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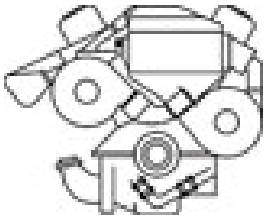

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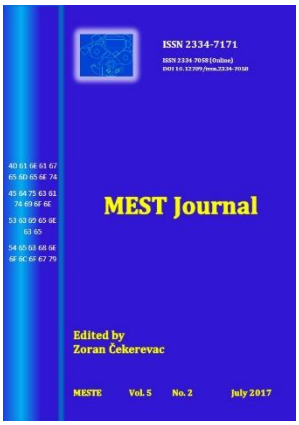

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July 15th, 2017

Welcome to the newest issue of the MEST Journal!

At the beginning of this year, the Faculty of Business and Industrial Management has changed its business name and now operates under the name: Faculty of Business and Law of the "Union – Nikola Tesla" University in Belgrade.

The faculty changed its name, but the journal remained an international peer-refereed academic journal, the official journal of the non-profit organization MESTE, the Faculty of Business and Law, and the SZ & Associates - Toronto. This issue is published online and in print.

The MEST Journal is registered in DOI system by CrossRef with ***DOI 10.12709/issn.2334-7058***. All articles published in this issue, as well as in the previous issues of the MEST Journal, have their own DOIs. The MEST Journal is registered in **doiSerbia** of the **National Library of Serbia, COBIB.SR, Matica Srpska Library, COBISS.SR**, **Google Scholar, CrossRef, OALIB, EleCas** base of **KoBSON,** the **Index Copernicus ICI Journals Master List 2014,** and in the **ResearchBib** (IF: 2016 Evaluation Pending).

We keep the practice that articles, that have undergone peer review, and will be published in the next issues, we make available to readers in the form of preview - early reading. The focal point of the journal remained at international level, with the view on matters from a global perspective. However, due to their importance, in this issue have been published some papers relating to some specific local events.

In this issue, fifteen of submitted papers were published, of which five were classified in the group of research scientific papers, and ten in the group of the scientific review articles. Most of the articles is multidisciplinary. However, four of them can be predominantly classified to the field of management, three to the group of economics and finance, three to the group of education, and five to the group of application of IT.

We follow the mission and vision of the journal, and we help authors to publish their works and present their achievements in the most convenient way. However, we point out that the editors do not censor the works that we publish, as well as the published works, can contain and/or proclaim views that could differ from the views of the editorial board. We check articles on plagiarism, but we are not able to guarantee the accuracy of the data published in scientific and professional works of our authors. We believe that our authors are honorable and publish only their original works with really achieved results. For the quality of papers we publish, we thank the authors and reviewers who did their job well and conscientiously.

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Zoran Čekerevac

Prof. Dr. Zoran Čekerevac
Editor-in-chief

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- Technology forecasting
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- Specials of direct relevance to industrial entrepreneurs
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- All facets of industrial development

These are basic, but not exclusive themed areas.

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MODELING OF OPTIMAL CREDIT STRATEGY OF A PHARMACEUTICAL PRODUCT DISTRIBUTOR WITH DELAY

Myroslav Boychuk
Chernivtsi National University, Chernivtsi, Ukraine

Olena Yaroshenko
Chernivtsi National University, Chernivtsi, Ukraine

JEL Category: **C61, D30**

Abstract

The activities of pharmaceutical products distribution companies are multifaceted. They establish contacts with producers and consumers, determine the range of prices of medicines, do promotions, hold stocks of pharmaceuticals and take risks in their further selling. Therefore, the usage of mathematical models to research into ways of optimizing the management of pharmaceutical products distribution companies considering payments is of great current interest.

The purpose of the paper is to present a model of optimal credit strategy of a distribution company on the pharmaceutical products market considering late delivery. In the mathematical terms, the given problem is the one of optimal control, where a number of pharmaceutical products act as a phase trajectory and the amount of credit granted to a distribution company is a control. To tackle the problem sufficient optimality conditions are used. It is established that the model of optimal credit strategy of a distributor with the delay has two modes of crediting (full and no credit) and the optimal mode. The structure of the optimal process for the given model is also described.

Keywords: *Distribution, decision-making, optimal control, differential equations, deterministic models*

1 INTRODUCTION

The pharmaceutical market is a system of interdependent and interacting subjects and objects of production, distribution, and consumption of pharmaceuticals. It is characterized by high rates of profitability due to the specificity of drug products and attracts many participants: manufacturers, intermediaries, pharmacists and others.

Today the Ukrainian pharmaceutical market has formed an extensive network of intermediaries, which includes:

- large distribution companies that receive great quantities of pharmaceuticals from foreign and domestic manufacturers;
- wholesale intermediaries that can receive relatively small shipments of drugs from

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foreign and home manufacturers or from distribution companies;
- retail intermediaries.

They all play an important role and are economically advantageous of manufacturers because:

- many producers are deprived of the possibility to establish a direct contact with product consumers due to territorial isolation;
- it is more profitable for producers to invest into their core business, instead of carrying out marketing activities;
- distributors can provide consumers with the necessary range of medicines and high-quality service based on their own experience and qualifications.

Therefore, taking into consideration the pressing problems of the transitional economy in Ukraine, it is of vital importance now the optimization of business and economic activities of distribution companies which will allow them to maintain and strengthen their status on the market, to develop sustainably and to ensure profit growth of owners as well as of employees.

We believe that the system analysis principles and methods of economic-mathematical modeling, considering the huge potential, enables to understand better the causes of the stated problems, to investigate the performance of an economic system on the whole and the development of processes occurring in it. This allows not only to determine possible scenarios of the development of the target object but also to adjust policies pursued in the health care system.

Hrygorkiv and Yaroshenko's paper (2007) proposes a model of a realtor's optimal credit strategy without delay and carries out its investigation applying the necessary optimality conditions (Pontryagin's principle). Whereas in Boychuk & Yaroshenko's work (Boychuk & Yaroshenko, 2015)the model of optimal credit strategy of a distributor on the market of pharmaceutical products without delay is studied and researched using sufficient optimality conditions. On the basis of the latter, in the given paper we will construct a model of the optimal credit strategy of a distributor on the pharmaceutical products market considering product late delivery and will conduct its study.

2 MODEL BUILDING

Let at any point of time $t \in [t_0, T]$ (T – planning horizon) a distributor has the ability to take a money loan totaling $k(t)$ at a constant interest rate p. He uses the credit to purchase some number of pharmaceutical products $v(t)$ with the aim of it selling and earning the good profit.

Let us assume that increase in the volume of goods $\dot{v}(t)$ in time t in monetary equivalent equals the amount of credit $k(t)$ excluding the volume of goods sold $\alpha v(t)$ (α – coefficient of sales) and taking into account the volume of product $\beta v(t-\tau)$) with late delivery τ (β – product delivery ratio), i.e.

$$\dot{v}(t) = k(t) - \alpha v(t) + \beta v(t-\tau),\ t \in [t_0, T], \quad (1)$$

where $\alpha > 0$ and $\beta > 0$ – constant, $t_0 \geq 0$, $T > t_0$, τ – late delivery

This differential model must be supplemented by the initial condition of prehistory of volume of goods trafficking in the time period $[t_0 - \tau, t_0]$

$$v(\theta) = v_0(\theta),\ \theta \in [t_0 - \tau, t_0], \quad (2)$$

where v_0 – piecewise continuous (continuous) function on $[t_0 - \tau, t_0]$.

Since the credit amount is always a finite quantity, the above ratios should be complemented by the restriction

$$0 \leq k(t) \leq k_0,\ t \in [t_0, T], \quad (3)$$

where k_0 – the set upper bound of limitations on the credit amount.

Restrictions are also imposed on the profit from the sale of goods

$$\gamma\alpha v(t) - \beta v(t-\tau) - pk(t) \geq \varepsilon,\ t \in [t_0, T], \quad (4)$$

where γ – income from each item of the goods sold (in ratio), p – the credit interest rate (in ratio), $\varepsilon \geq 0$ – minimum profit.

Then a distributor's task is to maximize the total (integral) profit from the sale of goods in the whole-time interval $[t_0, T]$, i.e.

$$\Phi = \int_{t_0}^{T} \left[\gamma\alpha v(t) - \beta v(t-\tau) - pk(t) \right] dt \to \max_{k} . \quad (5)$$

In the mathematical terms, the problem (1) - (5) is the optimal control problem where the volume of goods is a phase trajectory v, and the credit amount acts as a control k.

3 MODEL STUDY

To study the optimal control problem (1) - (5) we use sufficient conditions for optimization that are presented by (Boychuk & Semchuk, 2012) or (Andreeva, Kolmanovskiy, & Shayhet, 1992). For this purpose, the following steps will be taken:

- construction of the left crediting process;
- determining the moment of switching of credit control;
- selection of the right crediting process;
- formation of the optimal credit process.

3.1 Left crediting process

Under the sufficient optimality conditions for the problem (1) - (3), (5) it is enough to optimize the function of many variables (Boychuk & Semchuk, 2012)or (Andreeva, Kolmanovskiy, & Shayhet, 1992)

$$R(t,k,v(t),v(t-\tau),V_0,V_1) \equiv \dot{b}(t) + \dot{V}_0(t)v(t) + \dot{V}_1(t-\tau) \times$$
$$\times v(t-\tau) + \left[V_0(t) + V_1(t) \right] \left[k(t) - \alpha v(t) + \beta v(t-\tau) \right] +$$
$$+ \gamma\alpha v(t) - \beta v(t-\tau) - pk(t) \to \max_{k,v(t),v(t-\tau)}, \quad (6)$$

Where the required functions b, V_0 and V_1 – are continuously differentiable on $[t_0,T]$, $V_1(t) \equiv 0$ if $t \in (T-\tau,T]$.

To take into consideration the restriction (4) we will use the method of Lagrange in accordance with which we must maximize an auxiliary function

$$\bar{R}(t,k,v(t),v(t-\tau),V_0,V_1,\chi) \equiv R(t,k,v(t),v(t-\tau),V_0,V_1) +$$
$$+ \chi \left[\varepsilon - \gamma\alpha v(t) + \beta v(t-\tau) + pk(t) \right] \to \max_{k,v(t),v(t-\tau)}, \quad (7)$$

where χ –Lagrange multiplier.

Writing down unnecessary condition for the optimality of the function $\bar{R}$ on χ, that is, the partial derivative equals zero, $\frac{\partial \bar{R}}{\partial \chi}$, we obtain the equation

$$\varepsilon + pk(t) - \gamma\alpha v(t) + \beta v(t-\tau) = 0 , \; t \in [t_0,T] . \quad (8)$$

Function $\bar{R}$, using the equation (8), coincides with the function R.

For variables $v(t)$ and $v(t-\tau)$ coefficients of these variables in function R equate to zero for these variables were arbitrary in the areas of their change. We obtain a system of equations

$$\begin{cases} \dot{V}_0(t) - \alpha \left[V_0(t) + V_1(t) \right] + \gamma\alpha = 0, \\ \dot{V}_1(t-\tau) + \beta \left[V_0(t) + V_1(t) \right] - \beta = 0, t \in [t_0,T]. \end{cases} \quad (9)$$

Function R on the amount of crediting k is linear, and therefore the highest value of k received with the optimizing value of control over crediting (10)

$$k_{opt}(t) = \begin{cases} k_0, & \text{if } V_0(t) + V_1(t) - p > 0, \\ 0, & \text{if } V_0(t) + V_1(t) - p < 0, \\ \text{any from } [0,k_0], & \text{if } V_0(t) + V_1(t) - p = 0, \end{cases} \quad (10)$$

$t \in [t_0,T]$.

Let's consider the case $V_0(t) + V_1(t) - p = 0$. From system (9) applying integration we get

$$V_0(t) = \alpha(p-\gamma)t, \;\; V_1(t-\tau) = -\beta(p-1)(t-\tau)$$

and respectively

$$V_0(t) + V_1(t) \equiv \left[\alpha(p-\gamma) - \beta(p-1) \right] t = p .$$

This means that equation must be performed

$$\left[\alpha(p-\gamma) - \beta(p-1) \right] v(t)t = pv(t) ,$$

that happens if

$$v(t) = 0 , \; t \in [t_0,T] .$$

The validity of this transition can be checked with the substitution of $v = 0$ in the function R, since if $b \equiv \text{const}$ the required function is (Andreeva, Kolmanovskiy, & Shayhet, 1992).

Substituting $v = 0$ in equation (1), we get that $k = 0$. Thus, from (10) we have two optimization variables on control

$$k_{\text{opt}}(t)=\begin{cases}k_0, \text{ if } V_0(t)+V_1(t)-p>0,\\ 0, \text{ if } V_0(t)+V_1(t)-p\le 0,\end{cases} t\in[t_0,T]. \quad (11)$$

Let set the full credit mode as the left control

$$k_{\text{left}}(t)=k_{\text{opt}}(t)=k_0.$$

As a result, we have two credit modes:

$k_{\text{opt}}(t)=k_0$, $t\in[t_0,T]$ – full credit mode

$k_{\text{opt}}(t)=0$, $t\in[t_0,T]$ – absence of credit.

Corresponding to it, the left trajectory of the volume of goods $v_{left}(t)$, $t\in[t_0,T]$ is determined from the original problem (1), (2) if $k_{left}=k_0$ applying the method of steps (Elsgolts & Norkin, 1971, p. 17).

The essence of the method of steps is in the following. In accordance with the previous history $v_0(\theta)$, $\theta\in[t_0-\tau,t_0]$ from (1)-(2) determine $v^{(1)}(t)$, $t\in[t_0,t_0+\tau]$. Then after $v^{(1)}(t)$, $t\in[t_0,t_0+\tau]$ find $v^{(2)}(t)$, $t\in[t_0+\tau,t_0+2\tau]$ and so on. For $v^{(N)}(t)$, $t\in[t_0+(N-1)\tau,t_0+N\tau]$ calculate $v^{(N+1)}(t)$, $t\in[t_0+N\tau,T]$, where N – integral part of a number $(T-t_0)\tau^{-1}$.

In this case, the left trajectory $v(t)$ is piecewise differentiated (piecewise continuous and differentiated) function on $[t_0,T]$.

Then the left credit process is $k_{\text{left}}(t)=\{k_0,v_{\text{left}}(t),t\in[t_0,\zeta]\}$. It is necessary to establish for this the moment of switching control over crediting ζ.

3.2 The moment of switching of credit control

Substituting $k=k_0$ and $v(t)=v_{\text{left}}(t)$ in the equation (8) we obtain a nonlinear algebraic equation

$$\varepsilon+pk_0-\gamma\alpha v_{\text{left}}(t)+\beta v_{\text{left}}(t-\tau)=0,\ t\in[t_0,T],$$

which can be solved by one of the numerical techniques (Yasynskyi, 2005, pp. 25-40) or (Vasilyev, 1980, pp. 17-73).In such a way, we define the moment of switching of credit control ζ.

3.3 Right crediting process

As the right control, we will take the condition of the absence of crediting $k_{\text{right}}(t)=0$, $t\in[\zeta,T]$. We determine the appropriate right path per the amount of crediting $v_{\text{right}}(t)$, $t\in[\zeta,T]$ by the right control of the amount of crediting $k_{\text{right}}=0$ in the original task

$$\dot v(t)=-\alpha v(t)+\beta v(t-\tau),\ t\in[\zeta,T]$$

$$v(\theta)=v_{\text{left}}(\theta),\ \theta\in[\zeta-\tau,\zeta].$$

This original problem with the prehistory can be solved by the combined use of the method of steps (Elsgolts & Norkin, 1971, p. 17) and the numerical method of Runge-Kutta (Yasynskyi, 2005, pp. 167-181). It should be noted that the right path $v_{\text{right}}(t)$ is a continuous and piecewise differentiated function on $[t_0,T]$.

As a result, we get the right process

$$\{k_{\text{right}}=0,v_{\text{right}}(t),t\in[\zeta,T]\}.$$

3.4 The optimal process of crediting

According to the results reported in (Boychuk & Semchuk, 2012) or (Andreeva, Kolmanovskiy, & Shayhet, 1992)bonding at the time of switching of credit control $t=\zeta$ of the left $\{k_{\text{left}}(t)=k_0,v_{\text{left}}(t),t\in[t_0,\zeta]\}$ and the right $\{k_{\text{right}}(t)=0,v_{\text{right}}(t),t\in[\zeta,T]\}$ processes gives the optimal crediting process $\{k_{\text{opt}},v_{\text{opt}}(t),t\in[t_0,T]\}$, i.e.

$$k_{\text{opt}}(t)=\begin{cases}k_0, \text{ if } t\in[t_0,\zeta),\\ 0, \text{ if } t\in[\zeta,T],\end{cases}$$

$$v_{\text{opt}}(t)=\begin{cases}v_{\text{left}}(t), \text{if } t\in[t_0,\zeta],\\ v_{\text{right}}(t), \text{if } t\in[\zeta,T].\end{cases}$$

This optimal control according to the amount of crediting k_{opt} is a piecewise continuous function, and the optimal trajectory in relation to the volume of goods is a continuous and piecewise differentiated function on $[t_0,T]$.

Profits from the sale of goods is determined by the formula

$$\Phi = \int_{t_0}^{T} \left[\gamma\alpha v_{\text{opt}}(t) + \beta v_{\text{opt}}(t-\tau) - pk_{\text{opt}}(t) \right] dt ,$$

calculation of which can be done with the help of one of numerical integration methods (Yasynskyi, 2005, pp. 99-128).

It is necessary to note that the above-described method is possible at piecewise constant interest rate

$$p(t) = \begin{cases} p_1, \text{if } \ t_0 \le t < T_1, \\ p_2, \text{if } T_1 \le t < T_2, \\ \ldots \\ p_L, \text{if } T_{L-1} \le t \le T_L \equiv T. \end{cases}$$

4 CONCLUSIONS

The model is suggested of the optimal credit strategy of a distributor on the pharmaceutical products market with late delivery and its investigation is conducted.

It is established that the model of the optimal credit strategy of a distributor with late delivery has two modes of crediting (full and absence of credit) and the optimal mode.

The structure an optimal process for the model of optimal credit strategy of a distributor with late delivery is described.

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DIFFERENCES BETWEEN PRIMARY AND SECONDARY SCHOOL PRINCIPALS' ROLE, THEIR ROLE AND POTENTIAL PRINCIPALS' PERCEPTIONS

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ES F. K. Frankopana, Zagreb, Croatia

JEL Category: **I00, I2, I21**

Abstract

The aim of this research is to identify differences between primary and secondary school principals' roles and the differences between the roles that principals perform and potential principals perceive. Under the term "potential principals" the author considered teachers and expert associates which have legal conditions to access the contest for principal and have the opportunity, to be chosen for principal function. The used questionnaire, constructed by the author, contained 192 variables about principals' tasks, and 10 questions provided data about the respondents' surroundings. Sample N=119 principals (N=83 elementary, N=36 secondary, presents 10% of principals' population in Croatia), and N=120 potential principals, provided answers in six categories of the Likert scale; from completely disagree to completely agree. Results confirm that the principals perform more duties that the law requires of them. Statistically, significant differences between principals' jobs in elementary and secondary school exist in six variables. Differences between teachers' perception and jobs principals do exist in 39% of examined variables.

Keywords: *Education system, education analyses, school management, leadership, principal's role*

1 INTRODUCTION

During the last fifteen years, there are plenty of researches and articles in both, profit and nonprofit sector dealing with the managers and leaders roles. In this research, we would like to exam the role of the principal through its realization and the work they do. The idea is based on the premise that the role is realized through acting. Through acting, tasks were realized. By realizing tasks, goals were achieved. Achieving goals guide to the role realization (Burcar, 2013).

This research examines the role of the school principal within the context of modern-day schooling. The term role translated in Croatian literature is ambiguously defined. The term role "*uloga*" includes the role and function (English-Croatian dictionary, Filipovic, 1970, p. 846), "The term 'role' usually refers to the function performed by someone" (Zvonarevic, 1978, p. 276, from

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Stanicic, 2006), "The 'role' means specific expectations of other people from the person who carries a particular function" (Bahtijarevic-Šiber, & Sikavica, 2001, p. 616). It may be concluded that the term 'role' in the Croatian language presents synonymous with the function. The function explanation, to which we adhere, gives Antic (2000, p. 297): To principal as "the first person in the school," is entrusted function of the "main commander" whose work in school can be understood as the state representative, governed under the delegated functions. Assigned functions include:

a. planning and programming,
b. managing,
c. keeping,
d. organizing,
e. routing,
f. monitoring,
g. controlling,
h. evaluating and
i. a circle of administrative and financial activities called the administrative jobs.

We agreed that the term role could be defined as behaving expected from the person that possess respective position in the group (Pennington, 2001, p. 279). The principal's role is realized in the organization we named school. At the same time, the organization is a group in which unequal distribution of social power and responsibility exists, as Zvonarevic (1981, p. 323) extracted. Principals show attitudes about their managerial and leadership roles (Burcar, 2013). Their roles cover four areas: status, organizing, leading and decision-making (Burcar, 2014). Principals are involved in the following processes: planning, decision-making, organizing, coordinating, communicating, impact and evaluation (Burcar, 2013). The managerial role of the principal derives from the exercising governance in schools, "the management is realized in four specific groups of activities: planning, organizing, leading and evaluating" (Stanicic at.al. 2002, p. 149), but also from the fact that the principal performs the parts of the administrative processes and the processes prescribed by legislation. From the analysis of the historical continuum may be concluded that the principal is no longer a manager and his role is no longer the dominant organizational, but also transforms to the role of instructional leader, (Bovalino, 2007, p. 16.). Some authors advocate a different opinion and explain that the role of principals in recent years increasingly transforms from educational leaders to business managers (Burcar, 2010), which we accept with caution.

2 METODOLOGHY

The goal of this research is focused on the description of the role of the principal through its job analysis. The role of the principal in this research has been examined through the job analysis, as well as the job estimation of the potential principals. The goal of the research was operationalized through the following tasks: a) Principals' jobs in the school have been examined through the empirical research. b) Potential principals' attitudes about the principals' jobs have been tested through the empirical research. c) Differences between secondary and primary school principals' jobs have been tested. d) Differences between principals' jobs and potential principals' attitudes about their jobs have been tested.

2.1 Sampling and sample

The first sample is intentional and consists of 119 principals, of which 83 elementary and 36 secondary school principals (10% of principals population in Croatia). The sample is stratified for the purpose of the research. The second sample consists of 120 potential principals: teachers and expert associates. Potential principals are class teachers, subject teachers, and expert associates which have legal conditions to access the contest for the principal. As well as they have the opportunity to be chosen for principal function, because they have a degree that allows them to work in the school as teachers, and have at least eight years of working experience in the school institutions, what are the legal requirements to become a principal? The tasks of class teachers can perform people ended:

a. Integrated undergraduate and graduate programs for teachers,
b. graduate university studies for teachers,
c. professional four-year studies for teachers in order to acquire 240 credits,
d. four-year undergraduate professional study which is acquired a university degree in accordance with previous regulations.

Subject teachers' tasks can perform a person who has completed:

a. the proper type of graduate study,
b. the proper type of integrated undergraduate and graduate study,
c. the appropriate type of specialist professional graduate study,
d. the appropriate type of undergraduate university degree or professional study with a minimum of 180 credits and has pedagogical-psychological didactic and methodical education with 60 ECTS points in specific situations.

According to the Consolidated Law on Education from 2012 workers caught in work and employed according to previous laws with lower educational level can continue to perform their job, but they can not become a principal.

Booth samples present skillful, educated and experienced persons, appropriate for this research as representatives of the population and useful generalization. Booth samples fulfill questionnaire with their own will during the national professional conference they participate.

2.2 Methods

For this research, basic statistics has been used, as well as nonparametric testing. Mean (M) as a measure of central tendency and standard deviation (SD) as a measure of distortion from mean, minimum and maximum of results have been used as well as median and mode. Correlations between variables have been computed to determine relations between variables. Secondly, the Kolmogorov-Smirnov normality test has been carried out for distribution type. The differences between groups have been tested. The level of relations between tested variables and the level of differences between the two compared samples have been confirmed after the statistical significance of correlations or differences has been proven.

2.3 Instrument - questionnaire

For the purpose of this research, for data collection questionnaire designed by Burcar (2010) has been used consisting of 192 variables, which describes different jobs principals perform. Examples:

a) I am reading daily papers.
b) I am informing school board.
c) I am planning staff.
d) I am organizing staff,
e) I am reporting school board, etc.).

The questionnaire consists of 8 subscales:

a. Information collector and divider,
b. Communicator,
c. Strategist and Planner,
d. Executive manager, administrator, and organizer,
e. Instructional leader and educator,
f. Evaluator,
g. Student,
h. Binder with the community.

The questionnaire also contained 10 questions, which provided data about the respondent and the respondent's school as well (mission, motto, working hours a day/week, education, gender etc.). The respondents provided answers in line with six categories of the Likert scale: (1) Completely disagree, (2) Strongly disagree, (3) Disagree, (4) Agree, (5) Strongly agree, (6) Completely agree, (Bell, p. 165 in Coleman & Briggs, ed. 2003).

3 RESULTS AND DISCUSSION

The results for booth samples shows nonparametric distributions of variables what is expected, because of questionnaire constructed for this research, based on qualitative values and because of fact that results show categorized numerical values on the ordinary scale. Regarding this facts, nonparametric statistical tests have been used as well. The correlations were tested with the Spearman Rank Order Correlations. The differences were tested with Kolmogorov-Smirnov two sample tests.

The sample in this research (67 male, 52 female) which present principals included in this research, work in the schools with 511 pupils in average. Their schools work in 1-4 shifts. Principals generally have gained university diploma (89.92%). On the other hand, a sample that presents potential principals (22 male, 88 female) work in the schools with 564 pupils in average. Their schools work in 1-3 shifts. Potential principals generally have higher, 2 years university degree (22.50%) or high, 4 years university degree (67.50%) (Tables 1 and 2).

Table 1. Number of working shifts

Number of shifts	Principals (n=119)		Potential principals (n=120)	
	N	% N	N	% N
1	31	26.05	19	15.83
2	82	68.91	80	66.67
3	4	3.36	2	167
4	2	1.68		

82.35% (98) of all principals reported that their schools do not have a mission statement, 85.54% (71) elementary school principals and 75% (27) secondary school principals. At the same time, they reported that their schools have a motto 61.34% (73) of all principals, and 60.24% (50) elementary school principals and 63.89% (23) secondary school principals. This seems unusual because motto is usually derived from clearly defined vision and mission, and it is questionable do they understand the purpose of the mission statement in contemporary management practice.

Table 2. Educational level

Education level	Principals (n=119)		Potential principals (n=120)	
	N	% N	N	% N
Middle level – middle school for teacher (older teachers) - ISCED 3			4	3.33
Higher level - 2 years' education for teacher (ISCED 5)	9	7.56	27	22.50
High level – 4 years, 3+2 years or 5 years integrated university education (ISCED 5)	107	89.92	81	67.50
Scientific level (Master of science, or PhD) - ISCED 6	3	2.52	4	3.33

Cronbach Alpha for a set of items in questionnaire tested on principals is 0.98 with internal consistency for variables between 0.21 to 0.68. For the set of items in questionnaire tested on potential principals' internal consistency for variables is between 0.25 to 0.84 with Cronbach Alpha (0.99). Cronbach Alpha for items in the subscales tested on the principals varies between 0.85 and 0.92 (Table 3), explains the high level of reliability for each subscale of the questionnaire and also for the entire questionnaire.

Table 3. Subscale analyses

Subscales	Mean	St. Deviation	Cronbach alpha	Stand. alpha	Average inter-item correlation
Information collector and divider	71.75	8.24	0.88	0.88	0.35
Communicator	62.36	6.68	0.85	0.85	0.34
Strategist and planner	76.60	8.04	0.85	0.86	0.30
Executive manager, administrator, and organizer	76.06	8.03	0.85	0.86	0.30
Instructional leader and educator	76.06	8.03	0.85	0.86	0.30
Evaluator	63.06	7.98	0.90	0.90	0.42
Student	49.65	6.36	0.90	0.90	0.48
Binder with community	40.80	6.58	0.92	0.92	0.60

We can conclude that differences between jobs among principals in elementary and secondary schools exist in 6 of 192 variables (Table 4). Jobs listed in the table defers because of legislation. Secondary schools do not have an obligation for pupil's kitchen. For organizing teachers replacement secondary school principals have established expert – associates. The results guide us to the conclusion that the secondary school principals have bigger daily and weekly workload then the principals in elementary schools.

The results from KS two-sample test shown in Table 5 reveal statistically significant differences between the surveyed samples of groups (principals and potential principals) on 14.95% of all analyzed variables. Statistically significant differences on the level of significance $P<.05$, $P<.01$ and $P<.001$, was determined on 36.60% of all variables. This suggests that potential principals do not have a clear overview of jobs and obligations that principals perform. This different perception of the principals' job points to the fact, those potential principals could not perform principals' function without appropriate preparation. Furthermore, significant differences arose in the fields of informing/disseminating information's, communicating, planning, organizing, leading, administrating, evaluating, conflict solving as well as in the daily and weekly workload.

Table 4. Differences between elementary and secondary school principals (KS two-sample test)

Variable	Max - Diff.	Max. + Diff	***P*-level**	M Group 1	M Group 2	SD Group 1	SD. Group 2	N Group 1	N Group 2
Plans meals for pupils	0	0.30	***P*= .05**	3.96	2.75	1.32	1.25	83	36
Organizes teachers replacement	0	0.28	***P*= .05**	4.40	3.83	1.05	0.85	83	36
Organizes meals for pupils	0	0.32	***P*= .05**	3.54	2.64	1.36	1.27	83	36
Evaluates plan for pupils meals	0	0.35	***P*< .01**	3.65	2.61	1.28	1.18	83	36
Work daily	-0.29	007	***P*= .05**	8.66	8.97	131	1.182	82	36
Work weakly	-0.31	0.02	***P*= .05**	44.99	47.94	8.13	7.51	82	36

Group 1 elementary school principals; **Group 2** secondary school principals; **N Group 1 & 2** number of cases in the group; **M Group 1 & 2** arithmetic means in the group; **Max - Diff.** negative difference; **Max + Diff.** positive difference; **SD Group 1 & 2** standard deviations in the group; ***P*-level** statistical significant level

Table 5. Differences between principals and potential principals (KS two-sample test)

Variable	Max - Diff.	Max.+ Diff	***P*-level**	M Gr. 1	M Gr. 2	SD Gr. 1	SD Gr. 2	N Gr. 1	N Gr. 2
Read regular mail	-0.01	0.28	***P*< .001**	5.44	4.89	0.81	0.96	119	119
Write e-mails. mails and submissions	0.00	0.33	***P*< .001**	5.03	4.36	1.05	1.08	119	119
Speak with parents live	0.00	0.30	***P*< .001**	5.24	4.70	0.85	1.13	119	120
Speaks with local representatives	-0.02	0.30	***P*< .001**	4.91	4.47	0.98	1.00	119	120
Speaks with secretary and bookkeeper	0.00	0.26	***P*< .001**	5.68	5.18	0.69	0.94	119	120
Speaks with pupils	0.00	0.26	***P*< .001**	5.35	4.78	0.84	1.12	119	120
Plans school year plan	0.00	0.32	***P*< .001**	5.50	4.83	0.76	1.11	119	120
Plans classes	0.00	0.37	***P*< .001**	5.30	4.50	0.91	1.11	119	119
Plans projects	0.00	0.29	***P*< .001**	4.93	4.33	0.92	1.21	119	119
Plans employees work duties	0.00	0.32	***P*< .001**	5.47	4.75	0.84	1.11	119	120
Organize meetings	0.00	0.26	***P*< .001**	5.25	4.77	0.84	0.89	119	119
Develops staffing analyses	0.00	0.32	***P*< .001**	5.46	4.67	0.85	1.22	119	120
Provides an instructive chat with teachers	0.00	0.31	***P*< .001**	5.03	4.45	0.90	0.87	119	120
Provides instructive chats with professional associates	0.00	0.30	***P* < .001**	5.20	4.61	0.90	0.91	119	120
Has lessons for employees	0.00	0.35	***P* < .001**	4.57	3.83	0.95	1.22	119	120
Teaches employees the pedagogical and psychological principles and methods of evaluation	0.00	0.28	***P* < .001**	4.46	3.82	0.90	1.17	119	120
Teaches employees new teaching techniques	0.00	0.47	***P* < .001**	4.49	3.56	0.81	1.24	119	120
Chair the meetings	0.00	0.27	***P* < .001**	5.30	4.72	0.88	0.98	119	120
Makes requests and submissions	0.00	0.26	***P* < .001**	4.01	3.29	1.18	1.42	119	120
Solve conflicts between employees	0.00	0.32	***P* < .001**	5.04	4.28	0.85	1.17	119	120
Organizes and participates in joint meeting with employees	0.00	0.26	***P* < .001**	5.02	4.63	0.88	1.04	118	120
Create annual school plan	0.00	0.36	***P* < .001**	5.14	4.41	0.84	1.07	119	120
Creates reports. charts and analyzes	-0.01	0.30	***P* < .001**	4.34	3.81	0.92	1.34	119	119
Create working loads and responsibility	0.00	0.26	***P* < .001**	4.91	4.41	1.17	1.13	119	120
Create employees educational plans	0.00	0.30	***P* < .001**	4.24	3.53	0.88	1.32	119	120
Analyzes personal notes	0.00	0.25	***P* < .001**	4.70	4.12	0.96	1.13	119	120

Variable	Max - Diff.	Max.+ Diff	***P*-level**	M Gr. 1	M Gr. 2	SD Gr. 1	SD Gr. 2	N Gr. 1	N Gr. 2
Enhance interpersonal relations	0.00	0.27	***P* < .001**	5.32	4.70	0.79	1.29	119	119
Works daily	0.00	0.28	***P* < .001**	8.75	7.81	1.27	1.74	118	111
Works weekly	-0.01	0.35	***P* < .001**	45.89	39.75	8.03	10.02	118	108

Group 1 principals; **Group 2** potential principals (teachers and expert associates); **N Gr. 1 & 2** number of cases in the group; **M Gr. 1 & 2** arithmetic means in the group; **Max - Diff.** negative difference; **Max + Diff.** positive difference; **SD Gr. 1 & 2** standard deviation in the group; ***P*-level** statistical significant level

Table 6. Workload differences between principals and potential principals

Principals				Potential principals			
Working hours/day		Working hours/week		Working hours/day		Working hours/week	
M	8.75	M	45.89	M	7.81	M	39.75
SD	1.27	SD	8.03	SD	1.74	SD	10.02

According to the results shown in Table 6, an average principal working day (M= 8.75 hours/day), and working week (M=45.89 hour/week) are longer than potential principals estimate (M=7.81 hours/day, M=39.75 hours/week). This result leads us to the conclusion that potential principals did not have a clear and real picture about principals' workload. It seems that potential principals do no participate in school organizational processes what is close to conclusion given from Burcar (2015, p. 43) that in prognosis of principals informational jobs the biggest influence has variable: teachers' weekly workload, from what it can be concluded that teacher who works longer have better overview onto principals' communicational jobs. Furthermore, that conclusion has been confirmed by Kolmogorov-Smirnov two-sample test results in workload variables shown in Table 4.

4 CONCLUSIONS

The results of this research support a model of the principal's role in the Croatian educational system developed from Burcar (2013). A high percentage of the principals from booth groups reported that their school does not have a mission statement what is in a collision with the conclusion that their school had a motto. The principals' average working day is longer than potential principals' estimate. The results of the research lead to the conclusion that differences between the principals' jobs in elementary and secondary schools exist in 6 variables. The results point to the fact that significant difference between the groups of principals and potential principals exist in 36.60 % of all variables. At the level of conclusion (99.999%) difference has been observed in 15% of all analyzed variables. It can be concluded that potential principals do not have a clear overview of jobs and obligations that principals perform. This different perception point to the fact, those potential principals could not perform principals' function without appropriate preparation, what is in line with findings from Burcar (2007). Furthermore, significant differences arisen in the important areas principals covers: informing / disseminating information, communicating, planning, organizing, leading, administrating, evaluating, conflict solving and in the daily and weekly workload as well, which are the pillars of educational changes and adaptation or educational design, explained by Burcar (2016).

The main value of this research is focused on the fact that research is based on the principal's job, or to the answer to the question: what principal do? Firstly, this knowledge and results from this research can help legislation creators to define curricula for the principal's additional learning system. Secondly, findings related to the differences between elementary and secondary school principals' job can be very helpful for combining groups of principals during additional training and education. Furthermore, the conclusions of this research can be helpful for understanding, that competent teacher could not be automatically the best option for the principal's function without additional and focused education, and appropriate preparation as well, because teachers' and principals' job differs in many components.

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INTERNET OF THINGS AND THE MAN-IN-THE-MIDDLE ATTACKS – SECURITY AND ECONOMIC RISKS

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Abstract

This paper presents some aspects of the Internet of Things (IoT) and attacks to which IoT may be exposed, above all, the man-in-the-middle (MITM) attack. After a short introduction, which describes the essence of the IoT and the MITM attack, used scientific methods and hypotheses are presented. The next chapters show the technology of MITM attacks and benefits that a successful attack provides to attackers. Here are presented also some of the most important examples of such attacks, which had a wider scope or significant impact on the Internet community. This part of the article ends by analyzing the possibilities of protection of IoT against MITM attacks. In the continuation, based on data available, an analysis of MITM attacks is given from an economic point of view. The conclusions show a summary of the entire analysis with assumptions of the future development of these issues.

Keywords: *Communication systems, computer networks, Computer applications*

1 INTRODUCTION

The Internet of Things (IoT), a system of interrelated computing devices, with its rapid development and distribution came into focus of interest of Internet users, especially the users of smart devices. This is supported by the fact that the IoT is not limited to mechanical and digital machines, but also covers other objects, animals, and even people that are provided with unique identifiers which have an ability to transfer data over a network. Because of this, nowadays, it is

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often used as a term with the broadest meaning, the Internet of Everything. During this interaction, any human activity is not required.

In his work, Evans (2011) predicted that in the year 2020 there will be 50 billion devices connected to the Internet. Good visualization of Internet development is shown in (Cisco, 2016) Thus, the massive deployment of IoT will cause a greater difference between the current understanding of the Internet, which came down to the "dot-com", "social" or "experience" web, and new evolution of the Internet that will lead to new and revolutionary applications with potential to significantly improve the quality of life. They will change the way people live, learn, work, and entertain themselves (Evans, 2011).

It is nice and useful when smart devices like TVs or watches are connected to the Internet and receive, or send, the data that user wishes. But, before reaching their final destinations data pass through all four steps of TCP/IP model, and they are exposed to all well-known risks. With extensive use of the Cloud storages, it can be said that there appeared also the fifth layer, the Cloud layer. The possibility of this layer being attacked is high, starting with the brute force attacks at password-based attacks. Also, it is possible to change data at the Session layer using Man-in-the-Middle (MITM) attacks. One should not lose sight of the sniffer attacks, denial of service (DoS), as well as the compromised-key attacks.

Every IT expert has heard of the Man-in-the-Middle attacks, and this type of attacks is frequently described in different articles. Together with the networking technology growth, with cloud computing, the Internet of Things (IoT) and Bring Your Own Technology (BYOT), attackers are finding new ways to make MITM attacks attractive again. The aim of this paper is to present a brief analysis of technology of MITM attacks together with some examples of attacks of this kind, and some economic factors in this regard.

2 USED SCIENTIFIC METHODS AND HYPOTHESES

Methodological basis of this research includes the principles of the systemic-functional approach to the analysis of phenomena. In justification of theoretical propositions and findings, there were widely used the following scientific methods: hypotheticodeductive method, axiomatic method, analytical-deductive method, and comparative method, scientific abstraction, induction and deduction, synthesis, and comparative analysis, as well as analysis of time series, graphical interpretation etc.

The null hypothesis was set as:
H_o – "MITM attack is an old technology and can't cause damages to the attacked on the IoT."

The alternative hypothesis was set as:
H_1 – "MITM attacks are not rare in the IoT and can cause losses to the victims".

3 MITM TECHNOLOGY

Man-in-the-middle attacks existed long before the appearance of computers. To show basics of the MITM attacks it can be used an example of a malicious postman who opens people's letters and reads or changes their contents before handing over the letter to its recipient.

The most of the Internet applications strives to use encrypted connections provided by SSL/TLS protocols on the application layer to provide services in a safe way. SSL/TLS can create a two-way trust relationship, but because of the complexity in administration, SSL/TLS is mostly used when only one participant validates the connection. This method represents a weakness, which can be exploited to attack.

The man-in-the-middle attack, using different techniques, intends to intercept a communication between two nodes. Once the attacker interrupts the connection of his victims, he can usurp the role of a proxy. An example of the MITM attack is shown in figure 1. To send an invoice to user B in a "safe" way user A wishes to encrypt the message. He sends "Hello" and asks for B's public key. MITM attacker forwards the message and follows the reaction of B. Upon receiving B's public key, the attacker keeps it, and his own public key sends to his victim A. User A, believing that he has received the real B's key, encrypts the invoice and sends it to B. The attacker receives the A's invoice and because the invoice was encrypted with the attacker's key he can read it. In the message, attacker changes elements of the payment and the new changed encrypted invoice sends to the victim B. Believing that he has received the requested invoice B pays the money to the wrong bank account and starts to wait for paid goods.

The attacker takes the deposited funds, disappears, and leaves victims to litigate themselves. This type of attacks is called manipulation. The attacks in which messages are only read and forwarded unchanged belong to another group of MITM attacks, eavesdropping.

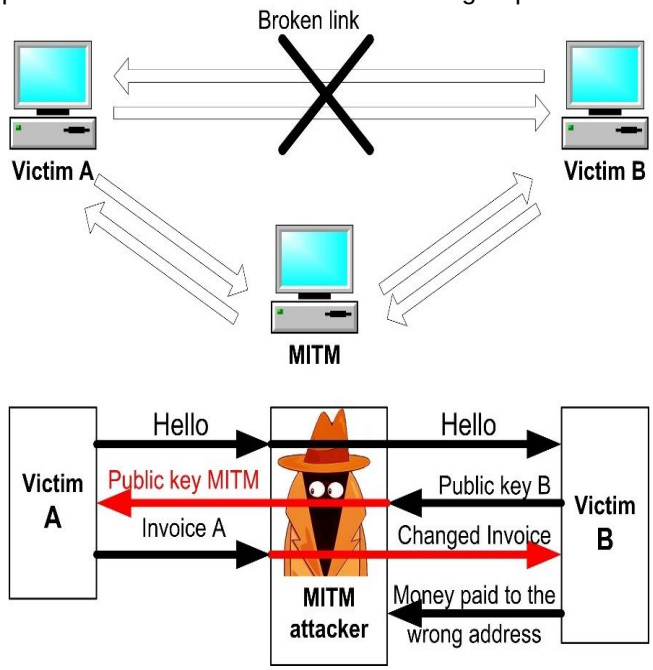

Figure 2 An example of the MITM attack

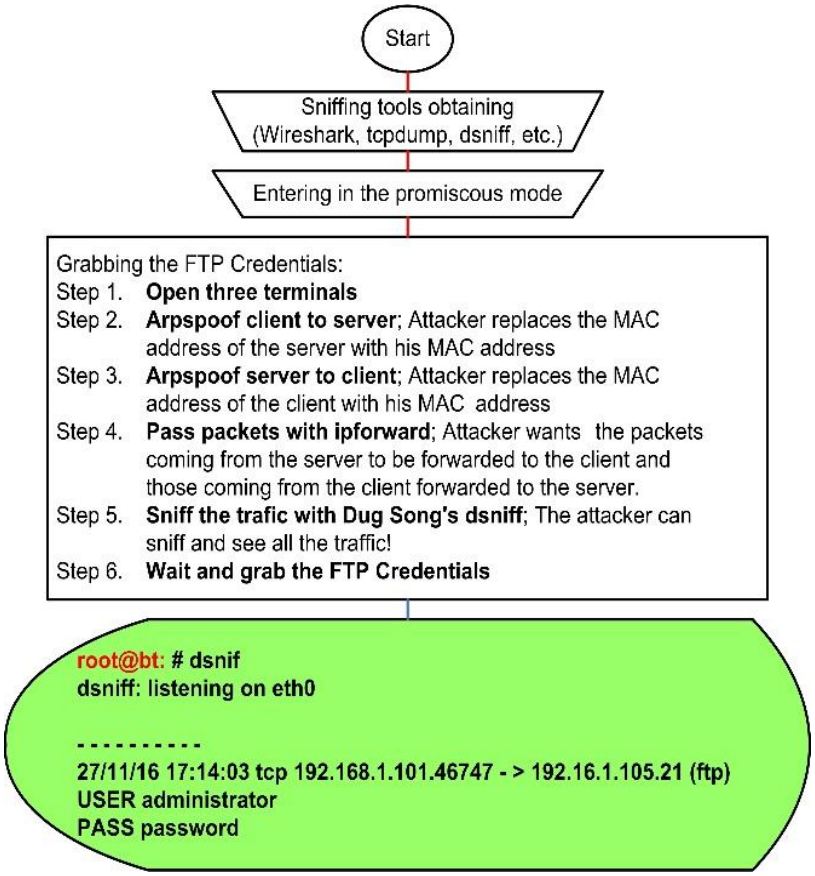

Figure 2. Sniffing and the FTP credentials grabbing

Authors visualization of (How to conduct a simple man-in-the-middle attack, 2014)

MITM attacks can be conducted in several ways:

- Address Resolution Protocol (ARP) cache poisoning,
- DNS spoofing,
- Session hijacking including side-jacking, evil twin, sniffing,
- SSL Hijacking.

These methods are well explained in the literature and will not be herein discussed in details. An algorithm of the FTP credentials grabbing is presented in figure 2.

The example shown in figure 2 illustrates the dsniff application to collect text data on unsecured connections, which is its primary function. Dsniff is a network sniffer, and it sniffs cleartext usernames and passwords, web pages being visited, contents of emails, etc. After catching the username and the password, the attacker has all that he needs to attack. The attacker can have additional benefits if the administrator uses the same username and password for all services and systems.

In the past, MITM attacks mainly affected laptops, but, now, thanks to a mass population of a cell phone great number of users can be under attack. The problem might be even worse because a recent Symantec study showed that around 50% of respondents did not even think about their data protection. (Covington, 2016).

The introduction of computers in numerous devices, their networking and their connection to the Internet further increase the number of potential endangerment. It is interesting to see how these attacks can be carried out in the IoT.

One of the first ways is the local attack via Ethernet connection or Wi-Fi. An attacker with access to the local home network can perform attacks against smart home devices on two common modes: cloud polling and direct connection.

In the first case, in the cloud polling, the smart home device is in constant communication with the cloud. The smart device uses this method when wants to continuously check the cloud server whether there is a new firmware version available. If yes, it uploads its status. To target such an application, attackers can perform an MITM attack. They can redirect network traffic using ARP poisoning or by DNS settings modifying. To intercept HTTPS traffic attackers can use a self-signed certificate or some tools such as SSLstrip. When the connection is done over HTTPS, some of the smart devices do not verify whether the certificate is trusted. Per (Barcena & Wueest, 2015), “none of the tested devices perform a mutual SSL authentication, where both sides authenticate with one another instead of just the server authenticating with the client. Most devices completely ignore certificate revocation lists, allowing an attacker to use keys that were obtained through a data breach without any problem”.

In the case of direct connections, devices communicate with a hub or application in the same network. This way, a mobile app can locate new devices by scanning and probe every IP address on the local network for a specific port. The Simple Service Discovery Protocol and the Universal Plug and Play (SSDP/UPnP) protocols can be used to discover the devices. Any attacker can do the same.

About scanning for victims, auto detection of local interfaces and default gateways, as well as about the setting up the MITM attacks for the victims, routers, IP forwarding, and restoring the victim after attack was done, can be found in numerous sources, e.g. (Edwards, 2016) or (Kapil, Manoj, & Borade, 2016), and will not be further analyzed here.

There are a variety of tools available to conduct a man-in-the-middle attack. Here are some of the tools that can be used for network and host analysis, but, which also have MITM attack capability

- Ettercap – a comprehensive suite for MITM attacks. It features sniffing of live connections, content filtering on the fly and many other options. “It includes many features for network and host analysis and supports dissection of many protocols. (Ornaghi & Valleri, 2015)
- evilgrade – a modular framework that allows taking advantage of poor update implementations by injecting fake updates and make hostname redirections (manipulation of victim’s DNS traffic). (Amato & Kirschbaum, 2010) (Jamie, 2016)
- SSLstrip – a tool that transparently hijacks HTTP traffic on a network, watches for HTTPS links and redirects and then maps those links

into look-alike HTTP links or homograph-similar HTTPS links. It also supports supplying a favicon which looks like a lock icon, selective logging, and session denial. (Marlinspike, 2014) Shortly, turns https:// URLs into http:// URLs.

- Dsniff – Per Song (2001) "dsniff is a collection of tools for network auditing and penetration testing. *Sshmitm* and *webmitm* implement active man-in-the-middle attacks against redirected SSH and HTTPS sessions by exploiting weak bindings in ad-hoc PKI."
- Cain and Abel, a Windows-based password recovery tool – Per Montro, this tool allows the use of sniffing the network, cracking encrypted passwords using Dictionary, Brute-Force, and Cryptanalysis attacks, recording VoIP conversations, decoding scrambled passwords, recovering wireless network keys, revealing password boxes, uncovering cached passwords and analyzing routing protocols. Using it, it is easy to recover various kind of passwords. (Montoro, 2014)

Smart devices, and consequently IoT, can be also endangered through Bluetooth hacks. Bluetooth Low Energy is probably most thriving IoT technology and can be used for many applications, e.g. for sensors, home automation, household goods, medical devices, door locks, alarms, banking tokens, smart every-things. Bluetooth Low Energy (BTLE, or BLE), a.k.a. Bluetooth Smart is a new mode of modulation and link layer packet format for low-energy Bluetooth applications. It was defined in the Bluetooth Core Spec 4.0. (Marquess & et al., 2010)

Some can say that the Bluetooth operating range is limited and that an MITM attack, can be difficult to perform because an attacker must be close to both of the attacked devices. But, BLE can have a range of more than 100 m. Furthermore, in some cases, the devices even do not need to be close to each other. The attacker can relay packets remotely, via the Internet.

Some mobile applications possess proximity features that might be abused by approaching the smartphone running the affected application away from the device and its original location. Mobile malware may attack BLE devices in range of the infected smartphone. Such malware is operated remotely, and the attack is theoretically possible on a mass-scale. (Jasek S. , 2016)

In his research, Slawomir Jasek (2016) found that the growing number of the Bluetooth devices used for keyless entry and mobile point-of-sales systems were vulnerable to MITM attacks. He noted that, although the BLE specification provides secure connections through link-layer encryption, device whitelisting, and bonding, "companies too often do not implement correctly that protections and this lack could allow attackers to clone BLE devices." After cloning, the attackers "can gain unauthorized access to physical devices when a smartphone is used as a device controller", as well as capture and manipulate data transferred between the two BLEs. "Jasek estimates 80 percent of BLE smart devices are vulnerable to MITM attacks. (Spring, 2016)" Per this research, 80% of reviewed devices were incorrectly configured allowing hackers to use some hackers' tools, such as GATTacker, to perform an MITM attack. Jasek explained that by using a few simple tricks, one can assure that the victim will connect to the attacker's impersonator device instead of the original one. "Common flaws possible to exploit, including improper authentication, static passwords, not-so-random PRNG, excessive services, bad assumptions" – allow to attacker "to take over control of smart locks and disrupt a smart home (Spring, 2016)".

It is interesting how MITM attacks have adopted themselves in nowadays circumstances. Here are some new experiences.

3.1 MIT-cloud (MITC)

Cloud computing has become a standard service for many companies. For the most of them, using of cloud-based storage is the very acceptable solution. Storage capacities are large enough to accept large amounts of data which can be transferred easily. It is easy to understand that these services will not demand user log on with his strong passwords for each data transmission session. It would be very uncomfortable for users, and many of these services, after the first authentication, use a session token saved on user's local system. If an attacker can steal the token, he would have a full control over the account, and he can whatever he wants. One of the possibilities is that the attacker infects user's computer by uploading malware.

3.2 MIT-browser (MITB)

A lot of people use (and will use) e-banking. The idea of MITB attacks is that an attacker on some way inserts a Trojan to victim's computer. After that, the Trojan will be waiting for the user to visit targeted banking website. When the victim attempts to visit targeted URL, the malware injects special HTML code into the original web page code, which may trick the user. If the user is not well educated and extremely careful, he will not notice small differences between current and original user interface. After that, "banking services" will be "provided" by the attacker.

3.3 MIT-mobile (MITMO)

Although it is not so safe and comfortable, like the use of desktop computers or laptops, many users prefer to make their financial transactions over their smartphones. Therefore, an MITMO deserves an increased attention. This type of attacks is focused on mobile transaction authentication numbers (mTANs) and transaction authentication codes. This attack intercepts SMS traffic and captured codes forwards to the attacker. The MiTMO presents a real and great challenge for out-of-band authentication systems. (Gregg, How new technologies are reshaping MiTM attacks, 2015)

3.4 MIT-app (MITA)

MITA attack can be conducted when an application does not perform certificate validation properly. In MITA attacks, an attacker, before starting communication with the application, successfully inserts a self-signed certificate. He exploits how the applications handle trust. The hacker can then intercept application data, steal information or impersonate victim on the application. (Gregg, 2015)

3.5 MIT-IoT

With the increasing adoption of IoT, MITM attacks will become bigger and bigger challenge. One type of MIT-IoT attacks targeted on smartphones, and caused by poor validation of certificates was already discussed in MITA. But, another example, more closely to home devices, could be IoT refrigerators that display a user's Google calendar. It was found that they did not validate SSL certificates. This slip could result in mounting of an MITM attack and stealing of the user's Google credentials. (Gregg, How new technologies are reshaping MiTM attacks, 2015)

4 ARE THE MITM ATTACKS RARE IN THE IOT?

According to McAfee research (McAfee, 2016), the most frequent attacks are a DoS and MITB attack (Fig. 3) and they together with SSL attack constitute the MITM attack. Together they make 64% of all attacks.

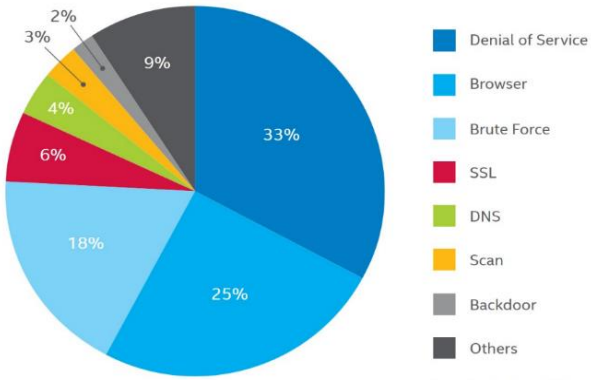

Figure 3. Top network attacks

Source: (Song, 2001)

There are billions of vulnerable IoT devices, and their number is growing rapidly. The most of them are always turned on and reside on unmonitored networks. If these networks allow high-speed connections, a compromised device can be a source of large DDoS attack traffic. So, embedded Internet-of-Thing (IoT) botnets are our present and future. They already were used for DDoS attacks, spam sending, MITM credentials hijacking, Internet chaos making, and for other malicious activities. One of the massive attacks with involving compromised IoT devices against dynamic domain name service provider Dyn is analyzed in (Gallagher, 2016) Here, however, we will not thoroughly deal with DDoS attacks. Here will be considered mostly risks connected with the devices like cars, webcams, DVRs, cable television and satellite set-top boxes, etc.

Embedded IoT devices are often maintenance free and with low-interaction level. Therefore, frequently, end-users are not aware of possible attacks. Barcena and Wueest, in their research (2015) by analyzing the network traffic, noticed that "the LightwaveRF smart hub generates certain network traffic each time it restarts and every 15 minutes to check for firmware updates".

The device sent traffic to a remote TFTP server on the Internet. Since TFTP protocol is a very basic file transfer protocol, this connection is not encrypted and authenticated. Therefore, it can be a subject to MITM attack.

In summer 2014, Samsung brought out their RF28HMELBSR smart fridge. The fridge implements SSL, but it failed to validate SSL certificates. This way it enabled man-in-the-middle attacks against other connections including those made to download Gmail calendar information for the on-screen display. Using MITM it is possible to steal victim's Google credentials. According to (Venda, 2015), the exception is when the terminal connects to the update server. During the testing of security, it was possible to isolate the URL https://www.samsungotn.net. This URL is also used by TVs, etc., but communications between the fridge terminal and the update server couldn't be intercepted.

Other devices connected to IoT also can be victims of MITM attacks. It is easy to imagine a scenario where a malicious competitor may want to fake temperature data from a monitored device, change them and forward them to the monitoring equipment. Getting false data, heat controller can leave machinery to overheat and consequently cease production. Except stopping production, this can also cause physical and financial damage to the operating organization. (Simko, 2016)

One of the reasons why IoT devices are attractive to attackers is that many of these devices are delivered with insecure defaults. It includes (Arbor, 2016):

- default administrative credentials;
- open access to management systems via the Internet-facing interfaces on these devices;
- shipping with insecure, remotely exploitable code;
- embedded systems that are rarely, if ever, updated, and
- a lack of providing the security updates. Many of vendors make no updates at all.

Modern connected vehicles may be connected to multiple networks including cellular, Bluetooth, Wi-Fi and Wired Automotive Ethernet. These advantages appear as an added risk. One of the recent man-in-the-middle attacks on smart motor vehicles was the July 2015 hacking of a Jeep Cherokee. Without the use of important security measures, hackers can be able to control the vehicles' basic functions, such as brakes, steering, and acceleration, which could be highly dangerous. (Simko, 2016)

And finally, are MITM attacks rare in the IoT? No! Some analysts say that any instance of an SSL root getting a bad cert can consider it as a sign of an attack. (Cisco, Threats in Borderless Networks, n.d.)

5 HOW CAN IOT CONFRONT MITM ATTACKS?

As shown, there is a great variety of possible MITM attacks. Their complete elimination is a very difficult task, but the careful user can significantly reduce the risk. Because of the great scope of features that each computer owns, there are very different types of MITM attacks, but also different types of defense that can be applied. Although there is no magic wand which can protect a computer from all attacks, one of the best approaches is to think about the protection already at the phase of creating the network, and then to update the operating system patches regularly. IoT devices are unique, made for specific purposes and therefore their protection is specific and, to some extent, can be easier. However, the number and diversity of devices, and striving to cheaper solutions are also an aggravating factor. These devices are frequently released with security vulnerabilities, and they can be prone to MITM attacks.

In stable devices, which are located within a secure private network, the first line of defense is at the router level, and the second at the level of the device. Given the fact that the devices are constantly connected to the Internet, that each device has its own original software, and that is rarely monitored by a user, possible protection comes down to a proper firewall configuration and periodical (regular) updating of software from trustworthy sources. Where it is possible, SSL certificates and strong encryption between client and server need to be used. If the network configuration is not changing frequently, it is quite feasible to make a listing of static ARP entries and deploy them to clients via an automated script. This can ensure that devices rely on their local ARP cache rather than relying on ARP requests and replies (Sanders, Understanding Man-in-the-

Middle Attacks – ARP Cache Poisoning (Part 1), 2010).

In the case of portable devices, it is possible to prevent MITM attacks when the devices are never connected directly to Wi-Fi routers of insecure networks. In such connections, an additional protection should be used whenever possible, for example, HTTPS Everywhere or ForceTLS.

DNS spoofing is mostly passive by its nature so it is difficult to defend. In very targeted attacks it is quite possible that the victim will never know that he has been attacked. But, there are a few things that can be done to defend (Sanders, 2010A):

- securing of internal machines;
- no reliance on DNS for secure systems;
- use of IDS; and
- use of DNSSEC.

Also, a few things can be done to defend against session hijacking (Sanders, 2010B):

- doing online banking from home;
- being cognizant and keeping an eye out for things that seem unusual, and
- securing own internal machines; such attacks are mostly executed from inside the network.

SSL hijacking is virtually undetectable from the server side, but some things can be done from the client's side (Sanders, 2010C):

- ensurance of secure connections using HTTPS;
- doing online banking from home; and
- securing own internal machines.

To ensure reliable identification of devices, the participants in communication in the IoT, IoT must provide greater application of public-key cryptography (PKC). The main challenge with the use of PKC is validating whether the public key is authentic, and belongs to the certain person, or it was replaced by an attacker. Verification requires a digital certificate issued by a trusted certification authority (CA). Once when the communication starts safely, the risks associated with the MITM attack are significantly reduced.

However, public key infrastructure (PKI) keys can still be compromised, and it can impact other devices. When an attacker gets access to the root key, he is in a position to sign malicious software and create fake certificates. The solution is to involve the "root of trust" (RoT) a set of functions in the trusted computing module that is always trusted by the computer's operating system (OS). (Jamie, 2016)

Finally, a recommendation to all users can be to avoid the functions "auto connect" and "Reply", and to avoid clicking on the embedded links from untrusted sources and the opening of not asked attachments. It can be of help to ignore unexpected communications. also, a sudden change in business practice is a reason to check by using other means of communication whether a legitimate person tried to establish communication. Not jailbreaking phones and not using apps from untrusted sources is also recommended.

6 THE ECONOMIC ASPECT

It is very rare to find exact data on losses caused by MITM attacks. MITM attacks usually target individuals, and they do not publish their losses. Companies often don't want to tell to customers that their products can be a victim of the MITM attacks. Therefore, it is easy to conclude that the published attacks are the tip of the iceberg. Defining of costs resulted from MITM attacks is even more difficult when MITM attacks are considered as a part of other major attacks, including DDoS.

On December 02, 2013, Seattle Division of FBI announced that it is aware of a fraud victimizing Washington state-based businesses, with "total loss experienced by the three area companies is roughly $1.65 million". (FBI Seattle, 2013)

Per SEC Consult and their analysis of the "firmware images of more than 4000 embedded devices of over 70 vendors, in which they paid their attention to cryptographic keys, they found more than 580 unique private keys distributed over all the analyzed devices. Correlating their data with data from Internet-wide scans (Scans.io and Censys.io) they found that their data set contained (SEC Consult, 2015):

- "the private keys for more than 9% of all HTTPS hosts on the web (~150 server certificates, used by 3.2 million hosts)
- the private keys for more than 6% of all SSH hosts on the web (~80 SSH host keys used by 0.9 million hosts)"

In addition, they recovered around 150 HTTPS server certificates used by 3.2 million devices,

together with 80 SSH host keys used by at least 0.9 million devices. In their analysis were included different devices: Internet gateways, modems, routers, IP cameras, VOIP phones, etc."

Such situation in cryptography can result in large losses caused by future MITM attacks. The situation with recycling cryptographic keys becomes even more difficult when one considers that many of devices can be accessed from a public network. This allows to MITM attack easy detection of credentials and/or sessions hijacking.

Earlier mentioned the Jeep hacking incident led to Fiat Chrysler recall of 1.4M vehicles, both cars, and trucks. (AP, 2015) For the manufacturer, FCA US, the American arm of the Italian auto group, this meant a huge inconvenience, big losses in potentially sending of more than one million USB memories with patches for software, but these losses are bigger when a reputation losses and goodwill diminishing are included. On the other hand, for users, except the wasting of time, it could also mean the loss of their (and not only their) lives.

Bearing in mind the possibility of attacks and their related losses, Internet users have a reason to think about sharing of risk with insurance companies. "Cyber insurance can provide a valuable and flexible tool for covering many types of cyber losses." (Watson, 2016) It is good to ensure coverage of the most probable attacks, in the broadest possible terms and conditions, in advance of a loss. But, to transfer risk successfully, with rapid developments in these evolving areas of coverage, the coverage needs to be flexible and to act upon at the time of loss through proactive claims advocacy.

7 CONCLUSION

IoT devices protection depends on many factors, starting from the producer of the device and their conception of the device protection, to the end user and their awareness of possible risks, and needs for device software patching whenever an update is released. Between all factors, the most conspicuous are a device identification and the encryption of communication between the device and its user. Such communications demand certificates to identify each device. Because there are, and there will be billions of devices, it is to be expected that IoT devices will be insecure very frequently, at least during the period from the moment when a device was connected to the network, up to the moment when a vulnerability is discovered. The problem is even heavier when the factor "user" is included in the analysis. It is hard to expect that each user will keep their device software updated. Another problem can lay in the tendency of insisting on constant cheapening of production and products. Cheaper products may mean less protection against attacks to the device. The consequences are numerous, and one of them is that an attack which was carried out at a network weak point can be transferred to other devices in the network.

The attackers are frequently at an advantage, both in terms of knowledge and in terms of technology at their disposal. MITM attacks because of their specificity and diversity remain effective technology for carrying out attacks and acquiring illegal benefits. Although they are performed in different versions, they are based on the same idea. An MITM attack is often combined with other attacks or built into them.

MITM attacks usually target individuals, and, the attacks often remain undiscovered and unrecorded in the statistics. When economic operators are under attack, the attacks often remain hidden to the public to preserve the company's image. Only in large-scale attacks, it comes to light the extent of the damage caused. Despite difficulties in collecting of relevant data, this analysis on examples clearly showed the possible extent of damage that can be caused by MITM attacks. Also, the analysis showed that the increasing number of IoT devices provides attackers with more targets.

The research has shown the great potential of IoT, but also the risks that may occur from insufficient protection, and that for IoT users, at least, a good idea is not to use public Wi-Fi in situations where doing anything sensitive and/or confidential. As it is mentioned, it is not possible to have a magic wand that will provide a whole protection, but there are two magic words: prevention and proactiveness!

Finally, the research showed that the null hypothesis H0 is rejected. The research showed that the MITM attacks, although a rather old technology, is not rare and, even more, can cause damages to the attacked on the IoT. That way the alternative hypothesis H1 is proven.

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CONTENT ANALYSIS PECULIARITIES OF USER INTERNET ACTIVITIES FOR PERSONALITY PSYCHOLOGICAL STATE SLICE FORMATION

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Abstract

A system for the analysis of the psychological and emotional state of the individual is developed. The aim is to assess the individual through social networks and the practical recommendations. The analysis of assessment data, the problems of this area and the relevance of the system were studied. The diagrams are developed that describe the structure and logic of the system. Description of system requirements according to RUP methodology was done and a prototype application that simulates the activity of individual analysis system was created. In the course of this work, it was carried out creation and development of the information system through which it is possible to conduct a psychological analysis of the individual using his/her Twitter messages. The system helps to automate information gathering project, as well as obtaining and saving the results. It was carried out the analysis of the subject area, as well as considered a variety of information systems based on the certain principle. There was conducted an analysis of the generally known methods and criteria of information systems development. Also, there was also conducted an analysis of the system functionality. There were foreseen the functions that would exist in the system and their usefulness. There was also carried out a systematic analysis of the information system of personality psychological analysis, as well as described the subject area problem and

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defined project purpose. Using systematic approach basic principles, there were described requirements created by the information system.

Keywords: *information resources, commercial content, content analysis, content monitoring, content search*

1 INTRODUCTION

One of the fundamental principles of modern psychology is a human person dispositional model, which includes 5 relatively independent dispositions (Lovakov, 2013), (Alizar, 2012):

- extraversion/introversion — a person's focus on the external world, talkativeness, sociability, or immersion into the world of imagination and thoughts;
- goodwill — a capacity for mutual help, mutual collaboration, and sympathy towards others;
- integrity — discipline, diligence, and result-oriented performance;
- neuroticism — emotional stability degree, impulses and anxiety control level;
- openness to experience — a degree of intellectual curiosity, desire for new and different things, and impressions.

Each person is ranked in order of 5 dispositions — this is the way the psychologists make a personal model. It is necessary for the prediction of human action, formulation of conclusions about its suitability, prospects for professional growth, ability to work in a team, possibility of particular individuals to work together for a long time, etc. When hiring a number of organizations, a responsible person should conduct mandatory psychological testing of candidates using each personal model assembly. This is a quite lengthy procedure, which requires certain costs. However, it is possible to significantly reduce the cost of such testing and make it automated. Dr. Shuotian Bai from the Chinese Academy of Sciences has published a scientific paper (Shuotian, Tingshao, & Li, 2012) describing a relatively simple method of calculating each of the five personality dispositions analyzing its activity in social networks. The experienced specialist determines the properties of the human person examining its activity in Facebook or Vkontakte — it is not a big deal for him. Another question is this process automation. In the works (Lovakov, 2013), (Alizar, 2012), (Shuotian, Tingshao, & Li., 2012), (Solov'yev, 2015), (Dzheffri, 2015), (Prokhorov, 2015), (Kluemper, 2012), (Schwartz, 2013), (Kosinski, 2013), (Vysotska, 2007-2016) it is explained that each disposition is calculated from the numerical parameters of social network activity. For example, the level of integrity (discipline, diligence, and result orientation) is determined by the number of messages with questions and requests for help. The sign of extraversion is a large number of emoticons; a frequency of status updates shows the openness to experience, and the level of neuroticism is determined by the number of messages that caused a negative assessment of others. Automatic creation of personal models is only beneficial for users of social networks and Web services, as it allows displaying contextual advertising more effective, improve recommendations system, and make dating services better. Perfect knowledge of the audience is crucial for business and recruiting.

2 ANALYSIS OF THE RECENT SCIENTIFIC PUBLICATIONS

2.1 Drawing up a personality model by means of activity in the social network

When people come to an interview, they "wear" a specially prepared mask. All of them have already rehearsed, but it is a fake. Some companies insist on psychological profiling through evaluation. An understanding of personality and who he/she really is still important for organizations (everyone wants to avoid costly mistakes in hiring, and no one wants to deal with the "destroyers of commands") (Lovakov, 2013). In most cases, in social media, people do not "play" and honestly express their opinion (no one is able to hide their emotions, thoughts, and behaviour for a long time), the analysis of tweets (i.e. Tweet Psych) gives a lot of interesting information (Solov'yev, 2015). Communication is a window into the human mind, and the way a person speaks has much to say about his/her opinions. Linguists have developed two ways of decoding written words into account of human cognitive processes. The first method is Regressive Imagery Dictionary

(RID). This encoding scheme is designed to measure the amount and type of the three categories of content: initial (unconscious; as they think in a dream), conceptual (logical and rational), and emotional. The second method — Linguistic Inquiry and Word Count (LIWC) — measures cognitive and emotional characteristics of personality on the basis of the words that people use (Lovakov, 2013), (Alizar, 2012), (Shuotian, 2012).

2.2 Psychological profiles in some famous social networks

Tweet Psych uses RID and LIWC to create a psychological portrait of a person based on the content of his/her tweets (Dzheffri, 2015). The method is based on comparing the content of user's tweets to the baselines, which are assembled on the basis of the analysis of more than 1.5 million tweets selected at random, and identification of the areas where the user stands out. The service analyzes the last one thousand of tweets (this works best with people who have placed more than 1000 updates). This method is well suited for the analysis of accounts that belong to someone who uses Twitter for conversations, not just as a platform for distributing content. The method measures: fear, oral fixation, work, positive emotions, negative emotions, social behaviour, sadness, spirituality, swearing (offensive language), sexual preferences, dream, sports, education, self-criticism, money, entertainment. In the case of effective carrying out of such studies, many recruiters would use the received data. Nevertheless, there is a huge number of legal nuances in this practice.

LinkedIn: "Pole Position" is in better condition for the establishment of behavioural and psychological profiles (Dzheffri, 2015). Although it is not its main objective, it has an access to analysis of:

- skills/experience,
- working experience (companies where people worked and duration of service),
- career growth (a duration of stay on certain positions),
- teaching and development,
- education,
- future education,
- recommendations,
- groups/associations/members of discussion communities,
- comments made by the members of these groups (possible psychological analysis),
- personal information,
- articles a particular person reads,
- articles a particular person sends,
- profiles a particular person is interested in/has become friends,
- size and the number of connections (network),
- updates made (analyzed for certain data again),
- "liked" places ("Like").

2.3 Human needs and their behaviour in social networks. "Like" theory

"Like" is the easiest way to get and give "stroking" on the Internet (Solov'yev, 2015).

1. Need for touching. In psychology, there is a concept of stroking, i.e. actions in which a person directs his/her attention to the partner, and, addressing him/her, indicates that he/she recognizes the presence or him-/herself as a person (Solov'yev, 2015). During this process, the partner feels certain emotions and feelings. This is not necessarily a physical touch (it is a smile, compliment, support, speech, and active listening that emphasize the importance of the human). This is the same need as the need for food, water, air, and heat. Lack of attention makes people emotionally vulnerable and prone to manipulation. A person lacking attention spends huge amounts of energy to meet this need. People get stroking in various ways. Some people become diligent and responsible employees. Others receive it in disputes. Others attract attention carefully watching the appearance. And the fourth receive it by manipulating others.

2. Ways to get stroking: unconditional (obtained by the person for being as is) and conventional (obtained by the person for doing/not doing something) (Solov'yev, 2015).

3. Conditioned stroking reflex. Social networks teach us the principle that "like" can only be earned. In the social network, it is impossible to receive "like" simply for being a human. To get "like" (love, approval, praise, or just to attract attention), one should do something: post funny pictures, write an interesting post, share news,

change avatars, show new photos, etc. When a particular user posts something, he/she shows that he/she is alive, and we can love and interact with him/her. It is difficult to interact with the users who stay aside the news line. A social network does not allow to "like" the person just because that person is. It is possible to "like" someone's actions or qualities only.

4. Social networks and attitude. People who have harmonious relationships in their family and personal life do not have a dire need of stroking, and their activity in social networks is much lower than those who replace gaps in their personal life by means of social networks. Also, the activity of such people is not aimed at finding acceptance but information and communication. The reasons why people put "like" are as follows.

4.1. *"Like" as nonverbal communication.* This is a convenient way to show you and express your presence without engaging in conversation. Comments require a response; time is spent on writing the answer. There is no need to waste time and energy on "like". People use "like" to draw attention to them. Sometimes they can not speak out to another person in person, but if they share his/her views, in most cases, they do not mind showing it. They put "like" as an expression of belonging to the thoughts of the post author.

4.2. *The tendency to nonverbal communication.* On the Internet, verbal language is replaced with a sign language. With information growth, there appeared a need for a new language of communication. People use fewer comments and put more "*like*". This is a laconic way to express relations. Experts note the trend that people leave fewer comments but use more "*reposts*" and "*like*".

4.3. *"Like" as a compliment and a way to draw attention.* It is also a convenient way to express compliment to a particular person, to attract attention, and the opportunity to meet in person. Social network users usually start familiarity with strangers from "like" (like post), and then they write a message or add to friends. The first compliment, then talk.

4.4. *"Like" button functions*

- social stroking: if its amount is not sufficient in the real world, the user always returns to the network and achieves attention there (it is easier to get it there);
- nonverbal communication;
- information storage;
- news selection for Facebook;
- news promotion within the social network.

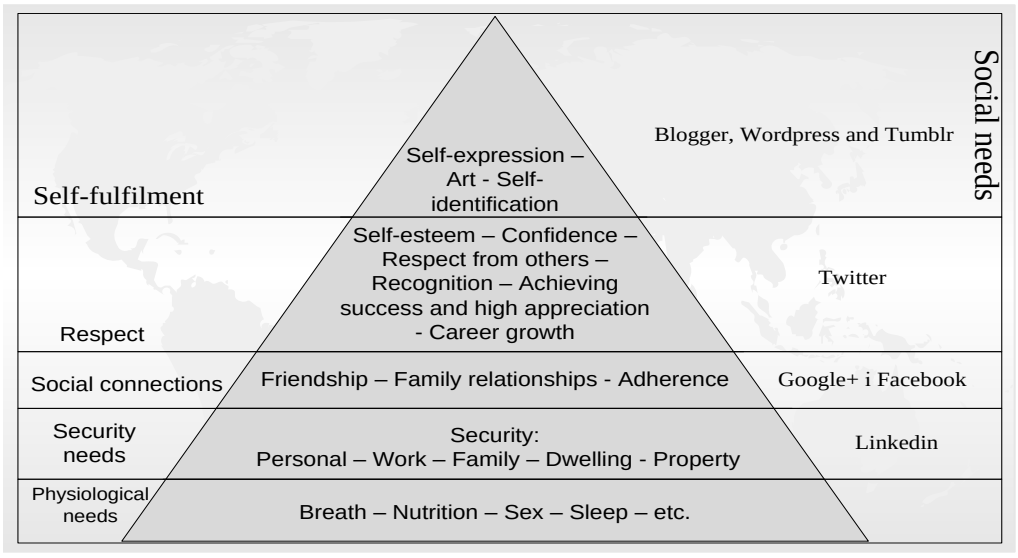
5. "Like" problem. This is an approval button, and this verb is an obstacle to some news sharing. Therefore, in its time, Facebook planned to allow its users to create their own verbs for "like" button such as "I am worried about it" or "I am concerned about it" (one may like not all the news, but it is possible to draw public attention to them). They wondered what would happen if use "like" analogue, a button with the formulation of the decision (to understand what this button will make and choose a verb to cause a discord between action and pressing). In social psychology, there is a notion that if a person gave the promise to do something, he/she will make it more likely than if he/she did not give a promise. In "Psychology of Influence" Robert Cialdini wrote that a person most likely performs the action if given a promise than if not given, as people are consistent in their actions and would like to appear so to themselves. For the same reason, there is a button "I will go" on Afisha or Look At Me website. This is an obligation as well. It is also possible to add "help me" button; when clicked, there would drop a list of assistance options. Then all the news pointed out by the user would be in one place by the type of to-do list, where they could be viewed.

2.4 Social networks: psychology, sociology, and business

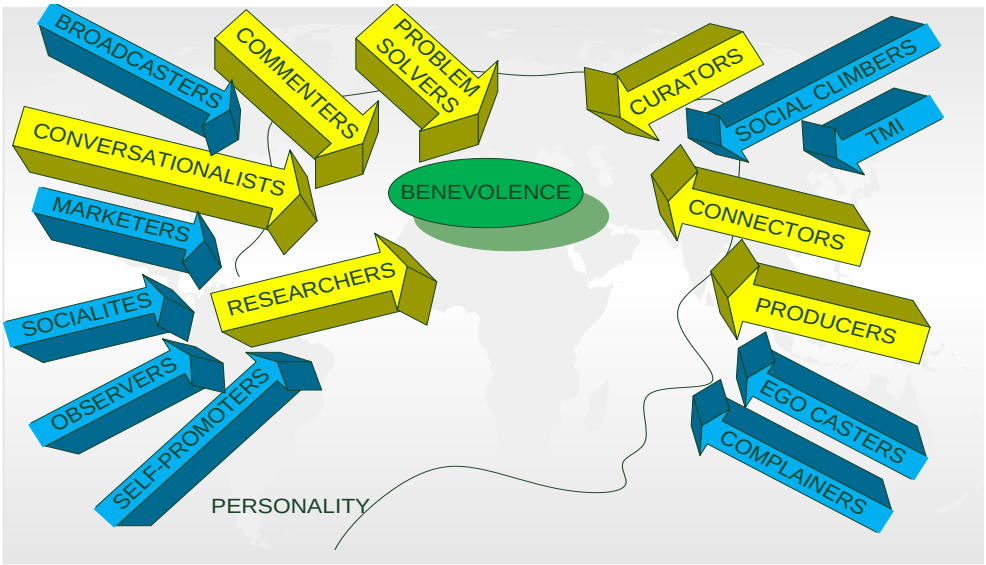
According to the results of various kinds of research, Slavs occupy a leading position in the world in terms of time spent on social networks (Prokhorov, 2015), (Global Web Index, 2009), (Bennett, 2012). In this paper, we will consider the reasons by which users refer to them. We will consider the personal psychological characteristics that determine the pattern of user behaviour in social networks. We will define the ways to analyze user behaviour in social networks and how these data are used for further commercialization of social networks, what opportunities and threats they bring users.

1. Needs for social networks can be defined in illustrations of the researchers from SMTT, where the need for social networks is correlated with Maslow's hierarchy of needs (Fig. 1a) (Prokhorov,

2015). Set of different human needs can be divided into five main categories. At all levels of social needs, there is a solution offered by social networks. Attribution of one or another social network in one of the layers is conditional. Therefore, LinkedIn service got into "Security" layer, as by registering there, one moves primarily by the desire to acquire social capital and make necessary acquaintanceship needed to insure in case of any danger such as job loss, legal issues, etc. Google+ and Facebook got into "Social communication" layer, as these networks provide a possibility to acquire and maintain friendly contacts, family ties, and find a "partner for a serious relationship". Twitter got into "Respect" layer, as for many people it is a convenient way to talk about them, i.e. to raise their prestige in the eyes of others, gain recognition, and talk about the successes achieved. Finally, Blogger, Wordpress, and Tumblr — popular services for blogging — are assigned to "Self-fulfilment" layer. In these services, a user him-/herself is a journalist, poet, and writer; it is a tool for art, spiritual expression, and self-identification.



a)



b)

Fig. 1 Maslow's hierarchy of needs (a- source: (Prokhorov, 2015)) and motivation to participate in social media (b- source: (Prokhorov, 2015))

Table 1. Categories of users motivated by different purposes of participation in social media (Prokhorov, 2015)

Name	Explanation
Problem Solvers	One of the most common sources of debates and social media updates is a question of people who are looking for information and hope that the network commentators will tell us how to solve the problem or where to look for solutions.
Commenters	The representatives of this category provide their opinions, thoughts, ideas, and experience on the topic of shared information. In a lesser extent, they are original authors mostly expressing their opinion based on someone else's content.
Researchers	They accumulate information and ideas of the authorities in their community and actively generate surveys and research in network space.
Conversationalists	They participate in discussions, actively update content looking for advice and comments on it, support themes within the community and between them.
Curators	They look for and share information on the relatively narrow topic they are experts in, filter content, and publish messages that they think professionals should be interested in.
Producers	They earn capital reproducing content in different network communities.
Broadcasters	In most cases, they distribute content and slightly participate in the discussion.
Marketers	They create an account in social networks for marketing ideas, products, or services.
Socialites	They received recognition/attention in the network transformed in the online popularity.
Self-promoters	They are focused on restoring the content about their own success, events they took part in, etc.
Egocasters	Modified self-promoters. Due to the constant promotion of their persons and careless attitude towards others, they lose their sense of reality creating the impression of themselves like people who praise their own point of view, which often ignores the views and knowledge of the team.
Observers	"The silent majority" that reads the content but does not participate in the discussions and does not give comments.
Social Climbers	They behave insincerely and selfishly towards members of social space publishing posts with a single purpose — to acquire weight in the eyes of the certain people who can contribute to their career development.
Spammers	They get acquainted with everybody feigning an interest in others and desire to be friends with a single purpose — to create a group to send spam.
Complainers	They use dissatisfaction as the main material for their posts, get pleasure from the issuance of negative emotions in the network space.
TMI (Too much information)	More and more users in social media publish information that is personal and private. Therefore, it should not be subject to public discussion. This behaviour is a kind of social exhibitionism and is negatively assessed by the part of the network community.

2. Individual aspects of motivation to participate in social media. Despite the existence of commonly reviewed motivations, there are undoubtedly country-related

psychological characteristics of the individual (Prokhorov, 2015). This issue is devoted to a number of studies (Lovakov, 2013), (Alizar, 2012), (Shuotian, Bai, 2012), one of which is a graphic illustration of the individual qualities that attract different users and determine their pattern of behaviour in social media. In the centre of Fig. 1b, there is an indicator that marks altruism (benevolence, kindness), i.e. mutual sympathy feeling, willingness to provide disinterested assistance.

Altruism is the central engine of social networks development because it creates communities based on trust and cooperation. The desire to provide disinterested help to others is not the only motive activity in social networks. There is a range of categories of users motivated by different goals (Tab. 1). Recently, the subject TMI was commented by the marketing director of Accenture Hamid Kastoev (Prokhorov, 2015) that the first person perceives social networks with caution, as something new, and trusts in this space a minimum of personal data, but then it enters his/her life and seems harmless listener like a personal therapist. A person begins to trust the network more personal information until he/she gets one or another negative experience. The fact that excessive frankness and openness in social networks is dangerous is repeatedly confirmed (for example, about 88 % of sexually explicit photos exposed to social media are stolen and move on porn sites without notifying holders) (Prokhorov, 2015).

3. Social networks as a tool to determine the psychological portrait of personality. The psychological qualities of a person leave their imprint on his/her behaviour in social networks. On the basis of this statement, there can be solved the opposite problem. According to Shuotian Bai from the University of Chinese Academy of Sciences in Beijing, in 2012, a team of researchers has developed an online test to determine the psychological portrait of the human personality by pattern (Eng. Pattern from Lat. Patronus — example to follow, style, design, pattern, shape, model, system — sustainable, context driven repetition of human thinking and behaviour to achieve certain results; a base unit of unconscious, a dedicated “automatism”; in a broader sense, any pattern, repetition of something), his/her behaviour in social networks such as Facebook or Renren (a popular social network in China), (Shuotian, Tingshao, & Li, 2012). The researchers asked more than 200 Chinese students who have accounts in Renren to fill in the test called “Big Five Inventory”, which was developed at the University of California (Berkeley) in 1990. Along with it, the developers studied Renren student pages fixing sex, age, and online behaviour profile: frequency of access to the social networks, emotional colouring and content of posts (written with humour or sadness, emotional or restrained, etc.). Further, they used statistical methods to identify the correlation between test results and user online behaviour in the social network. The description of a psychological portrait of personality was based on five categories of behaviour (A, C, E, N, O) — Tab. 2. The authors of the test argue that online behaviour can be successfully used to determine the type of personality and give some examples of correlations. In particular, people with high aspirations for the organization and discipline often published issues with a request to clarify the location of the object or email address; the frequency of emoticons use proves extroversion degree; constant updating of status parameters suggests openness of the individual, etc. Based on the research described, the specialized social networking services are implemented. They predict what types of services will be increasingly in demand by persons with different structures of the individual. What type of products, what type of advertising, what kind of news, what kind of contacts are in demand by people of a particular category. Research methodology can detect the psychological profile associated with religious, political, and cultural characteristics of the users. The owners of social networks used these techniques for further commercialization of services. In practice, the “pure” types are rare; there usually occur combinations of the main categories. Moreover, at different times and in different social networks, the motivation of the same people is different.

4. Features of social networks use in different countries. The interesting question is about the behaviour of the citizens of different countries and continents in social networks depending on the economic and cultural characteristics of social networks users. In works (Global Web Index, 2009), (Bennett, 2012), (Prokhorov, 2015) there is

presented infographics of the social networks global map by Global WebIndex, which

Table 2. Categories of individual behaviour in social networks according to (Shuotian, Bai, 2012)

Name	Decryption	Explanation
A	Agreeableness	predisposition to assist, promote, show affection, seek cooperation with the community members;
C	Conscientiousness	predisposition to discipline, organization, focus on achieving results;
E	Extraversion	the presence of a high level of communication skills, confidence, and a high degree of sociability;
N	Neuroticism	the degree of emotional stability, control of impulsiveness and anxiety;
O	Openness	the presence of pronounced intellectual curiosity, interest in innovation and all kinds of changes.

describes how people from different countries actively come into contact with each other under different behavioural types of social networks:

- Messengers and Mailers (Write letters and messages). Users, who received the message, spread it out on the network to each other.
- Content Sharers (Those who share content). Users who exchange content through the content network.
- Joiners and Creators of Groups (visitors and groups creators). Users who create groups, manage them and join other groups.

A map of behavioural patterns of social networks users in different countries is based on the research conducted by GlobalWebIndex. External (largest) circles on the map indicate the number of active participants in social networks; their number is expressed in millions of people.

The research shows (Tab. 3) that in developed countries, such as the USA, UK, Germany, Canada, users are more focused on the preparation of messages and less on the separation of content, while in the developing countries with rapidly growing economies, such as Indonesia or China, users spend more time on content sharing and participation in groups (Global Web Index, 2009), (Bennett, 2012). Tab. 4 contains the key investigations of Global Web Index by the following criteria (Bennett, 2012):

1. Upload photos online.
2. Upload video online.
3. Manage a social network profile.
4. Write your own blog.
5. Use a micro-blogging service.
6. Percentage with access.
7. Percentage without access.

The representatives of Global Web Index have interviewed 32,000 web users in 16 countries to provide a unique international perspective analysis of web behaviour and social participation of the media worldwide (Prokhorov, 2015), (Global Web Index, 2009), (Bennett, 2012). There have been conducted studies on the impact of social communication forces and the role of brands on consumer behaviour. This story of users' behaviour provides a global snapshot of the active participation of the social web interface market. The data show the percentage of those who are active in each of the forms of social activity. The size of the collected data is the amount of the audience in millions. On globalwebindex.net, one can find causes and trends, different demographics that are involved in the analysis of user behaviour, what motivates the Internet users to meet their own interests on the Internet, and quantitative assessment of how brands should be active in social media (Fig. 2).

Commenting on the situation, one of the researchers Ivan Yardley makes the assumption (Prokhorov, 2015) that fast-growing markets increasingly show a pattern of conduct that encourages the spread of new ideas and, as a consequence, the rapid economic growth. Indirectly, this trend confirms the investigation made by Brian Uzzi: his popular lecture "Teaming up to drive scientific discovery" is available on Youtube, where it is said about generating of new discoveries, which are increasingly conducted by groups, and the role of researchers of single drops. At the same time, the development team is

beyond the scope of research laboratories, institutions, and cities. Brian Uzzi states that creativity is, first of all, an internal quality of scientist, but the current studies show that an export/import of ideas begins to play an increasing role. Idea export and its use in a new area often lead to the invention (Prokhorov, 2015). The emphasis falls on the new area because the ideas move from one stable network group to another determines the given process.

Table 3. The main values of behavioural patterns of social networks users in different countries (Global Web Index, 2009), (Bennett, 2012), (Prokhorov, 2015)

Country	A number of active participants, in MM	Active online users, %	Messengers and mailers, %	Content sharers, %	Joiners/creators of groups, %
Canada	11.72	49	54	43	26
The USA	114.55	52	51	51	20
Mexico	12.80	56	52	63	37
Great Britain	19.27	46	44	40	28
Netherlands	6.30	45	45	42	18
Poland	12.03	58	48	46	26
Germany	18.81	39	47	38	32
France	15.92	41	57	45	28
Italy	12.66	44	38	49	36
India	35.08	63	50	64	49
Brazil	33.49	65	54	51	34
Spain	10.10	42	47	45	36
Philippines	14.43	77	57	72	45
Indonesia	18.83	76	57	66	52
Malaysia	11.50	68	54	63	41
Russia	26.06	64	56	62	45
Singapore	1.96	61	48	57	32
Hong Kong	2.56	53	39	56	33
China	155.29	48	47	53	34
Australia	23.06	47	45	43	30
South Korea	10.83	32	23	33	11
Ukraine	16.36	62	56	62	45
Japan	13.08	16	13	12	8

Table 4. Social Web Involvement (Global Web Index, 2009), (Bennett, 2012), (Prokhorov, 2015)

Country	**1, %/m**		**2, %/m**		**3, %/m**		**4, %/m**		**5, %/m**		**6, %/m**		**7, %/m**	
Access/Users	A	U	A	U	A	U	A	U	A	U	A	U	A	U
Canada	40.9	9.0	14.9	3.3	46.2	10.2	10.6	2.3	5.1	1.1	46.2	10.2	53.8	11.9
Great Britain	38.2	15.7	11.5	2.4	42.6	15.9	8.4	5.5	5.3	4.6	42.6	15.9	57.4	21.4
The USA	42.6	79.2	15.3	23.5	44.2	92.1	12.8	17.6	7.0	10.7	44.2	92.1	55.8	116.3
Mexico	52.9	6.4	22.1	1.6	40.2	4.8	25.6	3.1	13.7	1.6	52.9	6.4	47.1	5.70
Netherlands	37.0	4.8	10.0	1.3	36.2	4.7	10.1	1.3	3.5	0.45	37.0	4.8	63.0	8.17
Spain	39.4	7.4	16.2	3.1	35.8	6.7	17.2	3.2	7.5	1.4	39.4	7.4	60.6	11.4
Brazil	54.0	16.2	34.0	10.2	59.6	17.9	20.7	6.2	14.2	4.3	59.6	17.9	40.4	12.1

Country	**1, %/m**		**2, %/m**		**3, %/m**		**4, %/m**		**5, %/m**		**6, %/m**		**7, %/m**	
Access/Users	A	U	A	U	A	U	A	U	A	U	A	U	A	U
Italy	43.3	9.1	20.9	4.4	35.8	7.6	19.4	4.1	12.3	2.6	43.3	9.1	56.7	11.9
Germany	31.6	13.4	8.5	3.6	32.7	13.9	10.0	4.3	5.7	2.4	32.7	13.9	67.3	28.6
France	27.5	10.5	9.5	3.6	29.3	11.2	9.5	3.6	3.8	1.4	29.3	11.2	70.7	27.00
India	63.9	22.4	36.2	12.7	57.5	20.1	34.0	11.9	24.0	8.4	63.9	22.4	26.1	9.15
Russia	58.9	18.8	39.6	12.6	48.0	15.3	18.3	5.8	12.0	3.8	58.9	18.8	41.1	13.1
Australia	39.1	4.9	11.9	1.5	40.0	5.0	11.4	1.4	5.6	0.7	40.0	5.0	60.0	7.50
China	60.3	117.7	28.7	55.9	27.3	53.2	46.0	89.7	21.3	41.5	60.3	117.7	39.7	77.50
South Korea	53.1	14.9	19.5	5.5	15.6	4.4	39.9	11.2	14.0	4.0	53.1	14.9	46.9	13.20
Japan	19.5	12.7	5.7	3.7	14.9	9.7	24.5	15.9	8.0	5.2	24.5	15.9	75.5	48.90

The process of studies “collectivization” began before the era of the Internet and is developing by strong rates along with the process of emergence of more powerful means of collective communication. The increase in the number of group research and their members is observed primarily in technical disciplines and hardly noted in the humanities (Prokhorov, 2015). With the withdrawal that the online communication profile with an active content stratification promotes ideas and, consequently, economic development, we should agree only in part as there are additional considerations (Prokhorov, 2015).

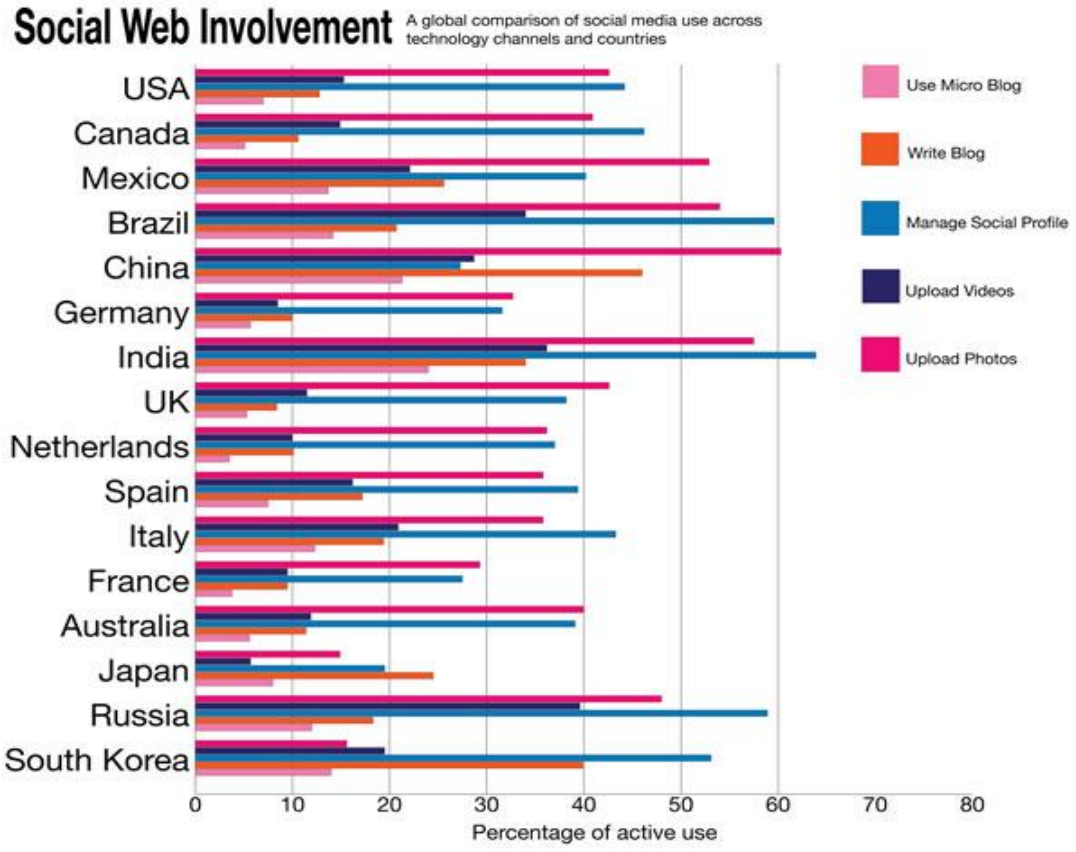


Fig. 2. The behaviour of users from different countries in social networks (Bennett, 2012)

To a large extent, the development of science and IT in society and economy happens in private commercial organizations operating in a competitive environment. If knowledge is

accumulated within a closed network structure (organization), where these ideas are recorded, protected from leakage, and patented, they do not make sense to invest forces and money. Therefore, one should consider the dialectic process, i.e. active information sharing as well as protection of corporate interests of the companies that invest in new promising IT. When looking at network members that exchange information, in addition to corporations, one should mention social networks owners. They do not only stimulate the networking, generating new knowledge, but also blur the boundaries of closed internal corporate communities. To some extent, the process of absorption of new knowledge is beneficial to social networks owners. Accumulating large amounts of information, they get a unique opportunity to identify new patterns in accumulated data using the methods of statistical processing of large volumes of content, including commercial, which employees of corporations unwittingly endure beyond the perimeters of organizations engaging in professional discussions on the pages of social networks (Fig. 3). The country, in which a global social network is based (through security structures), gets better access to the resource than other countries.

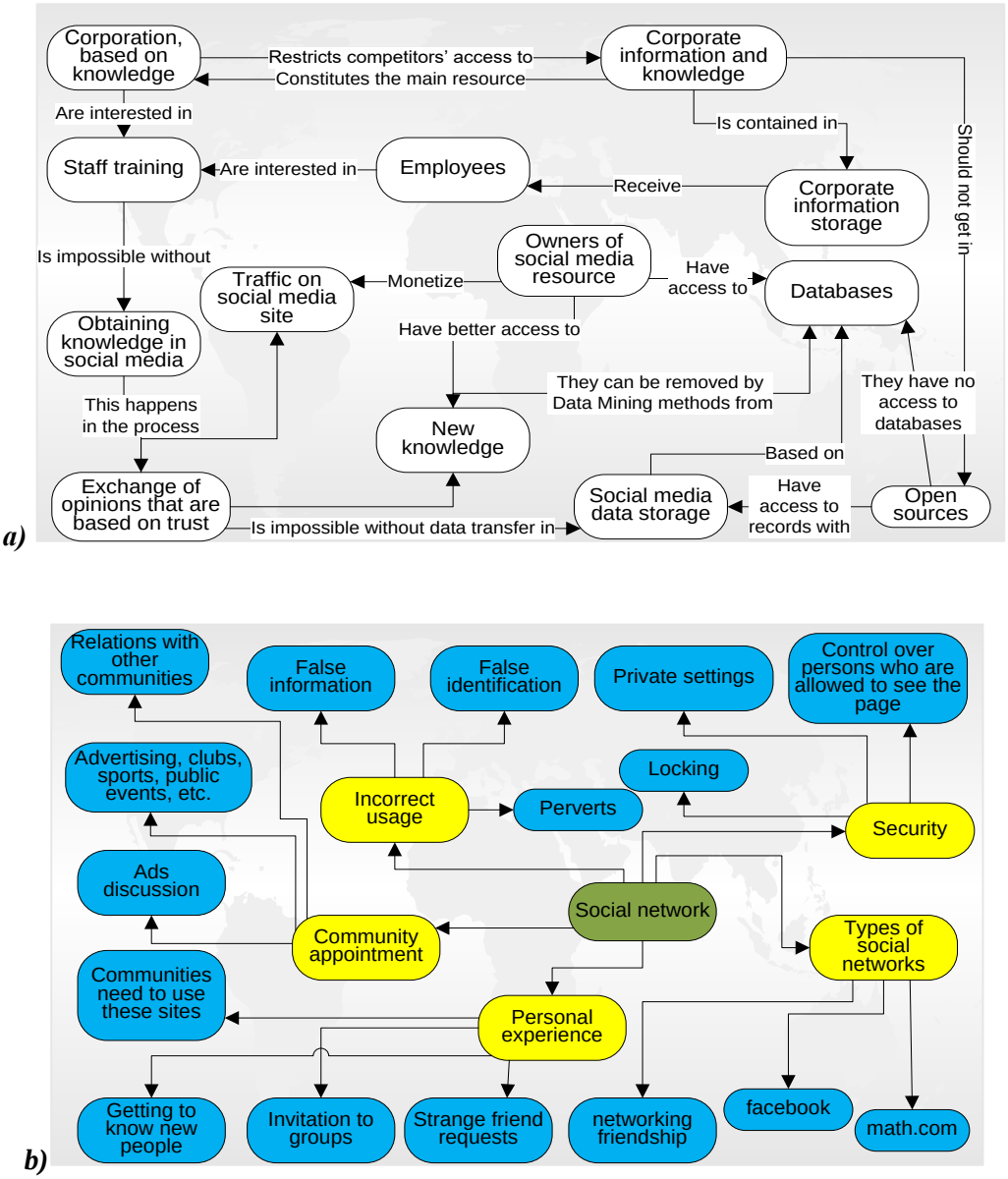


Fig. 3. a) Conflict of interest in attracting corporate employees in general profile social networks and b) social networks maps concept (Source: (Prokhorov, 2015))

5. Dissemination of information in social networks (the role of click and bridges) through the exchange of information between different network profiling communities and their associations in general profile social networks because it is very important to describe the spread of information in social networks. The combination of profiling communities in general profile social networks, such as Facebook and Twitter, leads to some psychological problems and attributes this to the fact that people do not have a common universal identity; on the contrary, the human person is multifaceted, and each edge faces different communities manifesting itself differently in each of them (Prokhorov, 2015). In a relaxed atmosphere with friends, persons use specific vocabulary and judgment, but in case a guest or woman appears, a conversation becomes different; and if the team consists of not only like-minded people, the other is not only the language but also the manner of presentation and tons, etc. Personality plays different roles in various social environments. Therefore, an attempt to combine them into one space leads to problems. For example, a person has an account on Facebook, where basically communicate with his/her friends and peers, and then he/she must be connected to the network of parents or children. It is likely that he/she is not ready to share all the statements with a new audience. Or, for example, a chief wants to become a friend on Facebook, and then a subordinate probably will not want to open all the information to him.

The problem of discomfort in general profile social networks can occur more frequently: it depends on the person's conformist degree. Anyone who keeps his/her own judgments — political, religious, national — regardless of the opinions of others, is ready to publicly declare and defend them in different communities. Therefore, he/she will feel less discomfort in general profile networks. On the contrary, a practice to "belong" to different communities by the principle "to run the hare and hunt with the hounds" will cause problems. Profiling social networks will not be fully absorbed by general profile networks, as communities are united by the old principle of union supporters. And the problems are discussed within a closed network community. Closed corporate networks, which unite against competitors, inspectors, etc., are constructed by the same principle (Fig. 4).

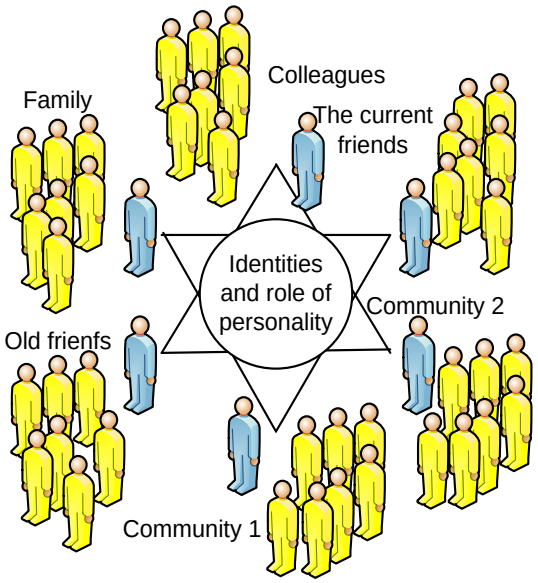


Fig. 4. Personalities in general profile social networks are different communities' members

The possibility of profile network communities intersection does not only creates problems but also opens new possibilities for users. General profile network gives its members the opportunity to cross social barriers. For some people, the opportunity to be with his chief in one information space of the private character is not so much a psychological problem as a new opportunity to learn more about him/her, found necessary people in his/her circle, and make friends with them, for example, on the basis of common hobbies. General profile social networks give a possibility to be in the right network space without various complexities and costs. The possibility of different social layers intersection moves the spread of information in social networks through the so-called bridges that connect different communities (clicks) and are information conductors.

6. Social Commerce Psychology Apart from the psychological and social reasons, patterns of communication and information exchange in social networks determine the level of activity and principles of user behaviour in social commerce (Tab. 5) (Lovakov, 2013), (Alizar, 2012), (Shuotian, Bai, 2012), (Global Web Index, 2009).

Table 5. Principles of user behaviour in social commerce social networks (Prokhorov, 2015)

Name	Decryption	The explanation according to Briansolis
Crowd opinion	People tend to look at what they do or other did to overcome the anxiety associated with taking wrong decisions (in this case, the wrong purchase).	81 % of buyers in social networks ask advice regarding expedience of purchasing a product.
Authorities	For customers, it is important to appeal to the authorities — experts in their field.	77 % of online shoppers are turning to reviews of professionals in the social media to make the right decision.
Less is better	Social networks users, as well as buyers in general, tend to give more weight to service with limited access. Phrase "While supplies last" is often heard in advertising. Operated by fear of losing benefits and desire to belong to an elite group, network users are ready to enter the communities that will have an access to exclusive offers.	77 % of people wanted to get an exclusive offer of limited party goods acquisition through Facebook.
Keep an eye on those who trust	People tend to have business with those who are sympathetic to, trust, and this is particularly true in social media. People tend to share information about good deals, interesting trends in the group of their community network to enhance the degree of trust to their own person and raising their authority in the group.	Almost 50 % of consumers made a purchase on the advice received from their community on the social network.
Permanence	Faced with uncertainty, people tend to minimize risks by referring to the proven solutions. Frequently, an offer to buy a new brand product at a lower price does not work because of the given pattern in the customers' behaviour. Confidence in the brand forms new purchases pattern.	62% of online buyers show loyalty to the brand because of a positive experience of online shopping.
Mutual assistance	One of the most important capitals in the social networks is a kindness. Those, who help friends in the community, create goodwill reserve to their selves. People tend to balance the desire to uphold social justice and give thanks for services, even if they did not ask for a favour.	Every month, 25 billion pieces of content are shared on Facebook.

3 SCIENTIFIC RESULTS ANALYSIS

Software system functionality. The mechanism for using functions allows describing the features of this information system (Tab. 6). To improve the quality of this information work, we introduce the concept "function attributes", i.e. data elements that provide additional information about each function.

Table 6. Functions of the system

№	Name	Description (function value)
1	Personalization	Each program should be strictly personalized for a particular person; i.e. each user must create an account in order to simplify the information system operation
2	Personalized information protection	Creating an account, user will give confidential data that must be protected from outsiders' encroachment
3	Primary data analysis	Collection and processing of data from social network profile. Filtering by key indicators
4	Statistical analysis of data	Identification of key patterns in the collected data and statistical report formation

№	Name	Description (function value)
5	Education	On the basis of the collected data and previous experience — preliminary conclusions improving or new programs creation
6	Processed data storage	Providing access to user's preliminary analysis data
7	Character analysis	Identification of key indicators of human nature
8	Temperament analysis	Identification of key indicators of human temperament
9	Emotionality analysis	Identification of key indicators of human emotionality
10	Self-assessment analysis	Identification of key indicators of human self-assessment
11	Volitional qualities analysis	Identification of key indicators of human volitional qualities
12	Social skills analysis	Identification of key indicators of human social skills
13	Comparison and adjustment of results	Comparing previous results with current ones on the basis of the comparison of functions No. 7-12, and, if necessary, their adjustment.
14	General conclusions formation	Generalization of individual's psychological state.
15	Formation of recommendations	Determination of appropriate strategies to communicate with a person or other interaction features.
16	Informing about research error	Detection of error in the research and informing about it
17	Help with use of the program	Creating a complete reference for user
18	Correction of analysis possible errors	Possibility for certain users, who have the necessary authority for this purpose, to correct errors in the mechanisms of psychological analysis or results
19	Freud's determination of psychological type	Typification of personality under Freud's studies and classification
20	Jung's determination of psychological type	Typification of personality under Jung's studies and classification
21	Encyclopaedia and information on psychology	Creating the required guide that contains a description of all psychological characteristics.
22	Data backup	Data backup function for cases when the data may be lost (personalized entity data, survey results)
23	Data access function and comparison of data from different social networks	Ability of an interactive comparison of data from different social networks
24	Personal analysis	Ability to analyze personalized user individual analysis on the basis of his/her social networks accounts, as well as requests.
25	Search for people conducted under certain types or preferences	Implementation of search or filtering people on the basis of specific preferences

Summing up all the above, it should be noted that since there are no qualitative and comprehensive solutions currently on IT, which offer this problem solving, it is extremely important. The main goal of internal research in this area is the evaluation of modern society psychological state. It is possible to create serious IS's that, on the basis of information from social networks, will be able to determine and predict a so-called "temperature", i.e. a general state of society at a certain time. This will help prevent different kinds of problems associated with the social discontent of the population, etc. I consider that this decision may find its application for solving a wide range of problems and challenges in various areas of the modern world.

4 DESCRIPTION OF THE SYSTEM REQUIREMENTS ACCORDING TO THE RUP METHODOLOGY

1. Persons interested in the precedent and their requirements:

- a registered user wants to quickly find out the psychological state of a person without spending a lot of time;
- a person whose psychological analysis is carried out: is not against the fact that his/her own data will be analyzed (i.e. provides open access to his/her account);
- project administration wants to have full information on the operation of IS.

2. IS user is the main actor of this precedent: it is an ordinary man who is a registered user and performs psychological analysis of different individuals using IS.
3. Precedent preconditions:

– IS must be active;
– user must successfully undergo authorization procedure (or registration) in the IS;
– data of the person, whose psychological analysis is under investigation, should be open.

4. The main successful scenario:

– the user begins a new psychological research;
– the user enters the name or ID of the person whose account in the social network will be explored;
– IS searches for human as well as his/her account information sample;
– IS carries out the analysis of data;
– IS displays detailed results of the analysis on the screen.

5. Expanding basic scenario or alternative streams:

5.1 Wrong person identifier

– IS informs the user about an error and cancels data input for the desired person.
– If necessary, a user can ask IS and obtain (as a hint) a list of all possible people identifiers (e.g., those that begin with a certain letter or number).
– A user repeatedly enters correct ID of the person.
– IS searches and displays the individual account of the found person (this is the point of returning to the main scenario).

5.2 A person is not found

– IS informs the user about an error and cancels data input for the desired person.
– If necessary, a user can ask IS and obtain (as a hint) a list of all possible people identifiers (e.g., those that begin with a certain letter or number).
– If a person is found again, IS notifies the user about an error and goes into the initial state.

5.3 A person has limited the access to his/her own data

– IS notifies the user about access error.
– IS outputs a request to search any other person or returns to its original state.

6) Postconditions: a list of conditions for compulsory execution in case of successful basic scenario (if all the interests of all stakeholders of paragraph 2 are satisfied):

– Data on personality psychological analysis are processed and stored in the IS.
– All the necessary recommendations and conclusions are made.
– A user has finished working in this session.
– A session is successfully recorded in IS database.

7) Special scenarios: to provide:

– the highest reliability of all sessions' processing.
– the possibility of user interface IS localization.
– 100 % ability to save data.
– a special access to a privileged group of users to correct errors in functioning.

8) List of necessary technologies and extra devices: IS should be

– developed as a WEB-oriented system.
– submitted as a supplement to all existing browsers.
– designed for all existing desktop and mobile operating systems.

The aim of this work is to create IS of individual psychological analysis. This system is designed to determine the main features of the "Big Five" using analysis of user messages on Twitter. The main users of the system are Internet users, in particular, as well as PC users in general, who want to quickly and easily learn some psychological characteristics of the individual social network user. Also, various recruitment companies can act as users, since the information gathered during this system operation can be used to find a necessary person to a certain position. The interface of this software solution has to be simple and intuitive even to weak PC users. The system should be integrated with the Internet to collect messages in social networks and other support services. The objectives of the given information system are as follows:

– user authentication for access to further work with the system;
– user authorization on Twitter;
– finding the appropriate user;
– analysis of the required user messages;
– easy viewing of analysis results.

The main input data for the system functioning are:

- personal user information — username, password, Twitter authentication data;
- messages of the user who is under analysis on Twitter.

IS should have the following opportunity: user authorization; user authorization on Twitter; user interface management; easy view the analysis results.

The result of work is the IP submitted as a desktop application, which is also the Internet service and allows analyzing the psychological state of a particular user on Twitter through his/her messages. This system should allow the user to store data analysis of the certain user as well as analyze other users of the social network.

The main issue of this paper is message analysis of specific Twitter user. There are many different methods of text analysis to determine one or another aspect of human nature: from habits and preferences to a specific and thorough analysis of the individual. It makes sense to consider such methods of text analysis:

– Content analysis — a type of document review. This method lies in systematic and reliable sequence to identify specific items of content of the particular array of documents with further data quantitative processing. It is used to study arrays of similar documents, large amounts of text, most of all — texts of mass communication. It is applied in determining results of questionnaires, conducting various interviews, etc.

– Morphological analysis — allows detecting morphological interpretation of each word of the text. This type of analysis is the basis for other, more fundamental types of text analysis.

– Semantic analysis — a method that allows building the semantic structure, consists of semantic nodes and semantic relationships.

– Intent analysis — a relatively new method that is based on the fact that the behaviour of each individual in society is intentionally-directed and has a particular recipient. Intension — a subjective focus on a particular subject or activity.

– Psychosemantic — a set of methods by which it is possible to determine the value or meaning of a word, object, or phenomenon.

There are some differences in detecting psychological content by means of intent analysis and psychosemantic. Along with the release of additional common factors, there are determined additional structures, and the relationship between them can not be taken into account when using these methods separately. The psychosemantical method basically detects unconscious tendencies, personal intentions. Combining these methods will enrich the analysis of the psychological meaning of the text.

Another problem is the methods of processing large volumes of text data. It is worth mentioning that conventional search algorithms are not very suitable for text data. Here one should use other methods. Some of them are reviewed below.

Formally, string search is defined as follows. Suppose that there is a specified array T with N elements and array W with M elements, and $0 < M \leq N$. String search finds the first occurrence W in T, the result will be considered index I, which indicates the beginning of the first line (from the array T) match with the image (word). For example, it is necessary to find all the occurrences of sample W = ABAA in the text T = abcabaabcabca. The sample enters the text only once, with the shift S = 3, the index I = 4.

Direct search algorithm.

1. Suppose I – 1;
2. Compare I symbol of the array T to the first symbol of array W.
3. If character coincided, then it is needed to compare the second character, the third character, etc.
4. If a character did not match, then it is needed to increase by 1 and go to step 2.

Algorithm completion terms:

1. M successive comparisons are successful.
2. If I + M > N, then the desired word is not found.
3. In the worst case, the complexity of the algorithm is O (N * M).

The disadvantages of this algorithm are:

- The high complexity of the algorithm (up to Θ ((N – M + 1) * M));
- If the characters did not match, the search begins with the first character of the sample and therefore can include T symbols, which have been previously reviewed.

- Information on T text, which we receive while checking S shift, is not used when testing these shifts.

KMP algorithm (Knuth-Morris-Pratt algorithm). This algorithm actually requires N comparisons only, even in the worst case. After a partial match of the initial part of W array with the relevant characters in T-string, in fact, it becomes known the first part of the line, and it is possible to determine some properties (based on the array W), through which it is possible to quickly move through the text. The idea of KMP search lies in the idea that each time when there is a difference between two text characters and the array is shifted to all distance covered since smaller shifts can not lead to full algorithm takeoff. KMP search features:

- there should be approximately (N + M) character comparisons to obtain results;
- KMP search scheme is really successful only when unsuccessful attempts were preceded by a certain number of matches. Only, in this case, the image shifts by more than one character. Unfortunately, coincidences occur much less frequently than differences. In most texts, the gain that may be obtained from KMP search is actually quite small.

Boyer-Moore algorithm (BM search). In practice, BM search algorithm is most effective if the array W is long, and capacity of the alphabet is large enough. At the core of BM search is the following idea: comparison of characters starts from the end of the array instead of the beginning, i.e. comparison of specific individual characters takes place from right to left. Then using some heuristic procedures we calculate a shift to the rights. Then again begin to compare characters from the end of the sample. This method does not only improve handling even in the worst case but also gives a bonus for intermediate situations. In most cases, except for specially compiled examples, BM search requires much less N comparisons. Under the most favourable circumstances, when the last character of the sample always falls on the character of the text, which is not the same, the number of comparisons is (N/M), in the worst case – O ((N-M + 1) * M + p), where p — alphabet power. Therefore, to work out user's Twitter posts, first, it was chosen combining intent analysis and psychosemantics as the most effective means of determining the specific features of the user, and secondly, they applied BM search algorithm, which proved to be the most effective of all the above algorithms and is not too difficult to implement.

Method of personality psychological state cut-off consists of the following algorithms

1. Personalization (system user authorization/identification, choice of social network, which will carry out analysis, search, and authorization/identification of the individual analyzed in this network, as well as system user personalization in this network to provide access to data).
2. Search for people conducted under certain types or preferences
3. Search and gain access to personalized information and personal activity history in social networks
4. Data access function and comparison of data from different social networks
5. Collection and primary analysis of analyzed personality data (history, profile, posts, comments, likes, communities, etc.)
6. Formatting and storage of data that are worked out at all stages
7. Statistical processing and data filtering
8. Content analysis of text to find marked words
9. System training according to the conducted content analysis
10. Preliminary analysis of individual data and building dispositional personality model under "Big Five" main parameters
    a. Extraversion/introversion analysis of the analyzed personality;
    b. Goodwill analysis of the analyzed personality;
    c. Good faith analysis of the analyzed personality;
    d. Neuroticism analysis of the analyzed personality;
    e. Openness experiences analysis of the analyzed personality.
11. The main analysis of the results of the preliminary analysis and the presence of marked words and activity in social networks
    a. Individual character.
    b. Individual temperament
    c. Individual emotionality
    d. Individual self-esteem
    e. Individual volitional qualities

f. Individual social qualities
12. Correction of analysis possible errors
13. Comparison with templates and results' adjustments according to the results of the conducted analysis
14. Freud's determination of psychological type
15. Jung's determination of psychological type
16. Data backup
17. Informing about research error
18. Formation of general conclusions and recommendations

The main results of the formation of general conclusions and recommendations depend on the correct conduct of text content analysis to find the marked words, the algorithm of which is as follows:
Stage. 1. Determining a set of criteria for the analyzed text content.
Step 1. Formation of such criteria as source type (a type of social network, public and/or private content, communities, etc.); content type (chat dialogs, history, profile data, shared content set, active involvement of friends, posts, comments, likes, activity in communities, etc.); personality being under analysis.
Step 2. Determining a size (scope/length), the frequency of occurrence, method/distribution place and time of content appearance.
Step 3. Determining of the array and marked words according to the category of psychological analysis of the "Big Five" main parameters.
Step 4. Creation, development, completion, modification of marked words dictionaries, blocked words, text classification rules under psychological parameters.
Step 5. Determining content filtering rules under existing criteria.
Stage. 2. The initial analytical-statistical sampling and content sample formation under limited sample from larger array criteria.
Stage. 3. Choosing linguistic text analysis unit to identify marked words on the basis of "Big Five" parameters.
Step 1. Identifying meaningful items of text content linguistic analysis (word, phrase, sentences subject, like, post, proof of friendship, idea, author, character, social situation, text part that is clustered under analysis category content).
Step 2. Formation of linguistic requirements for selecting analysis units: is large enough to interpret meaning; is small enough to not interpret many meanings; is easily identified; a number of units are large enough to hold the sample.
Step 3. Formation of rules of identified linguistic units' morphological analysis to determine the basis of words taking into account a frequency of their appearance in the text.
Step 4. Formation of the rules of identified linguistic units' syntactic analysis carrying out taking into account the analyzed text language features.
Step 5. Formation of the rules of identified linguistic units' semantic analysis carrying out taking into account the marked phrases formation peculiarities.
Step 6. Formation of the rules of commonly used marked words identifying among the set of identified linguistic units of the analyzed text excluding blocked words.
Step 7. Formation of the rules of blocked words identifying among commonly used linguistic units.
Stage. 4. Marking of text content accounts analysis units
Step 1. If units of account coincide with units of analysis, then it is needed to find frequencies of the selected content unit, otherwise, go to step 2.
Step 2. On the basis of the analyzed content, moderator proposes units of account, for example, the length of texts; text area filled with meaningful units; the number of lines (paragraphs, characters, text columns); size/type of file; the number of pictures of certain content/story, etc.
Stage. 5. Comparison of meaningful units of analysis with units of account.
Step 1. Classification by groups of weight with an assessment of meaningful categories in the total volume of the text. A classifier is an overall table, which summarizes all categories of analysis and analysis units. Unit expression units are fixed.
Step 2. Statistical calculations of content clarity and attractiveness.
Stage. 6. Development of text content analysis tool.
Step 1. Creating a protocol encoded content for compact presentation of data and quick comparison of all content analysis results.
Step 2. Filling a content protocol by properties (author, time of publication, volume, etc.).
Step 3. Filling a content protocol by labelled words according to the "Big Five" parameters.
Step 4. Filling a content protocol by the results of its analysis (the amount of use certain analysis

units in it and conclusions regarding the categories of analysis). Protocol of each content is filled on the basis of the count of its registration cards data.

Stage. 7. Development of content analysis table. Table type is determined in the form of coordinated and subordinated categories of analysis: each category (issue) provides a number of features (answers), according to which there is a quantification of the text content.

Stage. 8. Development of content analysis coding matrix.

Step 1. If a sample size is ≥ k units, then a set of matrix sheets is under analysis, otherwise, perform step 2.

Step 2. If a sample size is <k units, then a bivariate analysis is conducted. In this case, the coding matrix is formed for each content.

Stage. 9. Analyzing the text according to established coding matrixes.

Stage. 10. Results interpretation. Identify and evaluate the characteristics of the content on the basis of the statistical set of coefficients calculated over a period of time allocated for a certain category. Covers all extracted pieces of text, and the conclusions are based not on the part of the results but are taken into account as they are, without exception.

We suggest using syntax analysis algorithms of Ukrainian and English processing text and content analysis (the third step of the algorithm) of large volumes of text data and marked words analysis.

5 CONCLUSIONS AND PERSPECTIVES OF FURTHER SCIENTIFIC STUDIES

In the course of this work, it was carried out creation and development of the information system through which it is possible to conduct a psychological analysis of the individual using his/her Twitter messages. The system helps to automate information gathering project, as well as obtaining and saving the results. It was carried out the analysis of the subject area, as well as considered a variety of information systems based on the certain principle. There was conducted an analysis of the generally known methods and criteria of information systems development. Also, there was also conducted an analysis of the system functionality. There were foreseen the functions that would exist in the system and their usefulness. There was also carried out a systematic analysis of the information system of personality psychological analysis, as well as described the subject area problem and defined project purpose. Using systematic approach basic principles, there were described requirements created by the information system.

There was applied RUP methodology, by means of which there were defined and described the main precedents of the system and its actors. There were constructed use case diagrams, as well as diagrams of activity, packages, and sequence packets. There were described features and conducted an analysis of system use by a group of users. The basic algorithm of the given information system is described. The basic methods of solving the given problem are described. There was conducted a comparison of various techniques for analyzing large amounts of text, as well as organizing large volumes of text information. To work out user's Twitter posts, first, it was chosen combining intent analysis and psychosemantics as the most effective means of determining the specific features of the user, and secondly, they applied BM search algorithm, which proved to be the most effective of all the above algorithms and is not too difficult to implement. Also, there was conducted an analysis and selected the necessary means to solve the problem. There was chosen a platform (Electron) for building a web application and selected programming language to be used in the development of software solution.

There was carried out a description of the required software environment, in which the developed information system was developed, as well as provided a description of software tool implementation and results review. As a result of this work, there was achieved the set goal. There was created an information system that analyzes user's personal data (user's Tweets) and creates a psychological portrait of a person on the basis of five features: extraversion, integrity, gentleness, openness, and emotional stability. The software tool includes a user-friendly interface that is intuitive for even inexperienced PC users. This information system meets all current requirements, uses the latest web technologies, and allows users to analyze the text and form all the necessary conclusions based on them.

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ELECTRONIC DATA PROCESSING WITH QUANTITATIVE EVALUATION OF UNIVERSITY QUALITY

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JEL category: **C01, C54, L15**

Abstract

This article offers a quantitative assessment of university quality, algorithms for data processing and obtaining a numerical evaluation of its value. Two types of quality are discussed: Class A – of educational objects (subjects, teachers, programs) and class B – of training students as learning outcomes, acquired knowledge, skills, competencies, and values. It is placed emphasized on Class A, where assessments of teachers are obtained and similarly, academic leaders can be evaluated, so that they are proportionally stimulated for quality achieved. The summary conclusion is that to achieve objectification, group multi-subject expertise should be applied. Evaluation, which is multifactorial, multi-subjective, expert and quantitative (on an interval scale) with the participation of outside experts, requires a substantially complex evaluation system that would be worth only if it is based on modern means of electronic processing and correspondence. The principles of electronic data processing in evaluating the quality of education and university objects (subjects, programs, teachers, etc.) are presented. The article includes designed spreadsheets containing all the attributes: evaluated, assessed, criteria, standards, weight coefficients. Through e-mailing and processing of these tables objective assessments with preserved integrity are obtained. Additional polls are not held. The algorithm of university quality evaluation and algorithm of evaluating a teacher are proposed.

Keywords: *evaluation of university quality, multi-subject expertise, Objectification of assessments, electronic data processing, algorithm*

1 DEFINITIONS OF QUALITY OF HIGHER EDUCATION

There are different understandings of quality. A good definition is given in ISO 9001: 2000: *"Quality is a set of properties and characteristics of the products or services, which gives them the ability to meet conditional or presumed needs."*

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In the context of such an understanding, the quality of a subject is the *"degree of compliance of the stated educational goals with their actual achievement"* (Biling, 1999).

A classification of definitions of quality is given by Hristova (2007).

The definitions of quality as *a degree of compliance* do not consider the dynamics of change as a factor influencing on quality.

The definitions of quality as *a continuous improvement* underestimate the significance of

standards and requirements to the object of evaluation.

Therefore, the dynamic definitions where quality is examined as a level of compliance **in combination with changes of the purpose**, which it strives to conform to, are considered to be most suitable. In the paper, the following definition is assumed:

The quality of education is determined by the properties and characteristics of educational product or object (institution, program, subject, etc.), which gives it the ability to satisfy conditional or supposed dynamically changing demands on it. Quality is as better as smaller the difference between the outcomes, on the one hand, and dynamically changing requirements to what is evaluated, on the other hand, is and as more quickly the difference between them is overcome.

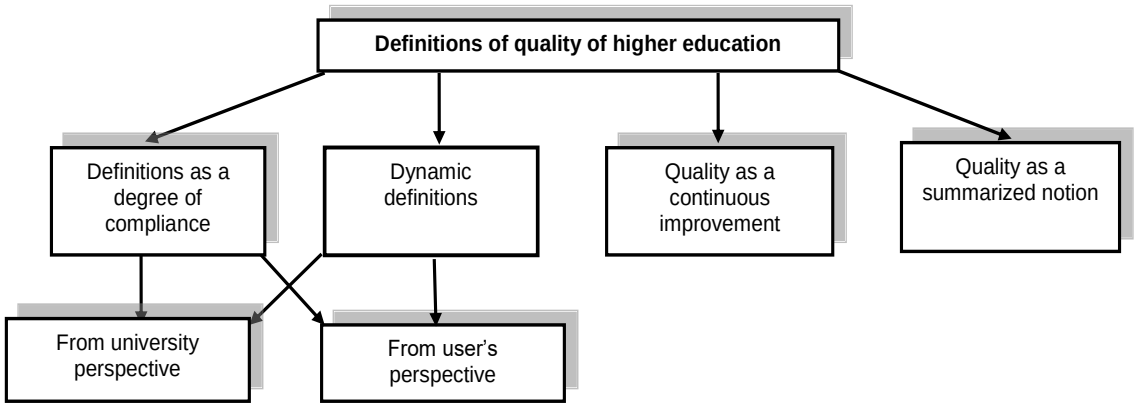

Fig.1 Classification of definitions of quality

This definition makes possible to give a **quantified assessment** by comparing the condition of the evaluated object (how things are in reality) with the academic standard, respectively requirements defined (how things should be).

Quality assessment is necessary not only for internal academic purposes but also in regard to the System of Evaluation and Assurance of Quality of teaching and academic staff, which is mandatory under the Higher Education Act, national accreditation, and university ranking system of the Ministry of Education, Youth and Science used to evaluate professional fields at different universities. Its significance has been increasing especially after the amendments to Higher Education Act in Bulgaria in February 2016, under which by 2020 60% of university budget funding will have been provided according to the results of national rating.

2 EUROPEAN DIMENSIONS

The quality of higher education is one of the values in Bologna Declaration (1998). It is a value that is present in all stages of the Bologna process. Documents of fundamental significance have been adopted as well:

- The *European* Parliament resolution, which emphasizes that *"the quality and relevance of higher education are key conditions for extracting maximum benefit from the intellectual capital of Europe."*
- *Program for the modernization of higher education systems in Europe.* It is where the European Commission accepts quality as a key driver of development and modernization.
- General principles, criteria, and methodology for quality assurance.
- Standards and Guidelines for Quality Assurance in the European Educational Area.
- Recommendations for accreditation agencies to apply the European standards and for universities to implement internal systems of quality management.

3 CLASSIFICATION OF TYPES OF UNIVERSITY QUALITY ASSESSMENT

Quality assessment is a condition for its stimulation. To get high quality, it should be encouraged. Subjects "carrying" quality (teachers, students, academic leaders) have to want it and be motivated to achieve it.

To reward one for quality that he/she has achieved, then first it should be measured and quantified. If the assessment is not quantitative, it cannot be stimulated in proportion. Quantitative assessments must be ***credible*** to the extent of being trusted in order to use them to stimulate quality improvement by closing the feedback between quality and its carrier. If the assessment is not adequate, if it cannot be trusted, it creates a sense of injustice – the moral grounds for demotivation of most academic staff. Unfair stimulation should not be applied, it leads to demotivation.

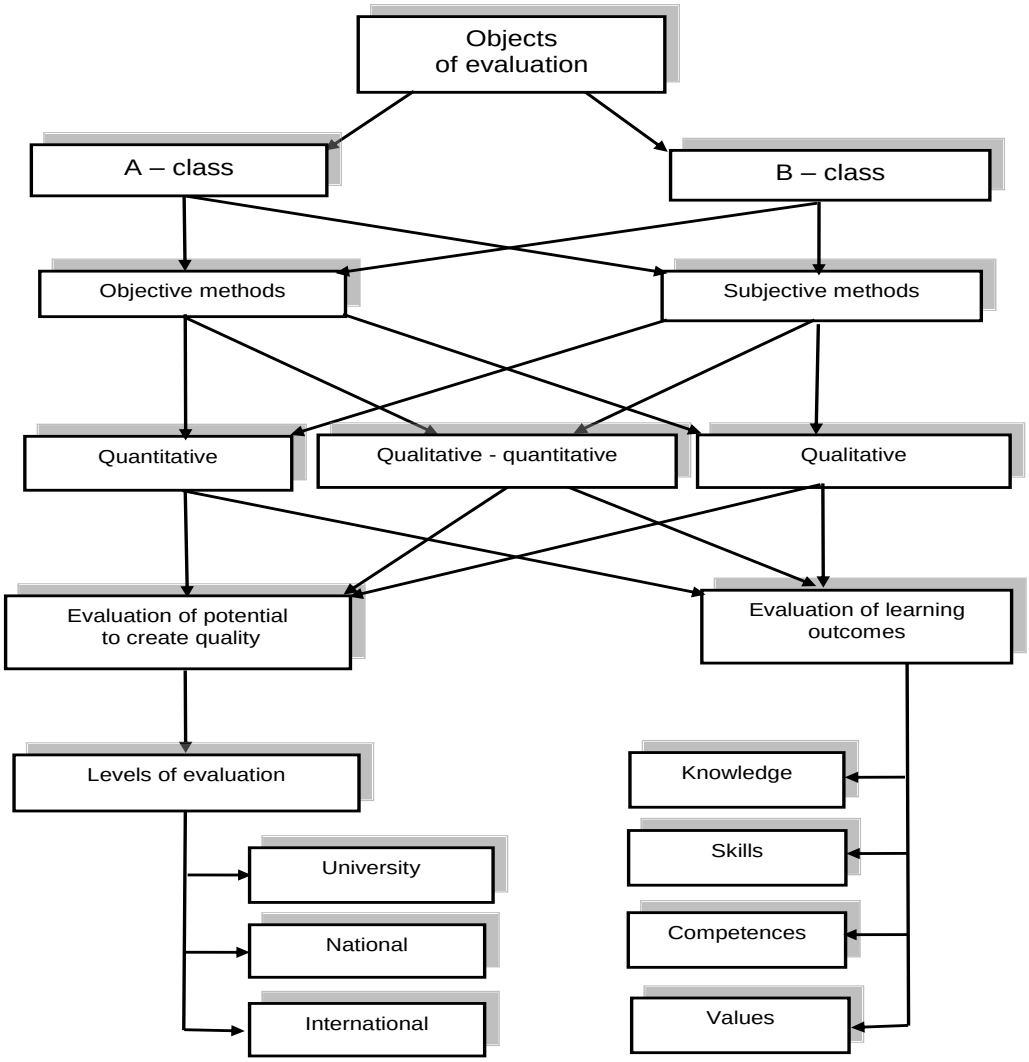

Fig. 2 Classification of quality evaluation types

Depending on what is being evaluated, (Hristova, 2007) has proposed a classification of quality assessment in two branches: A – class, and B – class (Fig. 2).

A – class. It assesses the conditions, prerequisites, and potential, which the possibility of the object "to create" quality is judged by, and which, although unequal to implement for all participants, collectively determine the quality related to the corresponding object. The objects evaluated are subject, program, degree, teacher, forms of training.

The fundamental principles of evaluation in the A – class are:

- *establishing quality criteria;*
- *determination of their coefficients of weight;*
- *measurement of quality indicators.*

A – class evaluation is applied also with accreditation. The national evaluation system of Bulgaria has chosen the option where various

aspects (factors) of training and research processes are assessed.

B – class. The evaluation in this area involves knowledge, skills, competences, and values of students, their ability of career on the labor market, in science and profession, personal fulfillment.

The quality in this class is oriented to outcomes at the exit and is understood as user's satisfaction. Since users in higher education are different (individual, company, state, society) and with different interests, there are different viewpoints on quality.

A well-known way to check the level of training at the exit is the ***test***, of which there are many examples in the world practice and in Bulgaria: tests for general education, tests such as TOEFL, SAT, etc. others. A tool to measure achievements, which is inherent in this class, is the exam. The science of exam and testing has entered in classics of didactics and pedagogy. But university exam today has been gradually losing its original meaning and should be harmonized with the features of the global information society. Knowledge and information are now quickly available but are limitless and cannot be acquired. A university should create abilities in humans to learn and acquire skills to creatively use the knowledge even when it is not his/her knowledge. The task of universities is to teach students to independently learn. These are also the positions, which the requirements to the evaluation of B – class should be formulated on.

3.1 Objectification of assessments

According to classification in Fig. 2, objective and subjective methods may be applied in both classes of assessments – qualitative and quantitative.

Objective evaluation is formalized control on the compliance with certain standards presented in quantitative metrics. The measurement result is the decision: "is – is not in compliance with". Often, for each parameter, based on objective data and formal methods, it can be established if it is or it is not in compliance with the accepted requirements and standards.

Subjective evaluation is applied when evaluation cannot be formalized. It consists in *forming a notion of the expert* or group of experts about one or another evaluated indicator of quality and formulation of opinion expressed in numerical or verbal assessment. *Benchmarking or comparison* lies in the basis of evaluation. The standard, which is compared with, is an established standard. With assessing university objects, such standards are the academic standards of subjects, degrees in professional fields, requirements for teachers set in standards, and also (as much as they exist) the standards for research.
Expert assessments are dependent on the object of evaluation, his/her scientific and professional competence, experience, premeditation and prejudice, emotions, conflict of interest and interpersonal relations. A method to objectify expert assessments provides an introduction of the weight of scores given by each expert. It depends on their awareness and competencies in each of the questions put. The model, which is used to identify the summary evaluation: additive, multiplicative, γ - averaging, etc., also influences on objectification. A number of publications are devoted to scientific methods of its definition (Timothy, 2013), (Bowen, 2006), (Berestneva& Maroukhina& Sharopin, 2002), etc.

With assessing the achievements of students, the part of an expert is performed by the teacher, examiner. It could be said that the traditional evaluation is subjective, especially in humanities where "digitization" the student's achievements in another way is difficult to make it possible.

It cannot be stated that when the teacher who has read lectures (the holder of the subject) is the examiner at the semester exam, the university, and national standards will be kept. To be closer to the truth, assessments must be given by at least two, one of which may be the holder. The other one necessarily should be an independent expert from another university or a leading specialist in professional business.

Objectification leads to "external testing" famous for decades. Recently, this proven age-old practice of the United Kingdom has given good results in some Bulgarian universities having an impact not only on the adequacy of assessments but also on harmonization with the requirements of the national and European standards and needs of the business.

The summary conclusion is that to achieve objectification, **group multi-subject expertise** should be applied. During a state exam or thesis

defense, for example, the State Board of Examiners consists at least of three examiners.

In a summary, the characteristics of evaluation where it is expected to objectify assessments can be reduced to (Bell& Warwick& Galbraith 2013), (Ho& Dey& Higson, 2006):

- **Multi-factor** (multi-criteria).
- **Multi-subjective** – the evaluators are a number of experts (independent, user and self-assessment) with different interests from at least three different countries from different viewpoints and with different viewpoints.
- **Expertise** – without applying formal method, assessments are given by experts-evaluators based on their own experience, current and objective information according to university data, direct and indirect impressions.
- **Quantitative** evaluation (e.g. within a 100-point interval scale).

4 CRITERIA AND INDICATORS FOR EVALUATION OF UNIVERSITY QUALITY

The indicators for the quality of education are divisions of criteria. The relationship between a criterion and its performance is hierarchical. The criterion is a consolidated component of the complex (aggregate) assessment of quality and is at the "output" of the process. The indicator is a component of the criterion summarizing the raw data of quality and "lies" at its "input". **Criteria K_i**, having indicators I_j, are developed for each evaluated object (Fig. 3).

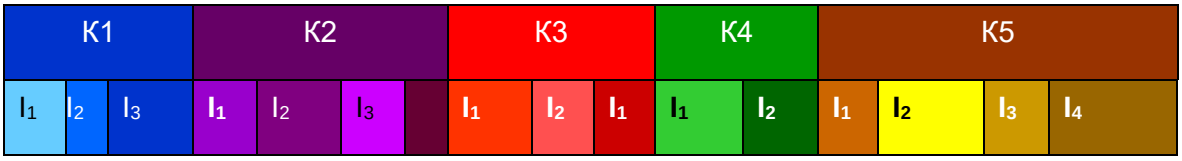

Fig.3 Criteria and indicators

A number of publications (Shield&Cartwright, 2015), (Akinbolu& Cartwright& Duffy& Good& Brown, 2007). present scientific approaches and methods for defining criteria and indicators: stochastic, deterministic, factorial or cluster analyses, multidimensional scaling, etc.

Academic standards, criteria, indicators and sources of quality assessments, including evaluation surveys, are completely interconnected, harmonized and directed to the university mission and priorities, to the National and European qualifications frameworks.

The significance (weight) of criteria in the overall quality assessment is not one and the same and is specified in an expert way. The weight $r < 1$is given by the size of the specific part of the rating scale (range) determined for the criterion. Similarly to criteria, the significance (weight) of indicators in the evaluation of the respective criterion is given by the size of the specific part of the criterial area determined for the indicator.

Weights are determined by the governing body - the one that "makes policies" for quality.

The total (global) quality assessment is the sum of scores for all criteria. The scale, which a general evaluation of quality is given by, is a 100-grade interval scale. This type of hierarchical relationships is used in the national criteria system: in accreditation of NEAA and Bulgarian University Ranking System.

5 COMPLEXITY OF UNIVERSITY EVALUATION SYSTEM

In a non-formalized area, where assessments are subjective, objectification of results to an extent to trust them as a basis for stimulation can be achieved through a multi-factorial and multi-subjective evaluation accompanied with transparency and publicity of assessments. But applied to dozens of programs and degrees, hundreds of subjects, by attracting external evaluators of the same order, the task is complicated and the system becomes difficult to control. When it is very complicated, it might be also inapplicable or inefficient. If it is simplified, for example, to only one evaluator (e.g. Head of Department evaluates in two global criteria: academic activities and research results), such assessment would be unreliable and cannot be used to stimulate quality.

To find reasonable sufficiency is an optimization problem. Several decades ago the search for such

a solution would not have been appropriate because of the a priori irrationality. Today electronic communication and processing make acceptable even a more complex system.

6 ELECTRONIC PROCESSING

6.1 Database

Modern universities have uniform electronic systems that manage information processes at the university. Their main functions are to:

- Store the academic information in the form of electronic documents.
- Automate the key information flows and resources.
- Serve administrative activities and learning process, research and development activities.
- Provide comprehensive interconnection of data from different databases.
- Provide access levels from anywhere in the world by Internet and it is regulated according to official powers of authorized persons.
- Integrate the system with national information resources.

For such an electronic system it is not generally difficult to absorb also the electronic data processing of quality evaluation of education and university objects (subject, program, teacher, etc.). The information necessary for evaluating is electronically acquired from all sources and processed only electronically.

Starting databases are:

- Criteria, indicators, and coefficients of weight addressed to the relevant object and presented in a table (sample Table 1);
- Academic standards by degrees complied with the NQF;
- Educational documentation (qualification characteristics, curriculum, syllabi, theses, etc.);
- Data from other modules of the electronic system necessary to evaluate academic activities, research, and teachers;
- Decisions of the governing bodies that have attitude to evaluation: proved evaluated objects, evaluators, coefficients of weight, etc.;
- Documented learning outcomes and success of students and doctoral students;
- Other documents.

Data access to the system is regulated: of evaluators – single, of authorized officials – for a certain period and under the supervision of the administrative offices.

6.2 Consultation with evaluators (experts)

The consultation about the quality of a program, subject, teacher, etc. is made with unified **electronic evaluation tables** relevant to the object evaluated. Table 1 presents a sample of an evaluation table containing:

- criteria K_i and their coefficients of weight r_i $\left(i=\overline{1,n}\right)$, $\sum_{\forall j} r_j = 1$;
- indicators I_{ij} and their coefficients of weight r_{ij}, $\sum_{\forall j} r_{ij} = 1$;
- evaluators where k is the next evaluator (expert);
- values of coefficients of the weight e_{ijk} of each evaluator k, for each indicator I_{ij}.

Correspondence with evaluators is electronic, tables are exchanged. Other surveys are not used. In the tables received, the experts fill in their assessments for each indicator in the empty fields (of red background). The tables completed in this way are returned electronically where they have been received from. When a coefficient of weight is not specified for the corresponding indicator, it means that the expert does not assess this indicator. The relevant box "Assessor-indicator" in the evaluation table, where the coefficient of weight is written, is empty in these cases. The authorized body has decided that the expert has no competence in the issue or in presumption is non-objective, directly interested in evaluation. When in the process of evaluating any of the assessors decides that he/she has no competence, he/she may omit this assessment.

6.3 Algorithm of data processing

Fig. 4 presents an algorithm for data processing with quantitative assessment of quality.

The algorithm of computing the evaluation table automatically reduces other coefficients of

weighting, so that their sum is kept to be one: $\sum_{\forall j} r_j = 1$.

For this purpose they are recalculated by the formula:

$$e_{ci} = \frac{e_{ti}}{1 - \sum e_{tr}},$$

where:

e_{ti} - table values of weightings where assessments are given;

e_{tr} - values of weightings where there is the refusal of assessment;

e_{ci} - newly corrected values of weightings where assessments are given.

Fig. 5 presents an algorithm for evaluating a teacher. The tables with criteria and indicators for teachers with academic ranks and those who do not have such ranks are different due to different powers and responsibilities of the two classes of academic staff. It is assumed that there are minimum requirements in the scoring system (e.g. 15 points for teaching and 10 points for research), which each teacher must necessarily cover in order to be assessed and attested by the system examined.

There are separate thresholds for teaching and research. The algorithm is used first to check teaching and then research and results applying criterial evaluation tables of the type of Table 1.

These algorithms already operate systems to quantification at some Bulgarian universities.

Table 1 Evaluation table

Criteria	Weight of criterion	Indicators	Weight of indicator	Assess-ments Q_{ij}	Evaluators (experts)			
					Self-assessment	Students	Users	Professional guilds
1	2	3	4	5	6	7	8	9
K_1	12	I_{11}	5	e_{11}	0,2	0,4	0,1	0,3
				Q_{11}				
				$r_{11}Q_{11}$				
		I_{12}	7	e_{12}	0,2	0,3	0,5	
				Q_{12}				
				$r_{11}Q_{12}$				
K_2	22	I_{21}	5	e_{21}	0,2		0,5	0,3
				Q_{21}				
				$r_{11}Q_{21}$				
		I_{22}	7	e_{22}	0,2	0,2	0,4	0,2
				Q_{22}				
				$r_{11}Q_{22}$				
		I_{23}	10	e_{23}		0,3	0,4	0,3
				Q_{23}				
				$r_{11}Q_{23}$				
.....								
K_n								

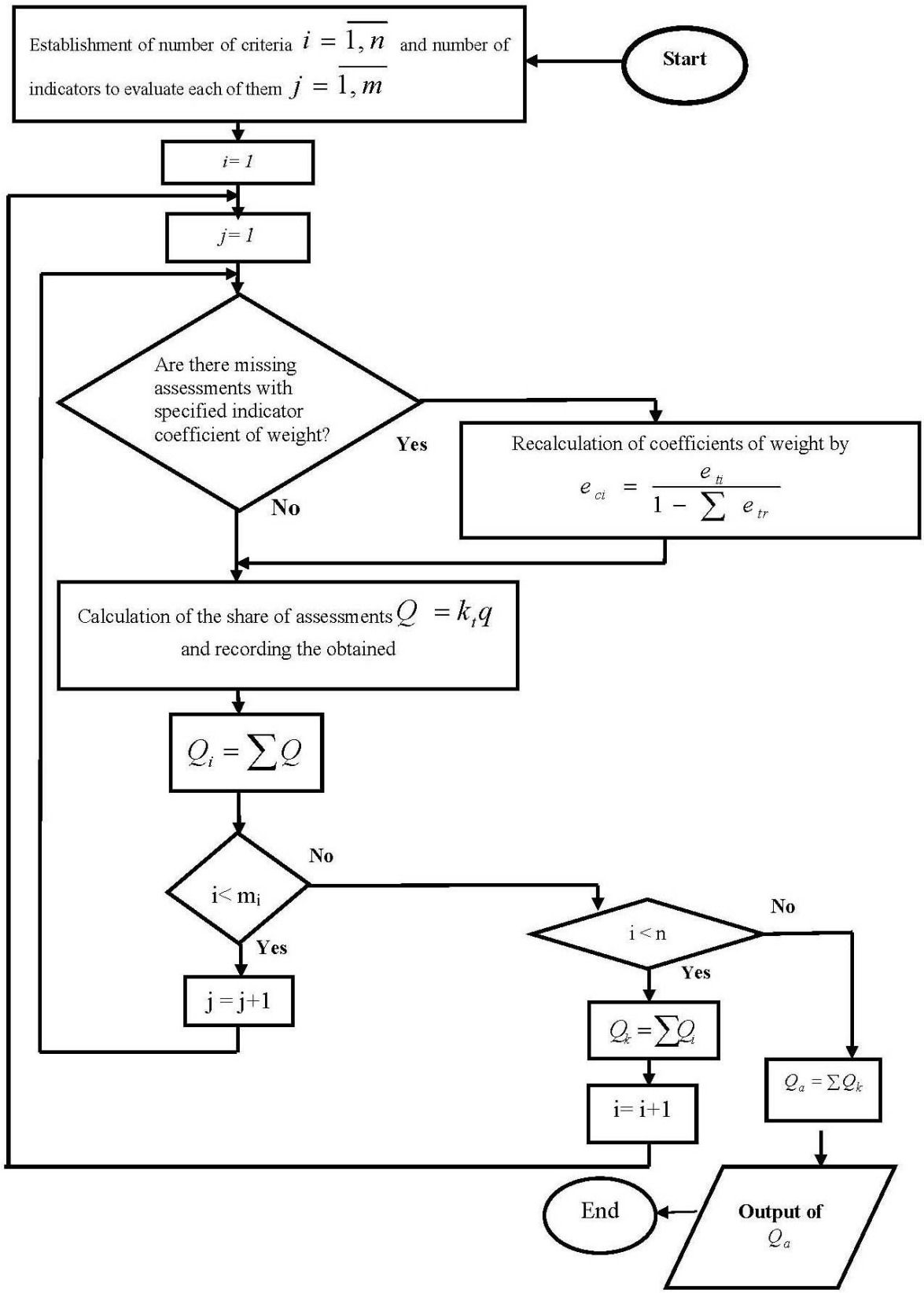

Fig. 4 Algorithm of university quality evaluation

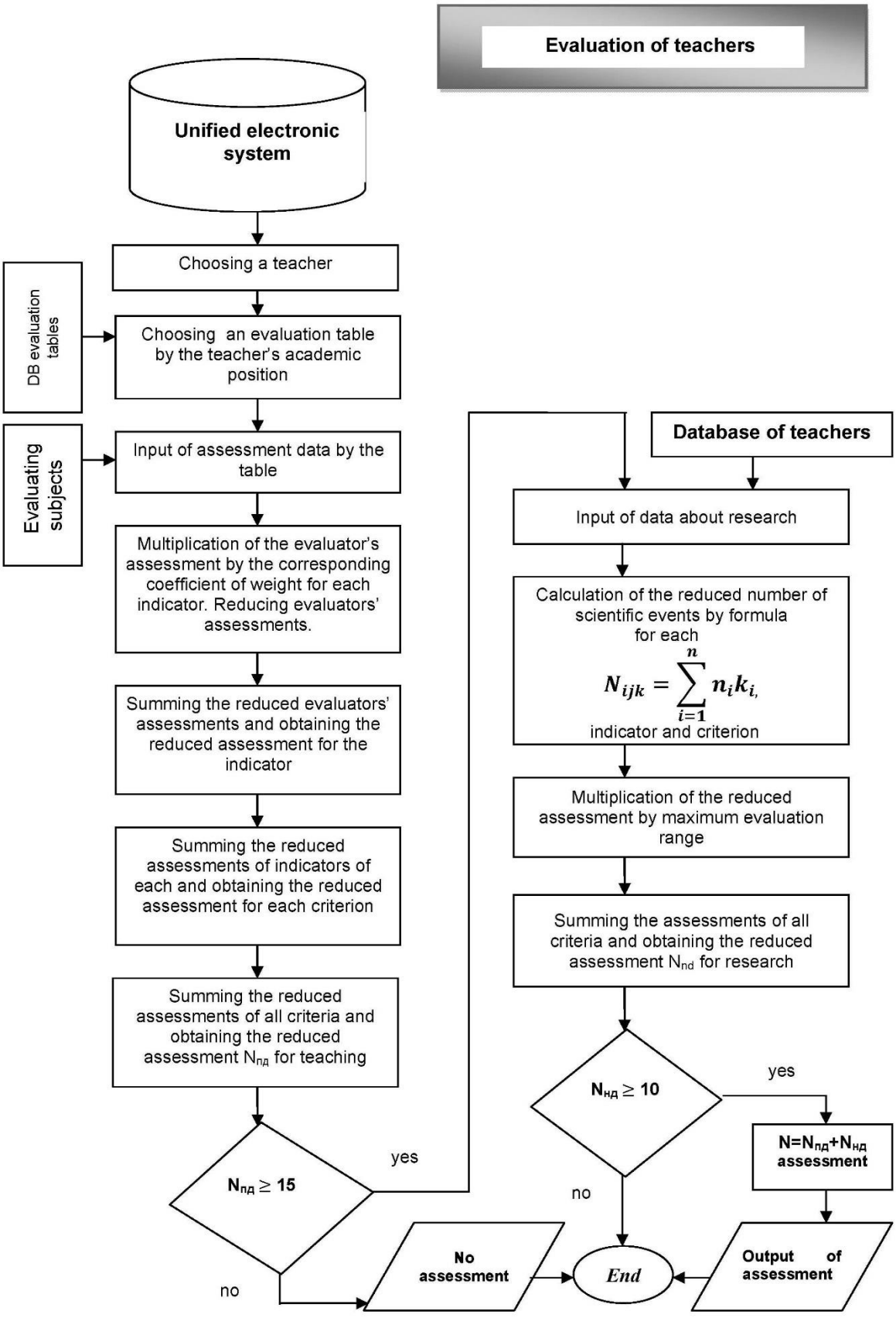

Fig. 5 Evaluation of teachers

7 CONCLUSIONS

The paper has proposed approaches, methods, and algorithms for quantitative (numerical) assessment of the quality of university objects and learning outcomes at the university exit. It is emphasized on the evaluation of teachers who must be motivated to achieve high quality by this system. University management presumably provides a system of proportional stimulation of the academic staff.

By e-mails, e-consultation, and the proposed processing methods it is possible to overcome the complexity of the evaluation system, which otherwise (with conventional technologies) is inapplicable. Accuracy and authenticity are achieved. Data integrity and assessments are stored. Time and resources are saved.

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CONSERVATISM AS A CATALYST FOR ECONOMIC CHANGES IN CENTRAL EUROPE STATES

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JEL Category: **F41, F43**

Abstract

Geographical-political term Central Europe is not strictly defined neither in time nor in space. The states and the groupings of states that have ever occurred in this region are typical for some significant qualitative distinctive characteristics comparing to those states of Western Europe. Even though these Central European states account for conglomerates of nationalities, ethnics, and religions, in fact, there is no destructive war that might have been waged among them by the end of 20th century. Central Europe, on its way to a new perception of the internal and foreign policy of states on the threshold of the 21st century, had to overcome two enormous barriers. The first one concerned ideological change, the second one was related to the change of economic rules in national economies. From time to time, theoreticians differ in their opinion on which of those barriers was more preeminent to be overcome first. Logically, the political changes and the acceptance of a new ideology were a high priority, thus a base for the transformation of economies had to be formed, which has been proved, especially from a time perspective.

Keywords: *conservatism, Visegrad Group, economic transformation, person-property-society, economic interests, laissez-fair*

1 INTRODUCTION

Experts on the economy are right in that respect that the economic systems of the socialist Eastern Bloc had already started to malfunction during the period of one-party political system governments (Kazansky, 2002). Particularly economic failures and less and less effective dynamics of their economies accounted for the source of local citizens´ dissatisfaction, which could not have been solved by then available political means. The states of a narrowly defined Central Europe, now co-existing and integrated in the Visegrad Group,

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as well as the states of a so-called larger Central Europe region, including the Balkan states, have found themselves on the above-mentioned threshold of 21st century in the situation that might be termed as a 20-year old cure[1] or as a long-term hybrid revolution (Vlcek, 2014). Such transformation process encompassing minor or major departures from standard socialist models, democracy, the socialist way of states´ governance, a change of the communist regime into another model form – a democracy based on a multiparty political system, market economy, as well as the observance of human rights, took for 20 years. At the same time, it also required a transformation of the existing security and defense models of those states, which were formed from the 50s to 90s of the 20th century, e.g. the Warsaw Pact (Usiak, 2009).

The analysis of states´ development, taken into consideration both either the Central European states of a lesser scope or a larger scope, have become a subject of the research of many theoreticians on political science and international relations. There exist many complex works on this issue. From our perspective, the analysis of the discussed issue´s development lacks processing of the impact resulted from various economic concepts of how the respective states have managed to cope mainly with the economic barrier mentioned in the introductory paragraph. An economic transformation of the political system is always demanding in as much as it requires a complex approach once introduced, e.g. in the Copenhagen criteria[2], an approach that might be implemented only by theoretically and practically proficient politicians, with thorough propaedeutic at an expert level. Otherwise, there, in a transforming state, occur apolitical accidents (corruption, budgetary and financial crisis, the failure of the private sector as the main part of the state´s transformation).

This ambition of this article is to analyze the selected concepts of conservativism that played the most significant role in the successful transformation of the former socialist states, the wherein economy was primarily based on central planning. The methods applied for preparation and realization of the articles' content itself have been determined by the character of the given issue. These are, primarily, analysis/synthesis, also comparison, as well as security synergetic, simply put, those methods that are commonly used when dealing with possible threats and cures resulting because of economic transformation in a modern society. The term modern society itself is a polyfunctional term with several meanings used, in fact, since the 17th century. This means that modernity expresses itself via the change of human´s mindset (the birth of modern liberal and conservative theories), via the change of ways of production (feudalism was replaced by the capitalist way of production), even via the change of social relations. These symptoms of modernity are, in their essence, transformed into new models from the 18 and 19th century to the 20th century where the most important sign of modernity, typical mainly at the end of the 20th century, is merging of various theoretical models of development into one hybrid concept. At the turning point of the 20th and 21st century, it is not possible to talk about the so-called pure liberalism or conservativism. A modern society cannot be segregated the way an economic theory only manages it. States enter multinational groupings – sub-regional, regional, supra-regional ones at the various level of economic and political integration. For the research of this social reality are more suitable hybrid theories such as functionalism, neo-functionalism, or social constructivism. Although a theoretical basis utilized by these theories is ever present. A recent development, of the last twenty years, points to such basis that is represented by conservativism in as much as it contains a guaranteed stability of terms, causal relations, and the direction of development trends in economy as well as in political systems, which

[1] The term "20-year cure" was coined by the well-known English liberal thinker E. Carr. "Long-term hybrid revolution" is a *modern terminus technicus* expressing those factors that are rather difficult to define, and which, at the same time, account for the sources of contemporary revolutions, and when compared to historical revolutions of the past, they lack a common ideological platform as well as the masses of a particular social class traditionally supporting a rigid revolution. (Authors´ note)

[2]The Copenhagen criteria account for the accession procedure the states must conform to become an EU member. The EU Summit in Copenhagen in June 1993 decided to open EU membership to the Central and East European countries, the countries of the former Soviet bloc.

has been proved via the spectrum of political parties in the European states. (Puslecki, 2013)

2 CONSERVATISM AS A FACILITATIVE APPARATUS FOR POLITICAL AND ECONOMIC TRANSFORMATION OF STATE

The Latin term *conservatore refers to* the activity that aims to preserve something from decay. From the beginning of civilization, human communities formed instruments in order to preserve the real value of humankind´s activities related to the production of food, weapons, buildings, ships, etc. Probably since the Middle Age, the term *conservatore* relates to peace maintenance as a universal human value heralding peace and welfare. European states started to invoke it in connection to the Enlightenment movement that was in direct opposition to monarchism and clericalism, which applauded conservative ideas. In fact, philosophy concurs with the opinion that the project of conservativism had from the beginning of its language frequency a significant political accent, though accompanied with criticism that conservativism had always been a dogmatic or skeptical doctrine. (Skutova, 2014) This objection was mainly related to the fact that conservativism, in general, does not support sudden and abrupt social changes, it mainly aims at the preservation of existing *status* quo. Radical and abrupt changes are considered to be dangerous for the stability of the state. A broadly taken conservative thinking cannot just be taken as a political doctrine. Conservativism, if adequate, impacts social ethos and morality, determines priorities in the sphere of social values (preferring traditional, confirmed ones), it also attempts to preserve the legislative and legal order of a state via ever present *inertia* models. Conservativism strengthens even the cult depiction of national, or tribal, ethnic as well as regional symbolism. It can also function as a permanent part of the national pride, but in its overblown form, it turns into a cliché, allusion, sentiment, and nostalgia, phenomena that had already been criticized by the German Enlightenment philosopher J.G. Herder (Dejiny filosofie 2, 1961). Supporters of conservative thinking claim that the criticism of conservativism is mainly driven by *nescience* of the real parameters of conservativism, which are rather broad and are directly interconnected with economic development.

One of those parameters tends to lean towards a right-wing political ideology, it supports the existence of social elites and their affluence, paternalism, and partially, it is also in support of liberalism on condition that it serves to national economic interests. This kind of conservativism is derived from the classical perception of a doctrine under which authority, social hierarchy, and power, are natural and inseparable in every society in a similar way as it is rather natural that there are those who govern and those who are governed by a government in every society. As such, social and economic fruit is allocated and enjoyed within society.

The basic idea of conservativism related to the economic development has two praxeological bases. Traditional conservativism, especially the paternalistic lineage, is typical for its significant skepticism towards the influence of market economy. Then, conservative alternatives, which are closer to liberalism and mainly to the New Right, consider the free market system as fundamental. Both lineages agree that *private* property ownership creates a basis for an effective working state. Here arises a parallel to the philosophical conception by Thomas Aquinas, regarding private possession as a right to decide[3] and make use of it, and, viewing it as an inseparable part of human (Christian) society. Humanly, this alternative is extremely useful for man mainly because of moral reasons. A person who possesses their own property could socially be very beneficial in the sphere of charity or humanitarian aid, as it is evident in the contemporary period of time from the side of NGOs, states, and various movements. (Passmore, 1968)

Conservativism also points to another ethical dimension of private possession that disappears in social collectivization: the way of running a

[3] Ius procurandi ete despinsend - this theory was developed by Aquinas in his book De ciuitate Dei. Authors ´note

business, respect to possession and labor. It works also when an individual personally participates in an enlargement of private possession, while attempting to preclude its devaluation, and, at the same time, society effectively enjoys the same possession. Particularly, this causal relationship, i.e. person-property-society, has lost its value during the existence of one-party political systems.

Conservativism as an independent economic doctrine is mostly perceived as opposition towards Enlightenment philosophy in France, especially towards its part accentuating rationalism. The Enlightenment was materialized in the French revolution at the end of 18th century. For the European nations, this revolution was a concept that abolished feudalism in situ, and it established a tradition of accepting human and citizen rights by the motto *Liberty,* Equality*,* Fraternity. Less known is the economic dimension of the French Revolution, which enormously changed the economy of the country, internal and foreign policy, and two decades later, also the design of Europe during the Napoleonic Wars. (Macha, 1968) Aristocracy, the most affluent social class in France, after the reforms of Jean Colbert became an element of the societal stagnation heading forward but lacking a strategy how to secure economic development. Social economic welfare completely lacked its utility function, there was no increase in social product, the structure of industry and agriculture compared to that one in England, and thanks to some backward feudal concepts, it was obsolete, including the means of production, the exploitation of natural resources, as well as the human dimension of economic production. Financial sector structurally did not catch up with other three European states – Great Britain, Spain, and Portugal. Their pursuing of "El Dorado" overseas voyages and expansions, made them modernize financial sector and implement various economic reforms. France failed to keep the pace in those processes. Soon after this course of events took, a different direction thanks to the French revolution took place. J.B. Colbert was no long a doctrinal guru of economic reforms, and the financial situation improved due to the increasing number of taxpayers. New forms of political representation took precedence over aristocracy. In a newly proposed centralized Jacobin democracy, the state was no longer governed by a monarch and his ministers, but by the elected National Assembly. France with its 28 million citizens became the biggest European state, the state of a new sort termed republic. From an economic perspective, a new social class – bourgeois, at that time a very flexible and progressive part of the society, was not limited by feudal restrictions and could fully enjoy a new economic phenomenon - the free market economy. Many theoreticians dealing with modern ideologies explain the occurrence of conservativism as a need of aristocracy, and its feudal values completely lost in the revolution events during the decade.

A similar situation also occurred in other European countries. The 19th century with its permanent bourgeois revolutions, encompassing various different features (nationalism, the unification or division of a common territory into several smaller states, also religious and language connotations) produced two relevant social-opposing entities. They were represented by traditionalism (aristocrats, toppled monarchs, clergy), and, on the other hand, liberalism (mostly bourgeois representatives from industry, construction industry, and agriculture) supported by less prosperous social groups, intellectuals, and very often, with the army. Liberals were considered as tradition breakers, citizens lacking patriotism, cosmopolitans, heretics. (Kopal, 1949)

Political, mainly liberal political parties, started to be formed particularly in that. Their continuity, especially in the conservative domain, has been preserved by this period, especially in Great Britain, also in France, Spain, Italy, as well as in the states that were formed at the end of the 19th century. Interpretations of conservativism vary. The first one and the most frequent has already introduced in previous parts of the article. The second interpretation has historical connotations. The American political scientist Leo Strauss makes use of history to point out that conservativism is not completely independent from other modern ideologies. Conversely, he stresses the interconnection between conservativism and liberal state theories as being the main actor of international politics, while in contrast with liberalism, conservativism accentuates the paternalistic and protective role of a state. (Strauss, 1953)

3 EXPLANATORY POSSIBILITIES OF CONSERVATISM

Conservativism is adaptable. As an example might be mentioned today´s neo-conservativism, as well as various right-wing, people´s parties, which within political spectrum belong to conservativism.[4] An increasing number of conservative parties are then reflected in the composition of the European Parliament and its leadership.[5] The opposition in this particular case radicalizes on a national as well as regional (EU) level. Conservatives have also adopted the traditional conception of a family as a basic economic unit of a state, claiming that a traditional family - bisexual one, guarantees orientation towards patriotism and religion, as well it acts as a guarantee of traditionally proved morality. Particular values, patriotism, the maintenance of economic stability, the cultivation of economic behavior, etc. are considered by conservatives as a man/citizen´s duty. They criticize liberals who take these values as optional. (Sutor, 1999)

Essentially, the third interpretation is sociological, and it dates to the second half of the 19th century - since the period when August Comte started to be ideologically influential. (Macha, 1968) Due to this fact, conservativism is not ideology, it is only an attitude motivated by fear of the future of those social classes and groups which view unavoidable changes, and despite warnings, they are not able to reverse this course. For this reason, they attempt to present feelings as to be political postures. The economic dimension of the first interpretation is based on the fact that conservativism strived to oppose unavoidable changes that impacted through altering the way of production and distribution of material possession the economic status of a country, then the social status of citizens, and finally, political awareness. An uncontrollable economic boom in Western Europe as well as in the USA as being an emerging superpower, caused a fear of an economic collapse if a *laissez-fair* principle was to be fully applied in the financial, market production sphere. K. Marx, though not being a conservative, considered this fact as a crucial, fearing a potential collapse of modern capitalism. (Marx, 1965)

Within this interpretation, conservative proponents did not oppose technological scientific changes, as it was interpreted from the side of their critics. In contrast, technological and scientific development was considered to be decisive though not that much as to change social life in a radical way. Science and technology enhance state´s power, a state is more respected on an international scene, having a higher prestige, scientific and technological inventions are highly appreciated. Such high a conservative tolerance to scientific and technological development was supposed to confirm the political correctness of conservatism and its positive impact on a state´s economy.

According to the second interpretation, conservativism is not "an ideology *per se"*. Today, after two centuries of the development of political parties, it has been proved that "ideologies *per se*", do not exist. Concerning the wealth of a state from a perspective of geographical conditions, natural resources and energy potentials, conservativism thanks to its structure encompassing an important economic dimension, has managed to integrate itself purposefully in part with liberal or socialist ideas and doctrines. Conservatives in the economy always prefer acceptance and maintenance of their own rational concept in a project form. But means for the realization of this project could be liberal or *sic* totalitarian since conservatives are fully aware of the experience from the past that "the end justifies the means".

In the 19th century, Britain was termed as "an industrial workshop of the world". Thanks to the industrial revolution: the invention of steam engine, textile industry technologies, modern shipbuilding, railroads building, etc. Britain transformed into a country where conservative political elites gained a strong position.

The third interpretation lacks the essence. A person can think conservatively in a way to be in

[4] Russian United Democratic Party – Yabloko, Christian Democratic Movement in Slovakia, Movement for a better Hungary-Jobbik

[5] 17th January 2017 Centre-right politician Antonio Tajani was elected the new president of the European Parliament

accord with self. But that person wants to be socially active they have to transform their own opinion into a political form. If people want to impact a society, they have to get involved in conservative party politics, while differentiating between economic and social conservativism. This selection often takes place in states´ electoral campaign where strong conservative political parties participate. But this situation might lead to an undesirable repercussion. If a voter separates the economic agenda from the social one, there is a threat that the state will not provide security in that sphere where such voter wants to see it. Therefore, conservativism has its flexible strategy to integrate with Liberals into a coalition which is able to transfer a state´s protectionists policy from its source to a sphere where needed. A phenomenon called social-democratic consensus emerges as a certain kind of verified strategy which tended to appear and disappear in many periods of European and American political history. (Oakeshott, 1962)

In a larger Central Europe and the Balkans, conservativism has taken a form of strong political parties of right wing, clerical, people´s character, already in a period when the transition process initiated a boom in the rising number of political parties. Very influential were mostly national and clerical parties with active existence for more than two decades while contributing to the economic rise and the stability of values and identity. On the other hand, an opposition to left-wing parties was formed. The failure of the conservatives in this period was caused by not having shared a common euphoria of candidate states to integrate into the blocks such as EU and NATO. Electoral concepts are mostly influenced by a situation from outside, the rising number of migrants after abolishing borders, free movement of capital, labor force, the increasing liberal ignorance towards nationalism, patriotism, religion, and traditionalism. Even today such situation worsens common-interparty coalitions, which is dangerous not only for security but also for aspects of a state.

4 CONCLUSION

Political conservativism is not a homogenous ideology. In practical politics, there are still differences between those who favor either economic or social conservativism. This is a result of the economic integration of Europe which suppresses national sovereignty in favor of transnational “supra sovereignty“. If we know as an inseparable part of conservativism work also affairs which are deeply embedded in citizen-religious believers´ minds, then there are two possible ways of further development. The first one is the subsequent building of narrowing the gap between conservativism and liberalism. The second one – the degradation of liberalism as a form a relic, might completely stop to completely exist in the future.

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THE HSR AS AN INNOVATIVE AND ECOLOGICAL MODE OF TRANSPORT

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Abstract

High-speed rails (HSR) connects major cities in developed countries, as listed in the table below. Internationally HSR is developed only in Europe, aiming at the use of trans-European transport network (TEN-T) to link all high-speed lines on the continent into a proper integrated European high-speed network. In terms of the economic development, it is considered that HSR redirects development from one area to another and as far as safety is concerned, most potential rail passengers accept aviation as a safer mode of transport. Another positive outcome is the provision of a better choice of travel mode for public transport users, who already have a lot of options represented by a low-cost bus, a fast plane or a personalized car trip. The general review proves, that besides discussing pros and cons, among which the huge investments, the lack of certainty in the future use of HSR there are positive signs of development. The new trends envisage HSR for freight as well passenger traffic. Still, there is a danger that newer technologies in transportation will boost forward in the time necessary to build a high-speed route. The question who will use the high-speed lines, when air travel provides the high speed, the self-driven cars allow for independent travels and public carriers provide Internet access and comfort to work on board remains.

Keywords: *HSR, economic considerations, innovative mode of transport, political issues*

1 GENERAL REVIEW OF HSR DEVELOPMENT

High-speed rails (HSR) are an integrated railway system of specialized rolling stock and dedicated tracks which differ from the so-called "conventional" railways. Multiple definitions for high-speed rail are in use worldwide. The European Union Directive 96/48/EC (European Commission, 2004) defines high-speed rail in terms of:

1. Infrastructure meaning specially constructed or upgraded track for high-speed travel;
2. Minimum speed of 250 km/h on specially built lines *and* approximately 200 km/h on existing upgraded lines;
3. The operating conditions require rolling stock specially designed for compatibility with infrastructure, providing the quality of service and safety levels (UIC, 2016).

High-speed rails connect major cities in developed countries, as listed in the table below. Internationally HSR is developed only in Europe, aiming at the use of trans-European transport network (TEN-T) to link all high-speed lines on the continent into a proper integrated European high-

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speed network. The liberalization of the mainline international passenger railway market on 1 January 2010 will also allow operators to compete and offer users a wider range of transport options.

According to Ginés de Rus, I. Barron, J. Campos, etc. (Baron, et al., 2009, p. 24), three different factors contribute to the definition of HSR in economic terms, namely the costs of acquisition, operating and maintenance of the specific rolling stock, estimated as "huge long-term company investments" (over 20 years); the public support of HSR undertakings, especially in Europe, with significant amounts of centralized investments; the growth in demand for HSR services, which has brought forward the idea of the "different mode of transport". Arising from the conventional railways, HSR compete successfully with the airline services over short and medium-sized distances within a continent, particularly Europe.

According to the definition of the International Union of Railways (UIC) based upon the above mentioned EC Directive 96/48, the HSR is a set of unique features, apart from the technical requirements, among which the defined above speed, namely a definite service level which is designed mainly in the field of passengers.

The distribution of lines for high-speed service could be followed in Table 1.

Table 1 Global Distribution of HSR Lines

Placement	Lines constructed (km)	Lines in process of construction (km)	Maximum speed (km/h)
Europe			
Austria	292	210	250
Belgium	209		300
Denmark	5	60	200
Great Britain	1,377		300
Germany	1,334	428	300
Italy	923	125	300
Netherlands	120	0	300
Poland	85	322	200
Norway	64	54	210
Spain	3,100	1,800	310
Russia	645	770	259
Finland	610		220
Switzerland	80	57	250
Turkey (Europe-Asia)	1,420	1,506	250
Total Europe	10,264	5,332	
Asia			
Japan	2664	782	320
China	19,000	18,156	300
Hong-Kong		26	200
South Korea	819	585	305
Taiwan	339	9	300
Uzbekistan	344		250
Total Asia	23,166	19,558	
USA			
	734	2120	240

Sources: (Gray, 2013) (List of high-speed railway lines, 2016)

The analysis of the data presented shows a lot of European countries, members or outside EU developing HSR. Simultaneously, 6 countries in Asia have 2.26 times more constructed lines and 3.67 times more lines in process of construction.

The contemporary high-speed trains in operation are able to support speed 350 - 400 km/h, with 560 - 580 km/h during test runs. The possibility of developing speeds at this rate increases their competitiveness to other modes of transport, for example, the airlines, while keeping the advantages of railway passenger transport such as the comparatively lower price of travel with a large number of the carried passengers. Regular movement of high-speed trains has started in Japan in 1964, implementing the Shinkansen project, accordingly followed in Europe first by high-speed train services in France[1], then in Great Britain, Belgium[2], Germany[3], and Austria. Currently, most of the territory of Western Europe is united by a high-speed railway network. After the pioneer in high-speed railways Japan in Asia[4], the beginning of XXI century places China as a top world leader in high-speed trains' development.

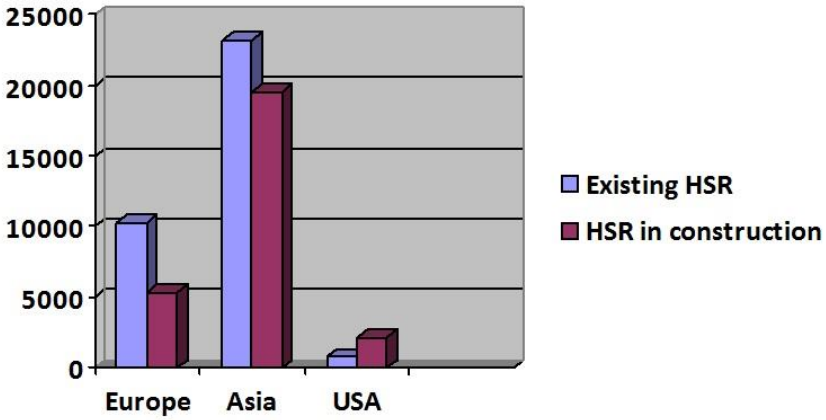

Figure 1. Distribution of HRS – existing and under construction

Figure 2 High-speed rail, km, selected countries
Source: Author based on (David, 2013)

Figure 2 indicates the advantage of China over all other countries dedicated to the development of HSR. Ever since 1993, Chinese strategy towards increasing speed backed-up by the intensive construction of new railway lines has been developed and implemented, involving both

[1] TGV, ***t**rain à **g**rande **v**itesse*. The Paris-Lyon high-speed rail line serves a combined population of 11.7 million people 255 miles apart (Myths/Fact, 2016).

[2] Train Eurostar, connecting Great Britain and the Continent, through Eurotunnel, as well as train Thalys, connecting Brussels, Paris, Amsterdam and Cologne

[3] ICE, "The Intercity-Express is the fastest and most comfortable way to travel on the DB network, reaching speeds of up to 300 km/h, and new standards of excellence" (DB, 2016)

[4] Shinkansen, "New trunk line" (Johnston & Pulling, 2007)

passenger and freight traffic. The large-scale construction started in 1996 resulting in 19,000 km lines for HSR until the end of 2015 (Simeonova, 2016). The USA is almost at the end of the line; countries like India and Russia, where railway transport is well represented are not included separately.

The Indian Railways' Vision 2020 envisages a two-fold approach to developing HSR in the country. The first strategy involves using conventional technology to increase the speed on main passenger corridors from the existing 80-100 km/h to 160-200 km/h. The second approach requires identifying viable intercity routes justifying the need to build high-speed corridors for speeds up to 350 km/h. The plans target building four corridors of 2,000 km by 2020 and planning for eight other corridors with expectations to deliver significant economic, social and environmental benefits (Shukla, Pathak, Mittal, & Dhar, 2015).

Bearing in mind the plans to expand, the current situation in Russian HSR is represented as follows (High-speed rail in Russia, 2016):

- The Moscow - Saint Petersburg HSR, with speed of 250 km/h (introduced at the end of 2009);
- The Moscow – Nizhny Novgorod shuttle HSR (since July 2010) Nizhny Novgorod: High-speed traffic in Nizhny Novgorod began in July 2010.[3] Two Sapsan trains make shuttle trips between Nizhny Novgorod and Moscow, and one between Nizhny Novgorod and St. Petersburg. The latter route takes 8 hours and 30 minutes, compared to the previous 14 hours
- The HSR service between Helsinki – St. Petersburg, with 200 km/h (started in December 2010).

The 'Strategy for the Development of Railway Transport of the Russian Federation by 2030' was approved by the Russian Government in 2008 and followed by a plan for the modernisation and development of railway infrastructure in 2011, including the construction of dedicated high-speed lines. The link Moscow - Kazan envisages 250 km/h to be completed in 2018. The project will be 60% financed by Russian Railways, with the remaining 40% to come from a Russian-Chinese consortium.

Only one HSR is in operation in the USA, Acela Express in the Northeast Corridor, with plans for extending these services in a number of states like California, the Midwest, New England, Florida, Texas, Pennsylvania, etc. The California HSR project was started in 2015, planning to link major cities in the state with expectations to be completed until 2029, with its first stage targeted for completion in 2017 (High-speed rail in the United States, 2016). An investigation has been carried out in USA (Feigenbaum, 2013) in order to justify the need for the development of HSR services, bringing forward several important outcomes defending the HSR idea:

- The necessity to support the sustainability of travels, based upon the expectations of increasing their number and importance on HSR[1];
- The efficiency of traveling by train in terms of energy saving[2]; intercity passenger rail is more energy-efficient than Intercity auto trips;
- Increasing the number of train passengers does not require additional energy resources. At the same time, the increased number of road passengers affects mostly the number of vehicles on the road, additional energy costs and considerable amount of pollution substances;
- The development of HSR is further affecting positively travels for employment and leisure reasons and the access to railway travels is provided for[3].

[1] Americans in 2025 are projected to take 112 million trips on high-speed rail, traveling more than 25 billion passenger miles, resulting in 29 million fewer automobile trips, nearly 500,000 fewer flights, and a potential reduction of greenhouse gas emissions by 2.7 million metric tons of CO_2 equivalent

[2] Trains are 3 times as energy efficient as cars and 6 times as efficient as planes on a per-passenger-mile basis

[3] The single largest employment zone in almost every metropolitan area is downtown, as are most convention

In terms of economic development, it is considered that HSR redirects the development of travels from one mode of transport to another, meaning from air to railway transport. In terms of safety, the potential passengers consider aviation and rail as equally safe modes with a preference to the air transport. In terms of economic choice, another positive outcome is the provision of better travel conditions for public transport users with the inclusion of HSR, together with already existing options represented by the low-cost travels (by bus or plane) to aid the process of abandoning daily personalized car trips.

In 2014 the Australian Government released a study on the implementation of high-speed rail on the east coast of Australia, linking the major cities Melbourne, Canberra, Sydney and Brisbane (High Speed Rail, 2014). The initial assessment of the project on the side of Infrastructure Australia is still expected since there are recommendations to include Adelaide and Perth in it.

2 EUROPEAN TRANSPORT POLICY, STATE OF COMPETITION AND INVESTMENTS IN HSR

According to the Ten goals for a competitive and resource-efficient transport system: benchmarks for achieving the 60% GHG emission reduction target, mentioned in the "White Paper on transport — Roadmap to a single European transport area — towards a competitive and resource-efficient transport system" (EC & DGMT, Roadmap to a single European transport area : towards a competitive and resource efficient transport system, 2011), by 2050 the European high-speed rail network should be completed, for the majority of medium-distance passenger transport to go by rail, while the length of the existing high-speed rail network will be tripled by 2030.

High-speed rail is controversial because high-speed trains usually depend on public subsidy, but the price of travel is often unaffordable for potential users, so losses occur and the return on investments is slow. The counter-argument, strongly supported by the European Commission is that at distances between 300 and 800km, fast trains between big industrial centers represent an efficient and less polluting form of public transport.

Supporting the argument for centralized investments, provided by EU and national subsidies, Europe has already added more than 6,000 km of high-speed tracks for high-speed travel and much more is under construction or planned. In 2015 a new line from Leipzig to Erfurt is open, while Milan-Brescia service will begin later in 2016. By 2017 four new French lines will come into service. Also, the EU plans to finance a €4.5 billion ($5.3 billion) in the fast-rail link between Estonia, Latvia, Lithuania, and Poland.

Figure 2 below is indicating the uneven distribution of HSR in the developed member countries of EU, for instance, France and Spain. General opinions show, that these countries may have overextended their networks, the reason being political decisions rather than economic considerations. In France, after the successful start of TGVs in 1981, traffic, revenues and profit margins have fallen considerably, because service has been deteriorated by increasing the number of stops. Spain's high-speed track is even longer than France's, and demand is less than expected.

The defendants of HSR consider the expansion of the HSL network as a new fresh breath into rail transport, thus increasing its competitiveness with other modes of transport. An example representing high speed trains accounting for approximately 40% of traffic over medium distances on certain routes[1] proves that on journeys less than three hours HS trains are the most competitive form of travel, compared to air and car journey times, because of the better access to the railway carrier (EC, High speed Europe, a sustainable link between citizens, 2010).

However, competition from other forms of transport, such as low-cost airlines and long-distance coaches will keep rising due to the liberalization of passenger transport in Europe[2].

sport and cultural centers. This is also where rail stations are located

[1] London–Paris, Paris–Brussels and Madrid–Seville

[2] Germany liberalized the coach market in 2013 which immediately affected high-speed routed of Deutsche

The competitive response of high-speed rail is expressed by cutting travel prices, by SNCF in 2013 and RENFE (Spanish Railways) in 2014 to boost demand, but the effect over passengers was less than the expected.

The analysis of competition including HSR usually starts with comparing the travels with the existing conventional rail lines, since the large markets for HSR are concentrated around major cities. Passengers are divided into two groups: direct travelers between two destinations (usually provided by HSR) and travelers between smaller stations. The first group is usually estimated as sensitive towards travel time, comfort and less towards the price of travel, opposite to the members of the second group. The estimates of the market distributions for passengers show that HSR is better in serving medium and long-trip markets, while conventional railways are serving best for commuter travel and as feeders for the HSR (Hsu & Chung, 1997).

Second, it has been reported, that on a few routes HSR has taken away certain market share from airlines, for instance, Eurostar on its main routes, Paris-Lyon and Madrid-Barcelona HS lines. Often, however, fast trains just take business away from slow trains. Between 2000 and 2011, as high-speed lines opened across the EU, rail's overall share of passenger-kilometres traveled was little changed, at 6.4% in 2011. Cars' share had barely budged, at 72.5%. Buses and coaches lost a percentage point, to 8.2%, with air travel (excluding flights to outside the EU) gaining more than a point, to 8.9% (Business, 2015).

Lack of competition among rail operators is another reason why high-speed rail is failing to win passengers from other modes of transport. Despite the railway reforms as well as three railway packages of measures, with the fourth one on the way, the EU is finding it hard to establish a Pan-European market in which operators compete across borders. The competition was introduced into railway freight services; some common technical standards have been laid down to make it easier to run trains across borders, and the foundations of a single market in cross-border passenger services were laid. However, the fourth reform package, to liberalize further the market for passenger rail, has been held up by the European Parliament. Meanwhile, the national rail companies prefer cooperation to competition[1].

Most active on the competition side of the busiest routes is Deutsche Bahn (DB), expressing an intention to send trains from Frankfurt through the Channel Tunnel to London, thus opposing Eurostar, in which SNCF owns a majority stake. DB is also gradually pulling out of Thalys, a venture with SNCF and its Belgian and Dutch counterparts, in preparation for competing with them on those routes.

In domestic markets, Europe's first private-sector high-speed operator in Italy, Nuovo Trasporto Viaggiatori (NTV), in which SNCF has a stake started services in 2012 and declares a market share of 20% (NTV, 2014). It has struggled to compete with the state-owned incumbent, FSI, which controls the tracks. NTV has complained to the authorities about the lack of fair competition (The Economist, 2015).

Generally, competition in railway passenger operations is strongly dependent on delayed privatization. Intention to privatize a part of FSI was expressed by the Italian government, Germany may follow about DB, but in France privatization has never been considered an option (Baron, et al., 2009).

Bahn and a loss of €50m of revenues was reported in the first half of 2014. A similar liberalisation is being proposed in France, where SNCF owns a big coach operator

[1] France's SNCF and Germany's Deutsche Bahn renewed a joint venture, Alleo, which manages some high-speed services between the two countries (rail.cc, 2016). Lyria, owned by SNCF and its Swiss counterpart, has opened a new service between Lille and Geneva (TGV Lyria, 2016)

Figure 2. High-speed rail network in Europe (UIC) *Source:* (UIC, 2016)

The general opinion of the ability of HSR as a means to boost long-term jobs, address regional inequalities, and provide a more sustainable global transport network less reliant on fuel-consuming planes and cars is opposed by considerations of the capital intensive HSR. Although the environmental impact of new high-speed rail routes has been widely discussed it is the economic benefits offered by these lines that need to be studied profoundly. While high-speed lines may be relevant in well-developed countries, they seem less practical in less developed regions, where the hugely expensive projects which are realized over a prolonged period of time[1]. The EU has been hugely in favor of developing an extensive network of high-speed rail lines that will serve some of the less developed regions, with strong connections to Europe's larger economic hubs. The US has also seen calls for a new network of high-speed lines since 2008.

The discussion paper by Ginés de Rus, University of Las Palmas, in collaboration with the OECD and the International Transport Forum, looked at the impact investment in high-speed rail could have on economies. Named 'The Economic Effects of High-Speed Rail Investment' (Baron, et al., 2009), it says that while improved transport links from HSR might allow large companies better access to previously underserved regions, they may also hinder these regions' industrial growth. With regards to Europe's growing network of high-speed lines, de Rus adds: "The Trans-European Transport Network will give much of the EU better access to the main activity centers. However, the gap in relative accessibility between the core and peripheral areas is likely to increase as a result of the new infrastructure, which reinforces the position of core regions as transport hubs. The emphasis on high-speed rail links is also likely to favor the main nodes of the network, and is unlikely to promote the development of new activity centers in minor nodes or in locations in between nodes."

This means the benefits from HSR can vary wildly and building a network of high-speed railways across huge territories makes sense in the case of countries like China and the US, but in smaller countries, the effect is less. When a government looks to build a high-speed rail network, the scheme must offer a net social benefit greater than

[1] "The impact in terms of economic exchanges, accessibility, and productivity gains are expected to be significant, and extend beyond traditional transport savings. The scale and scope of the Chinese high-speed rail programme offer a unique opportunity to measure such impacts", Gerald Ollivier, the World Bank's Senior Transport Specialist, working on China's high-speed rail network

the next best alternative. As HSR tends not to attract private investment, the burden on the government is usually quite extreme. Air and road travel, on the other hand, is more than likely to see heavy private investment, as the returns tend to be more immediate.

De Rus concludes that the risks associated with HSR investment, including the relatively high long-term cost, almost entirely undertaken by the state mean that the particular circumstances should always be considered before decisions have been taken[1]. Investing in HSR can prove beneficial if conducted in the right environment. Also, there is a danger that newer technologies in transportation will boost forward in the time necessary to build a high-speed route. The question who will use the high-speed lines, when air travel provides the high speed, the self-driven cars allow for independent travels and public carriers provide Internet access and comfort to work on board remains.

3 THE PLANS OF EXPANDING HSR

The general review proves, that besides discussing pros and cons, among which the huge investments, the lack of certainty in the future use of HSR there are positive signs of development. The new trends envisage HSR for freight as well passenger traffic.

China plans to build more high-speed railroads in the nation's western region during the 13th (and next) Five-Year Plan (2016-2020), as well as export more high-end railway equipment products to overseas markets. China will continue to deploy more resources and manpower to further develop "smart trains", which apply intelligent technology that will allow trains 'speed control, condition determination and fault detection operations to be performed digitally (Wang, 2015).

After years of discussions and investigations, there is a wide majority support for a large investment, which includes improved public transport in Sweden. This will be the largest infrastructure project in high-speed railway between the metropolitan regions which is to be completed around 2035 (Engdahl, 2015).

The USA are committing to national planning, funding, coordination, and prioritization of rail investment. Still, intercity transportation systems require active federal engagement to guarantee the development of routes that reflect national needs and national priorities. Political consensus is required to develop national goals and focus investments on HSR (Freemark, 2014). In response to strong and continued demand for rail travel in the Northeast Corridor, Amtrak has developed a vision for Next Generation high-speed rail service on the NEC (Amtrack, 2016).

High-Speed Rail has been discussed a lot in Australia and in December 2013 the HSR Planning Authority Bill has been introduced. The Authority's major functions involve land use planning for the HSR corridor and directing the HSR's development and construction. The Authority will also consider specific measures related to environmental impacts; ensure that the HSR system provides a safe, regular, efficient and cost-effective rail transport system; and consult with interested bodies and the public on matters related to the HSR system (Coombs, 2014).

In its strategic agenda for 2020, the European Rail Research Advisory Group (ERRAC) identifies seven priority research areas for the future development of the European rail sector (ERRAC, 2007):

- intelligent mobility: implementing a passenger information system which is harmonized at European level;
- environment and energy: increasing the energy efficiency of trains, reducing environmental impacts (CO_2 emissions, noise) and researching alternative fuels, in order to minimize the dependency on fossil fuels during electricity generation;
- safety: improving safety for passengers and staff;
- homologation, testing, and safety: speeding up product approval procedures and minimizing risks through better safety management;

[1] "When the investment cost associated to new high-speed rail lines does not pass any market test, and the visibility is reduced by industry propaganda, short-term political interests and subsidised rail fares, conventional cost-benefit analysis can help to distinguish good projects from simple 'white elephants'" (ITF, 2009)

- competitiveness and technology: improving the interoperability and attractiveness of products for customers;
- economy and strategy: developing new network infrastructure-related cost management and forecast models;
- infrastructure: developing less costly maintenance methods and maintenance-free interoperable infrastructure systems.

The general opinion of the European Commission is that "…..High-speed trains are a remarkable technological success, the outcome of government-funded research and development (R & D) and the innovation of European industry, working closely with the railway companies, equipment manufacturers and civil engineers" (EC, High speed Europe, a sustainable link between citizens, 2010). For these reasons, the EU is laying the foundations for a north-south railway route to serve as a link between Scandinavia and Western Europe. Rail Baltica is one of the top priority projects under the TEN-T package of transport infrastructure projects within the EU. The 430-mile route will link Finland, Estonia, Latvia, Lithuania, and Poland, with an extension reaching down into Germany. The future electric railway could cost €3.68bn to construct, but it is expected to be 85% financed by the European Union, including a €124m contribution granted under the TEN-T program.

Another priority project under The TEN-T agreement is an east-west high-speed axis through central Europe that would join France, Germany, Austria, and Hungary via one direct line. Sections between key cities alongside the railway's final route have been operational as far back as 2007; however, the complete route is expected to be finalized sometime after 2020, with deadlines varying for each section (Grey, 2015).

One of Great Britain's biggest infrastructure projects is designed as a long-term financial investment, uniting the northern and southern parts of the country. Planned in two phases, the HSR will reach 250 km/h, connecting 18 cities, including London, Birmingham, Manchester, and Leeds. The first leg of the track between London and Birmingham will start being built in 2017. The cost of the project is estimated at £50 bn in total.

With the early introduction of the TGV lines, France has established itself as a leader in HSR infrastructure in Europe. Since then, it has been persistent in further developing and growing its high-speed network. Another project, the South Europe Atlantic HSR, connecting Tours to Bordeaux, will be completed in 2017.

The rail line "New Silk Road" is the Eurasia rail link from the eastern China to Madrid, Spain stretched more than 13000 km. It is longer than the Trans-Siberian railway and the Orient Express, also has stops in various European and Asian countries including Poland, Germany, and Russia, along with the way (Amtrack, 2016). The grand project for a high-speed freight train through the whole continent Asia, connecting Beijing to the European railway network is considered the most viable economically for China in logistic deliveries towards the European markets. This is the new era of HSR for railway freight.

China and Russia are strengthening their ties via a direct line between Moscow and Beijing that is set to become the longest HSR in the world on completion. Trains with 250 km/h will pass a distance of about 10000 km, traversing China, Mongolia, Kazakhstan, and Russia. Much of the distance will run in parallel with the Trans-Siberian Railway, but the HSR will reach a travel time of 33 hours.

TRASECA, the transcontinental transport corridor Europe – Caucasus - Asia was declared in 1993 at Baku, with participants Azerbaijan, Armenia, Georgia, Kirgizstan, Tajikistan, Turkmenistan, and Uzbekistan. Later, Ukraine, Mongolia, and Moldova joined, and in 2000 Bulgaria, Romania and Turkey also became a part of it. The line is crossing the ex-soviet middle Asia republics and Iran towards Turkey.

The strategic partnership between China and Turkey has been contracted and the first results are out coming. The potential required resources are big, but both countries consider them affordable, despite the consequences of the world economic crisis, by using parts of the national railway systems and constructing the necessary links between them. The project is reviving the ancient "Silk Road" as the world longest transcontinental HSR. One of the links to be constructed is the HS corridor between Ankara and Istanbul. The first stage of the track is

completed and the second stage, from Eskisehir to Istanbul will follow to Edirne and the Bulgarian border, with the intention to be continued through Bulgaria (Vasileva, 2015). The natural and geographic background in Bulgaria allows a maximum speed of 200 km/h at most.

The Chinese government is interested in the construction of the railway infrastructure for high-speed traffic on the route Ruse - Dimitrovgrad as well as in Ruse – Varna section, which are parts of the revived “Silk Road”. The total length of the railroad needed to be reconstructed is 227 km, with an expected construction value of 383 million Euros. The construction could be bound with concessions of the ports of Varna and Ruse (Moskovski, 2015).

On the part of EU, there is a participation in the project of Turkey in the form of a number of European companies - subcontractors of the Ankara – Istanbul line. The European Investment Bank was among the main investors in Marmaray project below the Bosphorus.

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CONSTRUCTION OF RAILWAY TRANSPORT CORRIDORS IN BULGARIA BY PROMOTING PUBLIC-PRIVATE PARTNERSHIP

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JEL Category: **L92, O18, R4**

Abstract:

One of the main problems that hinder the development of railway transport in countries such as Bulgaria is the lack of fully liberalized market. As a result of the review of the Trans-European Transport Network Corridors in 2014, most of the Bulgarian transport strategy documents for the period 2014-2020 are directed toward the funding of railway infrastructure investment projects to stimulate better quality, safety and security of the services provided. In this regard, the main objective of the work is to reveal the possibilities of promoting risk allocation between public and private partners in order to promote construction of railway transport corridors in Bulgaria. Methods of induction and deduction, as well as methods of analysis and synthesis, are applied for the purposes of the research. A brief review of the main infrastructure projects, concerning railway transport corridors in the country, is made. In the paper, special attention is paid to the widely used public-private partnership forms for the fulfillment of railway infrastructure projects. The ideas, presented in the work would be useful for countries that meet the same problems as Bulgaria in terms of attracting private investment initiatives so as to provide railway transport services with better quality.

Keywords: *public-private partnership, railway transport, core network corridors*

1 INTRODUCTION

Development of financial markets and the opportunities the European funding sources provide could be perceived as prerequisites for attracting private investment initiatives in terms of construction, maintenance, exploitation and management of the transport infrastructure. What is typical for the transport sector is that there is enough potential for long-term growth. On the other hand, transport infrastructure is a long-term tangible asset that generates direct and indirect benefits for both the private sector and the society as a whole. In this regard, combining public funding with private initiatives must be seen not only as a form of partnership but also as a way to stimulate effective management and exploitation of the public infrastructure. That is why the Connecting Europe Facility was implemented in order to enable fulfillment of projects of public interest whose main goal is to develop, construct or upgrade the existing infrastructure in the Trans-

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European Transport Network. (EP, Regulation 1316/2013 on the European Parliament and of the Council on establishing the Connecting Europe Facility, 2013)

Construction, maintenance, and rehabilitation of transport infrastructure is a laborious process that requires significant investments. This fact could also be confirmed by the forecasts of the European Commission for funding of the transport infrastructure till 2030. The total value of the funding is 1.5 trillion euros (Bodewig, 2014), 500 billions of which should be utilized for the construction of the TEN-T network. Having in mind the importance of the trans-European transport network for the economic and social growth of Europe, the Connecting Europe Facility reveals opportunities for combining funding initiatives between European Structural and Investment Funds, Horizons 2020 and European Neighbourhood Instrument. The application of such types of funding contributes to the emergence of partnerships between private and public partners whose main objective is to found working packages; clear division of duties and responsibilities among partners and risk allocation, regarding:

- Integrating railways in the multimodal transport services along TEN-T Network;
- Promoting innovations in the transport sector by usage of bio-fuels;
- Application of information and communication technologies in order to ensure effective utilization of the transport infrastructure;
- Integrating urban areas in the TEN-T network by providing safe and secure transport services.

The main objectives of the Connecting Europe Facility that cover the infrastructure of all transport modes are as follows:

- Remove bottlenecks that impede freight and passengers transport services;
- Increase interoperability in the railway transport; building up the missing links among the core network corridors and developing the cross-border connections;
- Ensure sustainable transport system by promoting low-carbon, innovative and energy efficient transport technologies;
- Optimize interoperability among transport modes by construction of logistic terminals

The Connecting Europe Facility consisted also a detailed description of the core network corridors that have to be constructed, rehabilitated and developed, as well as the total budget of the funding for the period 2014-2020 which is 33.2 bln. euros.

According to the aforementioned, the main objective of the research is to reveal the possibilities of promoting risk allocation between public and private partners in order to promote construction of railway transport corridors in Bulgaria. Bulgarian section of Orient/East-Med Core Network Corridor is the object of the analysis and its subject is the methods by which this goal could be achieved. The main hypothesis that the author proves as a result of the research is the following: *there are real opportunities for the development of the railway network of Bulgaria as part of the TEN-T network by promoting the public-private partnership.*

The limitations of the research are connected with the size of the study, which is a part of conference proceedings and the main problems that are outlined in the analysis could not be revealed in details.

2 DEVELOPMENT OF THE TRANS-EUROPEAN TRANSPORT NETWORK

The development of Trans-European Transport Network (TEN-T) is of great importance for the competitiveness of national transport systems of member states. The trans-European transport network consists of structure at two layers: comprehensive network which is a network that covers all the existing and planned transport infrastructure of TEN-T, as well as the measures for stimulating sustainable exploitation of this network from social and environmental point of view, and core network – consists of these sections of the comprehensive network that are of strategic importance for the development of the TEN-T (EP, Regulation 1315/2013 of the European Parliament and of the Council on Union guidelines for the development of the trans-European transport network, 2013). The main

objectives of the policy for building up the trans-European transport network are as follows:

- Cohesion, based on better accessibility of the transport infrastructure, ensures better quality of the services provided and better connectivity of the sections included in the TEN – T network;
- Efficiency, based on removing bottlenecks and building up the missing links at border crossings as well as development of the interoperability among transport modes;
- Sustainability, based on reducing greenhouse gas emissions, promoting clean fuel usage in passenger and freight transportation and internalization of the external costs of transport;
- More benefits for the transport infrastructure users through better mobility of citizens in EU and third countries;
- Boosting safety and quality of transport services and provide better accessibility to the transport infrastructure for disabled people.

The core network corridors that are included in the TEN-T network are the following (DGMT, 2015)**:**

The Scandinavian-Mediterranean Corridor – it links the major urban areas, ports and industrial centers of Finland, Sweden, Northern and Southern Germany, as well as the Alps and Italy;

The North Sea-Baltic Corridor - it passes through Finland, Estonia, Poland, Germany, Netherlands, and Belgium;

The North Sea – Mediterranean Corridor – it stretches from Ireland and north of the United Kingdom, through the Benelux and the south of France;

The Baltic-Adriatic Corridor – it passes through the industrial centers of southern Poland, Vienna, Bratislava, Eastern Alpine Region and north of Italy;

The Orient/East- Med Corridor – it connects the maritime ports of North, Baltic, Black and Mediterranean Seas;

The Rhine-Alpine Corridor – connects the ports of Rotterdam and Antwerp with the Mediterranean basin of Genoa via Switzerland;

The Atlantic Corridor – links the western part of Iberian Peninsula with the French ports Le Havre and Rouen;

The Rhine-Danube Corridor – passes through the main Rhine and Danube waterways and links the central regions of Danubian countries with Ukrainian border and Southern Germany;

The Mediterranean Corridor – connects the Hungarian-Ukrainian border with the Iberian Peninsula.

3 RAIL TRANSPORT CORRIDORS PASSING THROUGH THE TERRITORY OF BULGARIA

Orient/East-Med Core Network Corridor is of significant importance for the economic development of the country, as well as for the competitiveness of its transport system. The corridor passes through the territory of Bulgaria from north to south and from north to southeast.

In accordance with the Connecting Europe Facility, the pre-identified infrastructure projects that have to be funded cover the following sections of Orient/East-Med Core Network Corridor:

- **Dresden – Praha -** high-speed rail; freight bypass; rail-airport connection**;**
- **Hamburg – Dresden – Praha – Pardubice –** ensure safe navigability in inland waterways**;**
- **Prague – Brno – Breclav –** construction and upgrading of multi-modal platform in Brno;
- **Breclav – Hegyeshalom –** upgrading of cross-border connections;
- **Budapest – Arad – Timisoara – Calafat –** upgrading of the railway infrastructure network**;**
- **Vidin – Sofia – Burgas – Turkish border –** studies and upgrading of the railway section Sofia – Burgas
- **Sofia – Thessaloniki – Athens – Piraeus –** upgrading, and rehabilitation of the railway network in the section
- **Vidin – Craiova –** cross-border upgrading**;**
- **Thessaloniki – Igoumenitsa –** developing multi-modal connection and port upgrading;
- **Athens – Lemesos – Lefkosia – Larnaka –** upgrading of the port infrastructure and application of information and communication technologies**;**
- **Athens – Patra –** studies and port interconnections

Figure 1 Scheme of the Bulgarian section of Orient/East-Med Core Network Corridor
Source: Directorate General for Mobility and Transport, 2015

Most of the transport connections among relevant member-states along the corridor are carried out by railway transport. The main objective in this regard is to construct a transport network that is low carbon, energy efficient and environmentally friendly, and to support better interoperability among railway, sea and inland waterway transport. This objective is easily achievable as most of the member-states along the corridor are well provided with the railway network. The density of the railway network in member-states along the corridor is approximately equal to the average values for EU-28 and even in some of the countries it is higher (see Table 1)

Table 1 Density of the railway network in member states along Orient/East-Med Core Network Corridor, km/1000 sq mi of the territory of the country

Countries	Years													
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU-28	50.35	49.64	49.73	49.99	49.35	49.10	49.16	49.23	49.31	49.33	49.35	49.52	49.41	49.14
BG	38.92	38.92	38.90	38.88	38.37	37.42	3735	37.0	37.33	37.39	36.91	36.68	36.67	36.32
CZ	119.74	120.5	121.72	121.75	121.87	121.90	121.68	121.57	120.28	120.16	120.05	120.07	120.06	119.93
DE	102.46	100.77	100.29	100.96	97.26	95.83	95.55	94.90	94.80	94.41	94.39	94.02	93.84	93.66
GR	18.07	18.01	18.06	18.29	18.56	19.52	19.01	19.33	19.34	19.34	19.34	19.35	19.35	17.16
HU	86.05	83.16	85.45	85.46	85.46	85.46	86.56	85.37	84.83	84.83	84.84	84.98	84.67	84.90
AT	67.54	67.92	68.90	68.99	67.66	67.85	69.36	69.36	67.53	63,85	60.07	59.86	58.35	58.35
RO	46.21	46.21	46.15	46.47	46.37	45.92	45.22	45.21	45.21	45.20	45.21	45.21	45.21	45.17
SK	74.68	74.68	74.58	74.58	74.64	74.60	74.60	74.01	73.89	73.89	73.87	73.91	74.05	74.05

Source: Directorate General for Mobility and Transport, 2015

Czech Republic (Directorate General for Mobility and Transport, 2015) is one of the well-provided countries with railway network – 120 km rail tracks of 1000 sq mi of its territory. The Higher density of the railway network is also observed in Germany, Hungary, Slovak Republic and Romania. Bulgaria (37.7 km of 1000 sq mi of the territory) ranks next to the last among the countries - Greece (18.8 km of 1000 sq mi of the territory) but compared to EU-28 its density of the railway network gets closer to the average values. Consequently, the existing railway network in the reviewed member states is

enough for carrying out passenger and freight transportation. This conclusion could be confirmed by the increasing number of infrastructure projects, funded by the Connecting Europe Facility. The objective of the most of the projects is modernization, rehabilitation and application of information and communication technologies in railway transport network but not the construction of new railway tracks. The same process is applicable in Bulgaria.

The railway infrastructure along Orient/East-Med Corridor comprises high-speed and conventional rail lines (EP, Regulation 1315/2013 of the European Parliament and of the Council on Union guidelines for the development of the trans-European transport network, 2013), terminals, logistic platforms, railway stations and telematic applications. The railway lines for conventional transport are classified as lines for movement of trains with speed over 250 km/h, conventional lines for movement of rolling stock with speed above 250 km/h and specifically equipped lines for movement of rolling stock in heavy terrains.

The main objectives of the TEN-T network transport policy are oriented toward implementation of the European Railway Traffic Management System (ERTMS); unification of the track gauge; mitigation of noise and vibration, caused by railways; interoperability among inland waterway, road, and railway transport; better safety and security at railway crossings.

4 TYPES OF PUBLIC-PRIVATE PARTNERSHIPS THAT ARE COMMON FOR FULFILLMENT OF RAILWAY INFRASTRUCTURE PROJECTS

The very common way of investment for rehabilitation of transport infrastructure in the last years is allocating financial risk among public and private companies in order to fully liberalize and enhance the competitiveness of stakeholders at the transport market and provide transportation services with better quality.

A public-private partnership (PPP) is a partnership between the public and private sector for the purpose of delivering a project or a service traditionally provided by the public (DGRP, 2003). PPPs recognize that both parties have certain advantages relative to the other in the performance of specific tasks. Widely used PPP forms for the fulfillment of railway transport infrastructure projects are as follows (Gechev et al, 2015):

Design-Bid-Build – this form of partnership allows the most appropriate and competitive partner to be chosen for the fulfillment of the construction phase of the investment project in order to provide better transportation services.

Build-Operate-Transfer – according to this type of PPP, the financial risk is allocated between partners, as the public partner is responsible for the funding of infrastructure, while the private partner must carry out the construction and exploitation phase of the infrastructure. This results in total cost optimization and brings social and economic benefits for the society.

Concession – this one is not a typical form of PPP and is applicable for investment projects when no public funding is needed. In this regard, the PPP premium for the private partner corresponds with higher total costs and obligation for the provision of public services.

5 REVIEW OF THE INFRASTRUCTURE PROJECTS FOR CONSTRUCTION OF RAILWAY TRANSPORT CORRIDORS IN BULGARIA

The overall state of rail infrastructure in Bulgaria is unsatisfactory, no matter that the density of the rail network is close to the average values for the EU-28 (see Table 1) and approximately 70 % of the rail lines are electrified which equals to the European average level of electrification of the railway network. These dues to the fact that most of the railway infrastructure was constructed 50 years ago (MTITC, 2014) which makes it inappropriate for high-speed and conventional passenger and freight transportation services. Such lines also exist at the Bulgarian section of the Orient/East-Med Corridor, namely in the direction Sofia – Plovdiv (railway section Sofia – Septemvri); Vidin – Sofia (railway section Vidin – Medkovets); Plovdiv – Burgas (railway section Plovdiv – Mihailovo). For the railway network of the country are also typical poor interconnections with the port and airport infrastructure, as well as

the lack of fully applied information and communication technologies for train and traffic management.

To overcome the existing problems that hinder the development of the railway transport in Bulgaria, the Ministry of transport, information technologies, and communications adopted a new Operational Programme Transport and Transport Infrastructure for the horizon 2014-2020. The main objective of the program is to fund infrastructure projects of national and European significance. One of the important projects to be fulfilled is the construction of railway tracks along the TEN-T network. According to this priority axis, the purpose of most of the funding is directed toward continuing rehabilitation of the conventional railway tracks, as well as the application of information and communication technologies in the section Sofia – Burgas. Most of the priority projects in this regard concern rehabilitation of the railway line Plovdiv – Burgas; implementation of interlocking systems in the railway section Karnobat – Burgas; development of railway junctions Plovdiv and Burgas; modernization of the rail lines Plovdiv – Orizovo; Orizovo – Mihailovo and Yambol – Zimnitsa. Special attention is paid to the equipment of 293 km of the rail network between Plovdiv and Burgas with communication technologies, as well as to the construction of double electrified railway lines in the section Elin Pelin – Ihtiman – Septemvri. The expected benefits as a result of the fulfillment of the projects are related to better reliability, safety, and security of the railway network in the country as well as the higher capacity of the infrastructure for passenger and freight transport services between Sofia and the Black Sea.

Another infrastructure project which is a section of the Orient/East-Med Core Network Corridor along the territory of the country is the modernization and full electrification of the railway section Plovdiv – Svilengrad. Most of the activities that have to be carried out concern electrification of the railway section Parvomay – Svilengrad, and modernization of the rail line Svilengrad – Turkish border.

Operational Programme “Transport and transport infrastructure“ 2014-2020 presents possibilities for funding investment projects concerning rehabilitation of the railway sections Serbian border – Dragoman – Sofia – Elin Pelin; Vidin – Sofia, and Sofia – Pernik – Radomir – Kulata through Connecting Europe Facility, as well as through alternative financial resources. This project also covers the construction activities at the rail lines Dragoman – Sofia; Vidin – Medkovets and renewal of railway junction Sofia.

The main investment priority axis, concerning conventional railway network of the country are also indicated in the Operational Programme. They cover the construction of intermodal terminals where transshipment activities among railway, inland waterway, sea and road transport are available. In this regard, the main objective of the funding is an intermodal terminal to be constructed at railway station Ruse, which will be directly linked with the Black Sea via the railway section Ruse – Varna. Another investment project of this priority axis is the rehabilitation of key railway stations that will result in better mobility of passengers and building interconnections up the infrastructure of the underground, bus and air transport. As part of the development of the conventional rail lines along TEN-T network is also the implementation of innovative, comprehensive and interoperable railway systems for noise mitigation in the urban areas. All these activities are related to the implementation of the European Railway Traffic Management System and GSM-R along Bulgarian section of Orient-East/Med Corridor.

In Table 2 below, the allocation of the funding for investment projects in the railway transport through Operational Programme „Transport and transport infrastructure“ 2014-2020 is presented.

The main beneficiary of the aforementioned projects is National Railway Infrastructure Company. As can be seen from the table, the private sector participates in the projects with zero funding, which does not exclude the opportunities to be attracted as a partner in a public-private partnership. The program stipulates that except for Connecting Europe Facility, alternative sources of funding could be used. This means that partnerships among private initiatives and National Railway Infrastructure Company are possible in order to promote construction of core network corridors through the territory of the country.

Table 2 Total value of the funding for investment projects in the railway transport

Project	Funding by EU (euros)	Type of Fund	National public funding (euros)	National private funding (euros)	Total value of the funding (euros)
Priority axis „Development of the railway network along TEN-T network" – *the main projects are modernization of the railway line Plovdiv – Burgas implementation of interlocking systems in the section Karnobat - Burgas; development of railway junctions Plovdiv and Burgas; rehabilitation of the rail line Plovdiv – Orizovo - Mihailovo; rehabilitation of the section Sofia - Septemvri*	572,343,631	European Cohesion Fund	100,001,818	0	673,345,449
Priority axis „Improvement of the mobility of passengers and development of sustainable public transport" – *the main projects are: construction of intermodal terminal in Ruse; rehabilitation of key railway stations in the section Ruse – Varna*	20,000,000	European Fund for Regional Development	3,529,412	0	23,529,412[1]
Priority axis „Investments in information and services management – implementation of traffic management systems and improvement of safety and security of the transport services" – *implementation of the GSM – R network in the railway transport*	57,944,591	European Fund for Regional Development	10,225,517	0	68,170,108[2]

Source: Operational Programme "Transport and transport infrastructure", MTITC, 2015

6 CONCLUSIONS

When analyzing the possibilities for stimulating public-private partnerships for investment projects in railway transport infrastructure in their preparation and realization phase, the following measures must be taken into account:

- risks, relative to the right project management and control of the activities for the construction of railway infrastructure corridors must be planned as early as possible;
- fair risk allocation between public and private partners, depending on their responsibilities for the fulfillment of the project must be made;
- the most appropriate and optimal form of PPP must be chosen, after taking into account the considerations of the public partner;
- Enhance the effectiveness of project control phase as a result of the strict monitoring of the obligations of both parties must be achieved.

Having in mind the fundamental principle of superiority of public partner over the private one, it is necessary variable financial schemes (e.g. a combination of private and public financial resources) for the construction of railway infrastructure to be presented. Moreover, the public-private partnerships is an opportunity that the good financial practice of the private partner could be successfully applied in the construction

[1]Sum covers the total funding in this priority axis

[2]Sum covers the total funding in this priority axis

of railway infrastructure as an alternative to the road network.

Considering the main purpose of the investment projects (see Table 2) in railway transport infrastructure, as well as the opportunities to combine private financing sources with EU funds and national funding, the most appropriate type of PPP will be *Design – Bid – Build*. This is also determined by the fact that most of the activities to be carried out are related to modernization and rehabilitation of the railway network in order to ensure interoperability between information and communication applications of ERTMS and GSM – R. As a result, both partners (National Railway Infrastructure Company and the private company) and the society will benefit from the partnership. On one hand, the fulfillment of the projects will bring to the private company better financial results and will ensure the quality of the services provided and realization of social and economic benefits for the infrastructure users, such as reduction of noise and pollution; shortening of delivery times; higher speeds for movement of trains. On the other hand, the public partner will be exempt from the financial risk during the rehabilitation phase when the potential costs for the construction activities are relatively high, but will still remain infrastructure operator and will be eligible to collect revenues from infrastructure charges.

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METHODOLOGICAL FEATURES FOR RESTRAINING THREATS TO ORGANIZATIONS

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Abstract

Methodological features of an original model for restraining threats to organizations are presented in this paper. It is worked out in three sections. Conceptual fundamentals of the model for restricting threats are clarified in the first section. Instruments of the model for restricting threats are presented in the second section. These are focus groups, an open investigation by questionnaires, confidence intervals with four evaluations, fuzzy trapezoidal numbers, fuzzy expertons, fuzzy random incidence matrices and aggregate licensing board of threats to the organization. Stages and procedures of the model for restricting threats are explained in the third section of the paper.

Keywords: *Strategic management, Restriction on threats, Licensing board of threats, Fuzzy subsets*

1 INTRODUCTION

The matter of restricting threats to organizations is one of the still undeveloped problems in the scientific literature on management. In this connection, *the paper is aimed at* presenting methodological features of a model for solving that problem. According to the authors of the paper, methodological features are referred to theories and tools for the model implementation as well as to the stages and procedures of the model. The model for restraining threats is elaborated within the framework of scientific research project "Theoretical fundamentals of an internal standard of measuring and evaluating threats to organizations", financed by the National Science Fund to the Bulgarian Ministry of Education and Science.

The model suggested here consists of evaluating the expected effect on threats to the organization of a package of managerial decisions on restringing these threats. Conceptually, the approach refers to the second step of an internal standard of the organization for measurement, evaluation, and restriction on threats to it.

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This paper is worked out in three sections. Conceptual fundamentals of an original model for restricting threats are clarified in the first section. Instruments of the model for restricting threats are presented in the second section. Stages and procedures of the model are explained in the third section.

2 CONCEPTUAL BASIS OF THE MODEL FOR RESTRICTING THREATS

The internal standard for measurement, evaluation, and restriction on threats to organizations is suggested by O. Simeonov. According to him, this standard should be implemented in two steps (Simeonov & Lambovska, 2010, p. 40).

The first step refers to the application of techniques for identification, measurement, and evaluation of threats. Their elaboration is based on the following activities (Simeonov & Lambovska, 2010, pp. 40-42):

- *Identification of the subjects of threats* - Parties concerned with the organization, whose actions and/or omissions to act could lead to the threat, are defined as subjects of threat. In this study, they are considered in their capacity of licensing institutions (LIs). They interact with the organization under specific operation parameters of the organization called license parameters (LPs) (Neely, 1998, pp. 121-123).
- *Localizing the sources of threats* - Deviations of the LPs meanings from the critical borders, determined in the agreements (licenses) with LIs, are defined as sources of threat. Deviations cause negative reactions by the LIs and ultimately termination of interaction with the organization.
- *Measuring threats* - Two functions are consecutively used for measuring threats. *The function of aggression* is the first function. It shows the dependence between different values of a license parameter (LP) and degree of aggressiveness of the licensing institution (LI), arising from its negative reaction. *The function of threat* is the second function. It shows the dependence between the degree of aggressiveness of a LI and the threat to the organization. This instrumentation is used for presenting a *current degree of threat to the organization*. Such functions and evaluations are prepared for all LPs included in the licenses of the organization with its LIs.
- *Evaluating threats* - Threats for all LPs of the organization, arising from its LIs, make it possible to construct *licensing board of threats*. It was substantiated for the first time by O. Simeonov as an instrument for focusing organizations on their threats (Simeonov, 2004, pp. 102-105). The licensing board is presented in the form of the polygon formed from a “radar” coordinate system by different LIs or for the organization as a whole. In both cases, the size of the threat is measured by *the area of the polygon* (see Fig. 1), limited by values of threats regarding LPs (Simeonov & Lambovska, 2010, pp. 41-42).

The second step of the internal standard is associated with a restriction on threats. The elaboration of techniques for implementation of that step is based on the following activities (Simeonov & Lambovska, 2010, pp. 43-45):

- *Development of alternative options for restricting threats* - As a result of the first step the organization has already obtained the evaluations of the threats by LPs. Based on these results, managerial decisions (Anguelov & Stoyanov, 2013, p. 26) are developed which are expected to lead to *distancing the LPs values from the critical ones*. Greater attention is paid to decisions on the LPs with highest evaluations of threats.
- *Evaluation of alternative decisions and selection of a decision package for threats restricting* – The evaluation of decisions requires consideration of combined effects of decisions on expected results for threats reducing, mutual effects between decisions by LPs, mutual effects between threats by LPs. Delayed effects of decisions on threats should also be studied. Thus, it comes to the evaluation of *packages* of *decisions* and selection of a decision package.

Forecasts are made for each decision package about *expected effects of decisions* on the meanings of the LPs included in the organization’s licensing board of threats. Further on, based on the instrumentation for measuring threats – scales and functions of aggression and of threats, expected effects of decision packages on threats

to the organization are defined. On this basis is formed a *new, expected licensing board of threats to the organization* which measures the expected effect of the corrective measures (packages of managerial decisions). The effect of any decision package on restricting threats is evaluated by *comparing the current and expected licensing boards of threats to the organization*.

The difference between areas of *the current and expected licensing boards* for each package is the criterion for selection of a decision package (Asenov, 2015, p. 22). The aim is a *maximum reduction of the area of the polygon* (Zivanovic, Zivanovic, & Todorova, 2010), limited by expected values of threats. The best package of managerial decisions is the one that *minimizes the area of threats to the greatest extent in quantitative terms*.

3 INSTRUMENTS FOR RESTRICTING THREATS

Instruments for restricting threats, suggested by the authors, are the following:

- Focus groups (FGs);
- Open investigation by questionnaires;
- Confidence intervals with four evaluations from the theory of intervals;
- Mathematical calculations with fuzzy trapezoidal numbers (FTNs), fuzzy expertons, random fuzzy incidence matrices from the fuzzy subset theory; and
- Licensing board from the theory of measurement.

The focus group method (Beshelev & Gurvits, 1980) is used *for generating expert evaluations* (judgments) in the procedure of forecasting effects of decision packages on threats to the organization. The focus group method is applied in this study due to the absence of sufficient and/or adequately structured retrospective information about evaluated/ forecasted parameters (Beshelev & Gurvits, 1980, p. 8-9) and mainly due to the authors' belief in the lower utility of statistical methods in forecasting under uncertainty. As a tool for group expert judgments, FGs increase the expertise accuracy by reducing the scale of the error (Beshelev & Gurvits, 1980, p. 8-9). A group subject called "Decision-making subject (DMS)", used in this model is also considered as a focus group. Its tasks are to evaluate threats to the organization and to make decisions on their restriction. DMS sets up the decision packages on restricting threats. In addition, DMS members generate expert evaluations about the significance of threats arising from the aggressive actions of LIs and forecast the effect of decision packages on the LPs values for the highest threats to the organization.

The evaluation of DMS is performed by *open investigation method by questionnaires* (Shmerling, Dubrovskiy, Arzhanova, & Frenkel', 1977, pp. 298, 301-302). This method is applied to all the DMS activities: setting up decision packages for restricting threats, evaluating the significance of threats by LIs, forecasting decisions effects on threats (including mutual effects between decisions and between threats) to the organization.

Theory of intervals is part of mathematics whose main application is for conditions of subjectivity and uncertainty (Kaufmann & Gil-Aluja, 1990, p. 21). In this model evaluations/ forecasts are described by intervals which are not characterized by the possibility of occurring (degree of belonging) and convexity (Kaufmann & Gil-Aluja, 1990, p. 51). The mathematical operations with confidential intervals are used in the model predominantly in the context of expected and therefore uncertain nature of most parameters. It is speaking of a use of confidential intervals with four evaluations, called *"confidential fours"* as building elements of random fuzzy incidence matrices and of expertons.

In addition to typical mathematical operations between confidential intervals, such as addition, subtraction, multiplication, and division, the so-called "representative number of confidential four" is calculated. It reflects the relative linear distance of an interval to the number "zero" (Kaufmann & Gil-Aluja, 1987, p. 202) and is calculated using all four characteristic evaluations of the confidential interval. The formula coincides with the Humming's representative number of fuzzy trapezoidal number (FTN) on the explicit condition of absent possibility of occurring (Kaufmann & Gil-Aluja, 1988, p. 74). The main application of representative numbers is an instrument of defuzzification which refers to a representation of fuzzy numbers and confidential intervals in a discrete form (Bojadziev & Bojadziev, 1997, pp. 144-148). This application is used in the model to

define delayed effects between decisions and threats as well as to a clearer presentation of the expected effect of decision packages on threats to the organization.

Theory of fuzzy subsets is part of mathematics which is defined as an improvement of the interval theory (Kaufmann & Gil-Aluja, 1986, p. 37). When the confidential domain is convex in the mathematical sense, the confidential interval is transformed into a fuzzy subset (Kaufmann & Gil-Aluja, 1990, p. 54). Or fuzzy subset is described by confidential intervals for any possibility of occurring by the interval [0, 1] (Kaufmann & Gil-Aluja, 1986, p. 37). A stricter mathematical formulation defines the fuzzy subset as a subset of the universal finite set where belonging of the elements to the subset is described by the so-called "characteristic function" or "belonging function", taking values in the interval [0, 1] (Zadeh, 1965, p. 345). The instruments of fuzzy subsets theory used in this model are FTNs, fuzzy expertons, and random fuzzy incidence matrices.

FTNs are used for describing DMS members' evaluations/ forecasts about effects of managerial decisions on LIs (respective threats to the organization), mutual effects between decisions and mutual effects between threats. The FTN is a fuzzy number with a linear and continuous characteristic function, which has two evaluations of the possibility of occurring "unity" and two evaluations of the possibility of occurring "zero" (Bojadziev & Bojadziev, 1997, pp. 24-25). The key problem of FTNs using in this model is associated with the possibility that results from the substitution of the fuzzy forecasts for the LIs/ aggression in the definite (mathematically) aggression/ threat functions could be outside the admissible interval for the functions [0, 1] and could even take negative values. The problem is due to the peculiarities of the mathematical operations with fuzzy numbers "pseudo-complementariness", "pseudo-inversion" (Kaufmann & Gil-Aluja, 1990, p. 35) and the fact that results from the operations "multiplication", "division", and "subtraction" between fuzzy numbers in most cases aren't fuzzy numbers (Kaufmann & Gil-Aluja, 1987, p. 67). To solve the problem, *authors of the paper apply normalization of the expected aggression/ threat* in the extreme definite interval of the change of aggression/ threat. Normalization is performed according to a complex formula specially designed for the purpose of the model.

Fuzzy expertons are used in the model for aggregating the evaluations of DMS members. The experton is a function that generalizes fuzzy random incidence matrices whose elements are described by confidence intervals (Kaufmann & Gil-Aluja, 1988, p. 42). Mathematical operation with fuzzy expertons, used in this model, is the function "maxmin". This function aggregates three types of effects - effects of managerial decisions on threats, mutual effects "decision – decision" and mutual effects "threat – threat", in combined effects of I and II generations of decisions on threats.

Mathematical calculations with random fuzzy incidence matrices are used for aggregation of DMS members' evaluations of effects as well as for evaluation of combined and delayed effects of managerial decisions on threats. Random character of the matrices pertains to the fact that laws on probability distributions of random numbers are described by them. The fuzziness of the matrices is in the context of an FTNs application for presentation of DMS members' evaluations/ forecasts of effects and of confidential fours in the analysis of delayed and combined effects. This model uses three operations with random fuzzy matrices – "maxmin" function, calculation of mathematical expectation of matrices and difference between matrices. The "maxmin" function is applied for evaluating combined effects of I and II generations of decisions on threats. The mathematical expectation aggregates the evaluations of effects by weighing them against the possibilities of their occurring. This calculation is used as a basis for defining delayed effects of decisions on threats. Delayed effects calculation is realized as a difference between representative matrices of mathematical expectations for combined effects of I and II generations and for effects of decisions on threats.

The licensing board is used in the model as a managerial tool for measuring and evaluating expected threats to the organization (Simeonov & Lambovska, 2010, pp. 41-45). Especially, its present function is to represent the expected effect of the package of managerial decisions on threats to the organization (see Fig. 1).

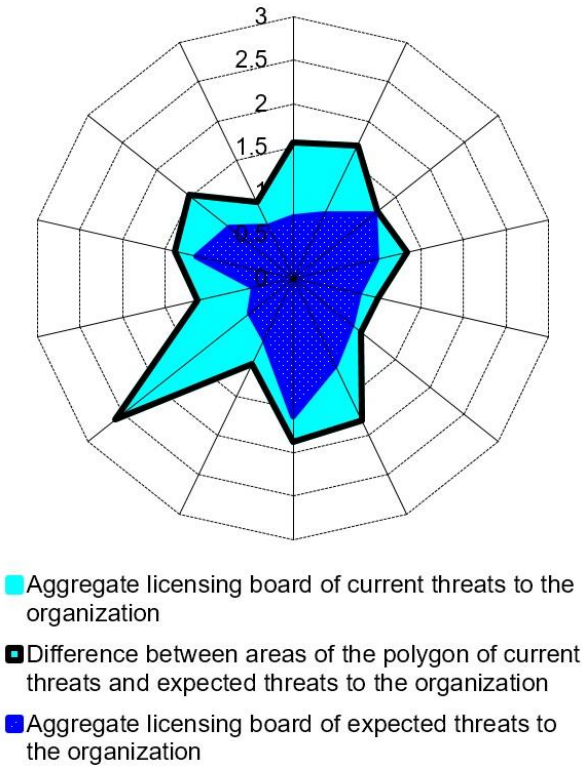

Fig. 1 Aggregate licensing board of threats to the organization

4 STAGES OF THE MODEL FOR RESTRICTING THREATS

The authors' model for restricting threats to the organization covers *four stages*:

- Stage I "Defining expected threats to the organization";
- Stage II "Aggregating expected evaluations of (mutual) effects between managerial decisions and threats to the organization";
- Stage III "Evaluation of combined effects of I and II generations and of delayed effects between managerial decisions and threats";
- Stage IV "Evaluation of the expected effect of managerial decisions on threats to the organization".

In *stage one* of the model, the normalized evaluations of expected threats to the organization are defined. These threats are expected to be achieved because of the application of a package of managerial decisions on restricting threats. Stage one includes *four procedures*:

- Generation of managerial decisions on restricting threats to the organization;
- Evaluation of expected (mutual) effects between managerial decisions, LPs, and threats to the organization;
- Evaluation of expected threats according to LIs and LPs; and
- Aggregating expected threats according to LPs and DMS members of the organization.

In the first procedure of stage one, a *package of managerial decisions on restricting threats to the organization is created.* The procedure is performed in two activities: defining the highest current threats to the organization and formation of a package of managerial decisions on restricting threats to the organization. By "the highest threats to the organization" in the model are meant the aggregated current evaluations of threat according to LPs, which are equal to or higher than a specific evaluation. The latter and the decision package are offered by DMS members of the organization.

The purpose of the second procedure of stage one is *to generate matrices of (mutual) effect between managerial decisions, LPs, and threats*. The procedure is performed in three activities: generation of matrices of managerial decisions effect on LPs, generation of matrices of mutual effect between managerial decisions and generation of matrices of mutual effect between threats to the organization. The evaluations in this procedure refer to decisions and LPs according to the highest current threats to the organization as well as to these threats themselves. They are generated by DMS members. In mathematical terms, the evaluations are represented by FTNs and are systematized into random fuzzy incidence matrices.

The purpose of the third procedure of stage one is *to define expected normalized threats to the organization according to LIs and LPs.* The procedure is performed in two activities: defining the expected aggression of LIs according to LPs and defining expected threats to the organization according to LIs and LPs. *The expected aggression* is defined by 1) substituting the DMS members' evaluations of expected effects of managerial decisions on LPs for the highest threats in the functions of aggression of LIs, and 2) subsequent normalization of the obtained fuzzy results in a normalization interval close to the interval [0, 1]. The first activity is performed in

compliance with the rules for operations with FTNs. Normalization of the expected aggression involves representing (recalculating) the extreme fuzzy trapezoidal evaluations of aggression in the extreme defined interval of aggression change, formed by substituting the extremely defined evaluations "0" and "1" for LPs in the defined function of aggression. *Expected threats* to the organization are defined in analogy with the expected aggression by calculation of the expected threats to the organization from LIs according to LPs and subsequent normalization of the obtained fuzzy results in a normalization interval close to the interval [0, 1]. The first activity is performed by substituting the normalized aggression of LIs in the functions of threat.

The purpose of the fourth procedure of stage one is *to aggregate expected threats by LPs and by DMS members and to perform subsequent normalization in the interval [0, 1]*. The procedure includes three activities: weighing expected threats against the LIs' significance evaluations, aggregation of the weighted expected threats for all LIs and normalization of aggregated expected threats. Normalization of aggregated expected threats involves weighing, against a rounded to an integer bigger number, the maximum aggregated current threat (defined from among the aggregated current threats according to LPs), which is taken as the maximum normalization value – "unity".

Expected evaluations of (mutual) effects between managerial decisions and threats to the organization are aggregated in *stage two* of the model. This is achieved by forming expertons of effects of the managerial decisions on threats, mutual effects between decisions and mutual effects between threats. Expertons require use of FTNs from the previous stage of the model as confidential intervals with four evaluations. Stage two includes *three procedures*:

- Calculation of the experton of mutual effects between managerial decisions on restricting threats to the organization;
- Calculation of the experton of mutual effects between threats to the organization; and
- Calculation of the experton of managerial decisions effect on the threats to the organization.

The purpose of the first procedure of stage two is *to aggregate mutual effects between managerial decisions on restricting threats through an experton.* The procedure includes accumulation of the expected DMS members' evaluations of mutual effects between managerial decisions on restricting threats and formation of the experton of the mutual effects of decisions. The random fuzzy incidence matrix, describing the probability distribution law of the DMS members' evaluations regarding mutual effects between decisions, is formed in the first activity. The experton of mutual effects between managerial decisions is formed in the second activity. It describes the law on the cumulative complementary probability distribution of the evaluations of mutual effects between decisions.

The purpose of the second procedure of stage two is *to aggregate mutual effects between threats to the organization through an experton.* The procedure is performed in analogy with the previous procedure of the model.

The purpose of the third procedure of stage two is *to aggregate effects of managerial decisions on threats to the organization through an experton.* The procedure is realized for the normalized aggregated expected effects of decisions on threats in analogy with the previous two procedures.

Combined effects of I and II generations and delayed effects between managerial decisions and threats are evaluated in *stage three* of the model. This stage includes *two procedures*:

- Determination of combined effects of I and II generations between managerial decisions and threats to the organization;
- Determination of delayed effects of managerial decisions on threats to the organization.

The purpose of the first procedure of stage three is *to combine mutual effects between managerial decisions, mutual effects between threats and effects of managerial decisions on threats* in the so-called "combined effects of I and II generations". Combined effects are evaluated by applying the "maxmin" function to the expertons "decision - decision", "threat - threat" and "decisions – threats" from stage two of the model.

The purpose of the second procedure of stage three is *to evaluate delayed effects of managerial decisions on threats to the organization.* The procedure includes de-accumulation of the random fuzzy incidence matrices of managerial decisions effects on threats, calculation of the mathematical expectation for the fuzzy matrices of de-accumulated effects of managerial decisions on threats and evaluation of delayed effects of managerial decisions on threats to the organization. The first activity refers to the experton of expected effects of decisions on threats and of the fuzzy matrix of combined expected effects of I and II generations of managerial decisions on threats. The second activity is realized for assessing possibilities of occurring of de-accumulated expected evaluations of managerial decisions effects on threats. Thus, the so-called "representative matrices of mathematical expectations" are generated. Delayed effects are defined by formation of differences between elements of the representative matrices of mathematical expectations for decisions effects on threats and for combined effects of I and II generations of these decisions; and subsequent definition as delayed effects of these differences which are equal to or higher than a given constant, belonging to the interval (0, 1].

In *stage four* of the model, *the expected effect of the managerial decisions package on threats to the organization is evaluated*. This is realized by three activities: plotting an aggregate licensing board of expected threats to the organization, defining the polygon area of expected threats and calculating the expected effect of the package of managerial decisions on threats to the organization. The difference between the polygon areas of current threats and expected threats to the organization is calculated in the third activity (see figure 1).

5 CONCLUSIONS

Three main results are achieved in this paper.

Firstly, a new complex toolkit for the application of an original model for restricting threats to organizations is proposed in this paper. The toolkit of restricting threats combines a variety of qualitative and quantitative methods and instruments from management and mathematical sciences.

Secondly, main features of the authors' model for restricting threats to organizations are systematized in the paper.

Thirdly, the application of various instruments in the stages of the model for restricting threats to organizations is clarified.

According to its authors, the contribution of this paper refers to the original decision proposed here regarding methodological issues related to the application of a model for restricting threats to organizations. In this sense, it can be argued that the paper fills a gap in management science as regards methodological aspects of control on threats to organizations.

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LIBERTARIAN THEORY OF BRIBERY AND INCITEMENT: A REFORMULATION

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Abstract

In the present paper, we propose a reformulation of the libertarian theory of bribery, particularly of Rothbard's account of the briber as an innocent inciter to crime. We discern an incompatibility between Rothbard's theories of bribery and incitement and side with the latter. This philosopher-economist maintains that only the bribee, not the briber, is guilty of criminal behavior; and also, that while incitement should be legal, aiding and abetting people into committing a crime should be considered illicit in law. But, the briber, in our view, does not merely limit himself to inciting the bribee, he actually aids and abets him. The briber exceeds the role of a mere inciter because he not only exercises his rights of free speech but also pays the bribee for violating the employment contract. Therefore, Rothbard's criterion for being merely an innocent inciter, i.e. that the inciter has nothing further to do with the criminal activities he incited others to perform, is not fulfilled in the case of the briber who also pays the bribee for the contract violation.

Keywords: *Bribery; incitement; libertarianism*

1. INTRODUCTION

A standard, Rothbardian formulation of the libertarian theory of bribery says that paying a bribe is a kind of discount on goods and services or a rebate paid by the briber to the bribee. Therefore, according to this formulation, "there is nothing illegitimate about the briber" and so "there should be a property right to pay a bribe" (Rothbard 1998, p. 129).

In the present paper, we claim that this account is untenable, particularly that it contradicts the Rothbardian theory of the limits of free speech and crime. Contrary to his account, we argue that in the case of bribery which involves a violation of an employment contract on the part of the bribee, not only the bribee but also the briber commits a

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crime. To justify our position, we propose to look at bribery from the vantage point of the incitement[1] to crime and particularly from the perspective of a crucial distinction between being a mere inciter on the one hand and being a person implicated in crime (a criminal) on the other. We argue therefore that Rothbardian interpretation of paying a bribe as a legitimate practice of lowering the price is unsound and inconsistent with other elements of his own theory. Abandoning this interpretation, we make a case for interpreting bribe paying as a complicity in crime on the part of the briber, viz. as a violation of property rights that should be considered illegal and punished accordingly. By making our point we hope to slightly refine an otherwise magnificent theory of Murray Rothbard's and to contribute to the advancement of the libertarian political philosophy.

In section 2 we discuss Bribery and Title-Transfer Theory of Contracts. Section 3 is given over to our analysis of Bribery and Incitement to Crime. The burden of section 4 is deal with Incitement and Complicity. In section 5 we confront Paying a Bribe as Complicity in Crime. We deal with an objection to our thesis in section 6 and conclude in the section 7.

2. BRIBERY AND TITLE-TRANSFER THEORY OF CONTRACTS

Per Rothbard, there is one and only one scenario in which bribery involves illegality: when, because of a bribe which he accepts, the bribee violates the employment contract with the owner of the company he works for. Rothbard writes (1998, p. 129):

> *"Suppose that Black wants to sell materials to the XYZ Company. In order to gain the sale, he pays a bribe to Green, the purchasing agent of the company. It is difficult to see what Black has done which libertarian law should consider as illegal. In fact, all he has done is to lower the price charged to the XYZ Company by paying a rebate to Green. From Black's point of view, he would have been just as happy to charge a lower price directly, though presumably, he did not do so because the XYZ executives would still not have purchased the materials from him. But the inner workings of the XYZ Company should scarcely be Black's responsibility. As far as he is concerned, he simply lowered his price to the Company, and thereby gained the contract. The illicit action here is, instead, solely the behavior of Green, the taker of the bribe. For Green's employment contract with his employers implicitly requires him to purchase materials to the best of his ability in the interests of his company. Instead, he violated his contract with the XYZ company by not performing as their proper agent: for because of the bribe he either bought from a firm which he would not have dealt with otherwise, or he paid a higher price than he need have by the amount of his rebate. In either case, Green violated his contract and invaded the property rights of his employers. In the case of bribes, therefore, there is nothing illegitimate about the briber, but there is much that is illegitimate about the bribe, the taker of the bribe. Legally, there should be a property right to pay a bribe, but not to take one. It is only the taker of a bribe who should be prosecuted."*

Rothbard's claim finds its justification in the title-transfer theory of contracts which says that for a contract to bind, there must be a property title that one party conditionally transfers to the other party so if the other party does not fulfill his contractual obligations, he finds himself in illegitimate possession of this property. A violation of a binding contract constitutes, therefore, an implicit theft: "In short, a contract should only be enforceable when the failure to fulfill it is an implicit theft of property. But this can only be true if we hold that validly enforceable contracts only exist where title to property has already been *transferred*, and therefore where the failure to abide by the contract means that the other party's property is retained by the delinquent party, without the consent of the former (implicit theft)" (1998, p. 133).

In the case of bribery, a crime committed by the bribee consists thus exactly in this implicit theft: by

[1] For other libertarian analyses of incitement, see Block (2011; 2012); O'Neill and Block (2013). For a debate on this matter, see Mortellaro (2009) and Block (2009).

violating the employment contract, the bribee becomes an illegitimate possessor of the employer's property[2]. Analytically speaking, what is then a core of the bribee's crime is not the fact that he accepts a bribe and privately pockets it (there is nothing inherently wrong with accepting money or other goods from people outside the employment contract) but that he violates his employment contract, although he does it because of a bribe. It can be the case that because of a bribe the bribee favors an offer which is worse for his employer than other offers submitted to the company; it can also be the case that he favors an offer that is the best for his employer but by the very fact of accepting a bribe, the offer is then more expensive for the employer than it could have been if bribery had not occurred. This point is further supported by Rothbard's remarks on bribing the very owner of the company, in which case, "there would have been no violation of anyone's property right and therefore properly no question of illegality" (1998, p. 130).[3]

In the remainder of our paper, we focus exclusively on a scenario in which bribery involves illegality (viz. when because of a bribe the bribee commits an implicit theft[4] by violating the employment contract) and within the purview of this scenario we scrutinize the role of the briber.[5]

3. BRIBERY AND INCITEMENT TO CRIME

As we pointed out above, bribery and its illegality consist in a violation of an employment [6] contract by an employee (a bribee) who prefers to accept this payment than to abide by the contract. If that is the case – and we have seen that it is with no doubts the case for Rothbard – what then is the point of the potential briber's actions? The potential briber, Black, tries to persuade an employee of the XYZ company, Green, to accept his business offer even though from the point of view of Green's employer it is a worse offer than those submitted by Black's competitors.[7] Black tries to persuade Green to become a bribee, i.e. to violate the employment contract and to accept Black's offer, contrary to Green's employer's best interest but to the advantage of Black, the briber. In a word, Black tries to incite Green to commit a crime: Go! Violate Contract! Implicitly Steal! Paying a bribe is, therefore, better characterized as an incitement to crime rather than as paying a rebate.[8] First of all, because paying a rebate is just one amongst many possible ways of persuading a buyer to make a purchase, it can be subsumed under the general term of persuading a buyer. Second, because the specific point of persuasion in the case of bribery is to encourage an employee of a given company to commit a crime, this kind of persuasion can be specified not merely as an incitement to crime, but as actively engaging, participating, in it.[9]

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[2] In effect, the employer's money. That is to say, in the absence of this theft on the part of the bribee, the employer, the owner, of the XYZ company would have ended up with the money that Black, the briber paid to Green, the bribee. If we eliminate the "middle man" Black, then Green stole from XYZ.

[3] That is to say, suppose Black bribed not Green, the employee of XYZ, but the latter directly. Then, there would have been nothing untoward about the commercial interaction. We would be hard put, even, to consider this a "bribe" at all. For, what is the difference between a bribe and a voluntary payment? The former must be in at least some way, illicit, or at least questionable, while the latter is not.

[4] Perhaps "indirect theft" would be more accurate.

[5] From this point on any time we talk about bribery we mean this and only this scenario.

[6] We could perhaps extrapolate to other contracts, although this is not usually done. Suppose Mr. Smith bribes Mrs. Jones to go to bed with him. The latter has no employer from whom she can be stealing money as in the Rothbardian example. However, she does have a husband, Mr. Jones, from whom she is stealing something (maybe even money, who knows, as in the case of pimping), perhaps honor. In any case, she is violating some agreement, at least in the case of monogamous marriage.

[7] Black's comparative advantage over his competitors is that he is willing to bribe Green, while they are not.

[8] Both are accurate. But in the present context, we are accusing Black not of merely inciting Green to commit a crime, but of actively aiding and abetting him to do so, by paying him for this service. Block (2012) levels a similar accusation against Spike Lee.

[9] The taxi driver who unwittingly and unknowingly transports the robber gang to the bank, or the restaurant that sells them lunch, and the shoe store that sells them their footwear (assuming all these

If that were the end of the story, Rothbard's position that “there is nothing illegitimate about the briber” and so “there should be a property right to pay a bribe”, would be saved, though slightly reformulated, because there is nothing wrong with inciting to crime – the inciter just enjoys his right to free speech. As Rothbard put it: “Should it be illegal, we may inquire, to 'incite to riot'? Suppose that Green exhorts a crowd: Go! Burn! Loot! Kill! And the mob proceeds to do just that, with Green having nothing further to do with these criminal activities. Since every man is free to adopt or not adopt any course of action he wishes, we cannot say that in some way Green determined the members of the mob to their criminal activities; we cannot make him, because of his exhortation, at all responsible for their crimes. 'Inciting to riot', therefore, is a pure exercise of a man's right to speak without being thereby implicated in crime” (1998, p. 81). By the same token, it seems that Black, the briber, does just this, namely exercises his freedom of speech by adding just one more cry to Rothbardian Green's exhortations: Go! Burn! Loot! Kill! Implicitly Steal! The problem is though that it is not the end of the story.

4. INCITEMENT AND COMPLICITY

According to Rothbard (1998, p. 81), there is a difference between merely inciting to commit a crime and actually committing one. He expresses this difference as a proviso saying that it is legal to incite to crime only as far as the inciter has “nothing further to do with these criminal activities”. Within these limitations, the inciter simply enjoys his right to free speech. Otherwise and outside these boundaries he is no longer a mere inciter but a person implicated in the crime, in a word, a criminal. From Rothbard's point of view, inciting to crime “is a pure exercise of a man's right to speak without being thereby implicated in the crime. On the other hand, it is obvious that if Green happened to be involved in a plan or conspiracy with others to commit various crimes, and that then Green told them to proceed, he would then be just as implicated in the crimes as are the others – more so, if he were the mastermind who headed the criminal gang. This is a seemingly subtle distinction which in practice is clear-cut – there is a world of difference between the head of the criminal gang and a soap-box orator during a riot; the former is not, properly, to be charged simply with 'incitement'” (1998, p. 81).

There is no doubt that if Green paid someone to commit a crime, Green would not be a mere inciter but would have something further to do with this crime and in this manner, would himself be a criminal. Consider the contract-killing case. If Green paid Black, a contract killer, to murder Green's wife and Black did it, Green not only incited Black to commit a crime but also and most of all *contracted* him to do it, i.e. he transferred a property title to his money in exchange for Black's service[10]. One cannot justify a claim that Green merely said something (“Go! Kill my wife!”) and had nothing further to do with the murder of his spouse, since he *both* said something (Go! Kill!) *and* paid Black to do it, which is literally a definition of “having something further to do with these criminal activities”. Therefore, Green is not a mere inciter but an accomplice.

5. PAYING A BRIBE AS COMPLICITY IN CRIME

Having prepared grounds and crucial distinctions, we are now able to conclude our argument. As we put it above, the briber tries to incite an employee of a given company to violate an employment contract and accept the briber's offer contrary to the company's best interests. In a word, the briber tries to incite the employee to commit a crime. Unfortunately for Rothbard's position, this classification of a briber as an inciter is only a first approximation. If we look at the crucial distinction between merely inciting to crime and having something further to do with it, i.e. cooperating with others to commit a crime, we clearly see that

services are necessary for the crime), are innocent, as is Rothbard’s mere inciter. But the getaway driver, the cook and the quartermaster who are all members of the gang and share in its spoils even though they do not pull any triggers, are guilty as is the person who aids and abets the mob, not only by shouting “Go! Burn! Loot! Kill!” at them, but by giving them an address of the target, as in the case of Spike Lee, or by paying them to do so, as does the briber in our example.

[10] Of course, this contract cannot be valid on libertarian grounds, since Black does not have a right to provide Green with such a service

the briber has crossed the border of freedom of speech and mere incitement and entered the purview of complicity in the crime. For it is obviously false that the briber has "nothing further to do with these criminal activities" that are committed by the bribee. Quite to the contrary, the briber *both* incites *and* pays the bribee to commit a crime of implicit theft – and this is literally a paradigm case of "having something further to do with these criminal activities". The briber is implicated in the crime and can be properly classified as an accomplice. The full analogy is therefore not with the mere incitement to crime, let alone with paying a rebate or lowering the price but rather with a contract killing. Green contracting Black to murder Green's wife and Green bribing Black to implicitly steal is philosophically indistinguishable: he pays an executant to commit a crime.

Hence, Rothbard's analysis of paying a bribe in terms of lowering the price is inconsistent with his theory of crime and freedom of speech, particularly with his account of the difference between inciting to crime on the one hand and being implicated in crime on the other. Consequently, his conclusions that "there is nothing illegitimate about the briber" and so "there should be a property right to pay a bribe" are untenable. What is illegitimate about the briber, is a fact that he cooperates in crime with the bribee and so there cannot be a property right to pay a bribe. Such a "right" would contradict other, true property rights. Therefore, from a libertarian point of view paying a bribe when it involves a contract violation on the part of the bribee is, contrary to what Rothbard said, a crime that should be prosecuted and punished accordingly.

6. AN OBJECTION

The following is a slightly edited version of a response to an earlier version of the present paper written by an eminent libertarian philosopher[11]:

"I don't agree that you have come up with a valid criticism of Murray Rothbard. You are right that there is tension between holding that bribery shouldn't be illegal and holding that incitement to commit a crime should not be legal. Your mistake, as I see it, is to take Rothbard to hold that incitement should not be legal. You have misread the relevant passage from Chapter 12 of *Ethics of Liberty*, which is this:

"Should it be illegal, we may next inquire, to 'incite to riot'? Suppose that Green exhorts a crowd: 'Go! Burn! Loot! Kill!' and the mob proceeds to do just that, with Green having nothing further to do with these criminal activities. Since every man is free to adopt or not adopt any course of action he wishes, we cannot say that in some way Green *determined* the members of the mob to their criminal activities; we cannot make him, because of his exhortation, at all responsible for *their* crimes. 'Inciting to riot,' therefore, is a pure exercise of a man's right to speak without being thereby implicated in the crime.

"On the other hand, it is obvious that if Green happened to be involved in a plan or conspiracy with others to commit various crimes, and that then Green told them to proceed, he would then be just as implicated in the crimes as are the others — more so, if he were the mastermind who headed the criminal gang. This is a seemingly subtle distinction which in practice is clear-cut — there is a world of difference between the head of a criminal gang and a soap-box orator during a riot; the former is not, properly to be charged simply with 'incitement.'

"You have wrongly taken 'Go! Burn! Loot! Kill! Implicitly Steal!' from this passage to indicate that Rothbard is in favor of making incitement illegal. In fact, as the context makes clear, he is rejecting this view."

We the present authors cannot see our way clear to agreeing with this criticism of our paper. In our view, this eminent libertarian philosopher is correct in seeing a "tension" between these two views of Rothbard, but he does not realize that this really constitutes a deep chasm, that is, a logical contradiction. Rothbard cannot be allowed to have it both ways. He may not, on the one hand, claim that while incitement should be legal[12] actively taking part in a crime should not be, and on the other hand maintaining that the briber is limited to exhortation. No, the briber *pays* the bribee to

[11] Who shall remain anonymous

[12] We, as libertarian followers of Rothbard, certainly agree with him on that.

engage in illicit behavior, in much the same way as does the husband who wants his wife murdered, financially compensates the contract killer.

The second error of this critic is thinking that we the present authors "…take Rothbard to hold that incitement should not be legal." We do not for a moment write in that vein. Very much to the contrary, we interpret Rothbard's clear statements to the effect that incitement should be legal to mean precisely that: to wit, that incitement should be legal. We have no quarrel with that, none whatsoever. However, this anonymous critic fails to acknowledge that Rothbard *also* maintains that going beyond incitement, to actively engaging in criminal activity by not only incitement but *also* by paying off the criminal, by having "*something further to do with"* the crime should *not* be legal.[13]

7. CONCLUSION

In the present paper, we proposed a reformulation of the libertarian theory of bribery. We argued that, contrary to what Rothbard says, the briber is not an innocent inciter to crime but rather an aider and abettor. We showed that the Rothbardian criterion for being a mere inciter is not fulfilled in the case of the briber who by paying the bribee to violate the employment contract, obviously has something further to do with the violation. Although we appreciate Rothbard's (1998) attempt to defend the briber, but not the bribee, we claim that this distinction fails, based on his brilliant distinction between incitement, which, surprisingly, should be legal, and aiding and abetting, or, having "something further to do with," the crime, which should not be legal.

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[13] We do not need any "context" to make this claim. Rothbard explicitly states this, over and over again.

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THE DATA ANALYSIS APPROACH IN IT-SUPPORT OF INCLUSIVE EDUCATION

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Abstract
The paper considers the features of the modern understanding of education as a learner-centered process. The individualization of the learning takes into account the psycho-physical development of the person, its abilities, and special educational requirements in order to ensure favorable conditions for the full development of the personality. The features of the use of information and communication tools to support inclusive education as a form of learner-centered learning were analyzed. The main requirements for recommender systems of information technology support of learner-centered education were outlined, and the main participants in this process were identified. The recommender system of learner-centered inclusive education gives the opportunity to facilitate the work of participants in this process and make improvements in such a process. The application of information technologies to support learner-centered inclusive education gives the opportunity to accumulate large amounts of data. The use of the multivariate analysis technology for the data processing will allow the most effective planning of educational strategies for persons with special needs.

Keywords: *education systems, inclusive education, individual learning trajectory, big data, multivariate data analysis*

1 INTRODUCTION

The modern world is characterized by an active formation of learner-centered learning as a new paradigm of education. Originally, the need of educational services, when the learning process is focused on a student, his abilities, and predisposition, comes from researchers cooperating with children who had specialties of psychophysical development. Modern scholars believe that the inclusive education (IE) is the most successful way of socialization of person with special needs. Such education offers to the person with special needs an education in a regular class of public school at the place of person's residence.

To improve the support of inclusive education, as well as the access to educational services to persons with special needs it is efficient to use the latest information technologies. The specifics of the maintenance of such education is related directly to the analysis of large amounts of data.

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2 THE ANALYSIS OF THE RECENT RESEARCH PUBLICATIONS

The implementation of the inclusive education requires the customization of the learning process, and such requirement is a characteristic of modern approaches to the implementation of the common learning process (Rushkevych, 2014). Achievements of the researchers of inclusive education have received a new use thanks to a modern understanding of education as a continuous process of improvement, that lasts throughout life (The European Higher Education Area in 2015: Bologna Process Implementation Report, 2015). Thus, an important direction of development of inclusive education coincides with the dominant modern European and world educational trends. An educational process, in which the choice of methods, techniques, the pace of learning considers the individual peculiarities of a person, is called an individualization of learning. Such type of learning pays attention to the level of person's development and ability to learn, no matter what features and to what extent these abilities were developed (Spirina, 2014), (Unt, 1990).

The formation of the person-oriented route of inclusive education for persons with special needs requires the consideration of both the characteristics of its mental and physical development, as well as available specialized tools and problem-oriented resources, that are to support such education. The set of specialized software, technical, informational, and problem-solving resources, that support person-oriented inclusive education is called an information and communication tools (ICT) of inclusive education.

It is purposeful to use modern information technologies to support learner-centered education, and it is crucial accompany the process of inclusive education with new intelligent educational technologies to ensure the stages of such process comprehensively. The appropriate information technologies are developed due to domestic standards of health care and education, pedagogical and psychological technologies, legislative support of inclusive education, etc. Complex support of inclusive education with information technologies allows systematical accumulation of large amounts of data. Such data concern features of the psychophysical development of a person, specialties of one's needs and capabilities. The technology of the multivariate data analysis – the OLAP systems – is a convenient tool in big data processing and exploration. Such technology appeared to be useful in decision-supporting (Lytvyn, 2013), knowledge extraction (Nikolskyy, 2008) and the like. The OLAP technology in (Gudkov, 2008) is considered as an easy and fast mean of access, visibility, and operational analysis of educational data. In the (Nazaruk, 2014), the authors suggested multivariate data analysis as a tool to study activities in secondary schools.

3 OBJECTIVES

The aim of this study is to analyze the requirements – functional and structural – to the information technology of inclusive education. To ensure the comprehensive multivariate data analysis of the process of inclusive education, the OLAP technology will be explored.

4 THE MAIN RESULTS OF THE RESEARCH

The individual educational plan is a part of an individual educational route of inclusive education. The document, that contains the individual educational plans includes learning content and the correction component, both provided by the selected inclusive institution. This plan is based on the desired material and technical, personnel, scientific and methodological support, etc.

The individual educational route for a person with special needs is developed with the participation of educational institutions (preschool, school, universities, etc.), institutions of extra educational activity (art, sport, crafts), places of work, training courses and the like.

In works (Skidmore, 2014) (Vrasmas, 2012) (Watkins, 2006), authors introduce a kind of individual educational plan – a concept of the individual transition plan, which is advisable, in their opinion, to be applied to resolve the transition of persons from one learning plan to another. Such individual transition plans can be useful, for example, in the case of transition from the school to the university, or getting a job, or changing job profile. Transition plan, in particular, makes it possible to increase the chances of a person with

special needs to pursue higher education and (or) the ongoing work, to combine the interests, desires, motivation, experience, skills and capabilities to the requirements of the university or the profession, working environment, increase the autonomy of such person and confidence in own capabilities. The individual transition plans (ITP) are designed to harmonize and smooth the person transition between educational institutions (from school to university, from university to the place of permanent employment, etc.). The accumulated learning results and their analyses they form the individual educational trajectory of the person.

Let us set the trajectory of inclusive education as a consolidated result of training, correctional and developmental influence on a person in the course of inclusive education, as well as the conclusions of a comprehensive study of these results. This trajectory, being an information trace of inclusive learning outcomes, reflects the educational, social, societal, and creative achievements of a person.

The information and technological support of learner-centered inclusive education is advisable to realize in the form of an appropriate recommender system. Such recommended inclusive education system is an intelligent information system that provides formation of recommendations, concerning the objectives, methods, and means of realization of person-oriented training of persons with special needs. Such concern is based on the analysis of the peculiarities of one's psychological development, and corresponding educational trajectory.

The aim of the development of the recommender systems of person-oriented inclusive education is to reduce the information burden on teachers, parents, a person with special needs etc. Such systems use the search – an intelligent selection of the most relevant objects (pedagogical and teaching methodology, ICT tools for inclusive learning, control, etc.) in large data sets. Developed information and communication tools of inclusive learning should combine the design versatility, availability, and regularity of services (Demchuk, 2013), (Lu, 2015), (Rice, 2011), (Wald, 2007). Modern online media, as one of the elements of information and communication tools, enables professionals, parents, and persons with special needs to provide information technology support and maintenance of certain stages of inclusive education (Hodych, 2011), (Ding, 2015), (Pereira, 2011).

The functioning of the recommender systems of person-oriented inclusive education lies in the analysis of the characteristics of the inclusive person, his mental and physical development and individual learning trajectory. Such analysis causes the building of a quality individual educational route, that would meet the principles of learner-centered learning, and ensure the efficient achievement of learning objectives. Modern recommender systems aim to support the user with information and communication in choosing education course, subjects of study and teaching materials, lectures and online discussions, etc. (Boyarinov, 2004).

4.1 The analysis of requirements of inclusive education participants

The implication of information technologies to the process of inclusive education will give an effective tool of support such education to those, who are involved in it. The design of such information technologies depends on the necessities of its users. The set of appropriate demands can be described as a use cases diagrams in UML notation (Fig. 1). This gave an opportunity to reveal users of such IT among the participants of inclusive education. Table 1 contains the main groups of such IT system users and the purposes of the groups' system appliance.

Table 1. IE and IT: users and system appliance

Participants of IE	*System appliance*
Person with educational needs (EN)	to identify the features of psychophysical development
Person with special educational needs (SEN)	to update the individual data; to the educational trajectory, as well reporting on an educational route
Specialists of PMPC	for accumulating data of the psycho-physical diagnostics.
Inclusive learning specialists	to evaluate individual observation; to record correctional development;

Participants of IE	*System appliance*
Teachers of public schools and assistants	development of an individual education plan; to form individual transition plans.
Employers, specialists of employment centers	for the analysis of the educational trajectory of a person through generated reports.

Among other things, the system makes the estimates obtained from doctors and psychologists of public profile, analyzes the accumulated data (in particular, with the purpose of identifying special needs), is monitoring the psychological and medical aspects of socialization while inclusive education.

The information technology of the learner-centered learning support, which would take into account individual peculiarities of psychophysical development of the pupils and give the opportunity to satisfy their educational needs in the course of formation of individual educational plans, must satisfy the following requirements (Vagramenko, 2005), (Kravets, 2003):

- To create conditions for the selection of learning content in accordance with the educational opportunities and needs of a person and the level of acquired competencies,
- To provide at the same time training and corrective work with a person according to the peculiarities of his mental and physical development,
- build individual educational plan taking into account the achieved level of acquisition of competencies and level of psychophysical development,
- ensure optimal selection of the educational content on relevant topics,
- contribute to the synthesis of contemporary pedagogical, correctional and information technologies,
- to ensure the formation of individual learning trajectory of the person, supporting the accumulation of learning outcomes and to their analysis.

Additional benefits of applying the information technology support of learner-centered inclusive education will be the opportunity to increase the efficiency of the educational process, to adapt quickly to changing conditions, to optimize the channels of gathering information, to automate control of learning outcomes; to analyze learning outcomes; to automate and improve the planning of the educational process.

4.2 The features of multivariate data analysis of inclusive education

The participants of the inclusive education can be classified as those who work with the system of IT support, and those, who can be a source of data to the system. Let us denote by *K* the set of roles of persons, who are a to be sources of data in inclusive education process:

$$K = \{K_1, K_2, ..., K_{12}\}.$$

Here K_1 stands for the person with educational needs, K_2 – the person with special educational needs, K_3 – the physicians of the PMPC, K_4 – other physicians, whom the person was consulting with, K_5 – the physicians, affiliated with the inclusive educational institution, K_6 – the psychologists of the PMPC, K_7 - other psychologist, whom the person was consulting with, K_8 – the psychologists, affiliated to the inclusive educational institution K_9 – the educators of the PMPC, K_{10} – the educators, affiliated to the inclusive educational institution, K_{11} – the educators, affiliated to the institutions of additional education (sport, art workshops etc.), K_{12} – parents. Table 1 shows the interrelation between the participants of the inclusive education – as a data sources, and the information technologies of such educational process, which are to support it (in Table 2, the letter S stands for the source of the data). Understanding the features of the data accumulation in inclusive educations allows designing functional requirements to the corresponding complex of information technologies in the context of data storage.

For example, the accumulation of data, received from the person with special needs, mostly takes place at all stages of such process. First, the data inclusive education is collected at the stage of person diagnosing with help of psychological, medical and pedagogical services (psychological, medical, and pedagogical consultation – PMPC). Second, such data accumulates at the stage of compiling academic and corrective outcomes. The set of such data – both text or speech – is called

the corpus of inclusive education texts. Creating a facility to analyze such texts is a relevant task in inclusive education, as well as in learner-centered education.

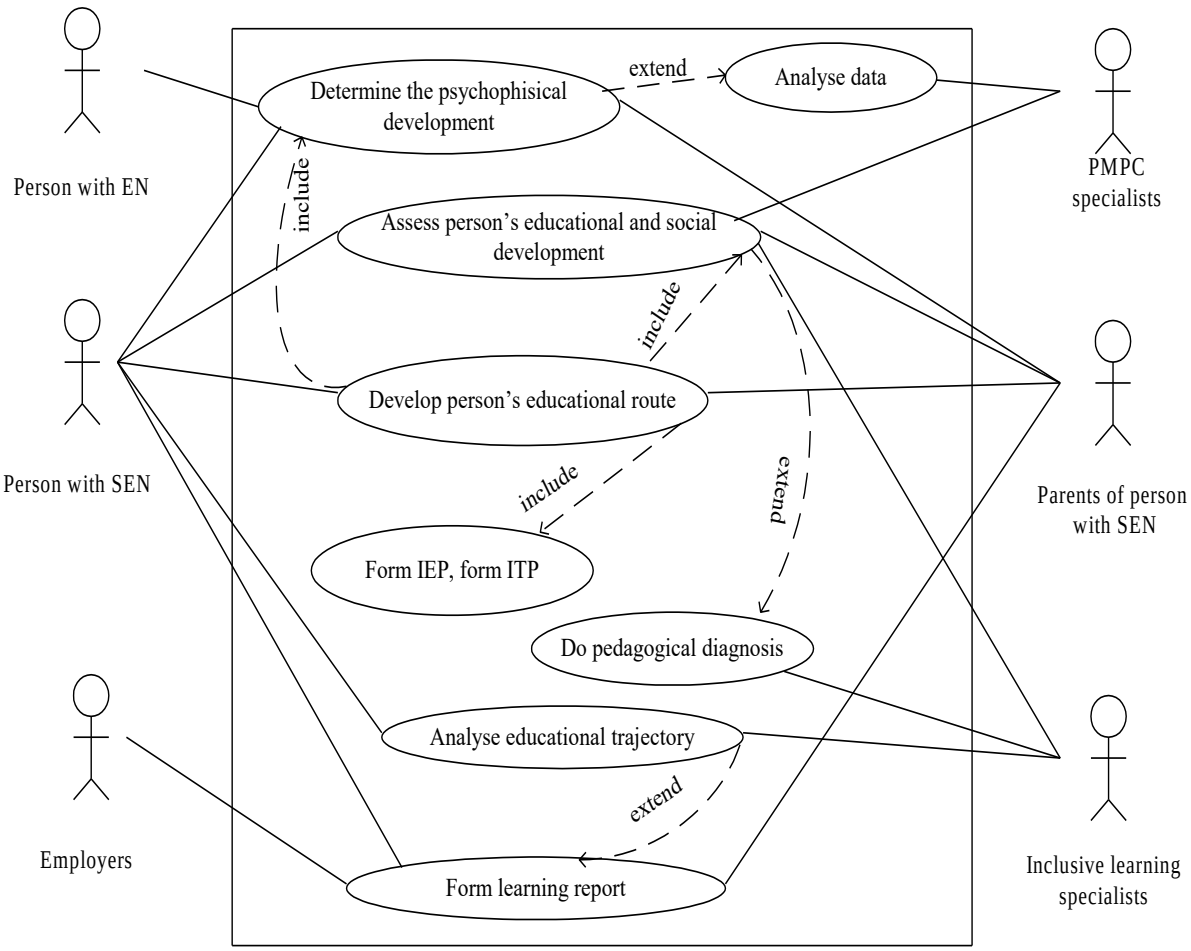

Fig. 1 Use of the case diagram of personally-oriented inclusive education IT support

The need for storage of big inclusive education data requires the application of information technologies. Such technologies should enable the storage and processing of big data amounts for further analysis. The modern means of such data accumulation and processing is data warehouse technology, a significant component of which is a complex multi-dimensional data analysis – OLAP. The use of OLAP technology to processing data, that were accumulated in the process of inclusive education, will give the opportunity to analyze the social development of the person with special needs, one's academic and correctional progress etc.

The multivariate approach is based on the idea of certain calculations on inclusive education data, conducted often or time-consuming, and saving those results for the later use. Saved results can be used in the process of knowledge extraction and decision-making. Basic concepts of the multidimensional data models are data hypercube, dimension, attribute, cell, relation (Shakhovska, 2009).

The hypercube of inclusive education data will be specified as a set of cells, which define the set V and A: $H_{IE}(V,A)$, where: V is a set of hypercube dimensions, $A_{V_i} = \{A_{1_i}, A_{2_i}, ..., A_{k_i}\}$, $i=1,...,n$ is a set of the dimension attributes V_i, $A = A_{V_i} \cup A_{V_i} \cup ... \cup A_{V_n}\}$ is a set of the hypercube attributes, $V' \subseteq V$ is a set of fixed dimensions, $A' \subseteq A$ is a set of fixed attributes. The notation $H'_{IE}(V',A')$ describes a subset of the hypercube data, that corresponds to a set of fixed values. A set of cells, that corresponds to the desired attributes and dimensions, we shall denote $H'_{IE}(V', A') | H'_{IE} \subseteq H_{IE}$.

Table 2. Information technology of data sources in inclusive education

Inclusive process participants	Information technology			
	The accumulation of ID. Data	The accumulation of teachers' diagnostics	The accumulation of psychological diagnostics	The accumulation of medical diagnostics
K_1	S	S	S	S
K_2	S	S	S	S
K_3				S
K_4				S
K_5				S
K_6			S	
K_7			S	
K_8			S	
K_9		S		
K_{10}		S		
K_{11}		S		
K_{12}	S		S	S

The process of inclusive education was research from the point of view of data accumulation. As a result, key dimensions of the multidimensional data model of this process were determined (Shestakevych & Pasichnyk, 2015). Each dimension consists of several consecutive levels, which, in turn, are parameters of other relations between dimensions. The multi-dimensional nature of OLAP data cube construction is presented in Fig. 3 (Ovsianitskaya, 2014). An example of such a hierarchical dimension is disease classification: Disorder – Speech Disorder – Type of Speech Disorder (Apraxia of speech Cluttering, Dysprosody, Muteness etc.).

The procedure of information obtaining from the data hypercube is in the operation of the dice with the corresponding dimension values, i.e. $H'_{IE} \subseteq H_{IE}$. For example, an information about psychologists' work with a person with precise speech disorder can be obtained. To do this, the data cube should be diced by dimension "Psychologist Affiliation", "Speech Disorder", and "Date". A point in this space will describe the ID of a person with a speech disorder, treated by the specialist.

Figure 2 shows another possible choice of the cube dimensions, based on person-oriented inclusive education data. Data cube allows conducting a detailed analysis of the characteristics of inclusive educational process separately by years of study, inclusive schools and characteristics of educational activities. If necessary, you can conduct a further detail for each of the aggregated dimensions – years of study, inclusive schools or characteristics of educational activity.

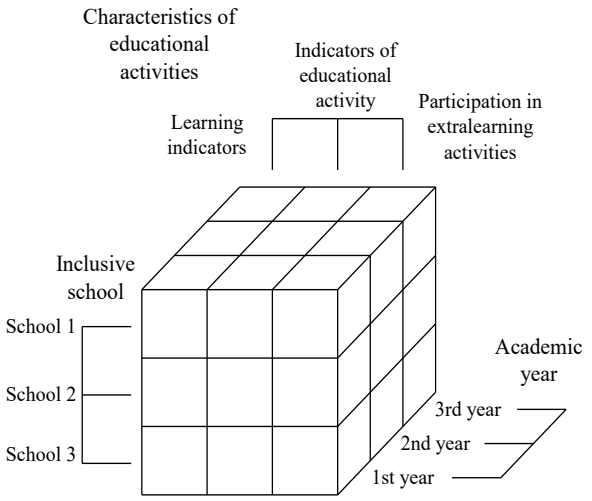

Fig. 2. Data cube dimensions

The dice operation in formed data cube (Fig. 2) allows solving the following analytical tasks for further data analysis:

– research about educational activity characteristics – with fixed measurements "Inclusive school" and "Academic year";
– research about the level of an extra educational involvement of inclusive schooling (with fixed measure "Participation in extra learning activities" and the summation on the "Academic year" dimension) – to analyze the influence of an additional education on academic results.

Figure 3 shows the cube of the second level of the hierarchy. This inclusive education data cube provides the opportunity to conduct an analysis of the educational characteristics. As such can be mentioned the correctional activities, the indicators of such activities, the inclusive classes or the academic semesters.

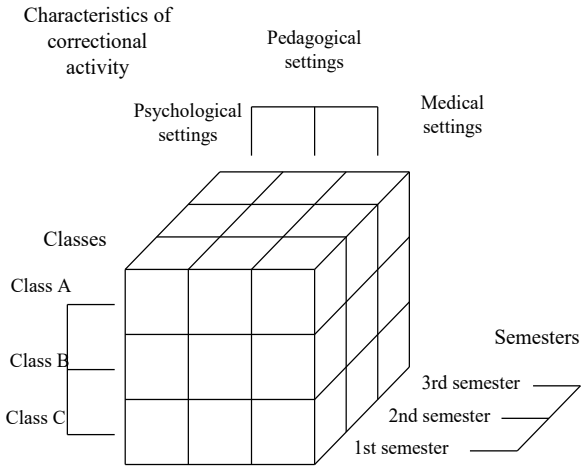

Fig. 3. The second level of the data cube

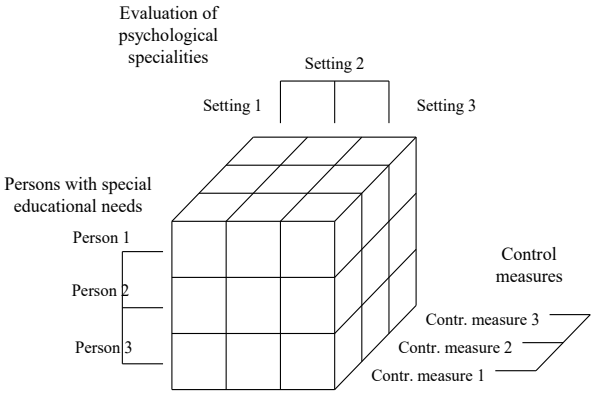

Fig. 4. The third level of the data cube

The dice operation in data cube at Fig. 3 allows solving, among others, the analytical tasks of operating with data in order to perform a research about the level of an extra educational involvement of inclusive schooling. To do so, the measure "Participation in extra learning activities" is to be fixed, and the summation of the "Semester" dimension performed – to analyze the influence of psychological characteristics of the correction measures in different inclusive classes. Cube of the third level of the hierarchy is presented in Fig. 4. Such inclusive education data cube provides an opportunity to analyze the evaluation of psychological characteristics of a person per certain psychological parameters, results of control measures or persons.

5 CONCLUSIONS

The learner-centered education, that considers personal characteristics of students, as well as ensures the full development of the individual cognitive abilities, is an innovative form of the learning process. Having exceptionally high value, such education for persons with special needs allows encouraging students to educational activity, providing conditions for a full social inclusion. The application of modern IT technologies became a relevant task – both scientific and practical.

In this paper, the authors considered the possibility of applying the multivariate data analysis techniques for a comprehensive operational analysis of data (including a corpus of inclusive education texts). The ability to organize and present the data in terms of various analytical tasks demonstrates the feasibility of an OLAP system. Such technology is an effective tool in IT support of learner-centered inclusive education.

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FINANCIAL MANAGEMENT IN STATE AND MUNICIPAL ADMINISTRATION

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JEL Category: **H50, R51, R58**

Abstract

Ongoing modernization of the Russian economy and public finance sector reform involves implementing measures to improve the functioning of the state and municipal organizations providing social services. The purpose of this paper is to develop practical recommendations for improving the delivery mechanism of government (municipal) services in a competitive environment. The article compares in social services, subsidies and analyzed species identified by their distinctive features, identified common characteristics and differences in the mechanism of delivery of services. The main results conducted during the preparation of the article analysis boil down to the fact that for the most efficient delivery of government (municipal) services in a market economy and competitive advantage requires a combination of different types of subsidies and methods of their calculation in conjunction with well-developed industry and departmental lists of services.

Keywords: *public services, efficiency of budget expenditures, budgeting*

1 INTRODUCTION

The definition of "financial management" is rarely associated with state and municipal sector of the economy. This is since it is difficult to imagine authorities or local governments using some mechanisms that are not clearly regulated by the relevant regulatory act. Especially in the financial sector, where every decision about spending carefully considered by numerous regulatory agencies.

Tools and financial management procedures in the state and municipal government sector have been actively used by governments of economically developed countries since the second half of the 1980s. By this time, the most common has become a point of view that government agencies and municipalities, as well as private companies, had to use the funds from the maximum return.

For more than twenty years of existence of the practice of financial management in state and municipal institutions of developed countries, an understanding of its essence and core principles have changed significantly. If at the initial stage of the implementation of financial management was considered primarily as instrument control of public expenditure, it is currently understood as a system of management of financial resources of a particular territory, which provides the best ways to use the limited amount of budget resources for effectively and efficiently achieve purposes.

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2 ON THE WAY TO THE PUBLIC MANAGEMENT

The starting point of financial management in the public sector and municipal management – comparison of costs with the results and determination of relationships between them. As a result of the calculation of the various indicators (economy, effectiveness, efficiency), continuous monitoring of their dynamics and influencing factors are accepted, are satisfied, adjusted and controlled management decisions to increase or decrease budget expenditures for the implementation of certain goals and objectives of the body authorities.

It is important to note the obvious differences between the levels of application of financial management in the private and public sectors. In the first case, it is the level of the enterprise (or group of companies), the public sector - is the level of, industries, sectors of activity of the main managers of budgetary funds or territory.

Another fundamental difference is the goal of financial management. The main objective of financial management at the enterprise - maximization of profit and wealth of proprietors of the enterprise in the current and prospective periods by increasing its market value. The main purpose of the financial management in the public sector - to provide more quality services and maximum efficiency of financial resources, which belong to the whole of society. The common of the private and public sectors is that the financial management is part of the control system of an enterprise or a territory.

In most countries where the practice of financial management in public sector, procedures, and financial management standards regulations resolved by the adoption of the relevant laws (USA, Australia), as well as through the creation of special services (agencies) on financial management in the executive branch (Sweden, United Kingdom). Thus, in several foreign governments conducted an internal evaluation of the quality of financial management, which is then used in the practice of management. Often the tools to assess the quality of financial management built into the system of executive power and are the elements of monitoring and control systems.

In developed countries, the financial management in the public administration sector determines, in the following way:

- In the theoretical literature - as "the activities of the state and municipal employees, which includes making decisions and performing other functions that allow you to determine how best to use limited resources efficiently and effectively to achieve political objectives";
- Practical guidelines (for example, the UK) - as "a system of the state financial or municipal agency and control, promoting the objectives of the organization".

In the Russian Federation, normative regulation of financial management in the public sector today is at an early stage of forming. The main efforts on the implementation of financial management quality assessment in practice of the attached now mostly at the federal level, the Ministry of Finance of Russia.

The Ministry of Finance has attempted to define the concept of "financial management" in the sector of public and municipal administration by order of 10 December 2007 № 123n "On the organization of the monitoring of the quality of financial management carried out by the main managers of federal budget", and supplemented it by order of the Ministry of Finance Russia on April 13, 2009 № 34n "On the organization of the monitoring of the quality of financial management, of main administrators of the federal budget".

According to the orders for financial management refers to a set of processes and procedures to ensure effectiveness and efficiency of budget funds and cover all elements of the budget process (drafting of the draft budget, budget execution, accounting and reporting, control and audit) (Gorbacheva, 2015).

Order № 34n part of the quality assessment of indicators of financial management was supplemented by indicators characterizing:

- Proportion of the budget submitted with the planning in the form of a pro-gram (reflecting the introduction of the main administrators of budget funds (MABF) result-oriented budgeting mechanisms;
- The share of allocations, which established the state (municipal), job (MABF shows the ability to determine the cost of providing the

sovereign governmental or municipal services and to ensure that the results of the cost);
- The quality of the established order of drawing up, approval and management of the budget-governmental estimates (characterizes the work of a network within the jurisdiction of the budget planning and execution of the budget);
- Availability of electronic document management system MABF treasury authorities and budgetary funds (illustrates the application of modern technologies of information in the budget process);
- Repayment of the amount of the share of the budget excessively paid or collected sums (as evidence of the implementation of its budget powers main administrators of revenues), etc.

In addition to the above-mentioned legal acts and activities of the Russian Finance Ministry, territorial financial authorities in the development and implementation of financial management items in the budget process are based on the Address of the President to the Federal Assembly. Thus, in the Budget Address for 2015 can distinguish the individual elements of financial management in the public finance sector:
- The effectiveness of budget expenditures and improve the quality of public and municipal services;
- The powers of the budget funds;
- Transparency and efficiency of use of budgetary funds;
- Control over the targeted use of budgetary funds, compliance requirements legislation, and the use of state and municipal property.

In the Address for 2016, the President was talking about improving the quality of financial management in the regions of Russia, on the promotion of the bodies of state power of Russian subjects and local authorities to improve the quality of regional and municipal finance management.

In the Budget Address for 2017, the emphasis is on the fact that the expansion of the powers of chief administrators in the budget should be accompanied by the development of financial management quality monitoring system with the support not only to the target clear direction of their activities but also on the well-established budgetary procedures, internal control mechanisms, a high level of budgetary discipline.

3 ONGOING REFORM

From the analysis of the provisions of the budget message, we can make an unambiguous conclusion that the first stages of the implementation of financial management in the practice of state and municipal sectors of primary importance for the bodies of executive authorities have the elements of financial management as budgeting, public expenditure management (with a focus on efficiency and effectiveness), and state and municipal financial control.

The position of local authorities on financial management that is largely due to the actions and decisions of the Russian Ministry of Finance. However, the absence of a single definition of financial management entails the appearance of widely represented municipalities.

The idea is that the new processes in the life of the country, regions, municipalities, require improving the existing public financial management system, including at the local level, directly close to the citizen, which tasks a great variety, the results of their decisions affect the population almost immediately, as financial resources are generally very limited.

Supported by federal and regional authorities in the framework of the current legislation, the present budgetary imbalance between a number of liabilities of local governments and their own income is the confirmation that improves first necessary procedures and municipal finance management mechanisms. To a large extent, the income budgets of many municipal-pal formations formed by financial assistance from higher budgets. This is a real reflection of the fact that the existing level of quality of the financial management at the local level is currently low (Gavrilova, 2015).

In the transition from traditional budgeting to the budget-oriented re-result, radically transformed the public finance management. In the area of budget expenditures there are two important characteristics: the control object becomes a structure of total authority expenditure (in the traditional budget such an object is not used in time funds), and criteria of managerial effectiveness - the achievement of results (in the traditional budget of the agencies success judged by the accuracy of the execution of the budget of painting).

The starting point of financial management in the public sector and muni-pal management - cost comparison with the results and the definition of their relationships. As a result of the calculation of various indicators (economy, efficiency, effectiveness), continuous monitoring of their dynamics and influencing factors are taken, executed, monitored and adjusted management decisions to increase or decrease budget expenditures for the implementation of certain goals and tasks of agencies. Thus, the effective implementation of the decisions taken duly embodied in the cost structure changes, and these changes, in turn, ensure the achievement of planned results (Loskutova, 2016).

Financial management system, in our opinion, should include two major components - the conditions and processes, which consist of a number of subcomponents. The first component of financial management includes:

1. Laws and regulations:
   a. the definition of "financial management in the sector of public and municipal administration" in a special regulatory document adopted by the legislative authorities at federal, regional and municipal governments;
   b. the inclusion of provisions on the financial management of all legal acts related to the budget process;
   c. the key role of the central authorities (primarily the Ministry of Finance) to create a set of documents aimed at regulating the financial management and covering all four stages of the budget process;
2. The system of distribution of powers and responsibilities within the financial management at the level of regional departments and local governments:
   a. the delegation of authority and responsibilities of financial management "top-down" - from the chief executive officer for operational managers (i.e., to the officials of branch and back-office departments, which have at their disposal certain budgets and supervise the implementation of targeted programs, activities, provision government services, and periodically report on the expenditure of funds and achievement of the planned results). This is done in close connection with the establishment of a clear legal responsibility of officials at different levels of the hierarchy of management, for the failure to achieve planned results and the violation of the requirements of normative legal acts. Delegate in conjunction with the responsibility of creating a coherent hierarchical accountability framework that sets out who, when, to whom and for the achievement of any performance report, which is responsible for the improper management (Leyman, 2014);
   b. a special role in the financial management system, executed by other subdivisions and departments of authorities - Financial (coordination department budget with the Ministry of Finance, the interaction with the cash budget execution, accounting and management accounting, preparation of financial and management reporting, cooperation with industry and operational units), internal audit and the audit committee, created in the framework of the collective governing body (monitoring and supervision in the field of financial management);
3. Ensuring human and technological capabilities of the financial management:
   a. the system of centralized and departmental training of operational managers and internal auditors;
   b. the practice of centralized agencies for consultation for financial management;
   c. incentive system of civil servants who have attained success in training financial management and its implementation;
   d. provision of electronic interaction in real time between information technology systems, operating in the industry and agencies in the organ of cash execution of the budget.

The second component of the system of financial management includes budgetary processes. They are identified by conventional terms, but have a different, compared to the conventional content:

1. Budgeting, characterized by:
   a. linking costs with results - in the budget documents, there are results expected

from the implementation of budget programs and other activities in state and municipal government sector;

b. the presence of the medium-term perspective - the formation of a financial plan as a three-year "rolling" document with the annual plan for the addition of the third year and corrections of plans on the first and second years (especially the former, respectively, second and third);
c. planning unity - linking current or capital expenses and the purchase of assets and services;
d. flexibility in determining the cost structure - decrease in the degree of detailing costs as the level of the management hierarchy, granting authorities the right to carry on next year's allocations are not used to the end of the expiring year;
e. the application of measures to ensure stability in government spending at the macro level - the introduction of fiscal rules and the establishment of a central financial authority limits appropriations for the department as well as, where appropriate, the individual direction costs;

2. Implementation of the budget, through:
   a. implementation of a set of agreements or frameworks for the provision of public services (a kind of contracts that provide links between expenditures with results provide authorities considerable freedom of action, and conclude, significantly both between the Ministry of Finance and line ministries, and between the sector ministry or agency, and its subordinate bodies and the Organization);
   b. an effective open procedure public procurement (including regular and comparative analysis of the average purchase price);

3. Accounting, covering:
   a. the accounting and reporting (including the availability of flexible and streamlined budget classification, publication and presentation of the legislative body of the annual report on the activities of departments and annual financial statements, the accuracy of which is confirmed by the conclusion of the State Audit Institution);
   b. management accounting and reporting (including the cost of the payment of all budget programs, state and municipal services and other results of authority's activity, as well as the preparation of management reports for operational managers) (Vassel', 2014);

4. Internal control and audit, including:
   a. a set of interrelated internal control components (control environment, risk assessment, control activities, information sharing, monitoring) aimed at risk management and the achievement of reasonable assurance in the task implementation of accountability, proper execution of management operations, compliance with legal acts, protection resources from abuse, fraud, and corruption;
   b. the presence of special structures: one of them - the internal audit function, which reports directly to the head of the department (and, consequently, does not depend on other departments), audits the financial statements, legality, and efficiency, providing senior executives and operational managers to consulting services.

4 CONCLUSIONS

The introduction of modern financial management is closely interlinked in organizations of state and municipal government sector and cardinal increase the efficiency of budget spending. Only their harmonious totality enables an effective budget process in the Russian Federation as a whole and in the Federation and the municipalities of Russia in particular.

It should be noted that the process of integration of financial management mechanism for the public sector to the real budget process carried MABF, is a process that encompasses the need to form hypotheses to be checked in practice, the application of the best financial management practices based on the analysis of international experience, and development of original ideas aimed to solve non-trivial problems. So inevitable errors that require analysis, allowing the result to find the true and only correct direction for further development. This is a complex task facing by all

the participants of the budget process, and its solution will speak for sure about the practical relevance of the process of financial management for state and municipal government sectors.

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THE FEASIBILITY AND BENEFITS OF GPS TELEMETRY MONITORING SYSTEM IN MINING

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ABSTRACT

The aim of this article is to demonstrate the benefits and justification of the use of GPS systems as a function of telemetry monitoring and control of production in the mining industry. The advantages of using GPS systems and information technology to manage the production in mining compared to the traditional way of managing in details are presented in this article. The analysis of the benefits and the feasibility were performed on the implemented case study with already applied GPS system in "RMU Banovici". Monitoring by GPS tracking systems is finding ways to reduce operational costs and the identification of possible bottlenecks in the production process to slow down or prevent the growth of production and business. In addition to the revenue side of the increase in output per unit of work, we have reduced costs. Thereby GPS system in the market economy in the function of obtaining lower prices of coal as a product becomes not only justified but necessary. Analyzing the results so far of the application, after the introduction of a system for telemetric monitoring and management part of the technological process, to be noted that the time of operation of the main machinery increased significantly. We realize the benefits this system which offers the implementation for monitoring, and primarily this system raised awareness of employees that has a constant supervision of their work.

Keywords: GPS telemetry system, monitoring in mining, network technology, techno-economic analysis, software for controlling.

1 INTRODUCTION

Systems for monitoring, control, and management of a part of the production process on the pit by dispatching center are used around the world over several decades. In mines with a large number of

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transportation means and auxiliary machinery, it is easy to determine the economic feasibility. For this purpose, the best solution is to apply the satellite supported equipment such as global positioning GPS system. Due to their abilities, such systems were largely applied in the surface mining of mineral resources for the control, monitoring, and management of mining machinery and equipment, as well as for geodetic works (plotting derivative works, budget volume excavated and deposited mass etc.). Methods of gathering information on the situation and position, movement of machinery and equipment, then space and time are implemented using the satellite supported positioning system.

Data can be stored in the database and they form the history of the spatial and temporal movement of the observed machinery. GPS technology enables the real-time visibility on the computer screen in the dispatch center continuously monitoring the movement and the position of machinery and vehicles, which represents the input parameters to make rational management decisions at the right time. The main purpose of the dispatching system is a telemetry monitoring and control over the work of the observed machinery, and thus be a part of the production process at the open pit mines.

Generally, each system for telemetry control and management consists of:

1. The supervisory control subsystem,
2. Subsystem machines and vehicles are monitored and managed,
3. Communication subsystem,
4. Subsystem for video surveillance.

Supervisory and control subsystem is the center of dispatching system and telemetry system for monitoring and management. This is the place where all the information about the traceable machinery and equipment are collected and a place from which the overall system is managed. For normal functioning and operation dispatching center, it is necessary to bring more jobs and employ persons who would work as dispatchers. The dispatching center is equipped with more personal computers, the number of which depends on the amount of the equipment monitored and managed. These computers are connected to the network so that the system works as a whole.

2 BASICS DISPATCHING SYSTEM FOR SENSING, MONITORING AND CONTROL

Software support system ensures that the display of each PC can show the current schedule of tracked (monitored) machines in the mine, and map open pit mine with markers, showing the position and direction of movement of each truck, the position of the excavator digs and other equipment and machinery equipped with devices for remote sensing. The dispatching center can also monitor other data on machinery, operating parameters and characteristics of the vehicle machines (excavators, trucks and other equipment).

The mobile subsystem includes a collection of all the monitored machines, that receive signals from satellites and provides communication with the control center.

The equipment in each machine enables:

- receiving signals from the satellite about the spatial position of the machine,
- forming the message which is sent to the dispatch center, and
- reception of control messages from the dispatch center.

Mobile subsystem in each machine includes (Kerzner, 2009):

- The display on which to display your messages from the dispatch center,
- control panel through which an operator machine sends a message to the dispatch center,
- sensors for measuring certain size parameters in the machine,
- GPS receiver with antenna,
- Communication modem (radio, GSM, GPRS) with the antenna.

The communication subsystem is a set of links, which provides complete communication within the dispatching system. This subsystem enables the exchange of information between machines in the mine, which is monitored and managed from the dispatch center.

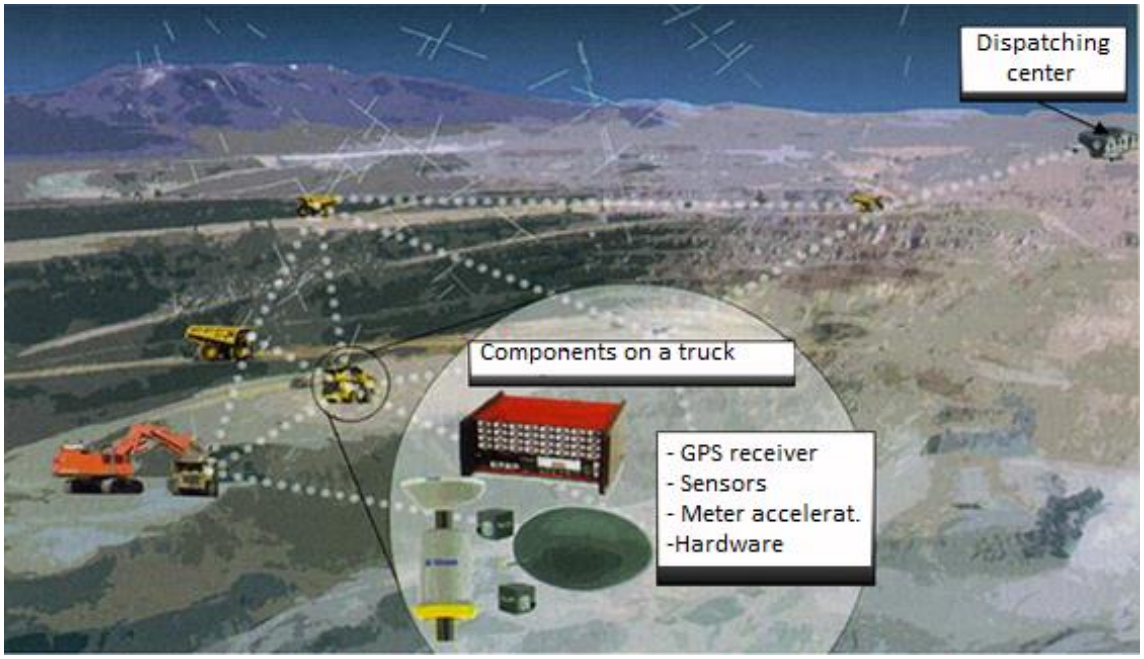

Figure 1. The basic elements of a system for remote sensing, monitoring, and control: Author's project of application GPS telemetry system for monitoring and management in RMU "Banovici" (Mesic & Rahmanovic, 2014)

The same is realized in the following way:

- Reading the spatial position in time,
- Telemetry control,
- The collection and archiving of reports,
- Management,
- Analysis and reports on the effects of work.

Reading the spatial position is done with the integrated AVL (Automatic Vehicle Location) terminals and satellite signal. The dispatching system does the geo-referencing, telemetric and telecommand overseeing of the complex of trucks and other equipment at the mine during the operation of the mine mechanization.

The conversion of position information and the movement of production equipment in the mine and the state of its circuits in some form of data (transfer, selection, storage, archiving and processing of the obtained data). All together form the function of the centralized control of the production process.

Telemetry supervision is carried out by continuous monitoring of production equipment and machinery in the open pit in order to timely adopt the right decisions about their work (switch to another lorry mine or work with another excavator, etc.).

The system for telemetric monitoring provides an opportunity for monitoring the dispatch center collecting information in real time. The information quantity depends on the number of sensors, encoders, and terminals that integrate the system. In addition to collecting information in real time, it is possible to adequately manage the production, procurement, and maintenance.

The management of these parameters and processes can significantly affect the revenues and expenses of the company. (Kerzner, 2013)

The management of complex machines in the production process is practically the management of the parameters of the technological process of production, the layout of machinery and equipment by manufacturing processes, capacity in waste and mineral raw materials, consumption of fuel and electricity, as well as the effects of this spending.

On the basis of known current value of the above parameters for each element of the technological complex or machine and the whole complex, methodologically are made management

decisions that will bring the highest production results, which will be followed by the best economic indicators. Quality control greatly influences the quality of governance, particularly in parts of the production process to be managed in real time. In order to provide timely accurate information arises the need for centralization of data Local diagnostics and monitoring.

It can be concluded that for better management it is required expanding the scope of timely information. This process leads to further local and telemetry automation. For all the specifics that accompany the process of surface mining, management is done in two ways:

- Long-term and short-term planning and monitoring the implementation of production plans,
- Optimization of monitoring and management in a real time of those parts of the production processes that are manageable at the current time.

3 COLLECTING INFORMATION BY USING GPS SYSTEM

On the basis of implemented AVL terminals, sensors can determine the status, speed, rest, during movement, distance covered vehicles, the length of stay in the designated area, etc.

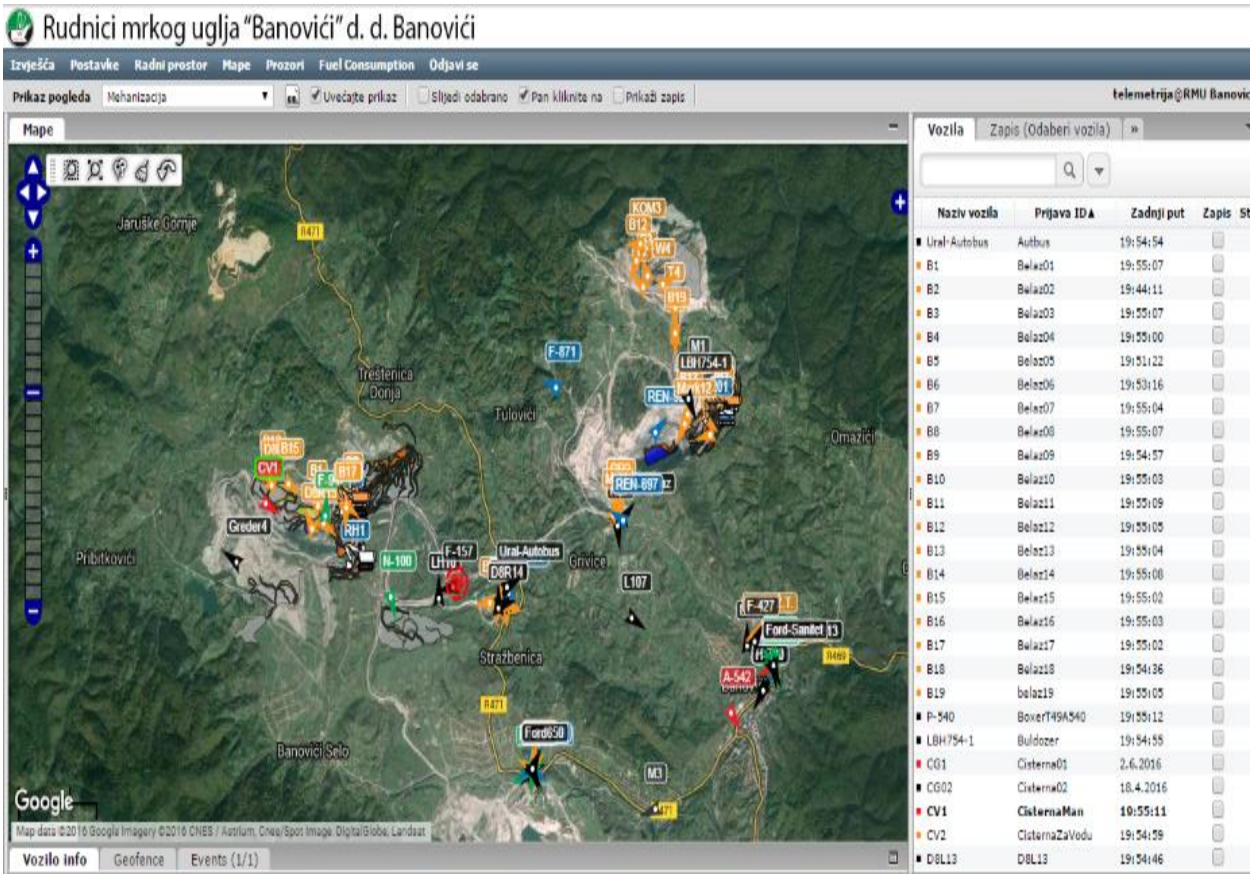

Figure 2. Main page of software platform GpsGate which is implemented in RMU Banovići

To collect other information such as fuel level, the state of the cap on the tank, load the drive motor and the like must be made installation of special sensors which can later connect to the device so that this information is available to control the dispatch center.

Example monitoring will show a sample tipper truck on which is provided to collect and record the following information (Mesic & Rahmanovic, 2014):

1. First GEO position,
2. The status of whether the machine is working or not working,
3. The consumption of fuel,
4. The fourth load of traction electric motors,
5. SOS button, hands-free set,

6. Velocity and speeding.

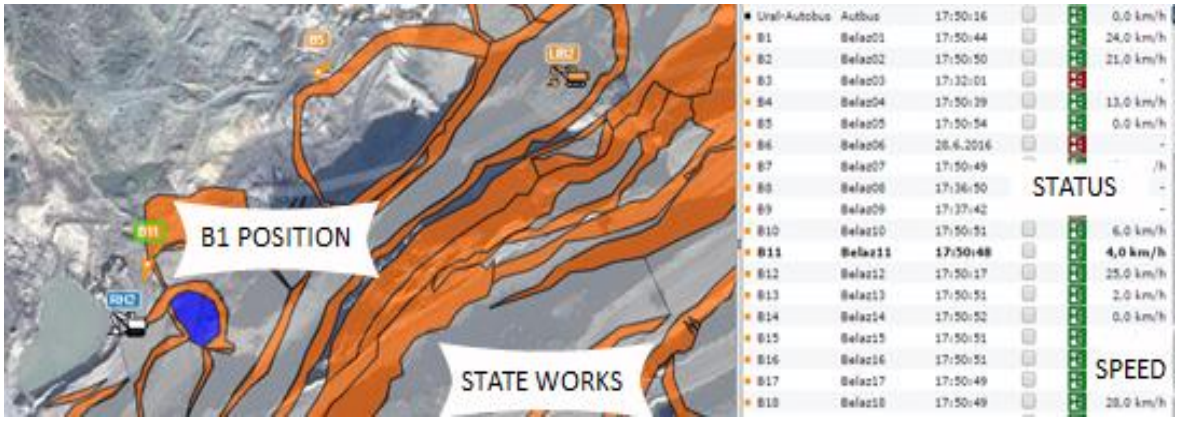

Figure 3. Currently monitored information for dumper trucks: from software platform GpsGate which is implemented in RMU Banovići

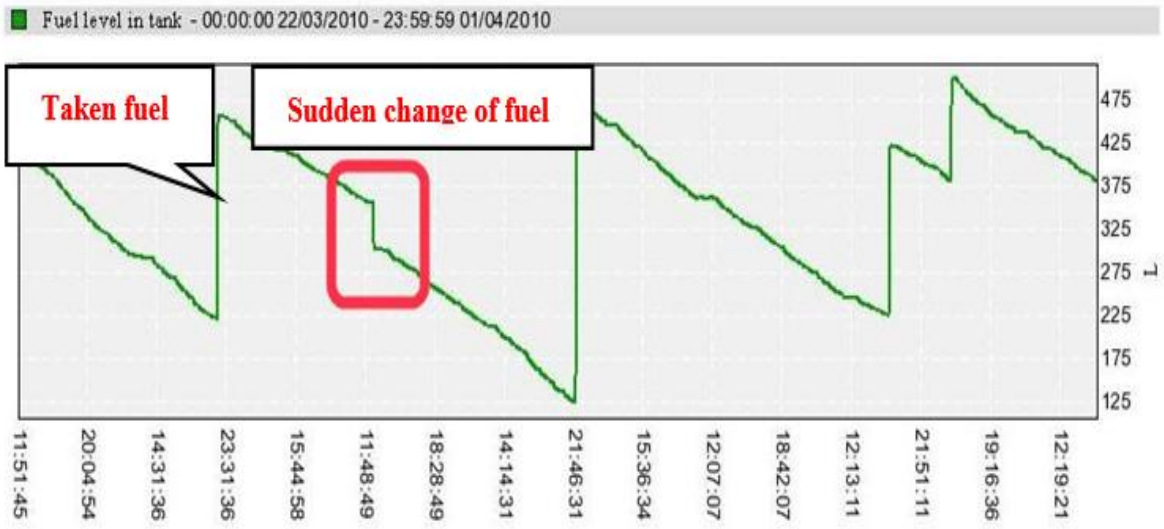

Figure 4. Fuel Chart: *Author's report of application GPS telemetry system for monitoring and management in RMU "Banovici" (Mesic & Rahmanovic, 2014)*

GPS system for telemetric monitoring can be implemented in a way that whenever there is a sudden change in the state of the fuel level in the tank information submitted to the server and to the marker vehicles include a warning message to the operator in the dispatching center could react.

4 CONTROL OF OTHER PARAMETERS

As part of the further implementation and development of the system should be left to the possibility that the programming terminal and the installation of additional sensors, monitors, and control other parameters. These parameters can be information on the number of revolutions, electrical load in electrical machines (propulsion and electric motors), predict and immobilizer in certain driving units in order to protect against theft, all depending on the requirements of the mine, in order to better use and protect equipment and better results. The subsystem for video surveillance allows continuous monitoring of the situation, trends and distribution of trucks and other mining equipment in the dispatch center via broadband installed cameras to video game consoles or mining machinery (Mujic & Rahmanovic, 2009).

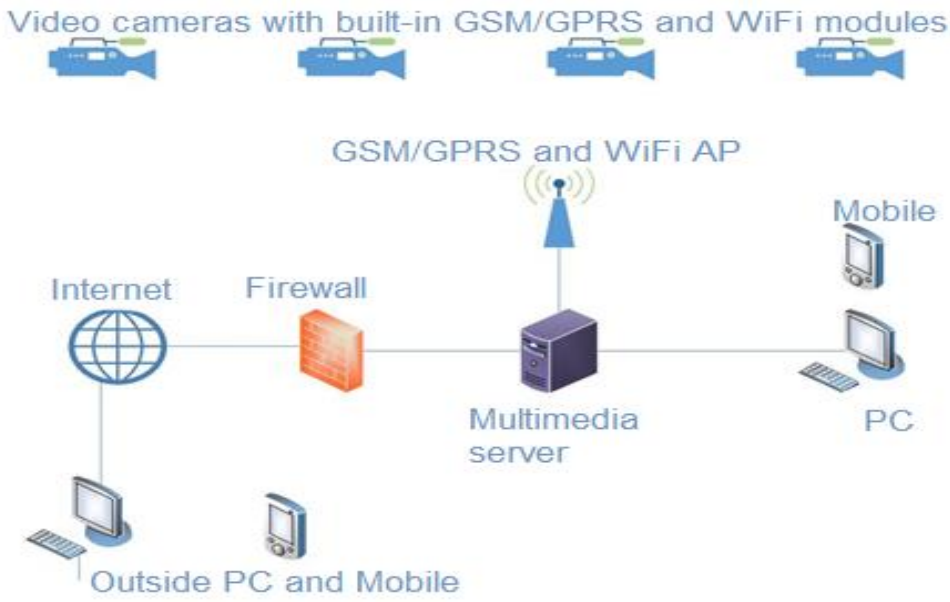

Figure 5. Scheme of the video surveillance system: Author's project in "RMU Banovići"

5 TECHNO-ECONOMIC ANALYSIS OF FEASIBILITY OF THE SYSTEM OPERATION

Monitoring by GPS tracking systems is finding ways to reduce operational costs and the identification of possible bottlenecks in the production process to slow down or prevent the growth of production and business.

The introduction of the GPS system has produced great resistance by the workers, which is characteristic for the introduction of new systems with large changes. For this reason, activities to educate users were aimed at highlighting the benefits of using these systems to the users.

The truth is that the users (operators of the machines) do not recognize that the timely and reliable information has a significant impact on the efficiency and utilization of the machine, but the effect of timely and reliable information, in the end, is visible.

When the benefits of this system are realized, it can be concluded that the implementation of this monitoring system raised the awareness of the employees that their work is under a constant supervision.

Analyzing the current application results after the introduction of the system for telemetric monitoring and management of the part of the technological process it can be noted that the operation time of the main machinery (excavator and trucks) is increased significantly. In particular, we refer to the movement of the truck and standing of the truck at the end of the shift.

By analyzing the information from the previous period, there is the information that the time utilization of labor tipper trucks increased significantly to an average of 6.66% (about 0.5 h/shift for each driving unit) as the number of over 20 vehicle units that are currently working gives the impressive results of additional effects.

As the aforementioned data and indicators imply, indicators of fuel consumption are improved when it comes to the consumption l/m3 of the amount transported. If we add the fact that it goes in the direction of better control and monitoring of consumption by installing special sensors effects of this monitoring and control will ultimately be even more evident.

Also, the work of other vehicles and equipment has been established to better control the use of the monitoring system, especially to the units of rolling stock, where we now have a much higher utilization and availability of vehicles.

We have had very frequent movement of two vehicles at the place where the performing loading, and thus unnecessary waiting, delays and so on. By using telemetry management system with GPS, we have created the preconditions for the optimization of transport in the process of coal production.

Monitoring results are also evident in the case of passenger cars of the Mine. Thus, a better control of their operation is established, the use of the company cars for private purposes is reduced, as well as the costs of fuel and maintenance.

Considering the overall situation, we can make a general conclusion that the application of this system has a positive effect on the work of workers and equipment in manufacturing plants and the financial and safety aspects improved using this method of control and supervision of the work equipment.

Some of the basic advantages include:

- Reduction in maintenance costs due to disciplined management mode equipment,
- Reduced possibility of theft, trucks have less useless work, putting under control the use of official vehicles for private purposes or outside working hours),
- Better utilization of equipment operating time (reflected through less congestion as trucks and diggers, reflected through less congestion of trucks and diggers; there is the truck schedule by dispatchers in real time.
- Reduction of the use of machinery and vehicles by employees for effective supervision,
- Reducing crime related to the disposal of public property companies by employees.

In addition to the start-up costs (the cost of purchasing equipment, devices, and software) and will have permanent monthly expenses that will occur as follows:

- Salary costs (employees in the service telemetry control),
- Costs of telecom operators,
- Repair and maintenance costs of the system of monitoring and others.

Certainly, what should be taken into consideration when purchasing such systems is the fact that IT equipment very quickly becomes obsolete and that this and similar systems have a high degree of depreciation, and their value rapidly falls.

Therefore, if the world trends in this area are to be followed, it is essential to regularly plan the resources for improvement and modernization of systems and equipment as well as enable the workers who work on the monitoring and maintenance of the system to attend seminars and courses in this field.

Implementation of the entire system in *"RMU Banovici"* cost around 250.000 € while the profit for the year due to an increase in production, and partly due to disposals of oil and through other forms of savings, was over 1.100.000 € (Rahmanovic, 2007).

6 CONCLUSION

The implementation of the GPS system in the function of telemetry monitoring and management, impact on greater efficiency, equipment reliability, reduces alienation, increases reduces theft, increases security and helps to make optimal decisions in the production process that take real time.

Also, relevant data in the form of reports can help in the analysis and future plans. In addition to the revenue side of the increase in output per unit of work we have reduced costs, thereby GPS system in the market economy in the function of obtaining lower prices of coal as a product becomes not only justified but necessary.

In analyzing the information obtained by observing the application of the GPS system and accompanying ICT structure leads to the conclusion that the application of new technology not only can give us accurate and timely information but can significantly affect the company's profits through the proper management of such companies. In real time, application of ICT technology in corporate governance and market economy conditions imposed as an exit strategy, the possibility of survival and further development of the companies in this field of activity.

The present case study of the application of GPS system for telemetric monitoring in *"RMU Banovici"* demonstrates that the investment in the project would be very profitable even in the first year.

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PROVISION OF INTERNATIONAL EDUCATIONAL SERVICES BASED ON NUS EXPERIENCE

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JEL Category: **I21, I23, M12**

Abstract

With increasing competition in the global education sphere, the only way to a decent functioning of the Higher Educational Institutions of Ukraine is to match the high international standards. This cannot be achieved without active international activities aimed at the development of international educational programs. In the "Admiral Makarov" National University of Shipbuilding, in Mykolaiv, there are successfully implemented several joint educational programs with foreign partners. Based on experience, it was developed project management methodology for the provision of educational services to the foreign customer. The mechanisms of the implementation of key programs in terms of project management are being studied. The development of Sectoral Distribution of Responsibility for project management training programs "2 + 2" and "4 + 0" with Chinese partner was performed. Implementation of the specialized training program "Junior Specialist (Associate Bachelor) - Bachelor" is considered. The project management mechanisms of implementation of the specialized training programs with Vietnamese partners are also considered. They are proposed as fundamental approaches of project management that are applicable to a variety of other programs that already exist, or are planned to be implemented.

Keywords: *project management, promotion, education system, effectiveness-performance, international experience, knowledge management*

1 INTRODUCTION

The formation of Ukraine as an integral partner of the European Union and serious player in the global arena is impossible without strong integration of not only economic factors, but cultural and educational components.

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The Association Agreement between Ukraine and the European Union signed on June 27, 2014, includes the process of implementation of European standards into many areas of life activity and healthy operation of a State. In particular, this concerns also the educational process. Everyone knows the high standards of the West in the educational field which means the increase of the Ukrainian education level.

The globalization of the educational services market causes the transformation of national

education systems of many countries. As a strongly marked indicator of this phenomenon, there can be such countries as the USA, the UK, South Korea, Eastern Europe countries, etc. For Ukraine, as for other European countries, except the system reforms, the most important factor of higher education reformation is the introduction and development of the Bologna process as a consequence of globalization (Bobrytska, 2013).

On June 19, 1999, 29 European Ministers of Education signed the Bologna Declaration (Vassiliou, 2010) which became the catalyst for the development and modification of the Sorbonne Declaration ideas (Leuven and Louvain-Ia-Neuve, 2009) on the European Higher Education Area. It promotes closer contacts between European countries in the development and strengthening of intellectual, social, scientific and technological potentials, academic and general cultural enrichment.

The academic mobility of students, a wide degree of autonomy in decision-making and active international activity are the most important components of the successful life activity of European universities. Considering the European model of education, we should take into account a factor of competitive activity. The educational services of the West are connected to the market economy and act according to the simple and hard "supply and demand" law. The specialty which is not interesting for the market employment cannot compete and the university has to cut it with all its consequences (redundancy, a decrease of study load, etc.). In fact, the ability of Western universities to adapt to the constant changes of our time is the key to a successful operation.

Accepting the European standards, the Ukrainian higher educational establishments should be aware that they accept also the conditions of healthy competition not only between each other but also between the European universities. And if the universities in the UK, France, and Germany has a little interest for the majority of Ukrainian applicants because of the historically formed circumstances of pricing and other factors, then the universities of such countries as Poland, Slovakia, and the Czech Republic look more attractive and real. The general level of satisfaction with the education system in these countries is higher than in Ukraine, as the "Report on Human Development over 2013" data evidence (UNDP, 2013).

In conditions of the increasing competition in the global education area, the correspondence to high criteria and international standards is the only way of functioning of the higher educational establishment in Ukraine. And this cannot be achieved without the active international activity which is aimed at the development of international educational programs.

Heading for the international integration, we should remember about the needs of Ukrainian regions on which the university works. Currently, there is uncoordinated work between the higher education and potential employers in conditions of development of market relations and the labor market. In the industrial regions of Ukraine, it is primarily connected with the active modernization of industrial enterprises: purchase of modern high-tech equipment, usage of the latest software, expansion of the range of products. It leads to the need for constant updating of training programs for junior specialists in accordance with the realities of the regional labor market (Belikov, Klimov, Pavlenko, & Tkach, 2013).

To achieve these aims, the management of higher educational establishment should be a balanced mix of professional managers, specialists on project management, supervisors, and teachers which can flexibly and effectively react to any circumstances of modernity.

The "Creation of a University of the European Type" program has been still fulfilling at the Admiral Makarov National University of Shipbuilding (NUS) since 2008 as a part of the "Concept of the NUS Development" (Ryzhkov A. , Management of international educational projects of National University of Shipbuilding on the example of Ukrainian-Chinese cooperation, 2014). The concepts and fulfillment of international educational programs of this university are used as the basis of this study.

2 ANALYSIS OF RECENT ACHIEVEMENTS

Project Quality Management includes all activities that relate to general management functions, determine the quality policy, objectives and responsibilities and implement them by such means as quality planning, its control and

improvement within the quality assurance (Guay, n.d.), (Papke-Shields & Boyer-Wrigh, 2017), (Bushuev, 2000).

The process of quality management project has three main components: quality planning, quality assurance, and quality control. Those methods to control the quality of the high school teachers make it difficult to perform the correct quantitative assessment. The need for this assessment indicates a large number of researcher, linking measures to motivate teachers for quality labor with the ability of the administration to have an correct assessment of teachers work (Burkov & Novikov, 1998), (Zynnurov & Huzayrov, 1991), (Hotomlyanskyy & Derevyanko, 2005), (Balyhin, 2003).

At NUS it is used to consider a teacher as a person who seeks to help the student to learn the necessary knowledge and skills required by educational standards. Based on this consideration the calculation to quantify the quality of teaching is taken as a standard (Ryzhkov A. , Quality Management Education NUS program "2+2" with ZIMC, 2017), (Ryzhkov A. , 2017), (Ryzhkov A. , 2016). This calculation is used for the evaluation of the educational process for Ukraine, but for assessing the implementation of international educational programs it is applied the first time. In literature, no data on the existence of a universal computing program for calculation of a quantitative assessment of the quality of teaching. Therefore, to simplify the calculations to quantify the quality of education has been developed the computing program.

The international activities and cooperation with foreign organizations were carried out according to the “Concept of the NUS Development” and “Tasks of the National University of Shipbuilding, the vector of the development remains unchanged (Ryzhkov S. , 2013).

The object of the study is an international educational program of NUS, and the subject is the successful functioning of the mechanisms and the implementation of these programs.

The Scientific Educational Centre of International Cooperation has effectively performed the activity on attracting the foreign citizens to study at the NUS. Thus, from 2011 to 2016 there is a record tendency on the increase of foreign students, postgraduates, and trainees who want to improve their skills over the entire period of the university existence. Thus, as at the beginning of 2008, there were only 88 foreign students at the NUS. As at the beginning of February 2016, 1073 foreign citizens from 24 countries studied at the NUS. The number of foreigners at the NUS has increased in more than 13 times which is a high indicator of the dynamics of the international cooperation development (Fig. 1).

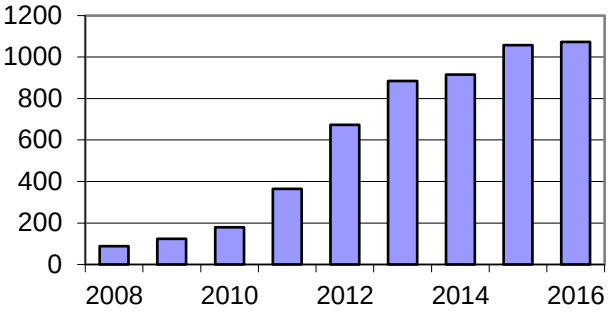

Fig.1. Number of foreign students in NUS

A training program is developing at the NUS with the International Maritime College (Zhejiang International Maritime College), Zhoushan, China. Over four years 70 Chinese graduates (junior specialists) of the college were directed in order to obtain the higher technical education (Bachelor degree) in the “Marine Engineering” knowledge field (Specialty “Ships and Ocean Engineering”, “SPP”) on the “2 +2” program. In summer 2013 the first graduation of Bachelors in this program (13 people) was held and in summer 2014 the second one (14 people) was also held. 30% of graduates continue their education in a Master’s program. In 2015 - 17 people. In 2016 new group of 22 students have graduated.

The agreement with the management of the Jiangsu University of Science and Technology, China, is fulfilled on the co-operative Bachelors’ training in the “Ships and Ocean Engineering” direction on the “4+0” program. There were 181 students over 2012-2015. Currently, there is a campaign to enroll the fifth group.

In 2012 the agreement was signed on the Partnership and Cooperation between the Admiral Makarov National University of Shipbuilding, Mykolaiv, Ukraine and Batumi Navigational Teaching University, Batumi, Georgia. Within the cooperation, the educational counseling NUS

center in Batumi was opened on the basis of the BNTU to fulfill the training of students on the Bachelor programs. 217 students were enrolled in the training in various specialties. Currently, there is a new admission campaign.

The negotiations have been continued and the preliminary agreements on the forms of cooperation in the direction of the Specialists' training with the government agencies and universities of Poland, Norway, Belgium, Turkey, Azerbaijan, Tajikistan, Georgia, Turkmenistan, China, Estonia, Argentina, etc. have been reached.

3 PRESENTATION OF THE BASE MATERIAL

Accumulated many years of NUS experience with international customers makes it possible for a rational approach creation for the project management of the foreign segment. Existing management models do not fully meet their stated objectives for the implementation of these projects. In particular, the closest models: traditional (cascade) project management methodology is not suitable because of its inertness and intolerance to changes, and popular in the West methodology PRINCE2 would make a lot of additional bureaucratic claims (Guay, n.d.).

Based on the results of the project management performed by Educational Scientific Centre of International Cooperation of NUS the project management methodology to provide the educational services to the foreign customer has been developed (Project Management for Education, PME). The processes of PME-methodology are shown in Figure 2.

The principles of the PME-methodology:

1. Possibility Assessment, selection of performers - whether the university is able to complete an international project in accordance with the requirements of the customer, in the case of a positive assessment the necessary university structural units are picked and the team of project executors is being formed.
2. The continuous growth - to take into account the wishes of the customer, to accumulate experience.
3. The use of the mechanism of "shared responsibility" - the responsibility for a positive outcome of the project is not only the main executor headache (in common, the international structural unit of the university is the main executor), but also it is a responsibility of all other structural units that are involved in the project.
4. Evaluation of the quality of work - maintaining an unprejudiced control over the quality of educational services provided by the university. The constant desire to improve and meet the high international standards.
5. Sectoral project management - the project is divided into blocks (sectors), every sector has its executing team.

Aspects of the PME-methodology:

1. Planning - preparation for implementation of the project, verification of curricula, preparation of supporting documents, dispatching support.
2. Co-ordination - the allocation of responsibilities, the matching of structural divisions.
3. Execution - the level of compliance of planned results to the actual implementation.
4. Risks - mechanisms to solve possible contingencies in the planning and the factors of external interference.

The processes of PME-methodology:

1. Rector's control.
   Rector or its authorized person conducts supervision over the implementation of the University obligations to the international customer. It is implemented throughout the project period.
2. The start of the project.
   The reason for the start of the project is the international contract for the provision of educational services. It is also the plan of the project. At this stage of the project, the responsible executors are appointed and all preparatory work is carried out.
3. Project Management.
   This stage is characterized by the distribution of sectoral responsibility.
4. Implementation of the project.
   The fundamental stage of the project, which is a direct provision of educational services to

international students/trainees by basic university divisions - departments.

5. Monitoring of progress.
   At the expiration of the specified time period, a comprehensive monitoring of the implementation of the project to identify abnormalities and other negative factors that can hinder the implementation of the contract is being performed. Usually selected time period is an educational semester.
6. The quality of teaching monitoring.
   Implemented together with the control performance and is aimed at compliance with international teaching criteria.
7. Completion of the project.
   It is characterized by the implementation of terms and conditions of the contract with the issuance of diplomas/certificates to foreign citizens who have completed all requirements for the assignment of the corresponding qualification.

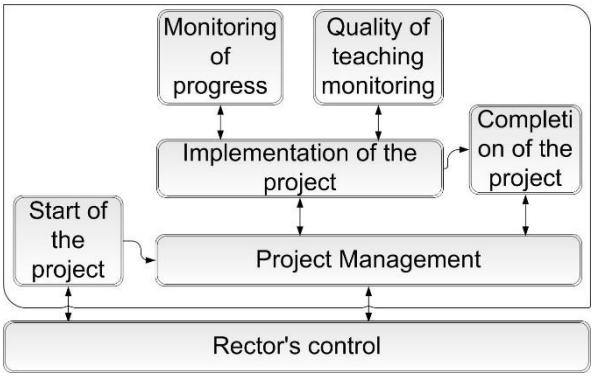

Fig.2. The processes of project management methods to provide educational services to the foreign customer

As an example, let us study the main educational programs performed by NUS for foreign partners (Ryzhkov A. , Management of international educational projects of National University of Shipbuilding on the example of Ukrainian-Chinese cooperation, 2014).

3.1 The "2+2" Program.

Specialty: "Ships and Ocean Engineering".

Teaching language: English.

Partner: Zhejiang International Maritime College, China (ZIMC).

Year of agreement signing: 2010.

Study duration: 2 years in China, 2 years in Ukraine.

1st graduation: June 2013.

The main point of this program is to train the students for a bachelor degree on the basis of two-year training in China followed by the study continuation in Ukraine. A state-pattern diploma of Ukraine is the final result.

This is a complex project which is included in the concept of the general NUS program of formation of a University of the European type. In this context, the fulfillment of training potential in the international arena is understood.

A group of students is the input data for this project. The final aim of the project is gained when these students obtain a Bachelor's diploma. The Educational Scientific Center of International Cooperation in Ukraine and the International ZIMC office in China manage this project. The International Relations and Learning and Teaching sectors distribute the duties upon program functioning at the NUS. The success of this project can only be achieved through the close cooperation and collaboration with other university departments, mostly with the Shipbuilding Institute and its leading departments and it resembles a coherent clockwork mechanism in which everything stops in case of a unit failure.

As is shown in figure 3, each structural subdivision which is involved in the program is responsible for specific tasks which allow successful carrying out of the project. There have already been completed two projects by July 2014: two groups graduated with Bachelor's diplomas, the total number of graduates is 27 people. In 2015, there are plans to graduate 17 new young specialists. The study continuation of some graduates of the Master's Program is a positive complementary product of this program. It should be noted, that the Master's program is carried out in Russian, so the attention is paid to the Russian language course during two years of study in English.

Basing on the experience of successful fulfillments, it should be noted, that the "2 + 2" project is subjected to a number of problems despite the visible rational distribution of responsibilities. All the problems are based on such a concept as a "human factor". It shows itself

both by the students and by the methodologists, specialists, and teachers. It gets also worse by the fact that a fairly low percentage of teachers knows English sufficiently to conduct lectures and practical activities in English, despite the large number of highly qualified personnel at the NUS. This is a slowing component under the integration into the global educational process and one should work seriously on this issue.

One teacher teaches several disciplines and when he/she cannot be in the class for some reasons, nobody can replace him/her. In this case, the ESCIC learning and teaching sector controls the situation. It reschedules classes for the days which are more comfortable for the teacher who missed the classes. This, in its turn, can cause other teachers' dissatisfaction, whose schedule changes as a consequence.

The solution of conflicts and minimization of harm by means of the human factor are one of the most important roles in the project of the Educational Scientific Center of International Cooperation.

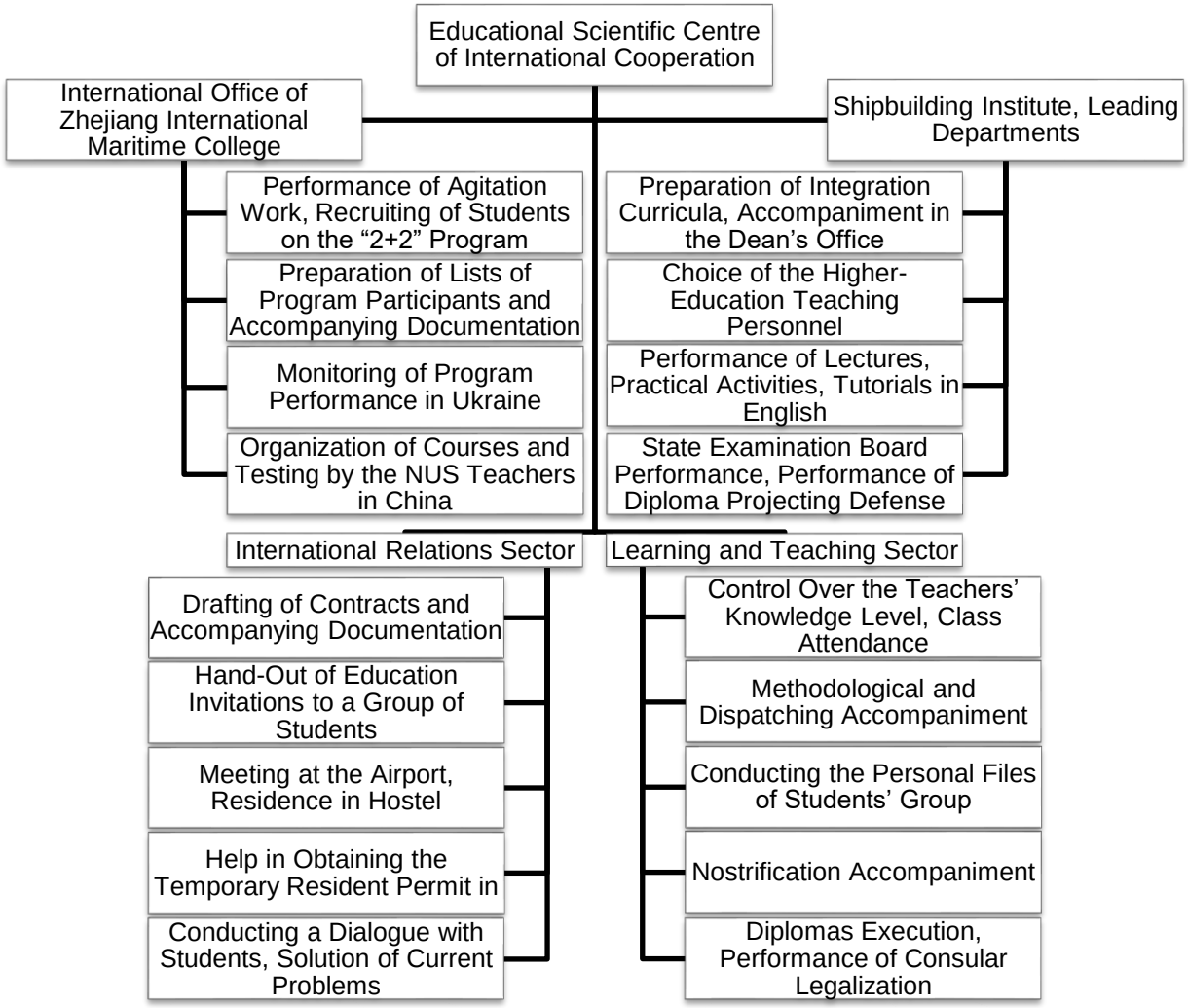

Fig.3. Sectoral Responsibility Distribution under the Project Management of the "2+2" Training Program

Only the well-coordinated work of structural subdivisions reinforced by a general program of development and formation of a University of the European type ensures the successful project fulfillment. The management of such a complex project requires the overall focus of the leaders' powers of three powerful subdivisions: the International ZIMC office, the NUS Educational Scientific Center of International Cooperation and the NUS Shipbuilding Institute.

It should be noted, that there is a high demand in the employers' market in China on the product of this project – the graduates of the shipbuilding industry. So, all the graduates of the first group were employed at the leading enterprises in Shanghai and Zhoushan. The graduation of the second group has been held recently, so there are no current data about their employment at the moment, but the preliminaries give a reason to conclude that these graduates will find a good place in life.

3.2 The "4+0" Program or a Double Degree.

Specialty: "Ships and Ocean Engineering".

Teaching language: English.

Partner: Jiangsu University of Science and Technology, China (JUST).

Year of agreement signing: 2011.

Study duration: 4 years.

1st graduation: planned in July 2016.

The main point of this training program is to prepare bachelors on the basis of an integrated curriculum between the Admiral Makarov National University of Shipbuilding and the Jiangsu University of Science and Technology. The training is carried out in China in the JUST classrooms and laboratories with the help of both Chinese and Ukrainian teachers. The part-time and distance studying technologies are widely used. The result is a so-called "double degree", a Bachelor diploma of the Chinese state standard and a Bachelor Diploma of the Ukrainian state standard.

The double degree programs are not new to Ukrainian universities; however, their main inclination falls on a partnership with Western universities which is noted by the Ministry of Education and Science of Ukraine. But the NUS is a pioneer and leader in Ukraine in the fulfillment of such a program with the Chinese partners.

This project is also a part of the program of the NUS development and formation of a University of the European type. It is structurally multi-layered and its successful fulfillment depends on the coherence of actions, both in Ukraine and in China. If we compare it to the "2 + 2" project, it requires much more advance preparation which also implies the approval of higher authorities.

The initial stage of the project fulfillment is to develop a common integration curriculum which will be implemented into the study process of the NUS, as well as the Chinese partner. In parallel to the curriculum development, there is work on the supplements to the main contract which will be the fundamental rules of the project fulfillment. The agreement stage begins after the approval of the integrated curriculum and supplements by the senior management of the universities. The Chinese party submits documents for the approval of the Board of the Jiangsu Education. The Ukrainian party agrees on the integrated curriculum with the Ministry of Education and Science of Ukraine. Once all the formalities are completed, the fulfillment of the program begins at the local level.

A distinct division of responsibilities between two parties is required for the successful management of this project. It is achieved by the formation of committees on both sides which are responsible for the project. These committees are responsible for the management of its project part at home university, as well as for the close cooperation with the Committee of the partner university.

From the both parties, the committee includes the Vice-Rector on the International Affairs, the Head of the International Department (Center), the director of the Shipbuilding Institute (School). In Ukraine, the committee coordinates the work of the Educational Scientific Center of International Cooperation which is responsible for the successful project fulfillment by the NUS. The duties are divided between the International Relations and Learning and Teaching sectors.

Taking Figure 4 as an example, the complexity of this project becomes obvious, because if you remove at least one component from it, the whole project is doomed to failure. Without the qualitative mechanisms of the control over the project, the final result cannot be achieved either by the performing parties or by mutual control between the partners. The key element of the control is the proper distribution of tasks, efficient monitoring conducting of their performance and, in the case of deviations from the stated conditions, efficient decision of arising difficulties. The methodology of

planning approach is applied at the NUS to fulfill this project. It allows carrying out the systematic analysis of work readiness. Basically, a semester control system is applied.

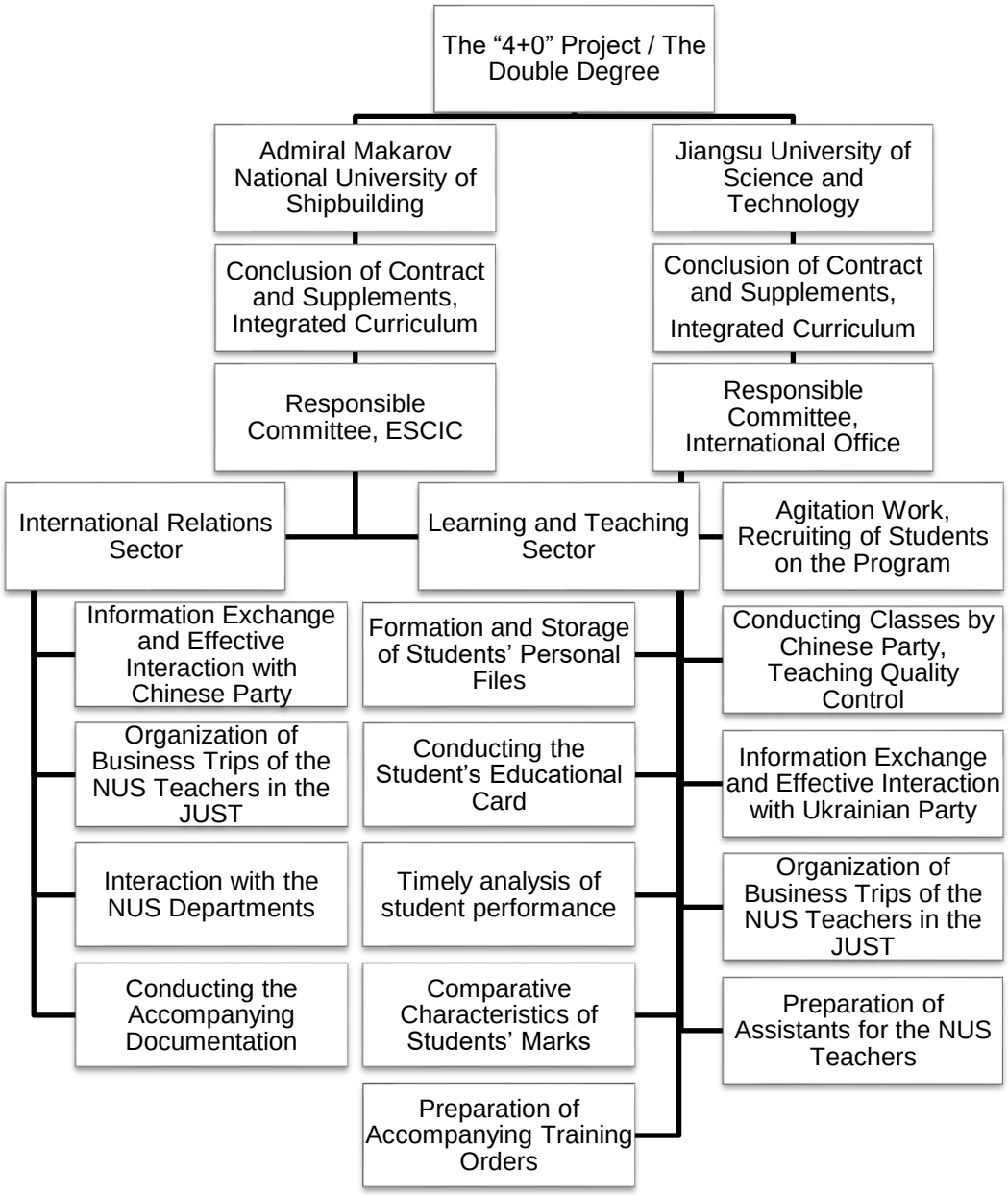

Fig.4. Sectoral Responsibility Distribution under the Project Management of the "4+0" Training Program

The effective management of the "4+0" project is impossible without two key criteria:

1. close interaction and mutual understanding of the project managers with executives;
2. effective interaction with the executives of each other, especially in the "Ukrainian-Chinese executives" tandem.

The process of forming a curriculum and supplements to the agreement to the issuing the dual degree is impossible without the strict observance of all the terms of this project. The terms (indicated in the supplements) of providing the training materials of various academic disciplines, as well as the terms of staying the NUS teachers at the JUST are a serious work indicator on this project of each of the parties. In particular, the NUS which is the executive of a number of requirements must fulfill all its duties in a certain timeline in order to achieve the common aim. Otherwise, the sanctions mechanisms will be involved which lead to the financial losses and can expose a successful project fulfillment to a risk.

As the executives of the project, the top-class experts in their field of education and project management are selected by the NUS. The responsibility for certain training directions lies upon the department, not upon the particular individuals, because in the case of a negative response to the "human factor", the substitution is picked up by the senior executives of the department or another way is found to solve the problem.

The NUS applies successfully the mechanism of the "responsibility distribution" in which the primary responsibility for a positive result lies not only upon the main executive which is the Educational Scientific Center of International Cooperation, but also upon all other structural subdivisions of the University which are involved in the project. Therefore, a synergistic effect is achieved by the joint efforts aimed at the fulfillment of duties of the University.

As part of improving the PME-methodology, universal computing program (UCP) for calculation of a quantitative assessment of the quality of teaching in educational establishment has been developed on the basis of improved by author mathematical model that is defined by the dispersion of average score and calculated as the weighted arithmetic mean of score dispersion for each discipline, with quantitative measure calculated as the return value of the quadratic coefficient of variation.

3.3 The "3+X" Program

Specialty: "Ships and Ocean Engineering".

Teaching language: English.

Partner: Zhejiang International Maritime College, China (ZIMC).

Year of agreement signing: 2013.

Study duration: 3 mandatory years in ZIMC at Junior Bachelor followed by an optional training in NUS at Bachelor (from 1 to 1.5 years, depending on the direction of training).

1st graduation: June 2016.

I. Objectives

To educate and train talents in Shipbuilding and Marine Engineering, who will have a good master of both professional knowledge and English skills so as to meet the requirements of the globalization and to support the development of specialization in Shipbuilding and Marine Engineering of Zhejiang International Maritime College.

II. Requirements

i. Knowledge Framework

1. To have a certain amount of knowledge of humanistic disciplines, social and natural sciences.
2. To have a certain amount of general knowledge of computer operation, word processing, and a foreign language.
3. To master the specialized knowledge in ship performance, ship hull graphing, ship hull structure, ship principles and ship hull building and repairing workmanship, required for the positions of ship production and design, ship hull assembly, production management, and ship inspection.
4. To know about the developing tendency and problems in ship and ocean engineering industry under the background of globalization.

ii. Skill Framework

1. To master the production and management skills required for the positions in ship and ocean engineering enterprises.
2. To be able to use computers, do word processing, communicate properly and use a foreign language.
3. To be able to make inquiries, analyze and solve problems, and have the potential of self-development.
4. To have the abilities of organization, coordination, planning, and creation.

iii. Professional Qualities

1. To have a good psychological quality, integrity, and endurance.
2. To have a responsible professional ethic and teamwork cooperation spirit.
3. To have the design and production concept in the modern manufacturing industry, professional awareness, and creativity.

III. Methods

i. To focus on the combination of skill-oriented and globalization-oriented talents in ship and

ocean engineering production and management.

ii. To combine domestic teachers with foreign teachers. Basic and specialized knowledge is provided by domestic teachers, and foreign language application and advanced techniques and concepts about shipbuilding are provided by foreign teachers.

iii. To diversify the teaching methods. In classroom teaching, teachers' teaching is combined with students' discussion. Multimedia and productive situation teaching mode is adopted in classroom teaching. In the practical course, analog training, and an integration of teaching, learning, and practice are adopted so as to trigger students' interests and teaching efficiency. In extracurricular practice, social activities during vacation and visits of other enterprises are included.

iv. To combine theory and practice. The comprehensive abilities to apply specialized knowledge to practical production and management, and to complete practical tasks will be formed in the combination teaching mode.

IV. Enrollment and Evaluation

Students are enrolled above the enrollment mark of the third level of higher education institutions (Higher Vocational College), particularly with English Course mark of no less than 85.

In the examination of both institutions, the lowest passing mark is 60 out of 100. Those who fail in any examination can take the make-up examination only once and shall retake the course if they fail again in the make-up examination. Zhejiang International Maritime College shall issue the graduation certificates in Shipbuilding and Marine Engineering to those who complete all the courses, and the Admiral Makarov National University of Shipbuilding shall issue the associate degree in Ship Machinery Design and Mounting to those who meet the qualifications.

V. Teaching Management

The management board of the Specialized Higher Education Joint Project in Shipbuilding and Marine Engineering between Zhejiang International Maritime College, China and the Admiral Makarov National University of Shipbuilding, Ukraine, is responsible for the teaching management (Figure 5). The Admiral Makarov National University of Shipbuilding shall provide syllabi and materials samples for Zhejiang International Maritime College at least 2 months before the beginning of courses. All the teaching methods shall be adopted under the approval by both institutions, with a face-to-face instruction mode. Teachers in China shall instruct in the Chinese or bilingual mode of Chinese and English. Centralized teaching mode can be adopted if necessary.

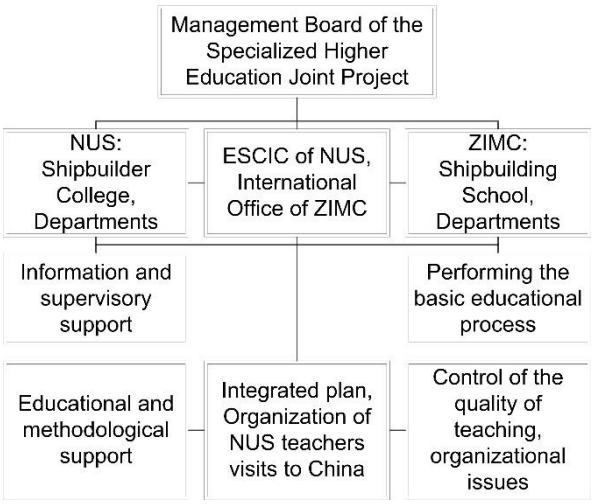

Fig. 5. Segment distribution of responsibilities in the management of the training program "3 + X"

To guarantee the quality, both institutions shall design the syllabi jointly, share the teaching materials, exchange the curriculum table, examination papers and students' assignments, the management group have the right to check and verify the teaching facilities of both institutions in advance.

3.4 Training programs with Vietnamese partners

In the case of the Socialist Republic of Vietnam, the direct work with the Vietnamese state-owned company "High Technology Application Company" is being performed. The company acts as the customer of educational services at NUS for Vietnamese citizens and working on saturation with graduates of various industries of the country.

In the period from 2004 to 2017 has been signed and performed/executing right now nine contracts for the training of Vietnamese citizens. The peak value of the number of students while studying in NUS are 2012 and 2013 years, (45 people every

year). While in 2000 the number of Vietnamese students was only 3 humans.

It should be noted that the specifics of the company's orders is a comprehensive training of highly qualified professionals, which is carried out in three different training models:

1. Basic education “Bachelor-Master”.
2. Ph.D. training.
3. Professional Development.

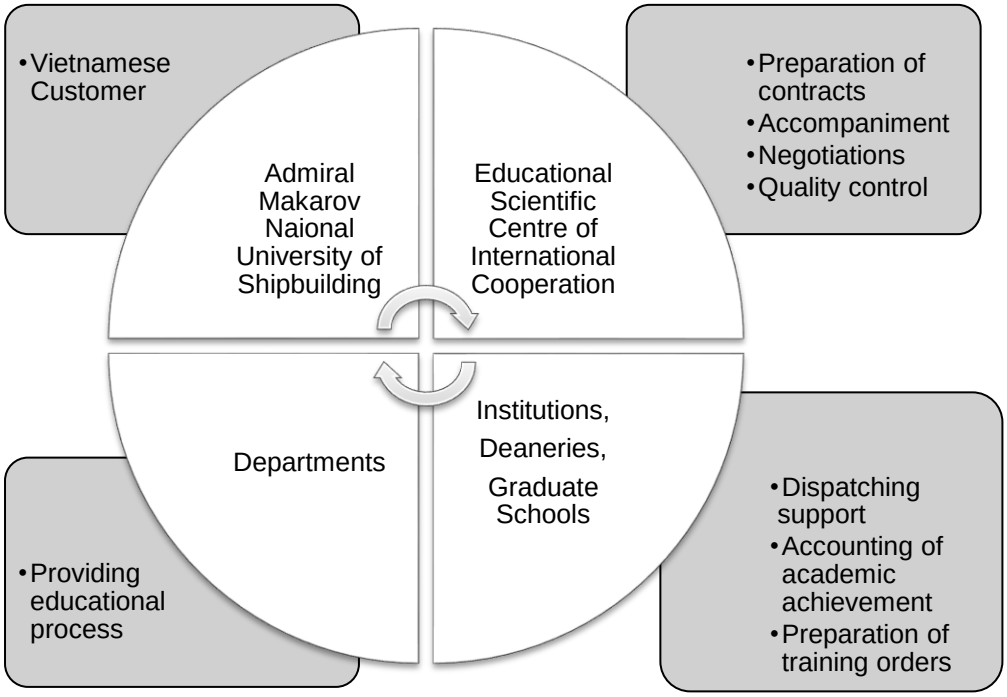

Fig.6. Project Management Cyclic Matrix for a Vietnamese customer

As can be seen from the Project Management Cyclic Matrix for a Vietnamese customer (Figure 6), the responsibility is distributed as follows.

Educational Scientific Centre of International Cooperation prepares contracts with customers, leads the negotiations and support, from issuing invitation letters to obtaining a visa to foreign citizens and ending with removal from accounting registration in the regional department of the State Migration Service of Ukraine. Also in the international center is to control the quality of the provision of educational services. Widely used universal computing program for calculation of a quantitative assessment of the quality of teaching developed in NUS by the head of ESCIC A. Ryzhkov (Ryzhkov A. , 2017), (Ryzhkov A. , 2016).

These structural units of the University, as institutions, deaneries, Graduate Schools responsible for methodical and supervisory support for the project. The monitoring function for the academic performance also is performed by them. Also, their duties include executing internal document flow at the University.

Summary division of the University - Department, is the basic order executor, providing educational services by conducting lectures, practical and laboratory classes.

4 CONCLUSIONS

Based on the results of the project management performed by Educational Scientific Centre of International Cooperation of NUS the project management methodology to provide the educational services to the foreign customer has been developed (Project Management for Education, PME).

This methodology allows to effectively manage international educational projects, which is confirmed by its application in a successful implementation of a number of international contracts of NUS.

Summing up main NUS international curricula with Chinese partners, we can conclude that the similar fundamental approaches of project management can be applied to other international projects despite their differences. They are also applied for various existent programs or programs which are planned to be fulfilled by the higher educational establishments.

After reviewing the implementation of international educational programs with Vietnamese partners in the Admiral Makarov National University of Shipbuilding for the period from 1996 to 2017 years we can conclude that in the conditions of modern globalization trends and competition in the field of education for universities the successful implementation of international projects for the provision of educational services possible due to clear coordination and optimal distribution of functional responsibilities between the executing departments.

This method of management is recommended to use for the universities, who wish to be competitive on the international market of educational services.

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E-COMMERCE PRACTICE EXPLORATION AND TEACHING REFORM BASED ON THE LOGISTICS MANAGEMENT MAJOR

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JEL Category: **I21, I23, O32**

Abstract

This paper takes the e-commerce course of logistics management specialty of the Ningbo University of Technology as an example to analyze the current situation and existing problems of E-business practice teaching in application-oriented colleges in China. At the same time, according to the logistics management professional goals and curriculum objectives, based on the school logistics management professional future employment direction and skills requirements, the reform issues of practice teaching of e-commerce course in the logistics management of the Applied University of Technology have been explored.

Keywords: *logistics, management, e-commerce, practice, teaching, applied undergraduate studies.*

1 INTRODUCTION

The Applied Technology University is characterized by the application of science and technology, to serve the local (industry), as the main purpose, and the integration of production and research, as well as the school-enterprise cooperation for the cultivation of talent training model of the application of technical colleges and Universities. The Ningbo University of Technology, as wholly-owned local government institutions, around the needs of the transformation of industrial development in Ningbo, make a clear objective of applied orientation and pilot demonstration, actively explore the characteristics of local application oriented colleges and universities. In this paper, taking the e-commerce course of logistics management specialty of the Ningbo University of Technology as an example, author, based on the future employment direction and skill requirement of this university, from the perspective of the application of logistics management expertise to e-commerce、focuses on the needs to grasp the content and key knowledge. This paper also explores the reform of the practical teaching of e-commerce course in the logistics management specialty of The Applied Technology University.

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2 OVERVIEW OF THE E-COMMERCE COURSE

The main objective of the logistics management specialty of the Ningbo University of Technology is to train the senior professional management personnel of enterprise logistics, employment is divided into shipping and port logistics, production, and business supply chain management, the purpose of this course is to make students understand the relationship between e-commerce and logistics, and learn logistics mode under e-commerce, logistics service, logistics cost management, logistics distribution, logistics information technology, logistics management information system, logistics system analysis, and design.

According to the Logistics Management specialty, at the Ningbo University of Technology, the “E-commerce and Logistics” as the professional elective course has 32 hours, and 1.5 credits.

3 ANALYSIS

In this chapter, an analysis of the current situation and problems in the practice teaching of logistics management in the Ningbo University of Technology is given.

3.1 The contents and methods of practical teaching are lagging

At present, E-commerce and Logistics course of the logistics management major is mainly taught in classroom teaching, assist with multimedia teaching and case teaching. The proportion of practice teaching in the curriculum system is less than 50%. Due to the practice teaching content, the system is not perfect, practice and training project arrangement is not in place and other factors, the students' practical ability is not well trained. Coupled with the rapid changes in modern e-commerce, students have a serious lack of practical ability, ability to think and solve problems, which can not be favored by employers.

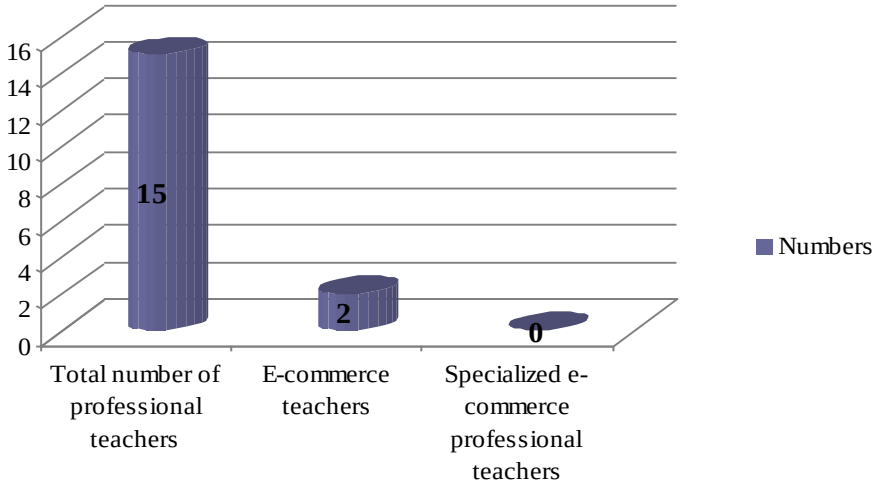

Figure 1 Situation of Related Teachers in Logistics Management

3.2 Teachers lack practical teaching ability and experience

The structure of the school logistics management professional teachers is shown in Figure 1. From the figure, the total number of professional teachers is 15, of which 2 teachers are engaged in the e-commerce teaching, but the number of specialized e-commerce professional teachers is equal to zero. At present, the relevant professional teachers teach the e-commerce and logistics course. We know that the professional teacher of the logistics can teach better, from the perspective of logistics management, and they can master the relevant e-commerce knowledge and skills in the direction of the future employment. Because this kind of teacher has not studied and researched the electronic commerce thoroughly, and don’t have the professional theoretical knowledge, it is difficult to them to meet the requirements of the electronic commerce specialty. As a rule, it can be said that teachers' comprehensive quality, coupled with their general practice, and very little work experience, in the course of the practice of e-

commerce and logistics, is low. So, there were some deficiencies, which led to difficulties in the teaching of the course. It is difficult to meet the requirements of combining current social e-commerce theory and practice teaching.

3.3 Weak resources and links of practical teaching

The practical teaching of "E-commerce and Logistics" course in the logistics management major is mainly through the use of simulation software to familiarize students with the operation flow of e-commerce, and the use of some e-commerce simulation platforms to allow the students to understand e-commerce fundamentally. But all of this just allow the student to be familiar with some surface knowledge only. Due to the rapid changes in the modern e-commerce, the practical operation is far behind the evolution of the market, which is far away from the goal of cultivating applied and technical skills.

In addition, in the practice of teaching, through a form of guiding students to open a free shop on Taobao website, teachers encourage their students to feel e-commerce through practice. Although modern college students know about the online purchase process, they still feel the lack of some of the basic principles and practical experience in background management aspects and have a lot of problems in web design, management, and customer's relationship maintenance. There are many half-hearted students in order to complete the task, just simply register online, plus teachers' limited energy. It is difficult to do one-on-one instruction, resulting in only a few really interested students can achieve better results.

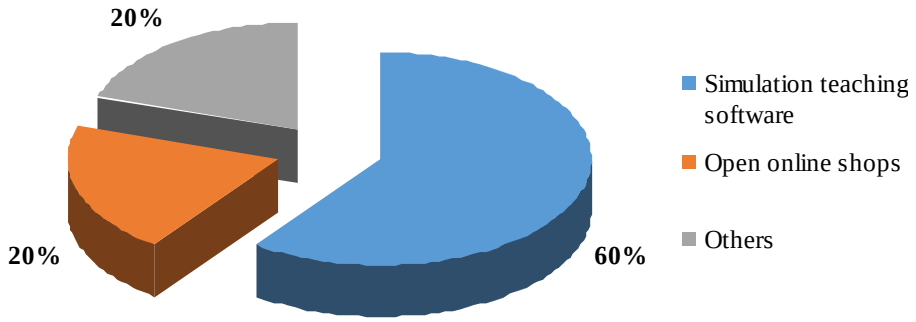

Figure 2 E-commerce practice teaching mode of Logistics Management major

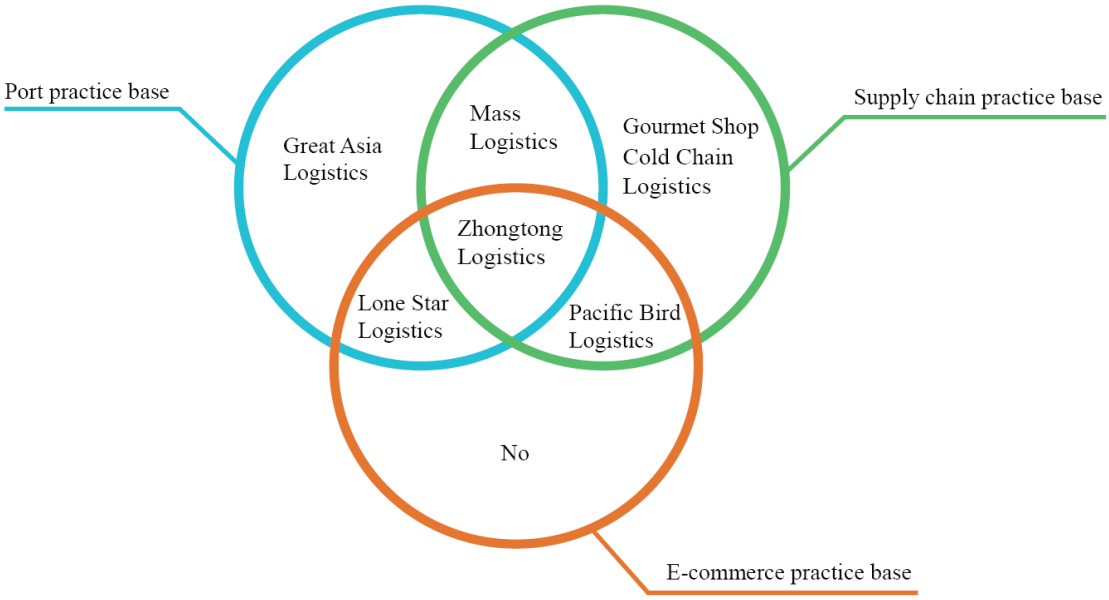

Figure 3 Situation of Logistics Management Practice Base

3.4 Lack of practical teaching base and enterprise platform

As shown in Figure 3, there are no specialized bases for e-commerce practice at present. Only training in Zhongtong Logistics, Lone Star Logistics, and Pacific Bird Logistics can enable students to have preliminary contacts with the electronics business practice in teaching activities. As the school-enterprise cooperation project of professional courses in the school logistics management major is on the port logistics management and supply chain management, the cooperative enterprise is in the majority of traditional logistics enterprises who have few e-commerce activities. So, the school arranges students have business training every semester. But, there are not many activities contacted with e-commerce. The student cannot achieve the dual education serving schools and enterprises as the main part. Its experience can only be based on the laboratory simulation training.

4 THE TEACHING SYSTEM ANALYSIS OF E-COMMERCE COURSES IN CURRENT APPLICATION-ORIENTED UNDERGRADUATE COLLEGES AND UNIVERSITIES

At present, the Ministry of Education is to promote the strategic reform of the University of Technology. Drawing lessons from the successful experience of University of technology in developed countries in Europe, the application-oriented colleges actively explore ways of teaching reform of electronic commerce course in China. (Peng & Wu, 2010) How to build a perfect teaching system of e-commerce curriculum and to ensure the electronic commerce course teachers have a lot of options in the organization of teaching and practice to enable students to achieve better results in teaching practice is a question worth considering. (Lixin, 2016) According to the social needs of e-commerce professionals, schools should be focused on technical skills for the training and make appropriate adjustments to e-commerce syllabuses. As e-commerce has obvious social and technical nature, it involves relatively wide theoretical knowledge and practices content. The theory and related professional knowledge should be taught, including e-commerce outline, e-commerce technology foundation, virtual enterprise management, network marketing, website construction, e-commerce security, e-commerce case analysis, shop management, and management, etc. It is unrealistic to complete such a system of teaching content, through every knowledge point. (Honggang, 2015) Therefore, first of all, we should grasp the focus of e-commerce content according to different levels of professional teaching objectives and needs and improve the training objectives of e-commerce courses, and accordingly, adjust the training program and curriculum system. On the one hand, the school should actively purchase the latest e-commerce teaching software to provide students with the latest e-commerce practice simulation platform. On the other hand, the school has to actively sign an agreement with the e-commerce companies to carry out the school-enterprise cooperation to allow the students to participate in the business practice, exercitation. In addition, qualified schools can establish a university pioneer park to provide students with comprehensive facilities and preferential policies to start their own business in Pioneer Park combined with the practice they've learned. Finally, since e-commerce is an economic form of continuous development and improvement, the teaching content is also in the never ending process of updating; the teacher should appropriately supplement and introduce new subject achievement in addition to the textbooks, and continuously participate in the learning of e-commerce practice, training, and improve teaching content.

5 E-COMMERCE PRACTICE TEACHING REFORM MEASURES OF MAJOR LOGISTICS MANAGEMENT IN NINGBO UNIVERSITY OF TECHNOLOGY

According to the demands of modern logistics market and the logistics management major of the Ningbo University of Technology, it is necessary to revise the professional training plan of e-commerce and to establish the clear training target, especially to train the e-commerce logistics

professional talents.

5.1 Reform practice teaching methods, innovate practice teaching mode

First, in accordance with the development trends of e-commerce, and based on the new model of e-commerce, update to use new materials of latest content, unique form, and sustainable development of e-commerce that related logistics, changings are necessary. Further evolution should continue to explore and research, develop education, and teaching content that suits to enterprise standards and professional standards. In the practical teaching, it is necessary to actively use classroom teaching, multimedia teaching, case teaching, classroom discussions, software applications and other complex teaching methods and means, and, especially, to invite some people into the classroom for practical teaching. That way students can have a better understanding of electronic practical application for doing business.

Also, it is useful to actively guide students to establish Taobao shop, micro-shops, so the students can earn the knowledge of the site management and maintenance. Also, it can be of use for students to play different roles in online sales scenario simulation in their classrooms. That way students can participate in the e-commerce process on different positions and job functions and can get a clearer understanding.

5.2 Improving practical teaching methods using modern advanced technology

E-commerce is a subject in the development. Its technology is also changing every day. To bring e-commerce practical teaching closer to the e-commerce market, and closer to the actual e-commerce occupation and the needs of employers, we should continue to upgrade and optimize e-commerce training software system, and gradually improve the training software system functions, to provide students with the latest e-commerce practice simulation platform. That way it is possible to better meet the needs of the times and to cultivate students' e-commerce talent. At the same time, through the establishment of the University Pioneer Park, it will be easier to provide students with comprehensive facilities and preferential policies to learn the practice part of the content of the stationed venture park and to start their own businesses.

5.3 Improving the construction of professional team, strengthening the practical teaching ability

Strengthen the training of professional teachers, make teachers have a deeper knowledge of e-commerce and high e-commerce control ability, and do a good job of guiding students. On the one hand, it is necessary to improve the creation of the original teachers of e-commerce in logistics management specialty of the Ningbo University of Technology, and actively encourage and support the teachers to participate in the network teaching, ant, this way to improve the teaching level of teachers. On the other hand, it is necessary to increase the introduction of talents and do a good job training together with the e-commerce teacher training. Also, it is favorable to use fully the advantages of the school-enterprise cooperation, playing the school-enterprise interaction model, and actively providing e-commerce courses for teachers on a good training platforms; encouraging and supporting of teachers to further study and develop the network entrepreneurship, and training a group of the faculties with theory and practice is welcome. In addition, it is also possible to strengthen communication and cooperation with other institutions through exchanges and discussions with other universities both inside and outside of Zhejiang Province, to realize the complementary advantages of resources sharing.

5.4 Promoting the e-business school connections to establish a practical teaching base

Ningbo City with the modernization of the international port city and logistics personnel skills raised to a higher standard. The school should cooperate with modernized port logistics enterprises and e-commerce supply chain enterprises to provide a specialized logistics e-commerce professional practice base to effectively help students to understand e-

commerce in the port logistics and supply chain production operation, such as bar code technology, automatic sorting technology, automated warehousing, container electronic identification technology, the wide range applications of logistics simulation technology in the field of logistics, as well as to provide students with a good e-commerce employment training platform, and guidance service platform to meet the talent training needs of current Ningbo "Traditional port" to "e-commerce port". But, also, for Ningbo City, as the first batch of five cross-border trade e-commerce services, and one of the pilot cities, it is the urgent need to develop new cross-border business talents.

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