The studies program for maximally short period of time (2 years) gives not only special knowledge, but provides the 1-st level of Higher Education.

Preliminary conclusions are quite obvious: the development of the Latvian restaurant business is impossible without active participation of State and experienced professionals.

3 Instruments of controlling risks-characteristic for catering enterprises

First of all, it is necessary to emphasize the social significance and vitality of the catering enterprises. And only the government and municipal attention with reasonable investments in catering could strongly reduce the "size of risk" for the entrepreneurs and defend the unstable business. The bright example of such social responsibility is the special program, rendering assistance to catering at schools, kindergartens, hospitals and other state private organizations. The foresight of such measures and the introduction of the legislative demands of observing definite rules, standards and limitations give positive results.

4 "Avoiding risks" and insuring catering enterprises risks

The author focuses his attention on the practical realization of different methods of avoiding risks. There appeared the conception of (HASSP), which became one of the leading means of avoiding risks at the catering enterprises. This method includes systematic watching, evaluation and control over dangerous factors, influencing the production safety [3]. This efficient system is in great demand in catering and restaurant business, because is capable of creating the guarantees of safety inside the production of food items on the national scale. Avoiding risks is, certainly, connected with the attempts of searching for "guarantees" and "insurance". New "insurance product" at the catering enterprises is represented in the commercial as well as in the social segments. The author points out that this is the "insurance product" of social responsibility, which forms the new direction of the branch [3].

5 Conclusions

In conclusion, the author confirms that the successful development of business is impossible without joint efforts of the State, municipal bodies and catering enterprises. The representatives of catering business should take an active part in stabilizing situation and neutralizing risks. The following actions should be undertaken:

- risks definition,
- searching for definition tools,
- finding the risks roots,
- emphasizing risks profile,
- developing the strategy of risks management,
- introducing the mechanisms of risks; acceptance and realization,
- controlling the whole monitoring and risks-management system with orientation to final positive results [3].

The application of the proposed risks controlling and management systems in the restaurant business and at all catering enterprises will help to create the objective database, to distinguish considerable risks and to define the strategy of risks-management.

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Management of university marketing activities: factors that influence on choice of place of obtaining higher education (according to the results of a survey of Latvian students)

Svitlana A Moroz

National University of Civil Protection of Ukraine, Chernyshevska Str. 94, Kharkiv, 61023, Ukraine

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

Abstract

In the article the attention is paid to the importance of marketing activity of administration of higher education institute for providing its popularization as a place of obtaining higher education. The article contains results of the analyses of answers of Latvian respondents as for their assessment of the power of influence of certain factors on the choice of place of obtaining higher education. In addition, the article determines the directions of improving the content and practice of the marketing mechanism of management of the competitiveness of the University and its attractiveness for students as a place of obtaining higher education.

Keywords: choice of the place of obtaining higher education, survey of students, market of education services, competence of administration of the higher education institute

1 Introduction

Marketing activities more and more often is considered on the level of one of the directions of professional activities of higher education institutes [1]. This phenomena is connected with the fact that competition between the institutes of higher education to get the most prepared applicants is held not only on the level of institutes of higher education offering of the quality of educational activities and compliance of professional knowledge and skills of graduates to requirements of the labor market, including in the plane of search of the most effective mechanisms to promote their product among potential consumers. It is quite obvious that nowadays for institutes of higher education offering a product of high quality (providing the quality of educational activities and the quality of higher education) is not enough to attract students, because the phenomenon of quality is not absolute, and its characteristics may vary depending on market conditions. The issue lies in formation, maintenance and satisfaction of the demand for the services of institutes of higher education. During fulfilling this task, administration of any institute of higher education faces with the need to settle issues of relationship administration between potential consumers or (and) customers of education services and the institute of higher education. Solving of this question is impossible to imagine without understanding of needs (requests) of potential consumers (clients) of education services offered by the institute of higher education.

2 Overview

In the framework of this publication the problematics of marketing activity of administration of institute of higher education with direction to find out preferences of consumers of educational services as for motives for the choice of the place of obtaining of higher education is considered, as well as opportunities of their inclusion to the system of measures to improve the competitiveness of the university:

- survey as a tool for obtaining information (finding out the opinion of potential consumers of educational services);
- analysis of respondents' answers as for the subject of science attention (motives to chose a place of obtaining of higher education);
- ways to improve system of marketing activities of institute of higher education.

3 Decision

In the framework of this publication we have a purpose to hold an analysis of one of the directions of maid by us survey "Assessment of quality of higher education", namely, the content of which is connected with determination of the power of the influence of certain factors on the formation of the applicants' choice of places for obtaining of higher education. The relevant non-commercial research was held on the territory of Ukraine, Latvia and China with participation of National University of Civil Protection of Ukraine (Ukraine, project organizer and coordinator - Moroz S.A.), Baltic International Academy (Latvia, project coordinator – Buka I.S.) and Institute of International and Comparative Education at Beijing Normal University (China, project coordinator – Liu Baocu). Authors of research chose survey as a method of obtaining information for the further research. Taking into account space constrains of this publication as a subject of scientific attention we have chosen the answers of those respondents who were interviewed by us in Latvia during the internship "Theory and practice of providing of quality of higher education: pedagogy, psychology and management" (April - May 2018).

The results of analyses of obtained by the authors of research answers as for determination of power of influence of certain factors on forming motives to choice a place of obtaining higher education is presented in Figure 1.

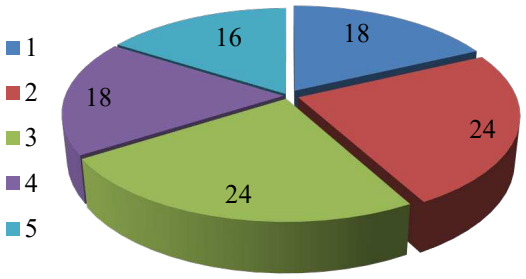

FIGURE 1 Power of influence of certain factors on the choice of place to obtaining of higher education

The answers of respondents are distributed in such a way (a number below of the provided list correspondents the number of the diagram sector): 1- territorial closeness of the institute of higher education to a place of permanent residence of the applicant (18% respondents chose this variant of answers); 2 - place of positioning of institute of higher education in the international university rankings (indirect indicator of the quality of higher education - international aspect) (24% of respondents chose this variant of answer); 3 - reputation of the institute of higher education among the immediate surroundings of the applicant (24% of respondents chose this variant of answer); 4 - development of the infrastructure of the certain institute of the higher education and of place where it is situated (18% of respondents chose this variant of answer); 5 - traditions of the institute of higher education in training of specialists (indirect indicator of the quality of higher education - national aspect) (16% of respondents chose this variant of answer).

Of course, all the mentioned above factors do not exhaust the content of the motives of the individual as for making decision to chose a place of obtaining of higher education, but at the same time, the proposed list, in general, can be considered sufficient for holding an analysis of the chosen subject of scientific research. Based on the results of the survey of respondents (figure 1) we can formulate such preliminary conclusions.

1. Any of five proposed for choice factors, taking into account the amount of choices by respondents, cannot be considered as dominating. At the same time the most important factor to the applicant to choose a place of future studying is a level of positioning of institute of higher education in international university rankings and reputation of institute of higher education among applicant's immediate surroundings. This tandem of factors allows us talk about the dialectics of the unity of objective (international ratings) and subjective (the opinion of parents, friends, acquaintances, etc.). Therefore, in order to create demand for the product of its professional activity, the administration of the institute of higher education, on the one hand, should focus on improving the indicators that are usually used to assess the achievements of the University within the framework of international University rankings (for example, to make QS World University Rankings experts use the following six metrics: academic reputation, employer reputation, faculty/student ratio, citations per faculty, international faculty ratio, international student ratio), on the other hand - forming positive image of the university . If for subjects of management of activities of science-teaching staff and administration of institute of higher education in the first way of work undoubtedly, is the administration of institute of higher education, in the second direction the definition of the subject is not unambiguous. In our opinion, the subjects of reputation management at the regional level in addition to the management of the higher education institute should also include applicants (students), former graduates and employers. In other words, the administration of the institute of higher education should establish and maintain a close relationship with students and the most authoritative employers in a particular region and their professional unions. Among the practical directions of implementation of this proposal are: holding of joint actions (open day in the institute of higher education and companies (organizations) which take graduates of a particular institute of higher education to work; exhibitions and presentations of professional direction; professional and sports competitions between students, employers and former graduates; joint social projects, etc.) with their coverage in the media and social networks.

2. In second place in terms of its importance in the process of forming the motive of choosing the place of higher education, the respondents determined the factors of territorial closeness to the place of permanent residence of the applicant and the development of infrastructure of a particular institute of higher education, as well as the infrastructure of the city in which it is located. If the impact on the location and city of the institute of higher education is significantly limited, except for the opening of a new higher education institute (the founders have the opportunity to choose both the city in which the institute of higher education will carry out its professional activities and the specific location of the University campus), then the impact of the administration on the development of the institute of higher education infrastructure is not only possible, but also obligatory. In previous directions of science research [2] we already paid attention to the importance of infrastructure of the institute of higher education in providing of directly the quality of educational activities of a certain institute of higher education, and the quality of higher education in general, and so result obtained from results of analysing of respondents only proves our assumptions about the place and role of infrastructure in ensuring the development of labour potential of institute of higher education, and accordingly in the formation of its positive image among future students. The vast majority of students who had the opportunity to take advantage of the program “Erasmus+ K1" after returning from the partner institution during communication paid attention to the advantages of the host University, which are associated with the level of development of its infrastructure. Therefore, one of the priority directions of the management of the University to ensure the increase of its attractiveness in the eyes of students and their parents is the development of the infrastructure of the university campus.

3. For the organizations of research unexpected became a fact of comparatively low level of importance of traditions of the institute of higher education training of specialists of the corresponding professional direction. Only one in six respondents chose this indicator at the level of the dominant determinant. Therefore, we can claim about a paradigm shift regarding the place and role of university traditions in providing by institute of higher education the quality of educational activities and the quality of higher education. This result may indicate the growing influence of universities so called new wave (recently established institutes of higher education) and their abilities to compete on the market of education services with accepted by society classical universities. There is a situation in which traditions are no longer considered at the level of one of the capitalization tools and gradually lose their value compared to modern, more effective tools. However, it should be understood that the result we obtained requires clarification and additional verification in other areas of scientific research.

4 Conclusion

The modern tendentious of development of market of education services together with the change of functioning of institute of higher education (internationalization of higher education, integration processes in the system of higher education, development of distant forms of education etc.) requires from the administration of institute of higher education not only knowledge of marketing technologies to promote (popularize) their product (educational services), and also specific actions for their use in practice. There is a situation in which the head of the institute of higher education should be competent in solving issues of organizational development of institute of higher education, its logistics and staffing, as well as the development of University science and quality assurance of educational activities. The practice of administration of institute of higher education shows the impossibility of simultaneous administration of the above issues with the same high level of efficiency, which will certainly affect the quality of educational activities and the quality of higher education. Taking into account mentioned above we propose administration of institute of higher education consider an ability to allocate of marketing activities in a relatively independent direction of the administrative work of the university and provide its institutional design and staff. Insufficient attention of the administration of institute of higher education to the conditions of formation and reinforcing of the motives for choosing a specific institute of higher education by applicants for obtaining of higher education, as well as ignoring the trends of the development of the university education, can cause not only the loss of competitive advantages of institute of higher education, but also the loss of part of the market of educational services.

The author of the article expresses sincere gratitude to the administration of the Baltic international Academy for the organization of training for scientific and pedagogical workers of National University of Civil Protection of Ukraine, as well as for the full assistance and support in the organization of the survey of students.

The author of the article invites interested persons in the study of higher education quality issues (those who work on the text of theses or articles, as well as other people who are interested in the quality of higher education provided through the prism of the method of comparative studies), will join the non-commercial empirical study "Assessment of the quality of higher education" (methods: questionnaires, comparative analysis) as a poll organizer in the region of their residence. It is anticipated that after the interview, the organizers will exchange their existing completed questionnaires available for further independent work with them.

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Management of university marketing activities: factors that influence on choice of place of obtaining higher education (according to the results of a survey of Chinese students)

Volodymyr M Moroz[1], Olexandr V Moroz[2]

[1]*National Technical University "Kharkiv Polytechnic Institute", Kyrpychova Str. 2, 61002, Kharkiv, Ukraine*
[2]*Tongji Medical College of Huazhong University of Science and Technology, Hangkong Road 13, 430030, Wuhan, China*

**Corresponding author's e-mail: moroz32@rambler.ru*

Abstract

The article pays attention to the importance of a decision of administration of Institute of High Education on the issues of ensuring the implementation of licensed volumes of students recruitment for further development of higher education; revealed the potential of internationalization of higher education at the University level to ensure the students recruitment; the results of expert evaluation of Chinese students of the importance of factors influencing the choice of place of higher education; the article contains proposals for improving the model of behaviour of Institute of Higher education in the market of educational services.

Keywords: choice of the place of obtaining higher education; factors that influence on choice of place of obtaining higher education; survey of students, implementation of students recruitment

1 Introduction

The fact that most of Universities of the World are open for foreigners to obtain higher education tangibly increases the level of competition of universities for talented applicants and applicants on the whole. Recently, an issue of non-compliance of licensed volumes of students recruiting with the Universities of higher education, at least within the higher education system of Ukraine becomes more and more relevant. In order to maintain a decent level of University's positioning in the market of educational services and to provide favourable conditions for the continuous professional development of scientific and pedagogical staff within its organizational structure on the one hand, the administration of institute of higher education should constantly improve the content and practice of using of existing mechanisms of attraction of students to study in a particular institute of higher education, and on the other hand - to search for new approaches to ensure the implementation of licensed volumes of training (providing recruiting of first-year students). Ensuring the recruitment of students is increasingly considered not only at the level of the conditions of development of the Institute of Higher Education, but firstly at the level of condition of its existence. Failure to comply with the plan of recruitment of students not only cases the loss of certain potentials and lack of resources, but also causes destruction of the system of training specialists in a particular Institute of Higher Education. Administration of the institute of higher education should solve the contradictions between the need to ensure the recruitment of students and the need to attract talented applicants. Solving of these contradictions is a challenge for both administration of the Institute of Higher Education and for the system of higher education on the whole. In the framework of this publication we have an the intention is to consider the possibility of using the potential of internationalization of higher education to solve the issues of attracting students to study in a particular Institute of Higher education. Taking into account difficulties and the diversity of manifestations of the discussed issues, to be more direct on the opportunity to propose usage of so-called universal mechanism to solve the issues of student recruitment, we believe it is possible to outline the scope of our scientific attention to the direction of clarifying the conditions for the effective involvement of foreign citizens for studying in a direct Institute of higher Education. Such our point of view is not only caused by aggravation of competition in the national market of educational services (most of institutes of higher education has to dump the prices, what means offering an educational service at a price below its cost), and also with the permanent decrease of applicants in the framework of the national institutional space. Taking into account the fact that the domestic market of the studying services is not attractive for the applicants from the countries having stable level of development of social-politic and market institutions, by the focus of our attention we choice China, which to our point of view can be considered as an unlimited source of applicants', with the high level of academic background, supply to the domestic Institutes of Higher education. We should pay attention to the fact that Chinese government all the time releases program of so-called pushing («go outsides») of talented youth to the studying space of countries with high level of development of person potential, and so aspiration of domestic universities to a attracting Chinese applicants to the national higher education space not only will not meet institutional resistance from the Chinese Government, but also receive its support. Of course attracting of foreign

students to the country has some direct risks, as after obtaining specialization some of them will probably consider of staying in the country of studying for realization of formed labour potential in the framework of local economics, what of course will influence labour market. At the same time, this risk, in the case of China is minimal, because the above-mentioned program of the Chinese Government not only "pushes" young people to study, but also creates conditions for their return after receiving higher education. According to statistics, the average percentage of those who studied outside China for public funds and returned home after receiving a specialty is 83%. The corresponding percentage for those students who financed their own education is much less and is 13.9% [1]. Therefore, increasing the risk of negative impact on the national labor market by increasing the supply of labor from foreign citizens is not critical.

2 Overview

In framework of this publication, we intend to focus on the results analysis of the assessment of power of those factors that, according to experts, most significantly affect the applicant's choice of the place to obtain higher education. The uniqueness of this publication lies in the fact that as experts we have chosen students of Chinese Institute of Higher education . Taking into account the their thoughts will allow the administrations of Institutes of Higher education improve content and practice of usage of mechanisms for attracting foreign applicants, especially Chinese ones, as china has unlimited relevant resource , to study in the framework of the domestic system of higher education. To obtain higher formed aim we should use such methods of science research:

- survey as a method of indirect collection of information (finding out the opinion of potential consumers of educational services);
- analysis of experts ' opinion on the subject of the survey (motives for the student's choice of the place for obtaining of higher education);
- directions of improvement the system of marketing activities of the Institute of higher education.

3 Decision

This publication is devoted to the analysis of certain directions of the organized and conducted research "assessment of the quality of higher education", namely those, the attention of which was focused on the results of the respondents ' assessment of the power of the influence of certain factors on the formation of the choice of the place for obtaining higher education. In the context of the implementation of the potential of the method of comparative studies for a comprehensive clarification of the content and trends of the selected object of scientific attention, the organizers of the study decided not to focus on clarifying the characteristics of only the national system of higher education, but to try expand the focus of the research, primarily through the inclusion of higher education systems in other countries. The organizers of the research had some difficulties in finding contractors on the territory of other countries, because participation in the project did not provide any payment of money rewards or the provision of any material and technical resources to the participants of the project. The project did not have financial support, and therefore, ensuring its implementation was based on the enthusiasm of its participants. The interest of the project participants was in the possibility of obtaining analytical information from another country for further independent processing and synthesis in the form of scientific reports, articles, monographs, etc. Leaving attention to the analysis of the content and practice of the mechanism of search of people interested in participating in the project, we pay attention to the result of its use, namely – to participation in the project joined the International Baltic Academy (Latvia) represented by Inta Buka and Institute of International and Comparative Education at Beijing Normal University (China) represented by Liu Baocu. The justification of our preference for Latvia as the place of the study was justified in the framework of previous publications [2].

Taking into account the fact that the focus of the study "Assessment of the quality of higher education" was focused on finding out the opinion of experts (respondents) in 18 directions, and given the limited volume of this publication, we have chosen it as an object for the analysis of the results of the survey in terms of determining the power of the influence of individual factors on the formation of motives for the choice of applicants for higher education. In the role of experts and the students of the Institute of International and Comparative Education at Beijing Normal University (China). The results of the relevant analysis are presented in Figure 1.

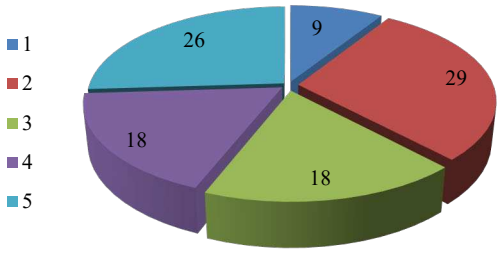

FIGURE 1 Power of influence of certain factors on the choice of place to obtaining of higher education

The answers of respondents are distributed in such a way (a number below of the provided list correspondents the number of the diagram sector): 1- territorial closeness of the institute of higher education to a place of permanent residence of the applicant (9% respondents chose this variant of answers); 2 - place of positioning of institute of higher education in the international university rankings (indirect indicator of the quality of higher education - international aspect) (29% of respondents chose this variant of answer); 3 - reputation of the institute of higher education among the immediate surroundings of the applicant (18% of respondents chose this variant of answer); 4 - development of the infrastructure of the certain institute of the higher education and of place where it is situated (18% of respondents chose this variant of answer); 5 - traditions of the institute of higher education in training of specialists (indirect indicator of the quality of higher education - national aspect) (26% of respondents chose this variant of answer).

3 Conclusion

Based on the results of the survey of respondents (figure 1) we can formulate such preliminary conclusions.

Firstly, among the most significant by the power of its influence on the formation of the motive for choosing a place of higher education experts (respondents) identified such factors as place of positioning of institute of higher education in the international university rankings (indirect indicator of the quality of higher education - international aspect) (29% of respondents chose this variant of answer) and traditions of the institute of higher education in training of specialists (indirect indicator of the quality of higher education - national aspect) (26% of respondents chose this variant of answer). The total share of these factors is 55%, which clearly indicates their dominance over others. Taking into account this fact, the administration of the Institute of higher education, the development strategy of which provides for the involvement of students from China, should focus on solving of issues connected with increasing the level of positioning of the Institution of higher education in the international University rankings and the development of traditions in the training of specialists with higher education. It is obvious that the content of the information resources of the Institute of higher education should contain relevant information. In addition, relevant information should be also available in Chinese. Sufficient capacity for the formation of the choice of higher education have such factors as reputation of the institute of higher education among the immediate surroundings of the applicant and development of the infrastructure of the certain institute of the higher education and of place where it is situated (18% each). Unexpected for the organizers of the research was the fact of relatively low importance of the factor territorial closeness of the institute of higher education to a place of permanent residence of the applicant (9%), what is being enough convincing evidence on the hypothetical willingness of the applicants to the choice of foreign Institute of higher education as places for obtaining of higher education.

Secondly, in order to ensure compliance with the volume of licensing conditions and the usage of the international cooperation potential, the administration of the Institute of higher education should lead market research among potential consumers of educational services not only in the region of the territorial location of the Institute of higher education, but also abroad. The availability of the results of the relevant monitoring will not only allow the administration of the institute of higher education timely review the content and practice of the strategy of behavior in the market of educational services, but also provide the formation of information and analytical basis for improving the mechanisms of attracting students with a high level of academic potential.

The authors express their sincere gratitude to the administration Institute of International and Comparative Education at Beijing Normal University (China) represented with the professor Liu Baocu for assistance in the organization of the research, as well as to Uliana Furiv (University of Tampere, Finland) for its direct implementation.

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Aspects of attractiveness of dark tourism to tourists (as an example of Lithuanian dark tourism objects)

Regina Navickiene*

Kolping University of Applied Sciences, Kaunas, Lithuania

**Corresponding author's e-mail: regina@turinfo.lt*

Abstract

Dark Tourism - a new direction for niche tourism which is widely explored by many scientists from the world who understand the concept, classification, attractiveness of tourism, the causes and perspectives of tourism. Today, we can fearlessly say that dark tourism is not just about visiting places related to war and death, but also visiting slums, catastrophe places, taking part in trips during night time - like hiking, diving, wade through the swamps, watching stars or fishing. It is also a trip to places that are beginning to disappear as a result of climate change, the development of active farming, the felling of forests and other areas. There are also dark entertainments that are dedicated to the mention of deceased artists or other people in organizing concerts and exhibitions. There are a lot of popular dark tourism objects in Lithuania that attract tens of thousands of tourists.

Keywords: dark tourism, attractiveness of dark tourism, Lithuania

1 Introduction

The theme of dark tourism came to the world of science at the end of 20th century, as a form of niche tourism was included in the tourism classification. Based research by many scientists can distinguish the following types of dark tourism: grave tourism, Holocaust tourism, (other) genocide tourism, prison and persecution site tourism, communism tourism, cult-of-personality tourism, Cold War & Iron Curtain tourism, nuclear tourism, disaster area tourism, icky medical and suicide death tourism, poverty tourism, dying tourism objects, tourism at night, mystical tourism, illegal tourism, dark entertainment tourism. There are many dark tourism directions listed, but you can safely say that their number will only increase as tourist activity increases and the interest of scientists in deeper analysis of the phenomenon of dark tourism is getting wider.

The quantitative survey was conducted by interviewing visitors of the 9th Fort Museum (Kaunas), the KGB Museum (Vilnius), the Cold War Museum (Plateliai), the „Grūtas Park" (Druskininkai) and the Ethnocosmology Museum (Molėtai). The study included 398 respondents from Lithuania, Latvia, Poland, Germany, Israel, the United States, Ukraine and Belarus, aged 18 to 72, both men and women who pointed out the following aspects of attractiveness: deepening historical knowledge on the basis of professional guides and authentic exhibits, emotional experience and engagement by being proud of their country's patriotism, strength, ability to survive in hellish conditions, participation in original travel directions, familiarizing with original exhibits, nostalgia and filling family historical white spots.

2 Overview

This work discusses the advantages:

- The classification of dark tourism based on the experience of tourists, and what emotions they experience when visiting dark tourism objects
- How the concept of dark tourism objects differs in different age groups
- How are the objects of dark tourism valued by tourists who lived in Soviet times
- What kind of benefits tourists receive when visiting dark tourism objects

3 Decision

Depreciation of the subject of dark tourism from a scientific point of view and empirical research allows us to understand why this type of tourism is becoming more popular and what kind of benefits tourists receive. This is important in preparing excursion texts - descriptions for tourists, publishing promotional publications. Dramatic booklets, catalogs and maps of dark tourism promoted by professionals in the field of advertising can add even more to the attendance of such places with all the following consequences: larger tourist flows, higher income, new places and high level education.

4 Conclusion

The study showed that Dark Tourism is also an educational tourism that provides historical, environmental, social knowledge with responsibility for our own actions and decisions. For many respondents, dark tourism causes emotions such as sadness, pain, loss, emptiness, but also positive emotions, especially if the objects that being visited are related to antiquity and entertainment.

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Recommendations for the use of computer-aided circuit simulation programs for distance learning

Vjaceslavs Orehovs*

Riga Aeronautical Institute, Latvia

**Corresponding author's e-mail: v.orehovs@rai.lv*

Abstract

The approach to the choice of a free publicly available program of computer simulation of electrical circuits and electronic circuits for use in the multimedia distance learning process in electrical engineering and electronics is shown.

Keywords: Internet technologies, computer simulation programs, distance learning

1 Introduction

In the conditions of distance education in conducting studies with students of electrical and radio engineering specialties for the study of electrical engineering disciplines, special requirements are placed on the improvement of educational and methodological support of the educational process through the use of new information and telecommunication technologies.

For remote teaching of electrical disciplines, as a rule, multimedia educational technologies are used with the use of computer simulation of electrical circuits and electronic circuits in the lecture process and in laboratory and practical classes.

2 Overview

Traditionally, in laboratory labs of universities, modern licensed versions of the NI Multisim program are usually used. The need to purchase licensed software is very inconvenient, especially for distance learning of students, since each student needs to acquire a license, which significantly reduces the possibility of its use. In addition, the program is not Russified and there are problems with emulation when using its versions [1].

3 Decision

Based on the study of this issue and many years of pedagogical experience, it was concluded that the use of the TINA-TI computer simulation program of Texas Instruments and DesignSoft for remote teaching of electrical engineering and electronics was made. TINA-TI is a simple SPICE-simulator with a simple, intuitive graphical user interface that allows you to master the program as soon as possible. This software is not has no restrictions on the number of used devices and nodes, copes with complex work without problems, is ideal for modeling the behavior of various analog circuits and switching power supplies [2].

The program was developed jointly by Texas Instruments and DesignSoft employees and is a limited version of the more powerful, but paid DesignSoft software package called TINA.

The software in question is available in both English and Russian versions. Moreover, in good Russian, not only the TINA-TI menu, but also the user's manual has been completed.

TINA-TI is designed to work in Microsoft Windows operating systems (including Vista and 7), however, the program also functions successfully in the Linux environment (using the Wine virtual machine). The only condition is that the language of the operating system matches the installed version of the softwareимеет.

4 Conclusion

The proposed recommendations for the use of TINA-TI simplify the availability of the program, the adjustment and optimization of the studied schemes and thereby expand the possibilities of distance learning.

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Theoretical aspects of pedagogical management in preparing future teachers of physical culture for professional activity

Halyna Ostapenko

Belarusian state pedagogical university named after Maxim Tank, Sovetskaya Str. 18, 220050 Minsk, Republic of Belarus

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

Abstract

In article pedagogical management is considered as a complex of principles, methods, organizational forms and technological methods of managing educational systems, aimed at improving the efficiency of these systems. Pedagogical management can be represented as a system for implementing the following provisions: focus on the creative activities of the future teacher of physical culture; providing a differentiated and individually-creative approach to teacher training; strengthening teacher education in conjunction with the cycles of related disciplines that ensure teacher awareness; openness, variability, dynamism of changes in the content, forms and methods of teacher preparation; democratization of pedagogical education, the whole way of life of a pedagogical educational institution.

Keywords: pedagogical management, future teacher of physical culture, professional activity

1 Introduction

Socio-economic changes, the processes of globalization and integration occurring in modern society, affect new priorities in the training of future teachers of physical culture in institutions of higher education of the Republic of Belarus.

Analysis of scientific and methodological literature indicates that in the field of management and pedagogical training, where pedagogical management is listed as an integrating factor, one of the priority areas is the modernization of professional training of future physical education teachers, ensuring their mastery of a certain level of knowledge and effective use of them in future management activities.

2 General

In the dictionaries, the concept of "management" is interpreted as the rational management of modern production associated with improving the organization based on the constant introduction of new principles, forms, structures and management methods in order to increase the efficiency of production and business (the authors of the Big Economic Dictionary) [4, p. 391]; activities that include planning, organization, coordination and control carried out by employees and professional employees (managers) (authors of the Sociological Encyclopedic Dictionary) [6, p. 175]. G. Kaznachevskaya defines the concept of «management» as the ability to achieve goals, using the work, intelligence and motives of other people [5, p. 17]. G. Schekin considers the concept of «management» as «management of some social object, mastery of management skills, high professionalism, which makes it possible to combine in one person the owner of the property and the organizer of production» [7, p. 6].

The analysis of the scientific literature conducted by L. Beskorovaynaya shows that the concept of «management» is defined as a system of rational management of people who take part in joint production activities, aimed at the effective achievement of planned results; the system of rational organization of production management aimed at the effective achievement of planned results; the sphere of human knowledge that helps to carry out reasonable and effective management; social stratum of the population, carries out management work; efficient use and coordination of resources such as capital, home, materials and labor to achieve planned goals with maximum efficiency; the manner and manner of addressing people to power and the art of management; special skill and administrative skills; governing body, administrative unit [3].

H. Ann, G. Bagiyev, V. Tarasevich define the concept of «management» as a set of functions necessary for the organization of any activity at one or another hierarchical level of a market economy; form of description, presentation of activities and the role of an individual or group, which establish and control the tasks of managing the processes of organization, planning, coordination and control in any ..., the science of managing a market economy, which includes systems theory, decision theory, social psychology, sociology, psychology, mathematics, etc.; the management of the company heads the process of organizing and operating production and is responsible for the results and the life of the company in a competitive environment; management of the economy, production, personnel, resources, etc. in the market [1, p. 716-717].

In the Big Economic Dictionary it is noted that the main goal of «management» is to achieve high production efficiency, better use of the resource potential of an enterprise, company, company [4, p. 391].

In the analysis conducted by O. Bayankin, it is noted that "pedagogical management" is considered as a complex of principles, methods, organizational forms and technological

methods of managing educational systems, aimed at improving the efficiency of these systems [2].

3 Conclusions

Focusing on the analysis of modern sources of literature, pedagogical management as an integrated strategy can be considered in preparing future teachers of physical culture for professional activity as a system for implementing the following provisions:

- focus on the creative activities of the future teacher of physical culture;
- providing a differentiated and individually-creative approach to teacher training;
- strengthening teacher education in conjunction with the cycles of related disciplines that ensure teacher awareness;
- openness, variability, dynamism of changes in the content, forms and methods of teacher preparation;
- democratization of pedagogical education, the whole way of life of a pedagogical educational institution.

Thus, pedagogical management in the field of preparing the future teacher of physical education for professional activity is a forward-looking promising scientific direction and reserve for the development of the theory and practice of managing a higher education system.

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Strategic tools for the formation of leadership positions of Ukrainian banking business in a global competitive environment

Oleh Mozgovyi*, Yevhen Panchenko, Nataliia Rudukha

Kyiv National Economic University named Vadym Hetman, 54/1 Peremohy Avenue, Kyiv, Ukraine 03057

**Corresponding author' e-mail: o.mozgovyy@gmail.com*

Abstract

With the economic growth of Ukraine, taking into account the experience of world leading banks, it is necessary to modernize the financial policy in the country in order to strengthen the competitive position of the banking business in global markets. In this regard, the article shows the key activities of the National Bank of Ukraine in the context of compliance with the principle of independence of the requirements of the Basel agreements and EU directives, as well as developing favorable conditions for the functioning of commercial banks, businesses and improving macroeconomic indicators.

Keywords: National Bank, inflation, lending, global competition, foreign investment, financial regulation, foreign exchange transactions, leadership

1 Introduction

The National Bank of Ukraine (NBU) is the main regulator of the country's financial sector and the subject of increasing its international competitiveness. At the end of 2018, it managed to achieve the planned relatively low inflation and lower interest rates. Price stability is the most important goal of the NBU, fixed at the level of the law. Last year, inflation surpassed the 10% mark and in the end of the year, it was at 9.8% level. This means that the regulator approached its target of 6 ± 2% (inflationary target), although it did not reach it. The hryvnia exchange rate remained flexible. The interest rate of 14.5% in 2017 and 18% in 2018 is still one of the highest in the world [1].

One digit inflation is a win. To do this, the NBU had to keep high interest rates and maintain currency restrictions, which adversely affected the development of lending and economic growth. But from the point of view of a longer-term perspective, this price was not paid for nothing: the "roller coaster" in prices has not yet brought any economy to the good result.

So then, in the coming year, inflation at 5% is hardly achievable, the rate of 7.4% is in the budget, and the NBU forecasts inflation at no more than 7%. Moreover, even if the National Bank repulses politicians, there are other factors uncontrolled by the regulator: global growth is slowing, raw materials markets are unstable, Europe seasaws because of Brexit, the "yellow vests" and the Italian budget, the US trade war with China continues. And Ukraine still has foreign currency debt, - payments on it in 2019 will amount $13.5 billion [2].

There is also a risk posed by Ukrainian politicians: a departure from inflation targeting in favor of low interest rates and concessional loans. These slogans attract by imaginary simplicity, but the popular solution does not lead to prosperity, but to the failure. Ukraine has a very high risk of default on debts, and it is not covered by European or world rates of 2–5% per annum. Sustained growth requires a solid foundation, but not card houses.

The goal in the Strategy-2019 includes the banking system that is resistant to macro-shocks and systemic risks, the standards that meet the standards of Basel III and EU directives, improved quality of loan portfolios, corporate governance that meets best practices, and international financial institutions do not refuse to maintain relations with Ukrainian banks.

The latest crisis cost Ukraine 38% of GDP, so it is extremely important to prevent its recurrence in the future. In 2018, two banks entered the liquidation stage (compared to 70 in 2015–2017), and the banking system ended the year with a profit. Although the peak of the crisis has passed, the banking system is far from ideal stability. The last stress testing showed that 8 out of 24 banks that had passed the test needed additional capitalization. But now, there is only one such bank. At least one of the 11 standards of the NBU (data as of December 1, 2018) was violated by 25 banks. The accumulated volume of problem loans is the largest in state banks - 68% of the portfolio, in private and foreign (except for those related to the Russian Federation), the situation is better – 24% and 39%, respectively [3].

During 2018, the National Bank has actively reformed and tightened the requirements for the stability of banks, seriously revised the processes in banking supervision, introduced international standards for assessing bank resilience and stress testing, ordered banks to introduce independent directors to supervisory boards. Banks themselves do not share many of the ideas of the regulator and prudential requirements, so they may still be adjusted.

Taking into account the global trend, an important strategic objective of banking policy is the constant reduction of bank troubled debts, the growth of the bank

loan portfolio at a level not lower than the growth rate of nominal GDP, the reduction of banks' credit risks. The cost of loans in the past year did not decrease, but rather increased along with the increase in the NBU rate. Accordingly, lending, with the exception of the consumer segment, was restrained. While in the countries with an average level of economic development, domestic loans for private sector have almost reached GDP volume, and in Poland and Turkey, they have made up about half of it, in Ukraine, they decreased from 90% in 2008 to 35% in 2017.

The fact is that price containment and an increase in lending are two goals from which it is always necessary to choose one. They have one instrument of achievement - a change in the discount rate, but it acts in opposite directions. The rate increase holds back inflation, but makes loans more expensive. Reducing the rate contributes to the availability of credit, but raises prices. The objectives of the NBU, formulated in the legislation, put price stability in the first place. Therefore, lowering rates is a matter of future steady and low inflation.

Another opportunity to form the leading positions of the Ukrainian banking business in global markets is to protect the rights of creditors. Nowadays, the worst trouble of the system are problem loans. Borrowers refuse to pay on them and withdraw assets from bail, taking advantage of gaps in the law, corrupting judges or officials. Protected rights are better prospects for repaying loans, which means lower risks, which means lower risk payments in the interest rate structure, and therefore, finally, cheaper loans. The relevant law, to the development of which the NBU joined, should help, but not immediately. As in the case of the stability of the banking system, the rule of law, high quality courts, and the political will to provide that are required.

An important role in getting the leading positions by Ukrainian banks in global financial markets is occupied by the expansion of currency operations, the deepening of Ukraine's integration into international capital markets, the increase in foreign investment in the economy, and the increase of financial and tax transparency of businesses and individuals.

Legislative changes were mostly managed to implement. In 2018, the Law of Ukraine "On Currency and Currency Transactions" was adopted. The law allows the regulator, at its discretion, to simplify the conditions for foreign exchange transactions and capital movements, which was previously impossible. While the regulator is not in a hurry: free capital flow was laid on the altar of inflationary stability, along with the revival of lending. The restriction was lifted only partially, investments in Ukraine were almost never received, even if compared with not the super-successful 2004–2007, but with the conditional stagnation of 2011–2013. The next step in this direction - countering the erosion of the tax base (BEPS) and the withdrawal of profits abroad - faces serious resistance from the interests of the owners of large businesses represented in parliament. This is again a matter of rule of law.

One of the priorities for improving the global competitiveness of Ukrainian banks is strengthening the protection of the rights of consumers of financial services, expanding companies and the public's access to financial infrastructure, developing remote and innovative banking products, using IBAN account numbers, speeding up payments, improving financial literacy of the population, expanding electronic document circulation, improving the efficiency and competitiveness of the banking system as a whole.

For example, financial inclusion is when citizens and businesses have access to useful and affordable financial products and services that meet their needs: transactions, payments, savings, loans or insurance, regardless of income, age, residence or activity. The National Bank does not formulate the goal of the percentage of coverage of citizens or small business with traditional or innovative banking products neither in the strategy for 2018, nor in the strategy for 2019, and does not provide statistics.

A positive moment there is the launch of Bank ID. This system allows to work with a bank account online. Progress in financial technologies will push IBAN - international account numbers, which make it possible to standardize interbank payments. The NBU also reports on the growth in the share of non-cash payments from 39% in 2017 to 44% in 2018 and an increase of 14% in the POS-terminals network. It is quite a good result, given the unsteady trust of people. However, many Ukrainians still do not have the physical ability to use financial products, especially in rural areas. Traditional, rather than innovative online or mobile banking, is declining in regions, - over the past two years, the number of operating bank branches decreased from 10,000 to 8,500. In its NBU report, this issue was missed.

The way the NBU's goals on financial inclusion are designed shows more the regulator's interest in another trend - reducing cash use, or "cashless". This is certainly related to inclusion, but not identical to it. Whether people in the regions are ready to change the receipts in the branches to mobile applications, or will the postmen continue to deliver monetized subsidies and pensions in the form of cash in the future, is an interesting question for sociologists only. For politicians, new or old, access of citizens to high-quality financial services is unlikely to be a priority.

2 Conclusions

Recently, the National Bank received an award for transparency from the international specialized magazine "Banker" on the activities of central banks and financial regulators of Central Banking. It really has become more open, publishes a lot of data and analytical reviews, minutes from committee meetings, etc. But the main political challenge for the NBU is to preserve its independence. And this is our main reserve for increasing the global competitiveness of the banking system as a whole.

Whether a new composition of the parliament will provide changes, is a question for billions - these are the amounts that are put offshore each year. There is reason for optimism here: tax transparency and the complication of working with tax havens is a global powerful trend. Such trends are lobbied at the highest world level and are quite capable to destroy the interests of individual corrupt officials. For Ukraine, in the following years, the support of western partners is very important. The system can resist for a long time, but in the end, it should come to civilized rules.

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Some aspects of small business financing through profit and loss sharing model in Islamic economic doctrine

Yevgen Panchenko*, Oleg Mozgoviy, Oxana Yurkevich

Kyiv National Economic University named Vadym Hetman, 54/1 Peremohy Avenue, Kyiv, Ukraine 03057

**Corresponding author's e-mail: kmm@kneu.edu.ua*

Abstract

There have been at least two distinctive approaches to try to overcome the SME finance gap. The first has been to broaden the collateral based approach by encouraging bank lenders to finance SMEs with insufficient collateral. This might be done through an external party providing the collateral or guarantees required. The second approach has been to broaden the viability based approach. Since the viability based approach is concerned with the business itself, the aim has been to provide better general business development assistance to reduce risk and increase returns. These two approaches in overcoming the SME finance gap are implemented and consistent with Profit and Loss Sharing Model, also called PLS or "participatory" banking. Profit and Loss Sharing is a method of finance used by Islamic financial or Shariah-complaint institutions to comply with the religious prohibition on interest on loans that many Muslims subscribe to.

Keywords: small business financing, under capitalization, Profit and Loss Sharing Model, SME finance gap, Islamic finance.

1 Introduction

There have been at least two approaches to try to overcome the SME finance gap.

The first has been to broaden the collateral based approach by encouraging bank lenders to finance SMEs with insufficient collateral. This might be done through an external party providing the collateral or guarantees required. Unfortunately, such schemes are counter to basic free market principles, and they tend to be unsustainable. This sector is increasingly called the Meso-finance sector.

However, there are some significant structural barriers for bank or private equity to finance suitable SME applicants on mutually satisfactory terms and conditions. The main obstacles to funding are:

- lack of satisfactory business plans and reliable expertise, accounting and other information;
- inadequate assets for use as security;
- insufficiently high levels of profitability, gearing, liquidity, stability, and other business-financial performance criteria on the part of funding applicants.

The second approach has been to broaden the viability based approach. Since the viability based approach is concerned with the business itself, the aim has been to provide better general business development assistance to reduce risk and increase returns. This often entails a detailed review and assistance with the business plan. A common aim or feature of the viability based approach is the provision of appropriate finance that is tailored to the cash flows of the SME.

These two approaches in overcoming the SME finance gap are implemented and consistent with *Profit and Loss Sharing Model*, also called *PLS* or "participatory" banking. Profit and Loss Sharing is a method of finance used by Islamic financial or Shariah-complaint institutions to comply with the religious prohibition on interest on loans that many Muslims subscribe to.

The jurisprudence used to engineer Sharia-based financial contracts is rather complex. Scholars must complete several years of training before becoming certified to issue financial rulings. However, there is no centralized Sharia finance authority, and consequently, there can be conflicting views on the implementation of these principles in designing and extending Islamic financial products. Many sources state there are two main schemes for profit and loss sharing model used by Islamic banks – *Musharakah* (equity participation contract) and *Mudarabah* (trustee finance contract or passive partnership). Other sources include Sukuk (also called "Islamic bonds") and direct equity investment as types of PLS.

Both PLS schemes require particularly vigilant reporting and a high level of transparency for profits and losses to be distributed justly. So these two types of contracts within Profit and Loss Sharing Model are used to overcome the SME finance gap and to finance small businesses in Islamic economic doctrine.

2 Conclusion

Profit and Loss Sharing has been called "the main justification" or even "the very purpose" of the Islamic finance and banking movement and the "basic and foremost characteristic of Islamic financing" [1].

Despite of having obvious positive aspects, such as focusing on financing the real sector of economy and encouraging direct interrelationship between financial and productive sectors, in our view, the mechanism of PLS in some ways is at variance with a number of fundamental principles of effective economic activity.

Critics have in turn criticized PLS advocates for

remaining "oblivious to the fact" that the reason PLS has not been widely adopted "lies in its inefficiency" (Muhammad Akram Khan) [2] and their "consequence-insensitive" way of thinking, assuming that "ample supply" of PLS "instruments will create their own demand" (Nawab Haider Naqvi), consumer disinterest notwithstanding [3].

Because clients can share losses with banks in a PLS financing, they (the clients) have less financial incentive to avoid losses of risky projects and inefficiency, than they would with conventional or debt-based lending. Moreover regarding the rate of profit and loss sharing – i.e. the "agreed upon percentage of the profits (or deduction of losses)" the Islamic bank takes from the client -- there is no market to set it or government regulation of it. This leaves open the possibility the bank could exploit the client with excessive rates.

In conventional banking, the banks are able to put all their assets to use and optimize their earnings by borrowing and investing for any length of time including short periods such as a day or so. The rate of interest can be calculated for any period of time. However, the length of time it takes to determine a profit or loss may not be nearly as flexible, and banks may not be able to use PLS for short term investment [4].

PLS is also not suitable or feasible for non-profit projects that need working capital, (in fields like education and health care), since they earn no profit to share. So today PLS schemes to finance small business originally operate in an unclear regulatory landscape. However, as they expanded, they presented several regulatory challenges that governments have attempted to address to various degrees. With increased attention by regulatory authorities, international organizations also have been created to set Islamic finance accounting and other standards.

Despite a shared core of Islamic values, these institutions often diverge with national regulators (and each other) over Sharia standards and crucially require further unification and standardization to be effective and convenient in small business financing.

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The TREACLE-ALEGRO timeline: from error-annotated corpus to adaptive learning tool

Oksana Polyakova[1]*, Penny MacDonald[2]

[1]*Universidad Católica de Valencia*
[2]*Universitat Politècnica de València*

**Corresponding author's e-mail: oksana.polyakova@ucv.es*

Abstract

In recent years, much research has been devoted to the error analysis but few have improved the visualization and correction of errors. In this report, we describe the study of error-annotated corpus which embodies some basic principles of error coding. TREACLE-ALEGRO, our recent projects for development of an adaptive learning tool, are the solution to a few challenges as such EFL grammar teaching curriculum and web-based language learning system.

1 Introduction

Corpus linguistics as a reliable language analysis tool has proved to be an effective approach towards natural sampling research. In addition, the possibility to extract teaching samples and exercises from the corpus to target learners' errors at different proficiency levels has been our goal for nearly a decade.

This report includes such research questions as: What are the most frequent errors made by Spanish university students? How can we transfer them to personalised teachable items?

Motivated by these premises, a group of Spanish researchers and university lecturers started a cooperative error-annotation project back in 2010. It was an important point to begin dealing with the real needs of Spanish students who aim to improve English grammar skills. The project is now being continued with the operational development of an adaptive learning tool that includes the most significant grammar rules detected.

The rest of the report is organised as follows. Section 2 provides a brief picture of the project outcomes and methodology applied. We place our work in context of two stages: the TREACLE project explores the main issues concerning corpus analysis and error coding, meanwhile the ALEGRO project moves the prior results to a new level of an online learning tool development. Finally, Section 3 draws some conclusions and recommendations for further actions.

2 Projects overview and methodology

2.1 THE TREACLE PROJECT (2010-2013)

As we already mentioned, the research has two broad aims and, therefore, two specific purposes. On one hand, it is the grammar analysis of students' corpora by looking at the errors learners make (stage 1). On the other, it involves identifying the mistakes and elaborating training procedures (stage 2).

The first stage of the study is related to the TREACLE project (***T**eaching **R**esource **E**xtraction from an **A**nnotated **C**orpus of **L**earner **E**nglish*) funded by the Spanish Government (Ministerio de Ciencia e Innovación, FFI2009-14436/FILO).

The error-coded corpus contained the following documents:
Essays written in English by Spanish university students.
304 texts (110,000 words) providing 16,000 errors
Source: 78 texts (67,000 words) from WriCLE corpus (Rollinson & Mendikoetxea, 2010);
226 texts (44,000 words) from the MiLC corpus (Andreu et al., 2010).

Quick Oxford Placement test scores taken at time of writing helped detect proficiency levels (UCLES 2001).

According to Murcia-Bielsa and MacDonald (2013), major results after automatic syntactic tagging and manual error annotation done by using UAM Corpus Tool (O`Donnell 2008) are the following:

- error areas: grammatical, lexical, punctuation, pragmatic, and phrasing;
- relevant grammar categories: np-error, prep-phrase-error, vp-error, clause-error (see Figure 1 below):

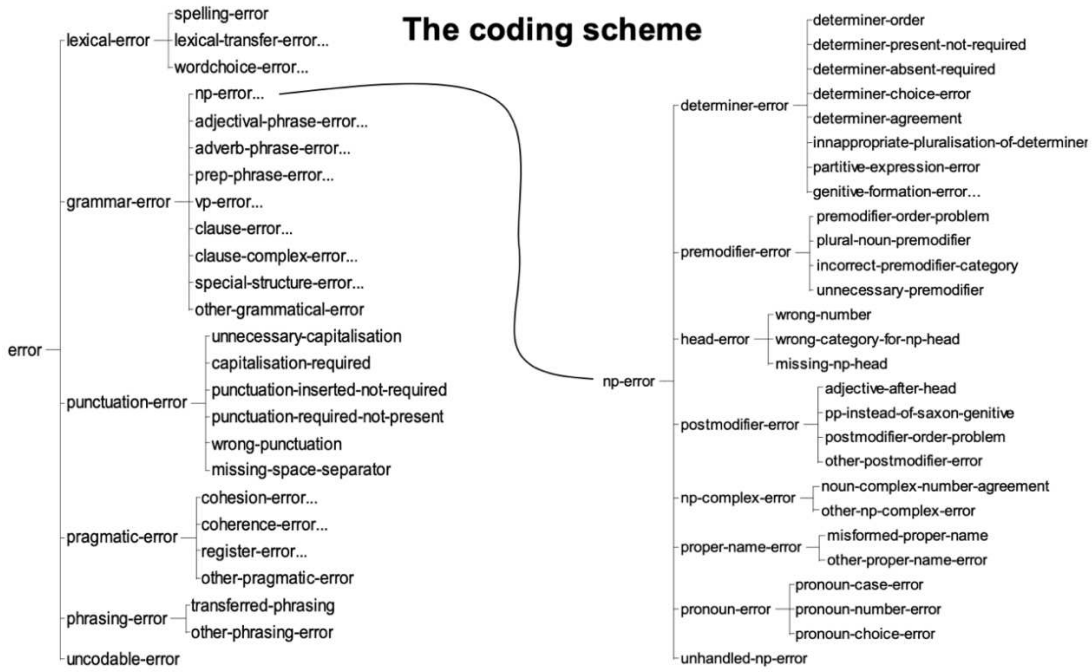

FIGURE 1 The TREACLE coding scheme

- most frequent grammar errors: determiner-present-not-required, prep-choice-error, subject-finite-agreement, determiner-absent-required, wrong-number (see Figure 2 below):

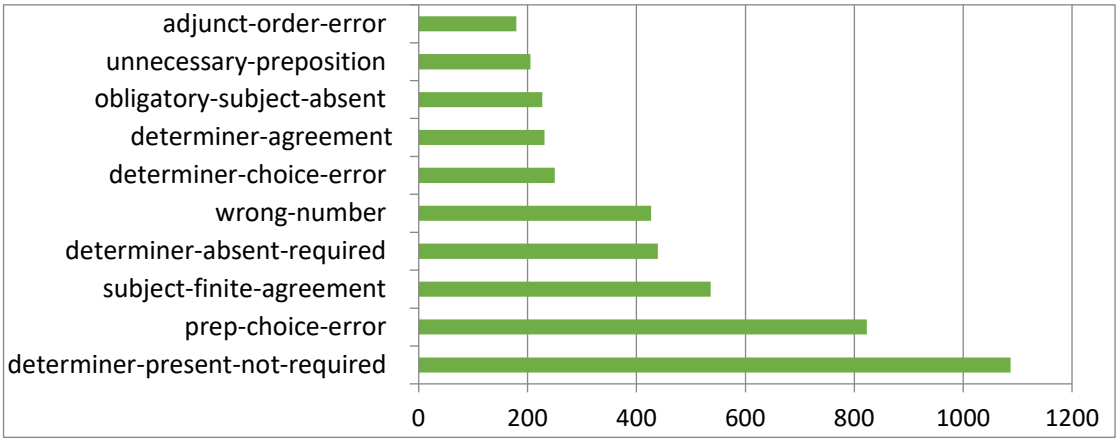

FIGURE 2 10 most frequent grammar errors in TREACLE

As a result, the TREACLE project approached English learner proficiency from two perspectives: correct and incorrect use of grammar structures (Murcia-Bielsa & MacDonald 2013). Furthermore, the stage 1 of the timeline intends for automatic grammatical tagging of the corpus to be initial part of the process. The major focus is on manual error annotation that will provide clear connections between grammar mastery at each proficiency level as well as a list particular structures university students are still acquiring/ learning.

2.2 THE ALEGRO PROJECT (ONGOING)

The second phase of the study is connected to the ALEGRO project (***A**daptive **L**earning of **E**nglish **G**rammar **O**nline*) funded by the Spanish Government (Ministerio de Economía y Competitividad, FFI2015-67992-R).

The goal of our current project is to develop an online learning system assisting Spanish university students in the acquisition of important grammatical concepts. In order to achieve it, an in-depth error exploration (MacDonald 2016), error coarse-graining and teachable concepts elaboration (O`Donnell 2018, O`Donnell el al. 2018) were required.

The major advantage of the ALEGRO approach consists in its adaptation to learner`s need. The online training system tracks learner assimilation of concepts and offers grammatical themes to study that each learner requires individually. For example, as Figure 3 shows, a student is presented with a short explanation of concepts and several examples of correct use and broken rules. After that, he/she can take quizzes on the concepts.

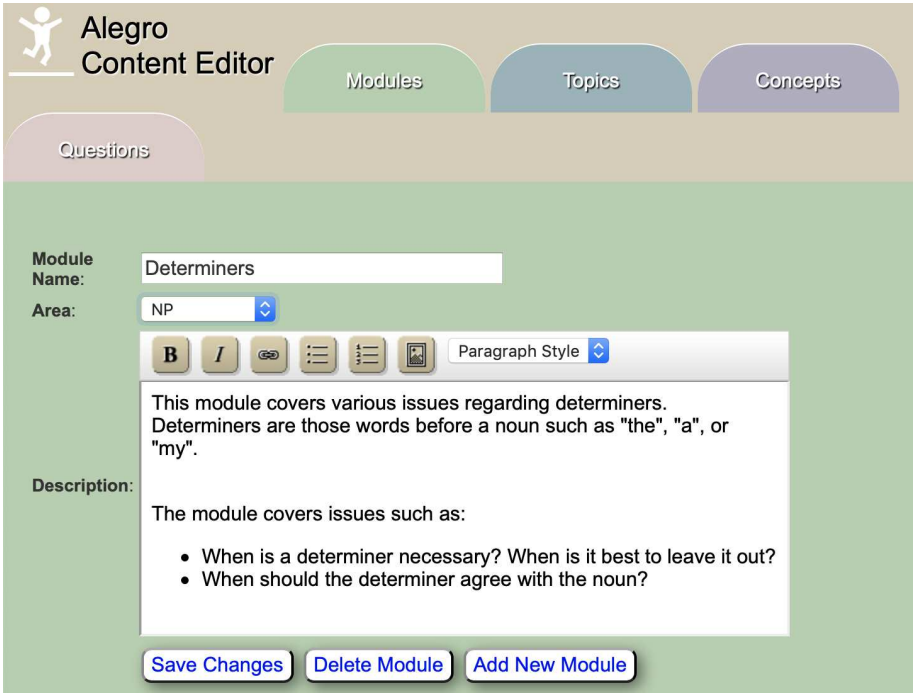

FIGURE 3 ALEGRO content editor

4 Conclusions

In our research, we proved that a combined linguistic and online technology based approach can be used to target English language mistakes and the TREACLE-ALEGRO projects are no exception to it. Our methodology for the error analysis and development of an adaptive learning tool helps redesign second language acquisition curriculum by motivating students to undertake a personalised training.

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HE reforms in Ukraine: challenges and possibilities

Maryna Salun, Kateryna Zaslavska

Simon Kuznets Kharkiv National University of Economics, Ukraine

**Corresponding author's e-mail: Maryna.Salun@hneu.net*

Abstract

Modern reforms of the Ukrainian system of higher education put forward the new requirements for the teaching staff of universities. Tightening the requirements for scientific and pedagogical personnel is necessary to improve the quality of education, to update the curricula and educational programs. The implementation of reforms envisages a broad interaction of Ukrainian higher educational institutions with EU universities in order to maintain the quality parameters of staff in accordance with the requirements of national regulatory documents.

Keywords: reform, regulatory legal act, qualification requirements, educational program accreditation

1 Introduction

Reforming the system of higher education in Ukraine, improving the quality of curricula, updating of curricula and educational disciplines have determined the changing requirements for the teaching staff of higher educational institutions. The theses are aimed at substantiation of the challenges within the reforms of higher education in Ukraine and arising possibilities of the EU and Ukrainian HEIs cooperation.

2 Overview

The reforms in higher education currently envisage:

- the change of the academic rank mechanism of a professor, associate professor, senior researcher The latest changes in the requirements are dated to 03.03.2017 [1];
- conducting an experiment on the award of a PhD degree by specialized academic councils of higher educational institutions (scientific institutions), the changes in the requirements for the level of scientific qualification for PhD, the formation of the specialized academic councils of higher educational institutions (scientific institutions) [2];
- toughening requirements for scientific and pedagogical personnel in the process of specialties licensing and accreditation of educational programs [3].

It should be noted that the basic list of requirements includes:

- the study, internship, or work in a higher education institution, scientific (or scientific and technical) institution in a country that is a part of the OECD and / or the EU, or the leadership / execution of the projects funded by these countries, and have relevant certificates, diplomas or other confirming documents;
- the availability of publications in journals that are indexed in Scopus and/or Web of Science;
- the certificate in accordance with the European recommendation on language education (at a level not lower than B2) or qualification documents (higher education diploma, degree) related to the use of languages of EU countries.

3 Conclusion

The presented legal base opens the new directions for the intensification of cooperation between Ukrainian and European higher educational institutions to maintain the qualitative parameters of teaching staff in accordance with the requirements of national regulatory documents.

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Business model innovation

Sohail Ahmed*

Poltava University of Economics and Trade, Ukraine

**Corresponding author's e-mail: sohail_h786@hotmail.com*

Abstract

Business model in innovation advancement is twofold. It helps managers also entrepreneurs to connect innovated products and technologies to realized output in current market face, second business model maybe source of innovation in and if itself. A business model easily defines how an organization creates, delivers and captures value, but for driving value creation both factors of business model (internal and external) needs to study while engaging with innovation. In this article, we will discuss iterative process designee and also try to highlight in detail two suggested methods for facilitating its implementations: service design (which helps to understand the external perspective of business model in more details) and Agile principal (which allows business model to respond swiftly). By using these two methods an organization create its wide value.

Keywords business model, organizations, innovation

1 Introduction

Innovation is a very vital and strong pillar to an organization's development. But also space for innovation is often tightly sanctioned within organizations. As a result, potential value may be overlooked or disregarded.

2 Overview

Business model innovation impressively encourages overcoming this issue. And in the past few years business model has become a very important part of analysis in innovation studies. Business model in innovation advancement is twofold. It helps managers also entrepreneurs to connect innovated products and technologies to realized output in current market face, second business model maybe source of innovation in and if itself. A business model easily defines how an organization creates, delivers and captures value, but for driving value creation both factors of business model (internal and external) needs to study while engaging with innovation. In this article, we will discuss iterative process designee and also try to highlight in detail two suggested methods for facilitating its implementations: service design (which helps to understand the external perspective of business model in more details) and Agile principal (which allows business model to respond swiftly). By using these two methods an organization create its wide value.

3 Decision

As rapid changes in the new business environment are quickly becoming the new standard, organizations are facing to make take very fast decisions between innovating and becoming irrelevant. New competition, small barriers for new competitor participation and a well-informed customer base drive organizations toward the most obvious of both options: the innovation path. Innovation intuitively brings to mind imagery of scientists in lab coats fiddling with the latest technology. Mostly people take innovation as something that is done at the back-end of the organization. Moreover, there is a common misunderstanding that innovation is about developing new products and services only.

Anyway recognizable this may sound, such assumptions immensely limit the necessary room for innovation within an organization, and the consequence is that the working field for innovators and their space for value creation both become very small.

Innovation should update the organization's entire business model in order to meet the challenges that come with change and should maximize value creation. This paper will propose a framework for doing so and relate it to already existing methodologies. If innovation stretches the entire business model of the organization and becomes everyone's responsibility, defining whose job it seems unnecessary. However, doing so is an important part of assuming what we consider potential areas of implementation within our proposed approach to innovation.Taking the term organization in large view; one could argue that each department comprises its own smaller organization, which requires its own unique business model too. For instance, An IT department deals with (internal) customers and manages suppliers. Therefore, Innovation is obliged to span the entire business model of the IT department, not just software development or new technology sourcing. We can also use similar arguments for other parts of an organization. This plan for business model innovation therefore clearly reaches beyond strategic level and can be implemented as is required in practice.

The main focused groups for business model innovation can best be described as follows:

1. **Main product and service providers** are delivering a specific product or service as the main objective. So without this product or service, there is no value

for customers and in this manner no organization. All private or public enterprises, profits, and non-profits fall into this category.

2. **In-company customer-oriented product and service providers:** works around one or more products or services. They help to hold the value of a core product or service and have an indirect but measurable relationship with revenues. They are normally Customer oriented and part of a larger organization. Customer care and communication Departments are great examples of such secondary product and service providers.
3. **In-company non-customer oriented product and service providers:** got no direct relationship with the organization's customers, but they are important to providing a product or service. Their internal focus, they should consider how they can help more and more client-focused parts of the organization deliver value. Examples are IT or logistics departments.

A business model describes the method of how creates, delivers, and captures value. Value can be made on the level of an entire organization or within its departments and also can be on a personal level. Providing feasible value implies mapping out and innovating the underlying business model on a regular basis.

4 Conclusion

In the start of this article, its stating that a business model explains how one creates, delivers, and captures value. It consists of external and internal perspectives, both of which drive value creation. It is necessary to take both factors into account when working in innovation.

External perspective: Customers, channels and relationships responsible for driving Revenues.

Internal perspective: Resources, activities and partnerships responsible for incurring costs consequently, above its defined business model innovation as an experimental and iterative process in which four distinctive steps can be repeated until a satisfying result are achieved.

Therefore, business model innovation as an experimental and iterative process in which four distinctive steps can be repeated until a satisfying result is achieved.

Observe: gather information.

Analyze: interpreting data.

Design: designing and prioritizing solutions.

Develop & test: developing and testing solutions.

Implementation encouraged by Service Design and Agile reasoning standards alike. They individually help to understand the outer point of view so as to arrange the interior viewpoint and its capacity to react quickly. Likewise, adjusting Agile and Service Design allows organizations to create more value by innovating across the entire business model.

The most crucial Service Design principles are:

Customer-centric

Co-creative

Sequencing and evidencing

Telescoping

The crucial Agile principles are:

Validity over reliability

Working products and services

Prioritization

Interdisciplinary teams over functional domains

As organizations are required to explore an environment trademarked by constant change, maneuverability becomes essential. Therefore this paper strive to help organizations walk the innovation path by suggesting a framework that can act as a compass rather than a rigid roadmap. Concluding this paper, we might want to give a summary containing the key takeaways in regards to business model innovation.

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Marketing management and e-business environment

Inese Spica, Baiba Berzina, Ernests Spics

ISMA, Scientific Institution Business Competence Centre, Riga, Latvia

Keywords: marketing management, e-business environment, Latvia, company, problems

Many standard marketing management functions have been undergoing radical transformations on e-business environment. Modern marketing management cannot be considered as a narrow national phenomenon. Marketing management internationalisation and globalisation process is characterised by the features like intenationalisation and globalisation company marketing management, differences between the place of location and residence of the company owners, abilities of accomodating themselves to the e-business environment, as well as international culture of business organisation.

Marketing management via Internet is a perspective area. It offers access practically to people all over the world. Of course, language barriers and legislation differences in various countries shall be taken into account. Internet creates the possibility to new directions of marketing management.

Thus understanding and investigation of e-business environment in due time give the possibility to avoid several problems related to further development of marketing management in Latvia.

The object of the present research paper is marketing management. The subject of the research paper is marketing management on e-business environment.

The objective of the paper is to study the integration process of e-business environment and marketing management problems, to elucidate the factors influencing the marketing management effectiveness, to develop proposals for solving problems and for marketing management mechanism by maiking use of relationship between these factors in investigation of marketing management in Latvia.

The tasks advanced in order to reach the objective:

- identify the concept of e-business environment and their main economic endicators,
- to carry out analysis of the factors influencing marketing management in the process of e-business environment integration,
- to carry out analysis of indicators characterising marketing management effectiveness on e-business environment.

Theoretical study methods are reported analysis of marketing management, e-business environment, study of correlation between marketing management factors and e-business environment. Empirical pilot methods are observation for the purpose of studying mutual influence between marketing management factors and e-business environment, study of documents regulating marketing management in Latvia, analysis of the e-business environment in Latvia, economic and statistical analysis of the marketing management results on e-business environment, economic experiment, study of public and non-government institutions data in Latvia.

Research basis are marketing management, business and its e-business environment in Latvia. The research period is from the year 2010 till the year 2018, separate themes have been studied for a shorter period of time or by way of comparison.

The main results and conclusions of the research:

1. Changes in the marketing management theory are associated with changes in the e-business environment.
2. Basing on the analysis of e-business environment and pilot studies, the developed system of indicators of e-business environment enables:
   - to carry out analysis of e-business environment in Latvia,
   - evaluate the effectiveness of marketing management on e-business environment in Latvia,
   - identify problems of marketing management on e-business environment in Latvia.
3. Solution of marketing management problems is based on the study of e-business environment and marketing management mechanism.

Self-employment of the population as a factor of reducing the uneven development of the regions of Latvia

Elena Sventitskaya[1], Yuri A Kochetkov[1, 2*]

[1]*Baltic International Academy, Lomonosova Str. 4, LV-1019 Riga, Latvia*
[2]*Institute of Mathematical Sciences and Information Technologies, Liepaya University, Liela Str. 14, LV-3401 Liepaya, Latvia,*

**Corresponding author's e-mail: Jurijs.Kocetkovs@rtu.lv*

Abstract

Self-employment is a form of employment of the population, when people independently find for themselves some kind of economic activity. One of the ways to solve the problems of employment in the regions is to promote self-employment. The research aims at identifying the features and differences in the formation of self-employment in the regions of Latvia and determining the prospects for its further development. The regions of Latvia are developing unevenly in economic terms. The number of working-age population is drastically reduced. To improve this situation, it is necessary to reduce the uneven economic development of the regions of Latvia, to offer residents the opportunity to work in the places where they live. One of the promising options is the organisation of local self-employment.

Keywords: self-employment, unemployment, regions of Latvia, development.

1 Introduction

Self-employment is a form of employment of the population, when people independently find for themselves some kind of activity that provides them with a certain level of income sufficient for living [1]. Self-employed people themselves are fully responsible for positive or negative work results. Self-employment in Latvia occurs more frequently in the service sector of the population.

In the foreign literature, one can find the definition of self-employment of the population in the narrow sense of the word as an alternative to unemployment. For regions with high unemployment in some countries, for example, in France, a promising, albeit expensive, way to combat unemployment is considered to be a replacement of unemployment benefits with subsidies to set up one's own micro enterprises. To a large extent, alternative methods of dealing with unemployment are focused on risk groups, and special features of different groups are taken into account: unemployed youth, long-term unemployed, etc.

2 Overview and analysis

The main factors determining the characteristics of the labour market in Latvia are the following [2]:

- continuing decrease in the total number of economically active population of the country due to the constant outflow of the working population to a country with a higher standard of living;
- constant increase in the number of undocumented self-employed citizens;
- discrepancy of the labour supply according to the professional and qualification structure to the requirements of employers, including discrepancy between supply and demand in the labour market by professions, specialties requiring a high level of qualification of employees;
- inadequacy of the structure and quality of vocational education of personnel to the needs of the labour market;
- saturation of the labour market with unemployed graduates of secondary and vocational schools; the expansion of secondary employment.

One of the ways to solve the problems of employment in the regions is to promote self-employment, involve the unemployed population in entrepreneurial activities. It is known that hired labour implies a complete economic and personal dependence of employees on the employer, while self-employment, on the contrary, determines its absence.

The promotion of self-employment leads to the implementation of the following functions:

- promoting inventions and innovations, which accelerate the development of innovative processes;
- creating new jobs;
- increasing the level of competition on the market of goods and services, which, in turn, brings benefits to consumers;
- raising the standard of living of the population by increasing its income;
- easing the situation on the labour market, as self-employment is a direct alternative to unemployment.

The research aims at identifying the features and differences in the formation of self-employment in the regions of Latvia and determining the prospects for its further development.

The Republic of Latvia is divided into four historical regions (Zemgale, Kurzeme, Latgale and Vidzeme).

Separately, the capital of the country, Riga, and Riga region are considered. Table 1 demonstrates the average statistics for five regions of Latvia in the period of 2014–2017 [3].

TABLE 1 Average annual statistical data on self-employed persons in the regions of Latvia

Regions	Riga & district	Latgale	Zemgale	Kurzeme	Vidzeme
Unemployment, %	7.4	18.1	12.3	11.3	11.5
Income of 1 taxpayer, €	8102	5316	5474	4981	4957
Ratio of self-employed persons to economically active residents, %	8.03	8.26	7.83	10.9	11.8

Riga and Riga region are the leaders in income per self-employed resident, and the unemployment rate in this region is the lowest in the country. Latgale region has the highest unemployment rate in Latvia, the income of a self-employed person is average in the country. In the three remaining regions, the unemployment rate is average (11–12%), as the income of self-employed persons. Self-employed persons make up an average of about 9.4% of the economically active population in the country. The largest percentage of self-employed persons among the economically active population live in the regions of Kurzeme and Vidzeme.

Revenues to the state budget come in the form of taxes mainly from Riga and other major cities in Latvia. In each of the regions of Latvia there are such cities. It is necessary to point out that tax revenues from Riga exceed almost 3.5 times that of the four other largest Latvian taxpayer cities combined (these are the cities of Daugavpils, Liepaja, Jelgava and Jurmala). Large tax revenues go to the state budget also from the districts located near Riga: Marupe, Kekava, Salaspils and some others.

Many residents of Latvia, especially from rural areas, tend to move to the capital or other large cities, where it is easier to find good jobs and earnings. According to statistics, the average monthly salary in Latvia in the third quarter of 2017 was 925 € gross. The average salary in the country increases annually by 5 %. However, it remains more than three times lower than in the highly developed countries of Western Europe. Therefore, the departure of many residents, mainly young people, continues to more prosperous EU countries for work and residence. Every day a few dozen people leave Latvia. The programme to return to the homeland of people who have left for work in other countries, unfortunately, does not bring noticeable results. Within a year, only a few hundred people return, while thousands are leaving.

3 Conclusion

The regions of Latvia are developing unevenly in economic terms, the development of Riga as the capital of the country is most successful. This causes the migration of the population to more successful cities and regions, and part of the population goes abroad to earn money. The number of working-age population is drastically reduced. The current state programme for the return of residents to their homeland with the payment of benefits to them is not effective. To improve this situation, it is necessary to reduce the uneven economic development of the regions of Latvia, to offer residents the opportunity to work in the places where they live. One of the promising options is the organisation of local self-employment, as exemplified by many developed EU countries. At present, such a programme of support for micro and small businesses exists, but it does not function well enough, as the allocated funding is not enough. Courses for start-up entrepreneurs should be organised, privileges for the first years of operation of newly organised enterprises should be introduced, taxes reduced, etc. Only the adoption of emergency measures will improve the situation with a catastrophic decline in the number of the country's working population.

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Innovativeness as a new factor of global economy development

Liudmyla Tsymbal

Kiev National Economic University named after Vadym Hetman, Kiev, Ukraine

Abstract

The prerequisites of a new model of the development of the world economy and the specific features of the realization of national interests under these conditions are determined in the work. Cluster analysis of countries for the level of financing of research works was carried out. The key indicators of the activity of the world's leading countries on the level of innovation development are analyzed, and certain features of the leadership strategy of the follower countries are identified.

Keywords: innovation, innovation model of development, research activity, knowledge economy

Reorientation to innovative development is a key feature of the current stage of development of the world economy. This is the basis of the Fourth Industrial Revolution. The goal of economies-followers is the development of non-linear innovations, as a characteristic of the most developed economies of the world. The formation of a global innovation space is a complex process that accompanies the current stage of development of the global economy. The fourth industrial revolution determines the further orientation and activation of the use of technology in production, robotics, network technologies, etc. Only innovation-oriented economies are highly competitive in these conditions and, the role of factors of intellectual development is changing accordingly. Classically factors of intellectualization of the economy are education and science, however, education ceases to be the only driving force for the development of society [5]. Characteristics of the modern market is the "offshoring" of the labor market, a change in the structure of production, the development of opportunities through technology and network, the active export of services. Expanding the scope of intellectual leadership as an ability to ensure competitiveness in the knowledge economy in this aspect is seen as the management of the changing business environment [1, C.16].

One of the key factors influencing the formation of a global innovation space is funding for science and research. Such circumstances as insufficient material and technical support, a low level of renovation of laboratory equipment, the lack of an integrated system for the introduction of developments, etc., will require an increase in the funding of science in general, as well as the diversification of its sources. On average, in developed countries, about 2% of GDP is allocated to finance research, and some indicators reach up to 4%. Less than 1% of GDP for scientific research is spent by Serbia, Kenya, Iran, Morocco, Argentina, Mexico, Egypt, Chile, Pakistan, Nigeria, Thailand, Colombia, Indonesia and Saudi Arabia [3]. The vast majority of developed countries spend more than 2% of GDP on financing, and some of them more than 4% (for example, South Korea). All countries that are in groups with a funding level of more than 2% occupy the TOP positions in the list of the most innovative economies in the world.

At the same time, innovations gain weight for countries of different levels of development, as they become the basis for forming competitive advantages in leading industries. To form the rating, both resources and results are investigated, institutions, human capital and research, infrastructure and market complexity become input resources, the results are patents, scientific articles and creative results [4]. The TOP-20 of the most innovative countries includes high-income countries and highly developed countries. These countries have been on such positions for several years in a row, since Switzerland has already headed this rating for 7 years. However, in the 20-s gradually begin to pour in separate countries of Asia, in particular, China from the 25th position in 2016 moved immediately to the 22nd in 2017. These countries steadily demonstrate a broad base of innovative opportunities, which consist in powerful scientific and engineering systems, cooperation of science and business.

Innovation efficiency is also important, it is classically high in highly developed countries, but individual developing countries show a significant improvement in the level of this indicator. These include Malaysia, Thailand, Vietnam, the Philippines, Indonesia and Cambodia. The evaluation of effectiveness takes into account the ability to realize contributions to education, research to obtain social and commercial effects; the number of engineering graduates and workers in science and technology; opportunities for the realization of talents in business structures; a high share of exports of creative goods, the costs of world companies, business and science cooperation, the number of patent applications.

The analysis of the results of innovation activity allows us to state that the intellectual leadership of the countries included in the TOP-10 of the most innovative countries is backed up and secured by a very active position and state policy [2]. So, for certain indicators, only some of the elected are not included in the TOP-10, however this can be determined by their focus on other types of innovation

activity. However, some countries that are not among the ten most innovative economies are leading by certain indicators. For example, Israel ranks first in the world in terms of the number of researchers per thousand population, which is a consequence of the state policy on the formation of an innovative technological hub, with simplified taxation for companies that open their research centers in Israel. China leads the way in the number of patent applications, as a result of the state long-term strategy, focused on very clear, defined indicators and goals. The strategy from imitation to innovation is primarily manifested at the level of certain indicators and in the long term can provide world leadership in the level of innovation.

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The fast-growing value of project management tools and techniques for achieving long-lasting business success

Olena Zerniuk*, Mariana Vasylchenko

Poltava National Technical Yuri Kondratyuk University, Ukraine

**Corresponding author's e-mail: zerniuko@ukr.net*

Abstract

The given paper is dedicated to the determination of the value of project management implementation for all success-oriented organizations. It is defined that in the present-day context project management is related to the following of the best practices, adhering to approved standards and using processes to move an idea from the concept stage to the direct implementation. It is also revealed that modern project management approach not only integrates, but also coordinates the key strategic and operational dimensions of the organization activity to achieve long-lasting business success under conditions of high uncertainty. Finally, it is concluded that the prospective project management tools and techniques allow completion of the project as intended, getting it done in a most efficient way by minimizing costs and achieving the goals, directly related to customer needs.

Keywords: business success, ever-changing external and internal environment, organization, project, project management, strategy.

1 Introduction

The long-term survival of any organization requires strong alignment between its corporate strategy and ever-changing external and internal environment. It should be mentioned that such an alignment is usually affected by various projects, related to the internal reorganization of business, or new investments in production or service development. And hence, under pressure of resource constraints, more and more organizations all over the world tend to implement some project management tools and techniques, able to maximize the proportion of successful projects.

2 Main part

The recent literature review demonstrates that many scientists and researchers have defined what a project is, or should be, but the most authoritative definition of this term is that provided by Project Management Institute, where a project is "a temporary endeavor undertaken to create a unique product, service, or result" [1]. Moreover, any project "usually has a specific starting point and ending point, intending to accomplish specific objectives" [2], and "circumstances around ending point can result in project success or failure" [3].

During this study is was revealed that the notion of "project success" is the subject of fruitful discussions in the project management literature and now it can be associated with fulfilling time, cost and quality objectives [4]. Following this scientific position, we can assume that project success may be estimated by different stakeholders, and the criteria for measuring this indicator must necessarily reflect different views.

In any case, successful projects are of great strategic importance to the survival of many business entities for several reasons.

First of all, the accurate project timing and further successful project implementation can determine not only the organization's competitive advantage, but also its ability to achieve long-lasting success through continuous change.

Secondly, all projects, regardless of their type, size and location, consume various resources "that might be otherwise employed to the benefit of business organization" [5]. When implemented properly, these projects will produce an expected return on investment; that is why the main goal of any project management system is to transfer each project to the set of stable operations that will finally generate liquidity for the investors.

Thirdly, the majority of projects normally involve the significant changes to the existing infrastructure and corporate culture of a certain organization. Thus, projects can be seen as a source of deviation from equivalence that can stimulate the need for change.

Whatever the project is, it should be developed, implemented and monitored through project management tools and techniques to create an expected result in the organization. During the short period of time project management has become the prospective management approach, due to which for many organizations it can be easy to respond to change, as well as to facilitate the development of markets ahead of their close competitors.

In fact, project management practices typically vary from one type of project to another. Different approaches are usually applied to various types of projects even within the one organization to adapt project management tools and techniques to the specific needs of each certain project (Table 1).

To perform at their best, project managers need to make the most of tools aimed at business intelligence and analytics, business requirements, change management and project management, as well as a wide array of forms and templates [6].

TABLE 1 Project management tools and techniques that are advisable to use nowadays [completed on the basis of authors' consideration]

The main knowledge areas	The most widespread project management tools and techniques
Integration management	Project selection, return on investment, payback period, project charter
Scope management	WBS, scope statement, quality function deployment, change request, scope change control, product review, performance measurement
Cost management	Cost estimating techniques, earned value management, cost change control system, performance measurement
Quality management	Benefit/cost analysis, flowcharting, cause-and-effect diagram, cost of quality, Pareto diagram, control charts, trend analysis, quality audits, benchmarking, statistical sampling
Time management	PERT, GERT, Gantt charts, simulation, Monte Carlo analysis, milestones charts, variance analysis
Risk management	Risk matrix, Monte Carlo analysis, decision tree analysis, SWOT analysis, and Delphi, project risk audit, earned value management
Human resource management	Stakeholder analysis, responsibility matrix, team building activities, reward and recognition systems, project team directory

The increase in demand for products and services in the markets in which the organizations compete, and the resource scarcity in many industries has greatly influenced the way business is done in the economic, social and related sectors, and has also changed the nature of the implemented projects.

In other words, the focus has changed from simple project management to the more advanced management by projects, where numerous ongoing business operations of the organizations are treated as projects. As a result, a huge number of projects are characterized by the following features:

- the technical complexity;
- a huge diversity of human resource skills;
- an intensive market research.

And this is extremely important for achieving business success because what usually determines the success or failure of an organization is not how great the strategy is, it's how well the approved plans get executed.

3 Conclusions

On the basis of the above considerations, it's reasonable to assume that any project is typically defined as a set of interrelated activities having a specific starting point and ending point, and leading to a specific objective. The most important aspect in the given definition is that a project is intended as a temporary endeavor, unlike traditional business operations.

In rapidly changing external business environment project management has become an important survival requirement for most small and large organizations. Nowadays project management is considered to be a management of change, while running ongoing business operations can be strongly identified with "business-as-usual".

Many organizations from various sectors of the economy today confirm the fact that management by multiple projects not only increases the efficiency and effectiveness of the organization as a whole, but also greatly improves the organizational outcomes.

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Job market for disabled people: issues in Latvia

Marga Zhivitere[1*], Zaiga Oborenko[2]

[1]*Ventspils University College, Ventspils, Latvia*
[2]*ISMA, Riga, Latvia*

**Corresponding author's e-mail: marga.zivitere@isma.lv*

Abstract

The paper is prepared as a forecast of the employment strategy towards to the EU Lisbon goals - to promote employment and social inclusion for all people. The problems are the inadequate employment of persons with disabilities. They are one of the largest inactive social groups. The objectives of this research are focused on the situation in Latvia. The survey is designed to assess the implementation of the human rights to the employment of the disabled people as to the contrary of the governments plans for programmes and institutional actions the results show very slow improvement and unemployment rate of disabled persons in the job market is still very high. The data for this paper has been collected from the experts - respondents and from extensive literature reviews. The results of this study lead to a better understanding of the employer policies and practices that can improve opportunities for employment of the disabled persons in the job market. The integration of people with disabilities into the mainstream activities will promote their employment and thereby would make a considerable effort to integrate inactive job resources into the job market to promote the achievement of the EU Lisbon goals.

Keywords: disabled employee, employer, human rights, job market, Latvia

1 Introduction

The rapidly changing economic situation in the European Union including Latvia takes part in the job market. In that, an acute problem of the Latvian labour market is an imbalance between its demand and supply: from one side, relatively high unemployment rate, from the other side – job vacancy. According to the latest available data from the end of 2018, there are 59588 unemployed registered (their proportion is around 6.4% from the working age of the total number of economically active population [NVA, 2019] and 17929 registered job vacancies (ibid).

One of the largest inactive social groups in Latvia is disabled people. The specific situation of in the job market is in Latvia, where there is an influence of the heritage from the past – the Soviet system, economic, legal and social issues.

In the case of Latvia, the Law on social integration of people with disabilities came into force in July 2005 (Ministry Cabinet of Latvia, 2005), bringing their system closer to the EU model. During the last ten years significant changes are observed in the employment of the disabled persons. It is a changing paradigm for disability policy making from compensation towards to human rights [3].

The objectives of the research study were as follows: to clarify the problem of above mentioned attitude of employers and the main reasons for not hiring people with disabilities several problems can be identified. Information for the paper is gathered through contacting experts - respondents and conducting extensive literature reviews.

2 Analysis of statistics data

The summary of Latvian statistical data is an empirical basis for the problems that are the subject of this research, i.e. employment and integration into the work environment of the people with disabilities and gives the opportunity to evaluate the tendency of the problem on its basis (Table 1).

TABLE 1 Registered Unemployment Rate of Disabled Persons

Year	2008	2010	2012	2014	2016	2018
Number of registered unemployed disabled persons, thousand	4,46	9,35	9,99	8,36	8,99	8.18 *
Proportion from all registered unemployed persons, %	5.6	5.8	9.4	10.2	10.5	13.7 *

Source: Central Statistical Bureau [6] *The State Employment Agency* (SEA, 2019)

The data in table 1 shows that the number of unemployed disabled people in the recent ten years is increasing: in the end of December 2018 the number of registered unemployed people with disabilities compared (4458, - 5.6%) to 2008 has almost doubled.

The situation regarding the employment of the disabled people in Latvia has not changed much. It does not commensurate to an employment and inclusive strategy for

* Note: this information is rather incomplete: it does not provide comprehensive information on different types of disabilities such as chronic illnesses, hidden disabilities, various other types of disabilities, i.e. people with disabilities, etc., but only for a small part - for people legally entitled to disability groups. Thus, the number of people with disabilities and their employment/unemployment rates are only a reference.

the priorities of the EU and Latvian employment strategy for promoting the job market objectives of reducing unemployment and fighting against social exclusion [3]. The Sustainable Development Strategy of Latvia up to 2030 sets out the state's long-term priorities and aims for sustainable state development [4].

It would conclude on a need to continuing in-depth evaluation of the scientific researches of the barriers for the people with disabilities to the labour market and employment.

3 Research methodology and methods

A lot of studies are performed on the barriers on the job market for the disabled people (Bučiūnienė & Kazlauskaitė, International Labour organisation 2010; Waldschmidt, 2009) as well as about moving the workforce of this social group to the labor market linking with education, demography, finance, etc, internal and external environmental factors (Shrey, 1995; Roulstone & Barnes, 2005). The authors of this article have also carried out significant research and development on the role of employers, opportunities to increase it by employing disabled people (Sparitis, 2018; Oborenko, Zivitere & Konstantinova, 2018; Oborenko, Rivza, Zivitere, 2018; Živitere, & Rjascenko, 2012; Živitere & Claidze, 2012 etc.).

This new survey has been carried out by ISMA team in December 2018. The survey was been performed using structured interview and expert survey method. Achieved response rate is 73% of the 210 eligible respondents. The survey's results are thus based on the responses from 146 human resource professionals conducted by the means of the telephone interviews.

4 The main barriers for the employment disabled people

The researchers' survey has been resented with main six possible barriers to the employment and advancement of disabled people. The questions consisted of the reporting barriers to employment for disabled people. It has been tried to measure with Likert type statements whether they see the disabled people as potential job suppliers (Figure 1).

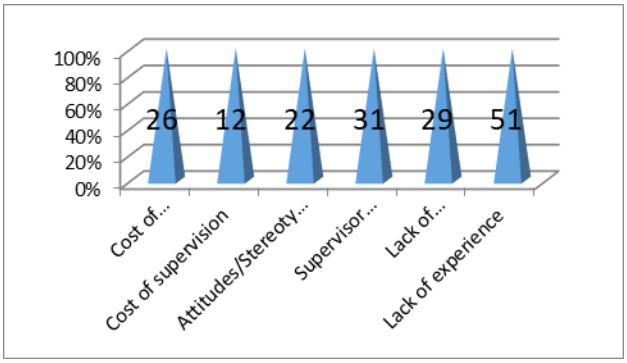

FIGURE 1 Percent Reporting Barriers to Employment for disabled persons

As it is seen in Figure 1, employers hiring and employing disabled employees face multiple barriers. The main ones are:

- Lack of experience;
- Supervisor competence;
- Lack of professional skills;
- Cost of accommodation & training;
- Attitudes/Stereotypes.

5 Decision

According to the respondents' answers to the survey the main barriers to the employment of the people with disabilities is required support to overcome their possible problems. The main assistance to the employers would be provided by vocational training and rehabilitation centres or from job coaches who follow up and support workers with disabilities.

6 Conclusion

Changing the employment paradigm of disabled people from exclusion to inclusion in the work environment has a specified, stable position in Latvian employment policy.

The employers need to see the benefits of employing people with disabilities and not see it as an impost. They acquire the necessary compensation for promoting and employment of people with disabilities.

The research has found that employing people with disability requires a complex government policy and investments needed to create a job market that is accessible to people with disabilities and attractive to employers.

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Modern problems of management in the state dental clinics of Kazakhstan

Gulbanu Dosberdiyeva*

Kazakh national medical university after named S.D Asfendiyarov, Almaty

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

Abstract

Dentistry is one of the most popular types of medical activity due to the high demand of the population for dental care. Currently, the portion of private dental organizations in Kazakhstan is about 80%. Private dental clinics have higher efficiency of management compared to the state. In conditions of limited availability of dental services, primarily for socially-unprotected segments of the population, the problem of improving management in state dental organizations does not lose its relevance.

Keywords: dental services, dental organizations, dental clinic, quality of services, system of management

1 Introduction

The effectiveness of management in private dental clinics conditioned by high competition in the market of dental services. Currently, price competition is replaced by non-price competition due to the expansion of the list of dental services, additional services, etc. Private dental organizations alongside with the state participate in the competition for the state order, which further exacerbates competition.

The aim of our research was to identify priority problems in the management of state dental organizations. For this purpose, a qualitative research was conducted on the method of focus groups online, which was attended by managers of state dental clinics in Almaty, Taraz and Shymkent (only three focus groups by 10 people), namely: chief physicians and deputies of chief physicians, heads of departments, chief and senior nurses. The participants in the focus groups independently identified priority problems in the management - table 1.

TABLE 1 Priority problems of management in the state dental organizations of Almaty, Taraz, Shymkent

Problems of management in the state dental clinics	Chief physicians and deputies of chief physicians		Heads of departments		Chief and senior nurses	
	Ab.	*%*	*Ab.*	*%*	*Ab.*	*%*
1.Absence of clear indicators for assessing the quality of dental care	8	80	8	80	3	30
2.Low responsibility of the clinic for the results of treatment	8	80	7	70	3	30
3.Insufficient training of clinic managers in the field of management and law	9	80	6	60	5	50
4.Insufficient introduction of innovation	8	80	9	90	5	50
5. Difficulties in continuous staff training	7	70	8	80	7	70
6.High competition from private dental clinics	10	100	9	90	5	50
7.Absence of strategy to attract new customers	6	60	5	50	2	20
8. Ethical problems,associated with payment service	5	50	4	40	2	20
9. Low corporate culture of the clinic	5	50	4	40	3	30
10. Introduction of diff.salary	9	90	10	100	9	90

The research based on the study of the opinions of the participants of the focus group showed that the most priority problems of management in dental public organizations in the opinion of chief physicians and deputies of chief physicians are: high competition in the market of dental services from private clinics, insufficient training of clinic managers in the field of management and law, the introduction of differentiated wages.

According to the heads of departments, the most priority problems in management are the absent of introduction of innovation, as well as high competition in the market of dental services from private clinics and the introduction of differentiated wages.

According to the heads of nursing staff, the most priority problem in management is the introduction of differentiated wages. The degree of reliability of differences of chi-square 8,6, p-0,01.

In second place among the priority problems in management, chief physicians and their deputies identified the following: the absence of clear indicators for assessing the quality of dental care, the low responsibility of the clinic for the results of treatment, the absence of introduction of innovation. Most of the heads of departments identified such problems as: low responsibility of the clinic for the results of treatment, the absence of clear indicators for assessing the quality of dental care and the difficulties associated with the training of staff. In the opinion of the chief and senior nurses,

the second most important problem is the difficulties associated with staff training.

It should be noted that all focus group members believe that the absence of a strategy to attract new customers, ethical problems, and low corporate culture of the clinic are the least priority management problems.

2 Conclusions

Analysis of results of the survey of focus groups showed, that for improvement of management is necessary:

- all managers of dental state clinics constantly improve the knowledge and skills of management of medical and business processes;
- to increase the responsibility of the clinic to patients;
- to form a healthy corporate culture associated with competent marketing and medical deontology.

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Matrix models of the structure of goals and works of the project portfolio

Roman Artiukh[1*], Anna Dorokhina[1], Yuriy Oleksandrov[2]

[1]*State Enterprise "Southern National Design & Research Institute of Aerospace Industries", Kharkiv, Ukraine*
[2]*Kharkiv National University of Radio Electronics, Kharkiv, Ukraine*

[*]*Corresponding author's e-mail: roman.artyuh77@gmail.com*

Abstract

The paper deals with the processes for planning the content of a project portfolio to identify the links between the main elements of the content of projects within the portfolio taking into account the interests of stakeholders. The structure of goals and works of the project portfolio, relations between the elements of these structures were determined and the matrices of relationship – "goals-works" and "stakeholders- goals" were built, the matrix of relationship "stakeholders-works" was calculated.

Keywords: interconnection matrix, interests of project stakeholders, project works

1 Introduction

Under the conditions of market relations, the problem of system project management becomes urgent. This means that instead of separate techniques and tools that are not efficient any more, the complex and interrelated system of management should be built. At present, scientists who deal with the project management pay attention to the formalized description of the impact of project external environment factors taking into consideration their instability [1, 2]. The portfolio approach to investment projects is used. The assessment of a project by stakeholders is applied in the process of selecting projects for the portfolio. The issues of structural description and analysis of the degree of interest of individual stakeholders in certain works of project portfolio to involve them in the project management at certain stages of the project life cycle remain unresolved.

2 Basic material

The project content that takes into account various information needs of stakeholders is developed at an early stage of its life cycle and is updated to reflect changes in the stakeholder community [3]. The preliminary plan of stakeholder engagement is developed after the initial identification of stakeholders. For this purpose, the matrix of relationship "goals-stakeholders" should be built; this matrix reflects those goals of the project particular groups of stakeholders are interested in and, therefore, participate in their achievement. If these stakeholders are actively involved in the process of managing a project portfolio to perform individual works, the efficiency of achieving the portfolio goals will be significantly enhanced.

Taking into consideration the fact that the portfolio of construction projects is complex and their properties cannot be fully described within the same structure, for a formalized presentation of the content of the project portfolio, the following structural models will be developed:

- the model of goal structure that is determined by the interests of stakeholders $\{P\}, p_i \in P, i = \overline{1,n}$;
- the model of project portfolio structure $\{W\}, w_j \in W, j = \overline{1,m}$ which describes a set of projects, stages and works that are necessary for achieving the goals of the project portfolio;
- the model of stakeholder structure that also contains the organizational structure of project performers в $\{S\}, s_k \in S, k = \overline{1,t}$ which describes a set of stakeholders whose interests correspond to the goals of the project portfolio.

As the basic stages of building the models of portfolio content of investment projects will be indicated [4]:

- the table description of WBS-structure of project portfolio;
- the graph representation of the structural models of a project portfolio;
- the formalized description of the elements of project portfolio models;
- the matrix representation of the relationship of project portfolio models.

WBS-structure contains several hierarchical levels of project works and they can be divided into separate subsets: W^{Proj}, W^{GrTask}, W^{Task}.

To represent the structures of project portfolio models and their relationships, the basic concepts and methods of graph theory will be used; they enable conducting the structural analysis of the target object, determining the structure connectivity, its redundancy and compactness, the degree of centralization in the structure, the rank of elements and structural joint of elements.

For the formalized description of the relationship between these models of the portfolio of construction projects, let the following matrix projections be introduced:

- the matrix projection between the model of goal structure $\{P\}$ and the model of work structure $\{W\}$ that coordinates the works of the portfolio goals: $\|r(p,w)_{ij}\|, i=\overline{1,n}, j=\overline{1,m}$,

$$r(p,w)_{ij}=\begin{cases}1 \text{ if the } j-\text{th work promotes achieving the } i-\text{th goal}\\ 0 \text{ if the } j-\text{th work does not promote achieving the } i-\text{th goal}\end{cases}; (1)$$

- the matrix projection between the model of goal structure $\{P\}$ and the model of stakeholder structure $\{S\}$ that coordinates the project goals with the interests of stakeholders: $\|r(p,s)_{ik}\|, i=\overline{1,n}, k=\overline{1,t}$,

$$r(p,s)_{ik}=\begin{cases}1 \text{ if the } i-\text{th goal expresses the interest of the } k-\text{th stakeholder}\\ 0 \text{ if the } i-\text{th goal does not express the interest of the } k-\text{th stakeholder}\end{cases}. (2)$$

The examples of matrix projections "goals-works" are given in Table 1.

TABLE1 The example of the matrix projection of the "goals-works" of the second level

Groups of works	The goals of the second level						
	P_1^{GrTask}	P_2^{GrTask}	P_3^{GrTask}	P_4^{GrTask}	P_5^{GrTask}	P_6^{GrTask}	P_7^{GrTask}
W_1^{GrTask}	1	0	0	0	0	1	0
W_2^{GrTask}	0	1	0	0	0	1	1
W_3^{GrTask}	0	0	1	1	0	0	0
W_4^{GrTask}	0	0	1	1	0	0	0
W_5^{GrTask}	1	0	0	0	1	0	0
W_6^{GrTask}	0	1	0	0	0	1	0
W_7^{GrTask}	0	1	0	0	0	0	1

By multiplying the obtained matrices ($R(P,W)$ and $R(P,S)$), the matrix can be calculated with the elements: $\|r(w,s)_{jk}\|, j=\overline{1,m}, k=\overline{1,t}$,

$$r(w,s)_{jk}=\begin{cases}1 \text{ if the } j-\text{th work is done for the benefit of the } k-\text{th stakeholder}\\ 0 \text{ if the } j-\text{th work does not concern the benefit of the } k-\text{th stakeholder}\end{cases}. (3)$$

that is

$$R(P,W) \times R(P,S)) = R(W,S). \quad (4)$$

Some elements of this matrix have value "2". This can be interpreted as the "double: interest of stakeholders in this group of works. Thus, the relationship between the elements "stakeholders-works can be assessed by a quality scale with a set of values {0, 1, 2}. This scale is comparable to the set of linguistic values {"irrelevant", "average interest", "significant interest"}.

3 Conclusions

Taking into consideration the fact that the project portfolio is complex and all its features cannot be fully described within the same structure, a set of interrelated portfolio models was developed and the content and sequence of their development were determined.

With the help of the developed relationship models, the works to be performed within the project to ensure the interests of individual (or many) stakeholders are defined. Analyzing the parameters of these works and matching them with specific stakeholders, the efficiency of project portfolio management can be improved. These structural models and matrix projections between them are the basis for building network models of a project portfolio management plan taking into account the interests of stakeholders.

The next step of the study is to quantify the degree of interest of stakeholders in the performance of relevant work. On the basis of assessments obtained, it is possible to manage the engagement of stakeholders at certain phases of the project portfolio life cycle.

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Marketing strategies for hospitality industry on example of the hotel "Semarah Metropole"

Sandra Demba*, Jevgenija Dehtjare

ISMA, Riga, Latvia

**Corresponding author's e-mail: sandra2807@inbox.lv*

Abstract

Nowadays hospitality industry is one of the most effective and fastest growing industries in the world. There are many hospitality related enterprises in Latvia and in Riga, therefore competition is quite high. In order to stay successful and profitable companies are using different approaches to attract customers. In the 21st century technologies take an important place in our lives and especially social media networks lately became extremely popular, therefore Social Media Marketing, like also other marketing strategies are very useful for business promotion. This work shows an importance of usage of marketing strategies in hospitality industry as the way of profit maximization

Keywords: hospitality industry, marketing strategies, social media, business

1 Introduction

The hospitality industry is the world's fastest growing sector, with a tremendous impact on local, national and global economies. Moreover, it is major service sector in the world economy. The industry encompasses an extensive variety of service industries that include food service, tourism and hotels.

One of the most defining aspects of this industry is that it focuses on customer satisfaction. While this is true of nearly every business, this industry relies entirely on customers' being happy. This is because these businesses are based on providing luxury services. Very few hospitality businesses provide a basic service that people need, like food or clothing.

Also it is a part of the larger service-providing industry and is divided into two sectors: food and accommodation services and arts and entertainment. The hotel and restaurant industries are included within the food and accommodation sector [1].

Success of a business always starts from a good marketing. When the enterprise is firstly opened it has to attract customers. First of all, people must find out about the company, because it's new and nobody knows it, on this step marketing appears. Marketing strategy is an organization's strategy that combines all of its marketing goals into one comprehensive plan. A good marketing strategy should be drawn from market research and focus on the right product mix in order to achieve the maximum profit potential and sustain the business. The marketing strategy is the foundation of a marketing plan.

The aim of thesis is to develop Marketing strategies which will lead to recognition of the hotel "SemaraH Metropole" and as a result it will lead to profit maximization.

The object of work Management of the entrepreneurial activity on example of hotel "SemaraH Metropole". While the subject is Implementation of marketing strategies in the hotel "SemaraH Metropole". To achieve the aim of work which is: "To develop Marketing strategies which will lead to recognition of the hotel "SemaraH Metropole" and as a result it will lead to profit maximization." following tasks were determined:

- The analysis of theoretical materials and trends in hospitality industry.
- The analysis of the hotel and its environment.
- The development of marketing strategies.

2 Overview

Regarding to the available statistics of Central Statistical Bureau in Latvia, the number of hotels in Latvia is growing every year.

TABLE 1 Number of hotels and other accommodation establishments (created by author)

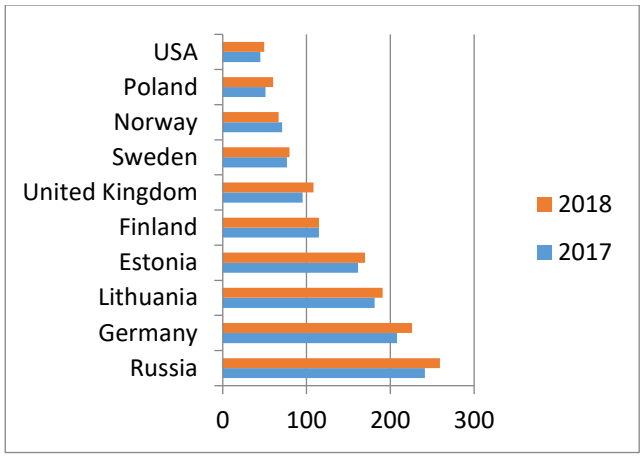
Year	2014	2015	2016
Total	544	563	607
Hotel and similar establishments	238	306	316
Guesthouses and other short-stay accommodation	289	242	275
Camping grounds, recreational vehicle parks and trailer parks	17	15	16

Table 1 shows, that total amount of hotels in Latvia is growing every year by approx. ~10%. The other type of accommodation is also increasing in number [3].

3 Decision

According to the Table 2 it is visual that not only number of hotels is growing, but also number of tourists in Latvia has grown comparing to the last year. It means that the more people are visiting Latvia the wider audience there is whom to offer our services to. Following this fact it becomes obvious to create a plan of marketing strategies to attract even more customers to the enterprise [2].

TABLE 2 Latvian tourists statistics (created by author)



In order to draw more attention to the hospitality enterprise and to attract customers marketing plan has to be created. It will include following marketing strategies:

- Social Media Marketing (SMM)
- Search engine optimization (SEO)
- Creation of loyalty programmes
- Advertizing in social sources

4 Conclusion

In order to stay competitive in the hospitality market it is very important to make marketing plan and use marketing strategies. All of them are helping to gain popularity and to become recognizable among society, as among locals as among foreign population. It will help to stay competitive in the hotel market of Latvia. Moreover, in future it will lead to profit maximization and most likely to success.

After calculating all costs and possible profit it is possible to start realization of the marketing plan.

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Challenges and prospects for the development of medical tourism in Latvia

Kseniya Yakovleva*, Elena Lukyanova

ISMA, Riga, Latvia

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

Abstract

Currently, the development of tourism, and especially the primary wellness tourism, is becoming a priority task of the state, concerning the sustenance of human activity and aimed at the restoring and developing of its physical and spiritual health. Primary wellness tourism, on the one hand, makes a significant contribution to the sustainable development of society, and on the other hand, represents one of the steadily growing sources of income for the state. The article discusses the main trends in the development of medical tourism and identifies the main objectives for its development in Latvia.

Keywords: medical tourism, state task, medicine, health care system, tourist, risks, health.

1 Introduction

Medical tourism, as an integral part of health tourism, has been identified as one of the priorities in the Latvian tourism development program until 2030. It also says about the need to improve competitiveness and innovation in this tourism sector. At the same time, special attention is paid to improving the competitiveness of medical tourism in the Baltic market.

According to the authors, the lack of competitiveness of the Latvian sector of health tourism in general, and medical, in particular, is caused by insufficient attention from the state to this sector of the economy, which is manifested in an underdeveloped regulatory framework, in an insufficiently effective company at the state level to shape the image of Latvia as a destination of health tourism, in the absence of adequate support for the development of the sanatorium-resort sphere, etc.

The enterprises of this sector themselves must move more actively to the path of innovative development in order to keep up with foreign competitors. An urgent task is to improve the quality of services provided.

2 Overview

According to the data of the World Health Organization, the number of "medical tourists" in the world is growing from year to year. Moreover, for a number of countries-exporters of medical services medical tourism is one of the revenue items of the state budget. However, despite the relevance of this issue, the literature provides limited data on the role and impact of medical tourism. On the one hand, medical tourism is an objective consequence of the institutional transformations that occur in the development of society, including medicine, at the current stage under the influence of globalization and information technology. On the other hand, considering it as a new model of labor relations in the health sector, it is necessary to take into account aspects of its influence on the traditional forms of organization of medical services and on the health consequences of those who are its consumers.

Analyzing the impact of medical tourism in a positive aspect, it should be noted, first of all, the economic effect both for consumers of medical services and for the economies of those countries that are their key suppliers.

The leading exporting countries of medical services are India, Thailand, Israel, Korea, China, Germany, Czech Republic, Hungary, Poland and Latin American countries (Mexico, Brazil).

Resort-wellness tourism, based on traveling to an area with favorable climate factors to health for health purposes, belongs to wellness tourism (see Figure 1).

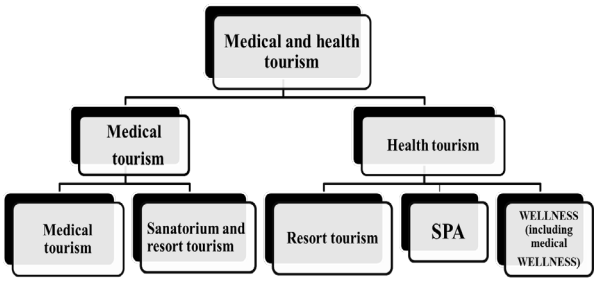

FIGURE 1 Primary wellness tourism

3 Conclusion

For the development of domestic medical tourism in Latvia, it is necessary to more widely introduce a system of insurance for health and medical and especially medical tours, with the involvement of employers, insurance companies and insurance funds.

As recommendations for the development of medical tourism in Latvia, you can specify the following:

1. To supplement the Law of the Republic of Latvia "On Tourism" with the definition "medical tourism".
2. Develop a strategy for the development of medical tourism in Latvia at the state level.
3. To determine the instruments of support and development of this tourism sector;
4. Enterprises in this sector are more active in identifying and marketing innovative products in medical tourism.

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The impact of application of information-communication technology to increase the efficiency of management in tourism

Aleksandra Jovanović

"Konstantin Veliki", Niš, University "Union-Nikola Tesla", Belgrade, Serbia,

**Corresponding author's e-mail: aleksandra.aj17@gmail.com*

Abstract

Modern business in tourism, in addition to the desire for greater productivity, cost-effectiveness and increased profits, is characterized by the speed and efficiency in which information becomes the key resource of each tourism company / organization. The implementation of ICT information communication in a modern business environment plays a key role in the process of improving and increasing the efficiency of management, that is, the business performance of enterprises that are engaged in tourism and it's positioning on the market. By generating innovation, ie implementing modern information and communication technology, significant results are achieved in raising the quality of goods and services, organization of work, marketing, and consequently management in tourism. At the same time, regular monitoring and evaluation of the business performance of companies in a modern business environment with the application of ICT are the basis for establishing competitive advantage, but also for successful connection with the international community. Due to this importance of ICT and the Internet, future managers are working to work. The author's attempt is to point out the importance of innovations and their introduction to tourist organizations with the aim of improving management and professional performance

Popular Internet services today provide an opportunity for people to communicate in real time with unknown people in remote areas. In this way, experiences on certain tourist destinations can be exchanged. It is this communication that complicates the business process and leads to the emergence of large amounts of data, and it is necessary to use modern solutions as well as the development of digital technologies that characterize significant expansion, as well as its potential application in many areas. The question arises where this segment of digital marketing improves the branding of the destination, or how does it encourage potential visitors to create a picture of the destination, and existing to maintain the destination experience? The solution to this question is one of the focus of this paper.

Keywords: ICT, digital marking, management, tourism, business performance

1 Introduction

The impact of implementation and continuous improvement of modern ICTs primarily affects the accelerated growth of productivity and economic growth of enterprises. This paper is based on the hypothesis that between the application of ICT innovations, that is, the generation of innovations and innovations in tourism and the improvement of management and business performance, there is mutual conditionality of the traditional concept of marketing communication, whether it is a tourist destination or some other product or service, thanks to the ever-faster and the growing development of technological innovation, is experiencing significant changes.

2 Implementation of ict in management in tourism

The application of ICT does not only involve the computerization of individual business processes, but it involves the creation of a unique system of information that is used by the organization in the business, management, research and sale of products / services.

The continuous development of information technologies is reflected in the business operations of the entities in the tourism market in terms of the constant increase of efficiency in the business of tourist agencies, hotels and other factors of the overall tourism economy.

In the territory of the Republic of Serbia, there is an increase in the communication between the subjects of the tourist economy and the population through ICT, that is, through the use of websites, social networks, e-advertising, offers via e-mail, Monitoring and analyzing the use of ICT in households is very helpful when it comes to the way ICT is implemented.

The application of modern ICT in tourism implies the use of the Internet and global distribution systems (special types of information systems for the distribution of tourism products). These systems combine tourism service providers with service vendors / travel agencies and with users of tourist services and electronic (on-line) business in everyday business activities. The advantage of these technologies is facilitating cooperation with other subjects of the tourism industry.

3 Digital marketing in tourism

Social networks, defined as a web-based service that allows an individual to build a public profile or private profile within a particular system, articulates a list of other users with whom they share a link and observe and use a common list of connections and lists of others within the system

4 Effects of improving management in tourism by the use of modern ict solutions

In the new era of ICT, which increasingly occupy a primary place in all spheres of society and business, success is guaranteed only to those organizations that are globally oriented, highly productive and who can boldly invest in the knowledge and skills of their ICT related employees. Knowledge also means finding a better way of creating a resource that has always been a basic requirement for increasing productivity and long-term economic growth. Modern conditions of business and life in general, and with it a new economy, will condition the acceptance of the

application of knowledge in the knowledge of the decisive determinant of success. When it comes to tourism, the key to success lies in the implementation of innovations, ICT technologies and the economy based on the announcement, that is, in the learning organizations, the successful creation, distribution and use of knowledge.

5 Conclusion

We can conclude that social networks and mobile applications, as the most dominant forms of digital marketing, directly influence the perception of the image of the brand of the destination, to create the credibility and competitiveness of the destination.

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The analysis of MICE tourism development in the world and in Uzbekistan

Kamila Khafizova*, Jevgenija Dehtjare

ISMA, 1/6 Lomonosova str., Riga, LV 1019, Latvia

**Corresponding author's e-mail: kamilakhafizova@yandex.com*

Abstract

The article discusses characteristics of business and leisure tourism and considers the components of MICE industry. Statistical data on the level of development of MICE tourism globally are being presented. The authors make a comparative analysis of MICE tourism in both the countries which are considered to be the leaders in this sphere, as well as in the emerging countries such as Uzbekistan. The relevance of this study is determined by the need to promote and develop MICE sector worldwide. The perspectives of the development of MICE tourism in Uzbekistan are presented on the example of Silk Road Destinations.

Keywords: Business tourism, MICE industry, Incentive tourism

The number of business contacts has started to increase steadily at the end of the 20th century. That resulted in the development of business tourism and MICE industry.

World travel and tourism council forecasts that the annual turnover of business tourism will increase by 3.7% over the next ten years and will grow from $1.15 billion in 2016 to $1.7 billion in 2027 [1].

The object of the study of this paper is MICE tourism in the world and in Uzbekistan.

The subject of the study is the perspectives and barriers to development of business and MICE tourism in Uzbekistan.

The aims of the article:

1. To examine theoretical aspects of business tourism and give a detailed analysis of the components of MICE tourism;
2. To observe the global MICE tourism sector, the latest trends and tendencies;
3. To study the specific character of the development of MICE tourism in Uzbekistan on the basis of Silk Road Destinations;
4. To evaluate the current state of the resources and infrastructure for the development of MICE tourism in Uzbekistan;
5. To develop appropriate recommendations for the development за MICE tourism in Uzbekistan on the basis of Silk Road Destinations.

During the research both theoretical and empirical methods of analysis were used.

The history of MICE industry and "bleisure phenomenon is being discussed in the paper. The statistical part of the research was collected from articles and official online sources.

According to Middleton and Clarke business travel is a "work related travel to an irregular place of work" and according to Swarbrooke and Horner business travel represents "the practice of people travelling for purposes related to their work".[2][3] Each year, corporate travelers take more than 480 mln business trips, according to GBTA. [4] In most cases the choice of the destination and the payment is responsibility of CEO or association. Therefore, we can define a business traveller as "a traveller whose expenses are paid by the business he works for". [5] The World Tourism Organization calculated that business people spend three to four time's more than ordinary citizens on vacation. [6] There is a growing number of "bleisure" tours being organized globally starting from 2010. In 2014, Bridgestreet Global Hospitality research dedicated to this phenomenon was published [7]. According to the research conducted by Carlson Wagonlit Travel, 1 in 5 business travellers take "bleisure" trips each year, accounting for 7% of all business trips. In nearly half of "bleisure" trips, the personal days occur at the end of the trip, in 34% at the beginning, while for the remaining 20% leisure occurs at both ends of the trip. [8]It is necessary to realize an initial analysis about the current situation in Uzbekistan. Uzbekistan gained independence in 1991. After gaining independence, tourism sector in Uzbekistan has become a vital part of economy.Due to the insufficient number of hotels to accommodate all foreign delegates, the Uzbek government started the development of hotels, which involved the construction of new hotels and the reconstruction of old style hotels.

Since independence, transportation links (airports, roads and railways) in Uzbekistan have been improved.

The latest events that take place in different parts of the world have proved the importance of security during the trip. For a company the disruption of business processes during the business trip will face with the threat of serious undermining of its budget. According to research by the IRF and the University of South Carolina that was released in June 2017, almost 60% of planners have experienced some form of disruption in their events, estimating that almost a quarter of their events have been affected in some way. Almost 50% of planners said they experienced a disruption costing their organization $10,000-$99,000. [18] In this

regard, it should be noted that Uzbekistan is in the list of the safest countries in the world. However, the analysis of the MICE tourism sector in Uzbekistan allowed finding several problems as well. Despite the economic importance of MICE tourism, this sphere still remains underdeveloped. It is high time for the governments, travel companies, hotels and other associated organizations and companies to think seriously about the attractiveness of MICE tourism.

Analysis of international business tourist attractions helped to reveal the important impact of MICE tourism such as economic growth of the region, creation of new job opportunities, development of infrastructure and tourist awareness.

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The conceptual model elements of transport system development projects

Dmytro Lytvynenko*, Igor Nevliudov

[1]*National Aerospace University "Kharkiv Aviation Institute", NAU "KhAI", Kharkiv, Ukraine*

[2]*Kharkiv National University of Radio Electronics, Kharkiv, Ukraine*

**Corresponding author's e-mail: newboroshno@ukr.net*

Abstract

The given paper suggests to use the effective conceptualization project management tools to achieve the progress in simplifying and structuring the project management processes. The author suggests to use current system in the early stages of the life cycle, it will help to keep the project management processes more consistent and structurized. In given paper was assessed the principle features of transport development projects. They were taken into account to build relevant and appropriate conceptual model.

Keywords: Project management, transport system, stakeholders, life cycle

1 Introduction

In nowadays transport system development projects become important part of the region economic system and, often, even for countries or continents. Globalization, in other hand, forces to invest more money and capabilities to develop transport infrastructure and to increase capacities of road systems. Such situation creates significant challenges for all involved and specially for project managers who managing new, more complicated and complex projects [1].

Taking into account industry concerns become demand of our time. Each industry affects the methods and tools of project management more and more. It helps to manage the project in more reliable and efficient way. Another tendency of project management is growing role of stakeholders and their involvement in project processes. Consideration of this principle in conceptual model development can help achieve effective project management and to comply with schedule, budget and technical quality requirements.

2 Main part

Transport system development projects are the projects which have aim to build, develop, renovate or modernize of important infrastructural objects. They are characterized by:

- significant magnitude of investments;
- long time for developing;
- huge amount of involved human and technical resources;
- influence on environment situation;
- considerable influence on economic of the region.

The infrastructure objects and their conditions, often, indicate the economic perspective of the region and have influence on investment attractiveness.

Stakeholder of the transport development project is an individual, group, or organization, who may affect, be affected or somehow interested in the project. The transport system development project stakeholder feature is a huge involvement of society and government. Their role, often, can have effect even bigger than investor position or managers ideas. Such situation appears because of the fact that transport system creates and develops, first of all, to solve the problems of the residents of the region (country), to respond their concerns and meet their needs. And only the secondary aim of the transport systems is economic effects. The conceptual model has to rely on specific features of the industry and take them into account.

For the conceptual model development of the transport system project has to be used value-based management which provides the assessments of stakeholder relevance. The value of project aim should be compared with the stakeholders interests. The aim of value-based management in conceptual model is to ensure the greatest conformity between the project and stakeholders aims.

As part of the concept model development should be identified internal and external factors which can affect on the project`s content. This factors should be assessed, evaluated and classified. The project should be ready that such factors can appear and disappear on different stages of the life cycle.

The stakeholders should be grouped by interests, their involvements by time and cooperation intensiveness. The stakeholders and their groups should be assessed in accordance with their interests and project aims. Stakeholder involvements and their impact should be taken into account during whole life cycle of the project.

3 Conclusions

The paper proposes the conceptual model elements, which can be used in transport system development projects with paying attention on features of the industry and taking into account stakeholders interest. Using such conceptual model

in early stages of the project life cycle will help to increase the stability and reliability of the project and will help on decision-making, even on late stages of project life cycle.

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Algorithmic and optimization models of procurement logistics

Olga Malyeyeva[1*], Natalya Kosenko[2], Viktoriia Nevliudova[3]

[1]*National Aerospace University "Kharkiv Aviation Institute", Kharkiv, Ukraine*
[2] *O.M. Beketov National University of Urban Economy in Kharkiv, Kharkiv, Ukraine*
[3]*Kharkiv National University of Radio Electronics, Kharkiv, Ukraine*

**Corresponding author's e-mail: omaleyeva@ukr.net*

Abstract

The issues of procurement logistics management are considered. The structural model of solving the task of procurement management is proposed based on the discrete converter; this model formalizes logistic processes taking into consideration the effect of the external environment. The mathematical model of stochastic programming is formulated to determine the basic parameters of procurement management tasks at the stage on product "growth".

Keywords: procurement logistics, automation models, optimization task

1 Introduction

Today, the tasks of managing logistic processes, in particular, planning of resources procurement are very important. However, in order to increase the efficiency of their solution, the models of the processes of resources supply should be used taking into account changes in the environment that enable assessing and making scientifically-based solutions [1].

2 Main part

The structure of the system model of the procurement management task is presented as a cybernetic model with feedback, where the correcting management is provided due to the closed loop. This model reflects two main aspects of management. The first one enables determining the object of the management as the combination of a business structure and the logistic subsystem of an enterprise and taking into account the impact of the element of the environment. The other one reflects the discreteness of the management of the development of production.

A set of probable states of the logistic system is determined by the Cartesian product:

$$H = X \times Y \times Z \times W \,, \tag{1}$$

where X is a set of system input parameters, Y is a set of system output parameters, Z is a set of system internal state parameters, W is a set of environment parameters.

Then, the tuple characterizing the state of the logistic system at a certain point in time is

$$h(t) = \langle x(t), y(t), z(t), w(t) \rangle \cdot \tag{2}$$

To describe the discrete states of the object of management, the models of logistic system states are developed.

When implementing strategies for the development of production at the appropriate stages of the product life cycle, decisions on logistic management are made. For each of the three main stages ("growth", "maturity" and "decline"), there are features of making decisions on procurement management, which should take into account the state models. The peculiarity of each stage of the life cycle is characterized by the following elements: external changes, planned goals, changes in the production and logistics system and the corresponding managing actions to solve the tasks of procurement management.

To formalize the description of the process of making decisions on procurement management, machine models are selected [2]. The equations of processes in the language algebra determine a set of allowable values and describe the changes in the states of all elements of a discrete system, which enables determining the sequence of performing tasks and converting relevant information while managing procurement. The equations in the algebra of relations describe the probable system states taking into account the conditions of transitions and managing actions.

Let us form automaton models for the main stages of the product life cycle. For example, for the stage of "maturity", when implementing the strategy of updating equipment, the equations of processes are:

$$F_1 = s_1 \vee F_3 s_1 \,;\; F_2 = s_2 \vee F_1 s_2 \,;\; F_3 = s_3 \vee F_2 s_3 \,, \tag{3}$$

when the states of the mode; are: s_1 is the change of the input data about business rivals and technological achievements; s_2 is the amount of equipment that is purchased; s_3 is a number of equipment suppliers; F_1, F_2, F_3 are allowable processes; $\vee$ is the operation of disjunction.

Then, a regular expression of the supply management process can be expressed as follows:

$$F = s_1 \vee s_1 s_3 \vee s_2 \vee s_1 s_2 \vee s_3 \vee s_2 s_3 \vee s_1 s_2 s_3 \vee (s_1 s_2 s_3)^* . \tag{4}$$

Next, let us form the equation in the algebra of relations:

$$f_1 = y_1 f_2\,;\ f_2 = y_2 f_3\,;\ f_3 = y_3 f_1\,, \tag{5}$$

where the transitions are: y_1 is the amount of equipment that is purchased; y_2 is a number of equipment suppliers; y_3 is the capability to repeat if the environmental conditions change; f_1, f_2, f_3 are equations of transformations of allowable processes.

Then, management is described as a regular expression:

$$f_1 = (y_1 y_2 y_3)^* . \tag{6}$$

An integrated model is built on the basis of a discrete converter (DC) that comprises a managed component and a managing one and completes local models of procurement management tasks at the various stages of the life cycle.

For a managing DC component, the following state and transition designations are introduced: $S_1^{'}$ is solutions concerning the modernization of products that are manufactured; $S_2^{'}$ is the analysis of the obtained data about suppliers; Y_1 is solutions of a procurement management task. For a managed component, the following state designations were used: S_1 is the values of the logistic system parameters; S_2 is the volume of production; S_3 is the volume and types of resources that are purchased; S_4 is the types and amount of equipment that is purchased; S_5 is the necessary number of resource suppliers; S_6 is the necessary number of supplementary material suppliers; S_7 is the necessary number of equipment suppliers; S_8 is a list of resources suppliers. Transitions from one state to another are determined as follows: $y_1^{"}$ is the volume of production; $y_2^{"}$ is the types and amount of necessary resources; $y_3^{"}$ is the amount of equipment that is purchased; $y_4^{"}$ is a number of resources suppliers; $y_5^{"}$ is a number of supplementary material suppliers; $y_6^{"}$ is a number of equipment suppliers; $y_7^{"}$, $y_8^{"}$, $y_9^{"}$ are the solutions of the tasks on selecting the suppliers of resources. The managing and managed components interact using the following commands: $y_1^{'}$ – management handover; $y_2^{'}$ – giving data on suppliers; z_1 – the environment effect; z_2 – agreements with suppliers.

Taking into account the impact of the environment on the management, the components of the model operation are described using a regular expression of the algebra of algorithms:

$$F = z_1(y_1^{'} f y_2^{'} z_2 \vee Y_1 z_2)\,, \tag{7}$$

where $f = y_1^{"} y_4^{"} y_7^{"} \vee y_2^{"} y_5^{"} y_8^{"} \vee y_3^{"} y_6^{"} y_9^{"}$ is a regular expression of the managed component operation.

The resulting expression describes the process of logistic management depending on the values of the parameters of managing actions.

The implementation of transition functions in automation models of the process of logistic management is described by mathematical models adapted to procurement management, which requires that the optimal parameters of logistic tasks should be determined. For example, the task of determining the volume of production arising at the stage of the product life cycle "growth" is presented as a mathematical model of stochastic programming:

$$\max L_1 = \sum_{j=1}^{n} \bar{c}_j x_j \quad ,$$

$$\sum_{j=1}^{n} a_{ij} x_j \le b_i \ \ (i = 1,\ldots,m),\ P(x_j \ge N_j^{\min}) \ge \alpha_j\,,$$

$$P(x_j \le N_j^{\max}) \ge \alpha_j\,,\ \ j = 1,\ldots,n\,, \tag{8}$$

where $\bar{c}_j$ is the mathematical expectation of the cost of the product of the j-th type; x_j is the amount of the product of the j-th type that is planned for manufacturing; a_{ij} is the cost of manufacturing a unit of the product of the j-th type; b_i is the resource of the i-th type; $N_j^{\min}$ is the minimum demand for products of the j-th type; $N_j^{\max}$ is the maximal demand for products of the j-th type; α_j is the given probability level.

3 Conclusions

The proposed integrated automaton model provides a formalized presentation of procurement management tasks that may arise at all stages of the product life cycle. Using the formulated optimization mathematical model will enable determining the main parameters of procurement management tasks at the stage of product "growth".

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Realization of the principles and methods of management in the system of rendering additional sports and tourist services (on the example of "Aqua Weekend")

Natallia Shkuleva[1*], Angelina Borisevich[2]

Belarusian state pedagogical university named after Maxim Tank, Sovetskaya Str. 18, 220050 Minsk, Republic of Belarus

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

Abstract

In the modern high-growth world there was a significant jump in the information plan that contributes not only to information technology development, but also personal development in general. However, you should not forget that the experts working full time are not in time fully it will be restored by next working week.

Therefore we offer such author's program "AQUA WEEKEND" which will promote not only relaxations of the person, and to development of the economic relations in tourism industry of Republic of Belarus.

Tourism is a type of activity which scales as the economic and social event for the last decade significantly extended. Considering close attention of the international organizations and public authorities of many countries to services in the field of tourism, this direction of activity and, respectively, its state regulation is quite relevant, including for Republic of Belarus. So, regulation of tourist activity is carried out by public authorities of various levels of the power.

Keywords: relaxing, services, games

1 Introduction

Features of management can be considered as need of realization of certain principles. The principles and methods are obligatory characteristics of theoretical fundamentals of any science. The realization of the principles of management is enabled by application of various methods. According to the level of development of science the revealed and formulated regularities become the principles and play a part in activity implementation, at the same time having an impact on the choice of methods of management. However between these categories there are certain distinctions, in particular on degree of obligation of their realization. If use of the principles is obligatory in certain conditions as they are manifestation of objective regularities, then application of methods of management is not determined and allows alternatives.

2 General

Among the Belarusian authors of the most widespread the point of view according to which methods are ways of impact on the operated object for achievement of the goals is. The method of management characterizes the finished act of impact on object of management. Methods reflect important characteristic of administrative activity: they describe how control is exercised. At the same time the ways of implementation of administrative activity applied to statement and achievement of the goals of the organization can act as management methods. Therefore we consider that at the AQUA WEEKEND organization we need to consider these methods.

The essence of methods of management is defined by the nature of influence which is caused by dialectic interaction of the purposes of the organizing influence on object of management, specifics of activity and the means used for its management. Realizing this or that task of management, different methods serve achievement of the goals of practical management. They provide such system of rules, receptions and approaches which allows to enable statement and realization of goals with the smallest expenses of time and other resources.

By consideration of essence of methods of management the result as their application specifies how it can be reached surely is meant. Meaning result in the essence, methods of management are directed to its effective achievement. Therefore, methods as fundamental theoretical category are of great importance for their implementation [3].

Methods of management can be applied in the course of all administrative activity. At the same time various enterprises, associations and groups of workers act as the operated objects. Orientation of methods of management always same – on the people who are carrying out different types of work including tourist.

The principles of management are understood by us as the fundamental ideas, regularities and rules of conduct of heads on implementation of administrative functions. The basic in management is the principle of an optimum combination of centralization and decentralization in management, optimum distribution (delegation) of powers

at adoption of management decisions:

- the principle of skillful use of one-man management and collective nature in management. The collective nature assumes elaboration of joint or collective decision on the basis of opinions of heads of different level and also performers of concrete decisions;
- the principle of scientific validity of management, i.e. all administrative actions have to be carried out on the basis of application of scientific methods and approaches;
- principle of planned character, i.e. establishment of the main directions, tasks, development plans for the organization in the long term;
- the principle of a combination of the rights, duties and responsibility, i.e. everyone in the organization is allocated with particular cases, bears responsibility for performance of the tasks assigned to it;
- the principle of motivation, i.e. the more carefully managers carry out the system of encouragement and punishments, the program of motivations and motivation of people to activity for achievement of the goals of the organization and the personality will be more effective;
- the principle of democratization of management — participation in management of all employees of the organization.

At the organization of additional tourist services "AQUA WEEKEND" we adhere to the following theoretical installations which we explain to our visitors.

Swimming as a type of activity is characterized by considerable degree of complexity. Correctly organized process of occupation swimming has the versatile developing impact on the person and has the high level of mobilization of functionality of engaged. Volume not only motive ability and skills, but also knowledge increases, physical qualities and mental capacities develop, moral and esthetic senses, strong-willed qualities are cultivated, the conscious and responsible attitude to the acts, to relationship is developed [1].

The technique of training relies on the all-pedagogical principles taking into account individual approach to everyone: consciousness and activity, systematicity, presentation, availability.

The conscientious and active attitude to occupations is of great importance for achievement of positive results. Understanding of sense of tasks stimulates the interested and active performance them, promotes gradual assimilation and awareness of value of exercises. It induces engaged to carry out movements as it is possible better, more accurately. He shows more independence, creativity if work consciously, understanding that it is necessary to make certain efforts for achievement of the goal. From that, how emotionally, classes are interestingly given, also the level of digestion of the offered material depends.

The consciousness and activity of engaged increases at analysis of occupations, observations of others and assessment of performance by them the movement. It is promoted by the simplest methods of self-checking and also the help each other when performing tasks by couples or groups. At systematic occupations the sequence, frequency, both in the organization of occupations, and in arrangement of the general material is carried out. At regular training alternation of physical activity and rest is obligatory, change of different types of activity, alternate performance of exercises and games is useful [2].

The main form of rendering fizkulturno - tourist services in the «AQUA WEEKEND» system are the classes given on water. The expert rendering this type of service itself selects and packs the systems of exercises and games, considering the sequence of loading and rest, and also specifics of work of engaged. One of important components in the organization of occupations is the room and stock. The room for training has to be equipped with the necessary devices allowing to control and maintain water temperature, air, humidity according to hygienic requirements. That occupations were safe for health and life, it is necessary to have the corresponding stock and the equipment. The supporting means and various stock are intended for the most effective organization of occupations, carrying out various exercises and games - it is boards from polyfoam, rubber circles, balls, small counters, nudlsa, hoops their quantity and color scale has to be as much as possible various. It is necessary to apply supportive applications purposefully and methodically correctly, otherwise their use does not lead to positive results.

3 Conclusions

Transformation of a game situation into relaxing promotes consecutive transition from simple - to difficult. The game method is widely known in physical training and a sports training. It is possible to realize possibilities of this effective method in many respects with the help of the applied games and entertainments which allow successfully not only to solve specially objectives, but to emotionally unload engaged. Application of games in this program helps to provide emotionality of occupations. A game on water helps to get rid of fear, to study swimming movements. Games, various on the motive contents, promote improvement of skills of the main movements, development of motive qualities, optimization of psychophysiological functions, restoration of physical and intellectual working capacity. Everything listed promotes restoration of an organism, implementation and realization of goals and tasks of rendering additional tourist services by the adult and children.

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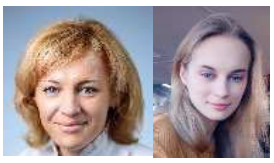
Organization of educational process in specialized sports classes in synchronized swimming in the institutions of general secondary education in the republic of Belarus

Natalia Shkuleva[1*], Nastassia Shkuleva[2]

[1]*Belarusian state pedagogical university named after Maxim Tank, Sovetskaya Str. 18, 220050 Minsk, Republic of Belarus*
[2]*Belarusian State University of Physical Culture, Pobediteley Avenue. 105, 220020 Minsk, Republic of Belarus*

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



Abstract

Guided by the State program of development of physical culture and sports in the Republic of Belarus for 2016 - 2020, approved by the Council of Ministers of the Republic of Belarus from 12.04.2016. №303, which States: "the Development of physical culture and sports is one of the most important areas of the state social policy, an effective tool for improving the nation and strengthening the international image of the Republic of Belarus", as well as in accordance with the Program of the Government of the Republic of Belarus for 2015, approved by the Council of Ministers of the Republic of Belarus on February 18, 2015 № 110 "Ensuring the availability and quality of education services is the goal, aimed at preserving and strengthening human potential for sustainable development of the state. One of the mechanisms to achieve this goal is to provide an opportunity to carry out specialized training in the X-XI classes of General secondary education institutions, combining the study of subjects at an advanced level and the conduct of professionally oriented optional classes".

Keywords: synchronized swimming, section synchronized swimming, school

1 Introduction

From 2015/2016 academic year at the III stage of in institutions of General secondary education introduced specialized training, which provides for the study of individual subjects at a higher level and optional classes of professional orientation (professionally oriented courses) to focus on teaching, military and other specialties.

2 General

The study of subjects at a higher level is organized in the mode of a five-day school week, and the study of professionally oriented and other optional classes is advisable to carry out on the sixth school day. Students enrolled in these classes must have at least 7 points in their major subjects, and the average score in all other subjects must be at least 6. In the Republic of Belarus, a wealth of experience in the organization of specialized sports classes in institutions of General secondary education. "Specialized sports classes are created to provide conditions for the organization of the training process and its rational combination with the educational process in order to prepare the sports reserve and (or) high-class athletes" [4]. For the implementation of the teaching process, students in these classes at a higher level and in-depth study of physical culture.

"The order of activity of classes specialized in sports, terms, the order and features of carrying out selection of the persons capable to achieve high results in a separate sport, the order of reception of persons for receiving primary education, basic education, secondary education in classes specialized in sports, and also features of the organization, carrying out and providing educational and training process with the pupils studying in classes specialized in sports, except for classes specialized in sports of Suvorov schools, the procedure of organization and carrying out of selection of persons for acquisition and the features of organizing, conducting, and providing them the training process" established by the decree of the Ministry of sport and tourism of the Republic of Belarus, the Ministry of defence of the Republic of Belarus and the Ministry of education of the Republic of Belarus [3].

The educational and training process is carried out in accordance with the schedule of classes and the peculiarities of the training process in the sport, considering the mode of the extended day group.

Admission to a specialized sports class is carried out from among the students who have shown good sports results in competitions, have passed a medical examination. Admission is carried out without entrance examinations in academic subjects. "In the direction of specialized educational and sports institutions, a specialized sports class in the institution of General secondary education can be formed from students representing several sports" [3]. In a specialized sports class in the educational institution of secondary school №47 of Minsk 27 students were trained. Of this number of students, 4 girls were engaged in synchronized swimming, the rest of the students were representatives of other sports: hockey, women's football, swimming, pentathlon and fencing.

Synchronized swimming is considered one of the most refined and graceful sports in the world. Behind the apparent

lightness and beauty of the so-called "ballet on the water" are hidden years of serious training.

In the synchronized swimming section, girls are taken from the age of 12, when their vestibular apparatus is fully ripe. By this age, they should be able to swim and confidently stay on the water, but this option is suitable for those who do not set the goal of achieving high sports results. The training process begins at the age of 7-8 years. By this time the girl must master elements of sports swimming. It is important that she expressed her own desire, was not afraid of water, listened carefully to the coach. In modern conditions early specialization increasingly meet situation, when girls take in synchronous swimming in 4-5 years. Initially, the group recruited everyone, and after two years of physical fitness testing. Selection takes place on several criteria: anthropometric data on physical fitness, as well as not a little important role played by selection in appearance.

The educational and training process with students of a specialized sports class is carried out in accordance with the training programs on sports for specialized educational and sports institutions approved by the Ministry of sports and tourism of the Republic of Belarus. In the group of initial training is conducted 2-3 times a week for 2 hours. The older the girls, the training process becomes more meaningful and diverse. In accordance with the periods of maturation of athletes, the load becomes more severe and the duration of training increases. Starting from the 5th grade, morning training is held from 7:15 to 10:00. It includes training in the gym for one hour and the remaining time on the water. At 11:05, school starts and ends at 15:40. After the end of all lessons, evening training. It starts from 16:45 to 18:30. Evening homework.

The curriculum of a General education institution for sports-specialized classes does not include hours of study on the subject of "Physical education and health", all other subjects are studied in the same way as in a regular school. Certification of pupils on the subject "Physical culture and health" for a quarter, a year is carried out by the teacher of physical culture on the basis of an extract from the Protocol of delivery of the educational standards defining level of physical preparedness and theoretical knowledge of pupils provided by the curriculum on the subject "Physical culture and health" [4].

We conducted a survey of students specialized in sports classes to study their attitude to sports and attitude to the profession of coach. 40 students of secondary school №47 of Minsk took part in the survey. On a question:

"Do you like your sport?" - 97% of respondents answered: "Yes", 0% - "no", 3% - "probably".

"Do I want to practice my favorite sport?": 68% - "Yes", 17% - "no", 15% - "probably".

"Do you follow the country's sporting events?": 21% - "Yes", 52% - "no", 31% - "probably".

"I want to win prizes at competitions?": 98% - "Yes", 0% - "no", 2% - "probably".

"Do you want to go to the Olympic Games?": 61% - "Yes", 13% - "no", 48% - "probably".

"I want to finish school successfully?": 87% - "Yes", 0% - "no", 13% - "probably".

"Do you like the profession of a coach?": 47 % - "Yes", 15 % - "no", 38% - "probably".

"Are you ready to take a course of optional classes "Introduction to the profession of a coach for further admission to higher education institutions in the specialty related to physical culture and sports?": 20 % - "Yes", 31 % - "no",49 % - "probably".

3 Conclusions

Analysis of the results of the survey and the answers suggests that graduates of specialized sports classes meet the requirements of the "Regulations on specialized classes", who attended the optional course "Introduction to the profession of coach", can be potential candidates for admission to higher education in the specialty "Coaching in sport", on the grounds provided in the Regulations on specialized classes.

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The analysis of global tourism industry development in Uzbekistan

Bekzod Halilov*, Jevgenija Dehtjare

ISMA, 1/6 Lomonosova str., Riga, LV 1019, Latvia

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

Abstract

The purpose of the paper is to describe the characteristics of global tourism industry development in Uzbekistan and to consider the components of tourism industry. Statistical data on the level of development of tourism industry are being presented. Discusses various tourism trends and examines their strategic impact on economy of the country in international examples. The authors make a comparative analysis of tourism industry in both the countries which are considered to be the leaders in this sphere, as well as in the emerging countries such as Uzbekistan. The relevance of this study is determined by the need to promote and develop new models of tourism in Uzbekistan. The perspectives of the development of tourism industry in Uzbekistan are presented on the example of Silk Road Destinations.

Keywords: Global tourism industry, Economics of tourism, Silk Road

Uzbekistan has been a hub of tourism, natural beauty and cross-culture and it is an emerging country and ideal hub for regional as well as international tourists. It has unique location at the crossroads of the Silk Road which has always connected people, minds, projects and civilizations.

Over the past decades, tourism has experienced continued growth and diversification to become one of the largest and fastest growing economic sectors in the world. According to United Nations World Tourism Organization (UNWTO), hospitality and tourism's contribution to world GDP grew for the fourth consecutive year in 2013, helped especially by strong demand from international travelers. Visitor exports, the measure of money spent by these international tourists, rose by 3.9% at a global level year on year, to US$1.3 trillion, and by over 10% within South East Asia. The World Travel and Tourism Council (WTTC) estimates that tourism contributed 9.4 % of global Gross Domestic Product (GDP) and forecasts that this will continue to grow at over 4 per cent per annum during the next ten years. WTTC forecasts that the annual turnover of business tourism will increase by 3.7% over the next ten years and will grow from $1.15 billion in 2016 to $1.7 billion in 2027.

The object of the study of this paper global tourism industry development in Uzbekistan.

The subject of the study is the perspectives and barriers to development tourism industry in Uzbekistan.

The aims of the article:

1. To examine theoretical aspects tourism industry and give a detailed analysis of the Uzbek tourism and hospitality industry;
2. To observe distortions and problems hindering the development of tourism sector;
3. To study the specific character of the development of tourism in Uzbekistan on the basis of Silk Road Destinations;
4. To evaluate the current state of the resources and infrastructure for the development of tourism in Uzbekistan;
5. To develop appropriate recommendations and strategies for the model to be implemented in Uzbekistan tourism industry.

During the research both theoretical and empirical methods of analysis were used.

Tourism is an important factor in the dynamic development of Uzbekistan's national economy. It has diversified geography having more than 7,000 monuments of different epochs. It is the hub of many rich and ancient civilizations, many of which are included in UNESCO World Heritage list.

The government of Uzbekistan projects its rich culture and ancient civilization in all the major events, which bring together representatives of the tourism industry from around the world to discuss the main trends of the industry dynamics and business linkages. Since 1995, in the fall Uzbekistan annually holds Tashkent International Tourism Fair (TITF). This forum is a good platform for a constructive dialogue of partners operating in this sphere. Uzbekistan's government has also started the project "Hosted Buyers" which was the main innovation at TITF 2015. Hosted Buyers is a specialized program of business meetings, for which special privileged buyer is pre-invited with a specific purpose that is to meet with interested partners and arrange for the sale of products, goods and services or implementation of a special joint program or project. Every year Uzbekistan has been holding the International exhibition "World of rest" since 2013 which opens the spring and summer tourist season in country.

In particular, since 1993 Uzbekistan is a member of the World Tourism organization (UNWTO), which unites more than 150 countries. Since 2004, regional center of UNWTO

on Silk Road is located in Samarkand, which coordinates support for tourism on this transcontinental highway. Uzbekistan's tourism has developed entity due to which has created favorable conditions for businesses involved in the provision of tourism services. According to 2015 data, there are 1279 tourist organizations in the country, in particular 548 hotels, hostels and campgrounds and 731 travel companies.

An ever-increasing number of destinations worldwide have opened up to, and invested in tourism, turning it into a key driver of socio-economic progress through the conception of jobs and enterprises, export revenues, and infrastructure expansion. Despite occasional shocks, tourism has shown virtually uninterrupted growth. International tourist arrivals have increased from 25 million globally in 1950, to 278 million in 1980, 527 million in 1995, and 1133 million in 2014. Equally, international tourism receipts earned by destinations worldwide have surged from US$ 2 billion in 1950 to US$ 104 billion in 1980, US$ 415 billion in 1995 and US$ 1245 billion in 2014. Intercontinental tourist arrivals worldwide are expected to increase by 3.3% a year between 2010 and 2030 to reach 1.8 billion by 2030, according to UNWTO's long term forecast Tourism Towards 2030 ('National Company "UzbekTourism"', 2014).

Since independence, transportation links (airports, roads and railways) in Uzbekistan have been improved. Civil aviation industry plays very important contributory and supporting role in the development of tourism industry. Uzbekistan has advanced civil aviation industry in the country due to which airports in Tashkent, Samarkand, Bukhara, Urgench, Navoi and Fergana have been modernized. Now it has 11 international air harbors. National air carrier "Uzbekistan Airways" has the most modern airliners, Boeing and airbus, which carry out regular flights to over 50 cities of Europe, Asia, Middle East and North America.

It should be noted that Uzbekistan is in the list of the safest countries in the world. However, the analysis of the tourism sector in Uzbekistan allowed finding several problems as well. Considering of economic importance of tourism, this sector is still in the process of developing. It is high time for the governments, travel companies, hotels and other associated organizations and companies to think seriously about tourism.

Analysis of international business tourist attractions helped to reveal the important impact of tourism such as economic growth of the region, creation of new job opportunities, development of infrastructure and tourist awareness.

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Research of organization metadiagnostics algorithms

Gleb Akimov*

ISMA, Riga, Latvia

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

Abstract

The study is dedicated to finding the place of an organization in a predetermined strategic space. The proposed approach allows the organization to stay on track and head towards the intended goal. This is achieved by detecting deviations in the initial stages of their nucleation.

Keywords: place, course, detection, position, arsenal, perspective, signs, development

1 Introduction

The study was based on two pre-references. On the one hand, we are talking about the consideration of the system from the perspective of the system itself. In contrast, the position of a higher order system is taken into account, which corresponds to the level of the metasystem [1]. As a result, the famous metasystem contradicts the conventional understanding of systems. The highlighted contradiction allowed us to formulate a problem, within the framework of which it is not possible to carry out the organization's metadiagnostics without the ability to determine the strategic position of the organization [2].

As a result, the object of the study is the skills that allow you to isolate what allows you to keep the arsenal entrusted to the organization in working order.

2 Formulation of the problem.

The purpose of this study is to develop a procedure that will support the organization in working condition in the medium term.

In accordance with the stated goal, the following tasks were set:

- establishment of a special group of observation parameters, the distance beyond which indicates an entry into the zone of special attention [3];
- definitions of conditions for reducing controllability, the emergence of a shortage of time, as well as manifestations of conflicting interests [4];
- identifying the dynamics of symptoms that may delay the achievement of the goal and the solution of tasks, endanger the planned process [5];
- recognition of the signs of "pain points" by examining the main results.

Solving these problems will allow us to approach the development of uniform objective means of metadiagnostics.

3 Conclusions

With the help of the developed algorithms, a basis is formed for the organization of the metasystem responsive to changes in external and internal conditions occurring at any stage of enterprise development.

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Algorithm requirements for the examination of organizations

Abilkhan Amangeldiyev*

ISMA, Riga, Latvia

**Corresponding author's e-mail: ab080161@gmail.com*

Abstract

A new approach on preparation of conclusions regarding the efficiency of the organization. During the research phase a confirmation on the degree of sustainability is given. In addition, previously implemented recommendations are considered, which give the organization higher chances of success in accordance with the inferred and later made efforts.

Keywords: reliability, principles, sustainability, conflict, skill, procedure, conclusion

1 Introduction

The contents of the research on one hand are justified by the inspection, which is required for objectively understanding the current management level of the organization, whilst on the other hand the need for suitable technology, corresponding to the principles of building a stable and sustainable system of control [1-3].

The objectivity of such inspection, carried out in accordance with the standard rules, is in contradiction with the organization principles that have a unique character to them.

In this case, the subject of the research is the mastery level of the expert, who is carrying out an independent research on the company's activity [4-6].

2 Approach

Goal of the current research is the development of the procedure, which allows to not only provide up to date, objective conclusions on the current affairs of the organization, but additionally when problems are discovered, to offer a program for restoring missed organizational opportunities. In accordance with the set-out goal, tasks are formulated in the following way:

- develop a complex of measures, in conformity with the expertise organization technology accordingly with the organization;
- organize a set of indicators, which will be implemented at certain development stages of organization;
- develop specification forms, on the basis of which diagnosis and performance restoration measures will be provided;
- prepare a document with expertise conclusion.

As the put forward tasks generate solutions, a careful selection process of specifications, which will be used during the process of full-scale inspection is carried out.

3 Results

The proposed approach creates systematic thinking. The developed algorithms are aimed at practicing the skills of creating, debugging, testing and maintenance of complex control systems. Use of the approach is intended for any user interested in the ability to implement a well calibrated system in their work.

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Algorithms for diagnostics of the financial condition of the insurance company

Aleksei Bezmaternykh*

ISMA, Riga, Latvia

**Corresponding author's e-mail: al-136666@yandex.ru*

Abstract

In the present study procedure and methodological approaches of the diagnostics of the financial condition of the organization are proposed.

Keywords: diagnostics, methods of diagnosing the financial condition of an enterprise, problems of diagnostics, anti-crisis management decisions

1 Introduction

In this study, a fundamental diagnostics of the financial condition of the company from the perspective of owners for internal use and efficient financial management is described. In order to ensure the survival of the enterprise in the current environment, staff must, first of all, be able to realistically diagnose the financial condition of both their enterprise and potential competitors operating on the market.

The problem of this study is the lack of objective tools of comprehensive analysis of the financial condition of the company [1-4].

The object of the research is the changes recorded in the assessment of two financial states of the insurance company D2 Insurance JSC.

The subject of the study is theoretical and practical research and the results of changes in the financial condition of enterprises, which became the basis for the development of mechanisms for fundamental diagnostics [5-6].

2 Features of diagnostics of financial condition

The purpose of this work is to develop a procedure that provides effective management of the financial activities of the enterprise.

To achieve this goal, the following tasks were**:**

1. to consider the theoretical position of the basis of diagnosis of the financial condition of the company;
2. to determine the main methods for diagnostics of the financial condition of the company;
3. to consider the system of indicators characterizing the level of the financial condition of the company;
4. to develop a comprehensive procedure for full-scale diagnostics of financial condition;
5. to test the implementation of the procedure within the framework of D2 Insurance JSC.

The scientific novelty of the study consists in developing the theoretical and methodological foundations for diagnostics of the financial condition in relation to insurance companies, as well as forecasting the development of a crisis of the financial condition of companies in order to improve the quality of information and analytical support taken by effective anti-crisis decisions at various hierarchical levels of management in an unstable economic environment.

3 Results

The practical significance of the results of this study lies in the fact that the proposed procedure and methodological approaches for diagnosing the financial condition of organizations can be used as a scientific and methodological basis in studying the possible occurrence of the financial crisis of companies.

The results obtained contribute to the formation of information and analytical support for making anti-crisis management decisions to minimize the effects of the financial crisis of the enterprise.

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Debugging of the algorithms measuring the image of organisation

Kirill Dubson*

ISMA, Riga, Latvia

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

Abstract

Researching is devoted to measuring of reputational ingredients of the enterprise at any moment of the time which allows it to coordinate it's further actions. The measurrment is condacted long-termed perspective on the bases of means through evaluation of the value none material actives. Comparing the measuring results work out the decisions connected with the growth or falling popularity of the organisation.

Keywords: coordination, unpopularity, doubts, procedure

1 Preconditions for researching appearance

The majority of typical mechanisms of measuring none material actives hinder the workout of the demands necessary for the unique measurment of image for newly created organisations. On this background traditional means of image measurment have not only controdictory character but also controdict to each other [1].

The research problem lies in inability of conducting the image measurement of the organization without understanding the reason of its unpopularity as well as doubts appearing at its potential participants [2].

Thus, object of the research presents by itself process of the skill formation, which gives opportunity to find key factors of the destruction the image of the organization [3].

2 Setting the task of the research

The propose of the research is the development of the procedure, allowing to conduct debugging of the evaluation and measuring none material actives of the organization, including its image.

The fundamental aims of the research are:

- classification of evaluation methods of the perspectives of view [4];
- detection of imprecision and removal of consequences of their corrections;
- collection and processing of business information, on the base, which forms knowledge of contradiction supposing changes ;
- presentation in digital format strategic coordinates of the organization's image.

Solution of the settled task happens in the course of the creating of the scientific research club НИК «ПОИСК»

3 Research results

Developed by treatment gives opportunity to define degrees of readiness operating club team to escort system of the organization on different stages of development.

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Research of metasystem accompanying algorithms

Irina Kazina*

ISMA, Riga, Latvia

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

Abstract

Prompt approach of control system incapability to react to external environment is examined. Lack of an appropriate management mechanism suitable for particular perturbation of a control system can significantly harm the organization. Determination of the current state of an organization within the given boundaries will allow to reduce the time of misalignment of interacting subsystems.

Keywords: effctiveness, changes, efficacy, independence, interference, regulation, hierarchy

1 Problem exposure

Efficacious standardized of subsystems comes in contradiction with measurements of the effectiveness of system [1].

As a result, it has established that it is inexpedient to carry out the improvement of the individual subsystems without knowing of their contribution to the overall performance of the system [2, 3].

The indicated problem allows, maintaining the independence of individual elements of the system, to develop the ability of the organization to accompany the system against the background of changes in the external environment.

Thus, the object of study is the formation of the skill of recognition of unauthorized interference in a stable process.

This fact leads to a violation of the principle of independence of the algorithm instructions from the input data.

2 Description of task statement

The aim of this research is oriented towards debugging the control system, alligned with requirements towards metasystems [4].

Based on the formulated aim the follwing tasks are set:

1. Research of cases of work capacity loss
2. Clarification of reasons of a stable operation loss of an organization
3. Classification of types of reactions on external enviroment impact
4. Systematization of factors, confirming control system affiliation with certain class of metasystems.

Finding a solution to the given tasks will allow to formulate specifications which characterize work of a well adjusted system [5].

3 Research results

During the researh a hierarchy of values was developed, based on which the state of an organization after detected external environment changes may be established; when necessary a set of measures for recovering loss of work performance of the organization may be offered.

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Algorithms for recovering a sense of loyalty of the organization

Dina Kelsina*

ISMA, Riga, Latvia

**Corresponding author's e-mail: d.kelsina@gmail.lv*

Abstract

A new approach of measuring a multi-user loyalty is proposed. This approach allows to ensure the development of the organization in the long term perspective. An effective scenario of the development is implemented on the basis of the consistent identification of cause came from the mistrust on the part of potential participants in the organization.

Keywords: programs, reviews, stereotypes, problem, implementation, violations, manual, recommendations

1 Introduction

Many typical offers which come from loyalty programs developers, conflict with the negative feedback from their users because of the low impact of their implemented tools.

That is why the organization must have an objective tools of measuring loyalty before it decides to implement the proposed program. This tools should allow to overcome the negative stereotypes that exist around loyalty [1-3]. An expert in the field of loyalty should feel its importance throughout the entire loyalty program implementation [4].

The object of the study is to assess the expert's readiness to recover the lost sense of loyalty.

The algorithms are performed as a subject of this research on which basis the effective measurements of multi-user loyalty will be developed. Such loyalty is considered in the context of calling counterparties to repeat the transaction before and after the violation of the norms of behavior of one of the organization's participants.

2 An approach

The purpose of this study is to develop a procedure that measures the loyalty program before and after its implementation. In accordance with the goal, the following main tasks are solving:

- finding out the reason for the ineffective use of loyalty programs;
- assessment of the qualified expert in the field of establishing trusting relationships among the participants of the organization;
- developing of scenarios for the organization development in the context of altered targeting;
- preparation of a manual that includes violations of the norms of behavior.

The listed tasks became the basis for the development of the procedure, which prevision is the requirements for the development of the desired algorithms.

3 Conclusions

The developed algorithms gives a chance not only to restore the sense of loyalty, but to improve conditions of the organizational skills in the threshold of the norms condition, which have been established for habitual behaviour of participants of the organization.

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Algorithm on adapting the user on methodological research

Rostislav Kopitov*

ISMA, Riga, Latvia

**Corresponding author's e-mail: rostislavs.kopitovs@isma.lv*

Abstract

A new approach organizing complex activities in conditions of continuous serious influence of the environment on the modern enterprise. This approach will allow management companies react to external challenges by responding accordingly. This is achieved through the use of efficient control mechanisms.

Keywords: connection, separation, choice, commitment, efficiency, performance, system hierarchy

1 A brief statement of the problem

Considering the assumptions on management technologies, in particular that they are inflexible towards the new stages of organization' natural life cycle, distort its intended use, which has become the issue of the research [1-7]. The contents are summarized into the following statement: "It is impossible to measure the effectiveness of company affairs in the absence of means of assessing the performance of its organization." Acknowledgement and understanding of the problem' existence have allowed to identify the object of control, which is in connection with the ability to join the segregation in the context of the system [8-11].

2 Itemized statement of the problem

The primary task of the research is orienteered towards the algorithm development intended for distribution of organization' powers in an efficient manner taking the resources into account. For its completion four objectives need to be addressed:

1. Conduct an audit of organization' current resources.
2. Identify misunderstandings, which arise during the resource allocation of the company.
3. Develop rules, concerning the inefficient use of resources.
4. Implement control over the whole process of the company.

According to the results of the procured solutions, development of problem-solving skills occurs for identification of barriers preventing to obtain objective assessment on the current state of affairs of the company.

3 Conclusions

Development of the algorithm allowed to prepare a detailed plan of expertise for the enterprise, which includes more than seventy points, hence giving the organization an opportunity to obtain effective management solutions.

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Specificity of value based algorithms

Rostislav Kopitov, Karina Skucka, Elena Smirnova, Valerija Tumanova, Galina Varpa*, Anna Zasuha

ISMA, Riga, Latvia

**Corresponding author's e-mail: galinavarpa@inboxlv*

Abstract

Value is an integrated indicator of a sustainable functioning of an enterprise. Its measurement is carried out in consideration of standards established in working management systems. The loss of functioning is determined by the discrepancy in the results obtained with a pre-set goal.

Keywords: performance, value, realization, conclusion, normative, factors

1 Introduction

There are many approaches in assessing the value of an organization, however, their practical use is rarely carried out in an appropriate way [1-6]. It is impossible to give an objective conclusion about the current state of an enterprise, in the absence of definition means of the changes occurring in the organization. Using this approach, decision making takes place in conditionally defined standards, which is leading to distorted accuracy of the conclusions drawn [7-11].

2 An approach

In the basis of this work were set goals: to development of a cost measurement procedure based on well-founded standards.

Implementation of the approach requires the solution of the following tasks:

1. Choice of management technologies related to the cost evaluation [12].
2. Maintenance of the cost formation system from the position of methodological principles.
3. Classification of assets contributing to the value.
4. Systematization of cost increasing approaches.

3 Results

This approach changes the attitude to the value characterizing the fourth level of the hierarchy and establishes its use as a mechanism for decomposition into elements. Thus, having established controlled parameters for each level of the organizational structure, it was possible to reconsider the position of the organization.

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Development of algorithms for full-scale protection of the organization

Azir Mamedrzayev*

ISMA, Riga, Latvia

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

Abstract

A new approach is proposed for the assessment of the readiness of the security service to fulfill its duties in the context of ongoing changes in the organization. Its implementation increases the effectiveness of the security system of the organization at all. This is achieved by identifying cases when vigilance on the part of staff was lost at the stage of introducing new technological tools.

Keywords: automation, manual mode, responsibility, readiness, requirements, assessment, recommendations

1 Formulation of the problem

Analysis of the condition of security systems has revealed two extremes. On the one hand, when the organization's protection is carried out automatically, human participation is minimized, and, opposite, in the absence of any technological means, the role of the human factor is maximal.

In this case, the introduction of new automated tools, by causing a decrease security responsibility level of the personnel, generates instances of its unwillingness to provide full protection to the organization in cases of a temporary suspension of the system [1].

Against the background of the detected contradiction, the problem which causes the violation of order was revealed. It is impossible to introduce new elements of the organization's security in the absence of personnel readiness assessment tools to operate the security system as a whole [2].

The object of study is related to the assessment of the current state of the organization before and after the next change [3].

2 Description of the approach

The purpose of this study is to develop a procedure which ensure the checking of readiness of personnel in the context of an improved version of the organization's security system. In accordance to this goal, the following main tasks are solved:

- survey of nodes of the initial hierarchy of value, on which basis the current state of the organization is assessed;
- development of manual for the preparation of recommendations, in case of detection of deviations in the organization functioning;
- study of standards for assessing the significance of attributes which are involved in assessing the current condition the organization;
- development of the event programs' in order to improve the means of organization's protection.

3 Results

On the basis of the developed hierarchy of values, eight basic foundations were identified, they allow not only to allocate more than forty technological means of the business protection, but also to form a system of evidence in favour of making the next changes taking into account a given level of personnel readiness.

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Development of the algorithm for the elaboration of the requirements for the creation of the scientific-research club

Alina Merencova*

ISMA, Riga, Latvia

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

Abstract

This research is devoted to the development of the approach that will allow assuming responsibility for the implementation of the existing potential of the scientific-research club. In the course of this implementation, the characteristics of future activities have been elaborated, the prerequisites for the formulation of the requirements for the creation of the club have been developed, and the priority areas of the operation have been worked out.

Keywords: inspection, training, alternative, movement, team, competences, interaction

1 Introduction

The analysis of the activity of the existing scientific-research clubs has shown the diversity of their forms. However, at the initial stage of the creation of the club, the difficulty of determination of the range of interests of its potential participants has been established. In addition, it has been revealed that many types of the clubs of scientific orientation do not correspond to the volume of demand for research activities in general.

The problem of the research lies in the difficulty of identification of the correlation of relation of supply and demand under constrained conditions.

The object of the research is the team of the scientific-research club that is capable of overcoming constraining factors and developing a favourable correspondence of supply and demand, taking into account the needs of the market.

2 Description of the Approach

The objective of the research is the development of the procedure that ensures the specification of the requirements for the program of the implementation of the scientific-research club.

The main tasks of the research are the following:

- classification of the interests and identification of the demand for the research activities [1, 2];
- development of the competences and distribution of the powers between the organizers of the future club;
- systematization of the proposals developed by the club organizers [3, 4];
- start of the program on the creation of the scientific-research club.

Solution of the set tasks will allow proceeding to the program of the club implementation.

3 Conclusion

Within the framework of the proposed approach, the elements of interaction between the club organizers through the identification of the characteristics of the proposed activity have been worked out. Based on the developed algorithms, the requirements have been elaborated that not only allow choosing the priority areas of the work, but are also ensuring the degree of readiness of the club organizers to begin its implementation.

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Development of the reconstruction algorithms of the organization

Zhanna Mikryukova*

ISMA, Riga, Latvia

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

Abstract

An approach that allows determining the coordinates of the location of the organization within a certain strategic space before and after introduction of the significant changes to the organizational structure. This makes it possible to assess the consequences of the changes in a methodological and non-financial context at the initial stage of adoption of the decision concerning the implementation of a specific organizational transformation, including also the restoration measures, which, due to their intangible properties, are usually manifested in the later stages of operation of an enterprise. This prevents the introduction of inappropriate proposals that contradict the effectiveness of the system.

Keywords: location, methodology, prevention, doubts, effectiveness, indications, position, readiness, protection

1 Content of the task

The problem of the research has been revealed against the background of the obvious contradiction, which is relevant in a wide range. The accumulated arsenal of definite changes characterizes this range on the one hand, and the assertive position "to change nothing" on the other hand. In the first case, we are referring to the constant desire for changes that are caused by violations of sustainable functioning, various financial losses and delays in the fulfillment of contractual and planned obligations. In the second case, the protective syndrome "not to punish the insider" is arising, which is also strengthened by the factor of consistency that is caused by the fact of full satisfaction with the work of the management team.

Thus, within the framework of the specified range, the following contradiction is identified: "the restraining position is in conflict with the decisiveness of changes". This contradiction is based on the uncertainty in the medium term.

The identified contradiction allowed not only to approach the formulation of the research problem, but also to determine the reasons for its complex and long detection. The main reason is the reference of the proposed change to the monetary equivalent. Taking into account that each organizational change causes structural rearrangements, this ultimately affects the financial potential of the company's departments. As a result, the private interests dominate. In this regard, the independent evaluation tools of the contribution of each individual change to the overall effectiveness of the organization that are not related to the financial outcome are required. The so-called "reconstructed contrast" of the problem, which is reduced to the following formulation: "it is impossible to carry out organizational changes in the absence of indication of the consequences of their implementation for the organization in general", is reflected exactly in such context. The presence of clear guidelines regarding the orientation in the strategic space helps the management of the enterprises to gain a sense of strategic position [1].

The object of the present research, being the carrier of the identified problem, is reduced to the development of a strategic position estimation skill, which is detailed at the level of interpretation of the full set of attributes that are contributing to this position before and after the implemented modifications to the organizational structure for any period of time [2].

2 Specification of the task

The objective of the research is focused on the development of the procedure that ensures the assessment of the readiness of the organization's management team to act within the framework of the reconstructed norms after the redistribution of powers in the organization. Such norms are established on the basis of selection of those changes that provide an additional contribution to the operating efficiency. Their selection is carried out in accordance with the developed algorithms [3].

In accordance with the stated objective, the following *tasks* were set:

1. To conduct a detailed analysis of the activities that cause a violation of the reconstructed norms.
2. To develop the options for the distribution of powers under the new conditions.
3. To select the scenarios for the development of the organization in accordance with the established rules.
4. To develop the guidelines for the improvement of the whole process under conditions of reasonable intervention.

Solution of the tasks will allow restoring the missing potential of the organization, and the results of replacement of the norms of behavior in the organization do not affect its clients.

3 Main results

The developed algorithms allow not only to estimate the coordinate that is characterizing the current state of the organization, but also to determine its position relative to a given trajectory in the direction of the ultimate objective. In case of detected deviations, the measures for order restoration are elaborated.

Thus, a new coordinating-communicative mechanism for the full-scale protection of the organization against violations has been proposed [4].

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Algorithm for constructing a metasystem

Eliza Molotkova, Veronika Okuna*, Nabi Rashidov

ISMA, Riga, Latvia

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

Abstract

The research is dedicated to forming the knowledge of a right way to select an object, which allows in future to upgrade different fields of activity. That way, the elements of usage of organization's resources get worked up, which, in the end result, affects the process of recovering and creating a link between objects inside the system.

Keywords: design, expertise, contradiction, object, procedure, goals, approbation

1 Introduction

There were prerequisites for the research. First is about orientation on the design technology of system creation that allows to find non-standard solution for realization within the short time scope [1-3]. Second is about the expert approach that allows within the composition of purposeful system gain motivated conclusions along whole lifecycle of its realization [4]. Taking into consideration mentioned prerequisites, current research authors may face contradiction expressed in a way how to combine design and artistic forms of actions with expert tools for work with approved scientific data.

On it's background there is highlighted a problem of the research that is mainly about impossibility of correct way of making the object notable without proper resources of understanding its strategic position. Therefore, an object of the reseach is the development of skill of defining coordinates of position that is calculated on the basis of constructed hierarhical system of values.

2 Method

Addition to technologies of design using a way of expertise allows the building of a metasystem [5].

In this link, the point of research is aimed towards development of a procedure that provides the building of a metasystem.

In accordance with the formed aim, following tasks were given:

- Finding the reasons that disturb the realization of creation of the systems;
- Development of parameter systems, that allow for grading the level of organization's functionality;
- Development of a set of proposals revealing the advantages of metasystems;
- Development of requirements given to a metasystem;

Solving of tasks leads not only to the formation of systematic thinking [6], but also allows to acquire the skills of management [7].

3 Results

The proposed approach is tested in terms of assessing the anti-crisis state of the enterprise [8].

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Category wisdom: expert thinking development

Elena Santirasegarama

ISMA, Riga, Latvia

Abstract

There is proposed an approach on the basis of which effective actions are revealed forming a certain space for studying the sustainable behaviour of the enterprise. Dynamic analysing of this behaviour, the knowledge that reflecting the exceptional uniqueness of the organisation, which cannot be copied or acquired by competitors, is being formed. The accumulated knowledge makes the management of the company able to gain experience of timely influence on the challenges of the business environment.

Keywords: wisdom, behavior, expert thinking, originality, experience, boundaries, skill, forces, traps, overcoming

1 Task

According to DIKW (Data, Information, Knowledge, Wisdom) the category Wisdom is used as a certain storage of knowledge formed by separate productive actions in different time periods [1]. In system context the term of the Paper is not being considered what results in the emergent effect destruction.

Taking into account the comments made the indiscriminate addition of new knowledge has been determined to be contrary to the decision-making, which should take place in the context of the understanding the strategic position of the company towards the achievement of the final goal.

The contradiction arisen causes the problem of research: it becomes impossible to understand the behavior of the organization without the availability of means to determine the limits of the sustainable behavior of the enterprise [3].

The object of Paper associated with the formation of the ability to acquire new knowledge that does not contradict the movement towards the final goal stands out of this research [5].

2 Methods

The purpose of this Paper is to develop the calculation of the organization coordinates defined relative to the route laid.

In accordance with the stated aim the following tasks have been set:

- designing a hierarchy of values, taking into account the forces of organisation destruction;
- developing of the instructions not to get into the entrepreneurs' traps;
- getting the skill of finding areas of increased attention;
- forming the ability to overcome dependence of the unsystematic use of typical business organisation schemes.

The solution of the tasks is carried out in the conditions of the technique of experimental thinking according to the consequences of the imposition of new knowledge on the well-established conviction [5].

3 Conclusions

The results can be practically used.

The proposed approach makes it possible to develop the mechanism for understanding organizational traps calling for the deviation of the enterprise from the final aim. As a result, the organization becomes able to cut the unhealthy knowledge that hinders the development of the organization.

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Development of a mission assessment algorithm of an organization

Karina Skucka*

ISMA, Riga, Latvia

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

Abstract

Fragmental acquaintance with the structure of the mission leads to its superficial perception, which ultimately affects its effectiveness. As a result, the mission ceases to be a source revealing the purpose of the organization. To eliminate the existing deficiency in the present, the approach of Campbell and Yeung is used, which allows to obtain an objective compression of the content of a small formulation into the norms of behaviour. Such an approach is considered in the combination of two positions: in the context of a "sense of mission", which should be understood as a possibility of the organization's mission and in terms of a "strong mission".

Keywords: effectiveness, formulation, norms of behaviour, procedure, realization, life cycle

1 Introduction

Despite the fact that there are many methods of creating a mission, modern organizations still do not have a clear understanding of their purpose [1, 2]. The accentuated problem is the lack of an instrument creating a common understanding of the mission's meaning [3]. In this regard, the object of the study is a mechanism configured to preserve the organization's purpose throughout the organization's life cycle, giving the opportunity to not only implement a business idea, but also to carry out the chosen strategy.

2 Formulation of the problem.

The purpose of the study is to develop an assessment procedure for the mission of the organization, ensuring effective access to it by all employees of the organization.

Objectives of the study:

1. Investigation of features of the estimated mission assessment mechanisms.
2. Analysis of the Campbell and Yeung's diamond-shaped model.
3. Development of the procedure's implementation.
4. Implementation of the procedure on a specific project.

3 Results

The considered approach, is an orientated result of a continuous and long process, allowing to obtain effective means of the evaluation of a business idea in the course of its realization [4, 5].

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Recovery of the activity of an inoperative organization

Alena Tugarina*

ISMA, Riga, Latvia

**Corresponding author's e-mail: k0teiko@mail.ru*

Abstract

During the sustainable operation of the enterprise, the vigilance of the management team is lost. At loss of stability consultants are involved. In the first and second cases, management has no objective means to make a reasoned conclusion about the state of development of the organization. This study proposes a full-scale assessment approach to the organization's current activities.

Keywords: problem, value, measure, losses, delusion, exit, uniqueness, advantages

1 Introduction

Existing business valuation methods are focused on standard procedures that are tuned to a specific set of coefficients, which does not allow to assess the stability of the organization as a whole.

Assessment of the state of the business is impossible in the absence of diagnostic tools.

Management should have a diagnostic method that will allow making a timely and accurate diagnosis as well as provide measures for restoring activity.

2 Approach

The purpose of this study is to develop mechanisms for assessing the inoperative state of a organization.

In accordance with the stated goal, the following tasks were set:

- to classify business valuation methods, diagnose current state and further remedial measures [1-4];
- to systematize the factors that interfere with the functioning of the organizations [5. 6];
- develop measures to restore lost functionality, taking into account the means of fully diagnosing the organization [7];
- to evaluate the effectiveness of the developed mechanism [8].

3 Conclusions

In the course of solving the set tasks, the bases for the development of the mechanisms mentioned above are formed [9].

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Development of effective working capital management algorithms through time

Galina Varpa*

ISMA, Riga, Latvia

**Corresponding author's e-mail: galinavarpa@inboxlv*

Abstract

The company cash flow are invested in three areas: fixed capital, working capital and new investment programs. Working capital is a movable area in which the circulation of money. Money is converted into materials, labor and overhead for some time, but then takes on its original form. In the course of turnover, all participants in the organization are involved, who need to understand that working capital is an important area of investment. This understanding comes from studying the interrelationships of individual functions and finding areas of delay in turnover. As a result, causes of losses and profit reduction are identified. In such situations, the size of losses is determined, but the sources of their occurrence are not identified. This is due to the diversity of complex financial chains, which make it difficult to identify the real culprit of the violation of the terms of circulation.

Keywords: investments, delay, losses, delusion, exit, uniqueness, advantages

1 Introduction

Traditional financial reporting allows you to determine the amount of profit but does not hide the reasons for the increase or reduction of the cycle of capital turnover. As a result, according to the calculated coefficients, the company is in a stable state. But in case of financial difficulties, crisis situations are revealed. In fact is that the traditional algorithms of the current assessment are set for medium-term periods of time which, moreover cannot be divided with the real turnover cycle. I addition, investments in a specific area of working capital should be comparable to the funds that are created as a result of the investment made.

2 Problem

In the absence of funds for the temporary synchronization of cash investments and generated cash, it is impossible to get an objective pictures of business. As a result, the crisis is revealed too late, and the management of the enterprise which is in the network of financial delusions, declares the growth of the organization entrusted to it.

Object of study**:** The problem can be solved using the approach of E. Jones focused on the management of working capital through time [1]. Exploring at the level of time intervals, but not money, discrepancies that exist between departments and participants of organizations are revealed.

Purpose of study: Develop a procedure to ensure the effective management of working capital over time in a forwarding organization focused on true growth. Such a procedure is created by supplementing Jone`s approach with the concept of true growth of Reicheld [1, 2].

According on the stated goal the following research objectives were set:

1. Develop business models for the forwarding company;
2. Describe working capital management methodology;
3. Identify the working feature capital management through time [1];
4. To formulate the requirements that are predictable for true growth, taking into account the net profit that brings regular customers [2]:
5. To determine the factors of harmful profits created in the forwarding company [2].
6. Develop a procedure for managing changes in working capital through time in the face of genuine growth;
7. Test the procedure using the example of the company under investigation;
8. Think over the improvement of the procedure taking into account the mechanism of credit management according to the discount scheme [3].

3 Results

The results of this research will be useful to those owners who are interested in improving the effectiveness of strategic management of the company.

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Algorithm adaptation of the organization in the new conditions

Elyor Abdurakhmanov*, Alicia Alekseeva, Lidia Mishkina

ISMA, Riga, Latvia

**Corresponding author's e-mail: noone93@bk.ru*

Abstract

It offers an approach to help organizations how to be competitive and adapted to the external environment. On the basis of the developed algorithms, the ability of an organization to be susceptible to the external environment is being tested. Thus, it is possible to develop an effective management system, which is not only the key to the success of the organization of all companies, but also allows it to respond in a timely manner to the challenges of the external environment.

Keywords: competitiveness, external environment, management system, purposefulness, statistics, sustainability

1 Introduction

A preliminary analysis of the statistics of the elimination and survival of firms showed that the introduction of new changes is contrary to the preservation of signs of the control system [1-3]. The revealed contradiction made it possible to define the research problem: "It is impossible to introduce new technologies into the organization without the means to determine its efficiency before and after the introduction". Thereby, the object of research that is the carrier of the problem is determined, it boils down to working out the skills of providing sustainability in changing conditions.

2 Description of the approach

The purpose of this study is to develop a procedure that provides an assessment of the organization's willingness to make changes without losing stability [4, 5].

In accordance with this, the following tasks were set:

- A comprehensive analysis of the coordination of motives and symptoms of the organization.
- Development of rules for making options in the new conditions.
- Evaluation of scenarios in the development of the organization.
- Development of user instruction for algorithms.
- Solving problems will lay the foundation for the development of the desired algorithms.

3 Conclusion

The developed algorithms are built taking into account the concept of the so-called "experienced judgment" [6], and meet the requirements for developing skills for assessing the organization's belonging to a type of system that meets the principles of sustainable business [7].

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Building algorithms tuned to the organizational aspects of pricing

Marina Grigorjeva, Rostislav Kopitov*

ISMA, Riga, Latvia

**Corresponding author's e-mail: rostislav.kopitovs@isma.lv*

Abstract

The introduction of new technological forms causes changes in the management system and requires a change in the strategic course of the organization. The problem is that most of the decision-making methods are typical, independent of the form of the organizational structure. Its resolution is aimed at finding the means to introduce new forms of organization and management without changing the existing strategy.

Keywords: cost estimate, controllability, stability, structure, breakeven

1 Introduction

The pricing is based on statistical business valuation mechanisms, among which three methods should be highlight: cost, comparison and income. These mechanisms are effectively used in cases of sustainable organization functioning. Otherwise, discounting methods are used that consider the dynamic features of the environment. Further, if necessary, use the tools of discounts and transfer pricing. However, in the transitional business development modes, the management of enterprises has difficulties in pricing. As a rule, the one who has technological and financial advantages wins. Chasing the market leader in open systems, even if it is economically justified, is not feasible from the point of view of controllability. In situations of continuous market change, flexible pricing mechanisms are required. Such mechanisms are self-organizing and self-tuned to the circumstances of the destructions of system. In the other words, they are based on a factor analysis of forces capable of removing the control system from a state of stable functioning.

2 Sustainability

This study examines the pricing approach used depending on the type of organizational structure. The solution of the problem begins with a justification for a certain stage in the cycle of the organization of the form of ownership: from a micro-enterprise to a holding structure. At the same time, the search for new forms of organization and management is viewed from the standpoint of the entire process, which includes related links that are turned to careful selection and development, and not the usual liquidation of organizational forms that have not justified themselves. The cycle of capital turnover comes to the forefront, the evaluation is carried out in terms of working capital management over time. Further, algorithms are used to calculate the price unit of production. Based on the data obtained, the variants of combined traditions and accumulating planned estimates are determined. As a result, it is possible to determine the sales unit prices, and, finally, to carry out a full-table assessment of the coverage norms and determine a number of important pricing characteristics, including: break-even point, Tax deductions and benefits, growth potential, etc. The developed diagnostic procedures are focused on a short-term assessment of the stability of the current state, and when a company enters the zone of unstable operation activity recommendations are developed on how to get out of it. Thus, procedures are being developed for the recovery of activities.

3 Conclusions

Thereby, the use of full pricing, costing and cost management approaches allows companies to reduce the period of long-term planning and control. However, each new organizational version does not require a change in the organization`s strategic course. As s result, the uniquely oriented approaches used do not cause problems of dependence of the strategic goal on the technological tools used in business design.

Investigation of purposeful stability algorithms

Olga Kamforina

ISMA, Riga, Latvia

**Corresponding author's e-mail: oljga2005@inbox.lv*

Abstract

Currently, an effective manager is required to overcome environmental resistance, and the same is required from management algorithms in an organization. The main goal of our research is to restore the activity of the enterprise when the system is unstable. Through the application of a new approach, by a hierarchy, we propose steps to determine the mode of interruption of the functioning of the enterprise. We need to identify algorithms that support the restoration of system performance and is protecting the overall hierarchy of the enterprise.

Keywords: factors, symptoms, sustainability, metasystem responsibility, purposefulness

1 Problem

Our task can be represented: there is a bunch of interrelated algorithms. A system of signs and norms has been developed, which makes it possible to trace the symptoms of unstable service [1, 2]. We can identify systematic errors in the work of the system, which further can contribute to negatively affect the operation of our company [3]. If you do not promptly take measures to adjust the system, the company will go into a chronic destructive state.

The main tasks are 1. Definition and classification of symptoms, that is, the effect of circumstances on the external environment. 2. Systematization of factors influencing the external environment on the organization as a whole. 3. Description of the signs of a well-established system from the position of the metasystem approach. 4 [4]. Development of instructions, allowing carrying out changes in the system, without interfering with a stable process.

The object of our research is the vision of the current state of the system. The object is the acting organism, in our case, it is the carrier of the problem.

2 Algorithm

The relevance of the study can be presented in the form of a "funnel", on the surface there are benefits - activities, the life of the organization, and work ahead of the process.

In any system, there are prerequisites or so-called flaws that do not make it possible to recognize the problem in time. To overcome these flaws, it is necessary to include a higher order system in operation, that is, to be able to abandon previously formed stereotypes in favor of new knowledge. Including the well-known program of E. Deming, which is based on the following three simple and pragmatic axioms: 1. Any activity is a technological process that can be improved; 2. It is necessary not only to solve specific problems, fundamental changes are necessary in order for production as a system to function stably; 3. Higher management should take responsibility for the activities of the enterprise in order to overcome the arising oppositions of the system.

By the consequence of these steps, we reveal the main significance of our problem, thereby having the possibility of influencing the object of study. The main problem that we solve is that the desire to improve each process conflicts with the restriction of intervention. It is not possible to change the organization in the absence of means of determining the position of the organization in an unstable state.

3 Results

We have developed a system of signs allowing tracing the symptoms of servicing an unstable state. Solving the above tasks will help an effective manager to develop the necessary management style and algorithm to help ensure the purposefulness of the organization.

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Algorithms for tracking unique models in entrepreneurship

Roman Belus, Bogdan Grishko, Denis Lipcinsky, Dinara Muslimova, Ksenia Ogorodnikova

ISMA, Riga, Latvia

**Corresponding aurhor's e-mail: dlipchinskij@gmail.com*

Abstract

An approach is proposed that allows an organization to adapt to a continuous and active influence of the external environment on the quality of training and the number of specialists requested. This approach is used to assess the readiness of recruiting an applicant for a vacant position in management. In addition to the authors of this approach, the skill of timely and high-quality response to external challenges through the response in the context of globalization, disruption and convergence is being developed.

Keywords: activity, pattern, novelty, need, management, uncertainty, experience, readiness

1 Formulation of the problem

In the course of finding out the differences between models used in business and entrepreneurship, it was determined that models contradict modern management methods, distorting the purpose of each organization [1-3]. Against the background of the highlighted contradiction, it was established that a specific model should be selected, adapted and accompanied by a high-level professional. In this regard, the problem of research is reduced to the inability to implement a unique model in the absence of tools for assessing the readiness of a specialist, who will be accompanied by a unique management mechanism.

The object of the research is the formation of the ability to use unique models in practice in modern control systems.

2 Methodological aspects

Within the framework of this study, the following goal was formulated: Developing a procedure to determine the degree of specialist training to accompany models adapted to the continuous influence of external factors.

In accordance with the goal were put forward the following tasks.

1. The distribution of the organization's resources in the face of uncertainty.
2. Development of a system to protect the organization's assets from unauthorized access.
3. Development of improvement options.
4. Development of requirements for the implementation of the model.

The solution of these tasks will allow finding ways to select a person to manage a specialist in a high position [4-5].

3 Results

The proposed approach is tested considering the technology of Greiner, which allows to assess the degree of the manager's readiness to use the appropriate model in crisis moments for the organization [6]. In addition, the unique experience of Egon Zehnder is considered [7].

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