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НАУЧНО-ТЕХНИЧЕСКИЕ ВЕДОМОСТИ САНКТ-ПЕТЕРБУРГСКОГО ГОСУДАРСТВЕННОГО ПОЛИТЕХНИЧЕСКОГО УНИВЕРСИТЕТА

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ON THE THEORY OF SHARING RISKS IN PUBLIC-PRIVATE PARTNERSHIP (PPP) IMPLEMENTATIONS

Л.Т. Тенхунен, С.Н. Нииттимаки

К ВОПРОСУ ТЕОРИИ РАСПРЕДЕЛЕНИЯ РИСКОВ ПРИ РЕАЛИЗАЦИИ ГОСУДАРСТВЕННО-ЧАСТНОГО ПАРТНЕРСТВА (ГЧП)

In this article, a theoretical model for analyzing the equilibrium between profit level and risk in a PPP project is described. Examining the real PPP cases, we usedweighted averages because of the missing data. The equilibrium in a PPP project can only be achieved if the partners analyze the project thoroughlyenough to come to a mutual agreement on the risks and profits involved in the project. Insufficient arrangements and misunderstanding may lead to disappointment and possibly sabotage the whole PPP project. Apart from the theoretical analysis, some practical cases of sharing the risks in PPP projects are presented in this article.

PPP; RISK SHARING; MICRO-ECONOMICS; FORTUM; NEGOTIATION CURVE.

Рассматривается теоретическая модель, анализирующая равновесие между уровнем прибыли и рисками при осуществлении проектов государственно-частного партнерства. Равновесие в проектах может быть достигнуто только при условии, что партнеры детально проанализируют выгоду и риски от будущего сотрудничества, а затем придут к взаимному соглашению по этим вопросам. Представлены практические примеры распределения рисков в проектах.

ГЧП; РАСПРЕДЕЛЕНИЕ РИСКОВ; МИКРОЭКОНОМИКА; FORTUM; КРИВАЯ ПЕРЕГОВОРОВ.

Short literature analysis

According to the British Broadcasting Corporation (BBC, 2003), «any collaboration between public bodies, such as local authorities or central government, and private companies tends to be referred to as public-private partnership (PPP)».[1]

The European Commission (European Commission, 2003) identified four principal roles of the private sector in PPP schemes:[2]
− Providing additional capital;
− Providing alternative management and implementation skills;
− Providing value added to the consumer and the public at large;
− Providing better identification of needs and optimal use of resources.

According to the report, there is no unique model for a PPP arrangement. Each project will separately define what is suitable and what is required.

There are many formal models and analyses of different types of PPP arrangements, see e.g. Savas.[3] Bennett et al.[4] and Beauregard.[5] These present one- or two-dimensional spectrums of PPP models based on the degree of private and public involvement.

Nowadays, there are laws on PPP in 69 territorial entities of Russian Federation. Mostof them are just declarations. The laws and documents do not cover all possible PPP forms.[6] In February 2013, experts rated territorial entities of Russian Federation according to their readiness to implement projects via public-private partnership. The most developed region is Saint Petersburg (with 7.8 rating), the least − Chukotka (0.0 rating). By 2013, there have been over 300 public-private partnership projects in Russia.[7]

Austin listed the elements of a strategically successful public-private partnership arrangement. These are listed in Tab. 1.

[1] BBC (2003).
[2] European Commission (2003).
[3] Savas E.S. (2000).
[4] Bennett et al. (2000).
[5] Beauregard (1997).
[6] Gevorkjan&Litvinova (2013).
[7] Gagarin &Dvinjanin (2013).

Table 1

Elements of a successful PPP-arrangement[8]

> a. Clear meaning
> b. Equal mission, strategy and values
> c. Additional value production
> d. Understanding of the meaning of cooperation
> e. Communication between partners
> f. Idea of continuous learning
> g. Commitment to cooperation

Canoy et al. emphasize that risk sharing arrangements within PPPs provide an instrument for creating incentives for both parties to increase efficiency of the project.[9] Analyses of risk sharing in general in PPP arrangements as well as examinations of PPP models in regional industrial policy have been presented, for example, by Tenhunen.[10]

Risk-return analysis in PPP projects

It is quite common to make practical calculations of risk value using the following formula:

$$R = p \cdot C,$$

where R = Risk value in currency; p = the probability of risk occurrence ($0 < p < 1$); C = the costs impact of the risk in terms of currency.

The formula presumably attempts to simply replicate the result. Assuming p and C to be independent, the expected risk $E(R)$ would correspondingly be

$$E(R) = E(p) \, E(C)$$

In general,

$$\partial E(R) / \partial(E(p) > E(C) > 0$$

$$\text{and} \ \ \partial E(R) / \partial(E(m) > E(p) > 0.$$

The expected risk value may differ between the public sector entity and the private sector entity. Thus, the expectation of risk value of the private sector entity $E(R_e)$ is not necessarily equal to the expectation of the public sector entity $E(R_f)$. If the risk analysis is done properly in cooperation, these expected values are practically equal.

The expected rate of private returns in the PPP project $E(i_e) = E(i)$ may also not necessarily

be the same from the point of view of the private sector entity $E_e(i)$ and the point of view of public sector entity $E_f(i)$. However, in this analysis we assume that the project benefits analysis is conducted together so that these two are equal $E_e(i) = E_f(i) = E(i)$.

Private Sector Standpoint

From the private sector entity's standpoint, a PPP project has to adequately balance the expected risks and the expected rate of return. The relationship between risk and return has long been shown in economic literature.[11] Private sector entities have a risk/return indifference, above which their investment decision becomes positive. For example, private sector entities will not accept excessive traffic risk if tolls are capped at relatively low levels.

According to the Federal Highway Administration (2012), private sector entity's willingness to accept a particular risk also depends on its ability to manage the risk, the existence of sufficient benefits to compensate for the risk, and the clarity of the contractual dispositions transferring the risk.[12]

From the point of a private sector entity, the higher the expected risk $E(R_e)$ is, the higher the required expected rate of return $E(i)$ grows. Mathematically, this can be expressed via private sector utility curve

$$U_e = U_e\{E(i), \, E(R)\};$$

$$\frac{\partial E(U_e)}{\partial E(i)} > 0; \quad \frac{\partial E(U_e)}{\partial E(R)} < 0.$$

A constant utility curve (indifference curve) can be expressed via total differential

$$dU_e = \left\{\frac{\partial E(U_e)}{\partial E(i)}\right\} dE(i) + \left\{\frac{\partial E(U_e)}{\partial E(R)}\right\} dE(R) = 0$$

from which we see that on the constant utility curve

$$\frac{dE(i)}{dE(R)} > 0.$$

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[8] Austin (2000).
[9] Canoy et al. (2001).
[10] Tenhunen (2007).

[11] For example, Friedman M. − Savage L.J. (1948), Pratt (1964) and Sharpe W.F. (1964).
[12] Federal Highway Administration (2012).
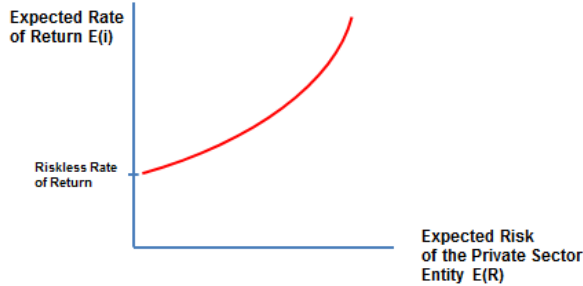
Fig. 1. Constant utility risk/return relation
for the Private Sector Entity
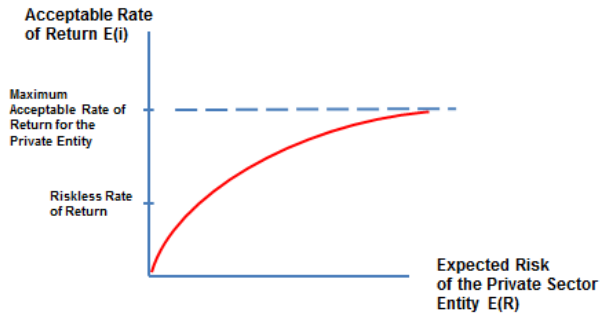
Fig. 2. Constant utility risk/return relation
for the Public Sector Entity

Risk aversive behavior implies that on the private sector entity`s indifference curve, the second derivative is positive[13]

$$\frac{\partial \left\{ \dfrac{dE(i)}{dE(R)} \right\}}{\partial E(R)} > 0.$$

For the visual representation of this dependence see Fig. 1.

Public Sector Standpoint

From the public agency's standpoint, PPP projects are supposed to include stages for transferring the project risks to private enterprises. The more risk is planned to be transferred to the private sector; the higher rate of return will be allowed for the private sector entities. However, a maximum for the expected private sector returns is defined by the public sector, according to the identified expected risk level of the PPP project (see Fig. 2).

For the Public Sector Entity, on the constant utility curve would be

$$dU_f = \left\{ \frac{\partial E\left(U_f\right)}{\partial E(i)} \right\} dE(i) + \left\{ \frac{\partial E\left(U_f\right)}{\partial E(R)} \right\} dE(R) = 0,$$

where $\dfrac{dE(i)}{dE(R)} > 0.$

However, reducing the maximum rate of return causes the second derivative to become negative on the indifference curve.

$$\frac{\partial \left\{ \dfrac{dE(i)}{dE(R)} \right\}}{\partial E(R)} < 0.$$

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[13] Friedman M. − Savage L.J. (1948), Tobin (1958).

Theoretical Equilibrium

Risk allocation can be envisioned as defining an equilibrium point, where the level of expected risk and the expected private sector return is acceptable for both the public agency and the private sector entity. Transferring all the risk to the private sector would significantly increase the private sector entity's required rate of return on investment.

The equilibrium can be reached based on risk-reward trade-offs. Both the public and the private sectors have tolerance levels for risk and returns. A balanced risk-reward profile is needed for the PPP arrangement to be considered attractive by both public and private sector entities (see Fig. 3).

In the equilibrium, the ratio of marginal utilities of both of the agreeing partners is equal, which mathematically means that

$$\frac{\left\{ \dfrac{\partial E\left(U_e\right)}{\partial E(i)} \right\}}{\left\{ \dfrac{\partial E\left(U_e\right)}{\partial E(R)} \right\}} = \frac{\left\{ \dfrac{\partial E\left(U_f\right)}{\partial E(i)} \right\}}{\left\{ \dfrac{\partial E\left(U_f\right)}{\partial E(R)} \right\}}.$$

Divergent analysis of the partners

Assuming that the risk analysis is not done properly in cooperation, this would mean that the expectation of the risk value of the private sector entity $E(R_e)$ is not necessarily equal to the expectation of the public sector entity $E(R_f)$. In theory, there are two new possibilities: $E(R_e) > E(R_f)$ and $E(R_e) < E(R_f)$.

When the private sector entity proposes higher risks for the project than the public sector entity $E(R_e) > E(R_f)$, the expected rate of return of the private sector entity would not accept the rate of return which is proposed by the public sector entity. This may cause the planned PPP project to lapse (see Fig. 4).

Fig. 3. Risk/Return Equilibrium in a PPP Project
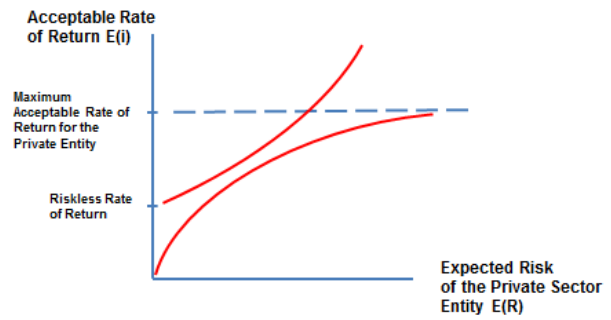
Fig. 4. Risk/Return Dis-Equilibrium
in a PPP Project when $E(R_e) > E(R_f)$

Following the definition $E(R) = E(p)E(C)$, the activities to settle the situation caused by the dis-equilibrium may cover discussions to find a common understanding of the expected probability of risk occurrence $E(p)$ and/or the expected costs impact of the risk in terms of currency $E(C)$. For example, the risks included in $E(C)$ may be covered by a proper assurance from the insurance company. Risks included in $E(p)$ may be divided between the private and the public sector entities within the project. This would mean, for example, defining limits for costs coverage for the agreeing partners.

When the private sector entity proposes lower risks for the project than the public sector entity $E(R_e) > E(R_f)$, the expected rate of return of the private sector entity would pass underneath the rate of return proposed by the public sector entity. This gives the planned PPP project possibilities; however, problems may arise while accomplishing the project. The PPP agreement can be done on various optional levels, while the utility curves clearly overlap each other. The expected rates of return $E_e(i)$ and $E_f(i)$ differ as well (see Fig. 5).
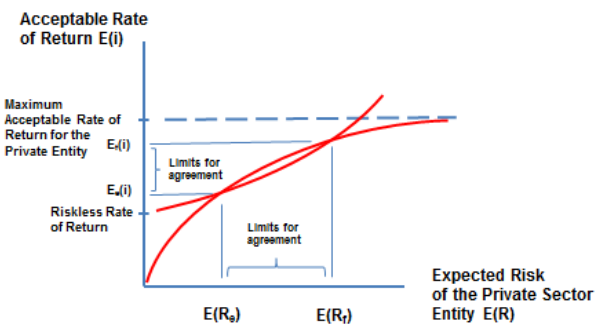
Fig. 5. Risk/Return Dis-Equilibrium
in a PPP Project when $E(R_e) < E(R_f)$

In the situation above, deeper mutual analysis of the risks in the PPP project should be conducted before agreements are signed to avoid problems while accomplishing the project.

As the expected rate of private returns in the PPP project $E(i)$ may not necessarily be the same from the point of view of the private sector entity $E_e(i)$ and the point of view of public sector entity $E_f(i)$, the differences in estimated rewards may cause similar difficulties in structuring a PPP project. These can be analyzed correspondingly.

OAO Fortum (Russia) case

Background. Fortum Oyj is a Finnish energy company that operates primarily in Nordic countries, Russia, Poland and the Baltic Rim area. The company's activities include electricity and heat production, sales and distribution, power plant operation and maintenance services, as well as other energy-related services. The company's main products are electricity, heat and steam. In 2012, Fortum's sales totaled € 6.2 billion and comparable operating profit was € 1.7 billion. Fortum has around 10.400 employees. Fortum was listed on the NASDAQ OMX Helsinki in 1998.

In Russia, Fortum Oyj operates in Urals and Western Siberia. Both in Tyumen and Khanty-Mansiysk area, where industrial production is dominated by the oil and gas industries, and in Chelyabinsk area, which is dominated by the metal industry, electricity demand increased marginally in the second quarter compared to the same period of the previous year. Fortum's operations in Russia are focused on power and heat generation and sales. Fortum's Russian Division includes OAO Fortum and Fortum's slightly over 25 %-holding in TGC-1 that operates in north-west Russia.

In the future, the integrating European and fast-growing Asian energy markets may provide additional growth opportunities to Fortum.

Early in 2008, Fortum acquired a majority in the territorial generating company, TGC-10 company in an auction arranged as part of the Russian power sector liberalization. OAO Fortum (former TGC-10, ownership today around 95 %) currently comprises nine power plants, mainly gas-fired combined heat and power (CHP) capacity. Its operations are based in the metal producing area of Urals and the oil and gas rich Western Siberia. The company also owns and operates trunk heat networks in several cities in Russia. The electricity produced is sold on the wholesale market while heat is soldon the local markets.[14]

The Investment. At the time of TGC-10 acquisition, Fortum applied to the Russian Government`s Capacity Supply Agreement (CSA) to invest in the construction of eight modern power plant units, of which Nyagan newest unit is the largest so far.

The acquisition and investment program combined, Fortum`s Russian investments will amount to about €4.3 billion (net assets in Q2/2013 were €3793 million plus some €490 million which is the remaining part of the investment program) by the end of 2014. It is about a third of all Finnish investments in Russia since the fall of the Soviet Union in 1991.

The new capacity of eight new units in the ongoing investment program will amount to approximately 2400 megawatts (MW). This is supposed to increase power generation capacity of Fortum Russia by 85 % and is therefore a key driver for solid earnings growth in Russia.

The investment program is to be completed by the end of 2014 and according to Fortum, begins to produce earnings properly. In autumn 2013, the mid-point of the investment has been introduced, but four large power plant units are still to be commissioned. According to Fortum plans and goals, the run-rate of the annual operating income (EBIT level) is some € 500 million within its whole Russian division during 2015.

The acquisition caused criticism in Finland, because the acquisition price was considered to

be too high, the power plants in Russia were considered to be too old and Russia was considered to be uncertain market. The criticism increased when the economy was getting worse and the electricity demand fell rapidly.

This meant that commercial risks of the investment were about to prove true although there is a lot of metal industry, gas industry and oil industry in the Ural area and Western Siberia which had to guarantee the demand for electricity.

Electricity and Capacity Markets in Russia. The day-ahead market is the central place for electricity trade in Russia. In 2011, a total of 213 buyers and 51 producers of electricity were registered as participants of the day-ahead market. The total amount of electricity traded on the day-ahead market was 864.9 TWh which constitutes approximately 80.5 % of all electricity volumes traded in the wholesale market (incl. regulated contracts, day-ahead market, balancing market) in 2011. The total market turnover was around €18.4 billion.[15] Thus, the average price of electricity on Russian markets was around 2.13 cents per kWh. In January-June 2013, the average electricity spot price, excluding capacity price, increased by 11 % to RUB 1.020 (920) per MWh (some 2.55 cents per kWh) in the First price zone.

Generators receiving capacity payments should convey full readiness to deliver the amount of electricity indicated in their accepted capacity bids (this requires only the readiness for production of the mentioned capacity). One of the criteria is checking the correspondence of volumes of electricity submitted to unit commitment procedure and day-ahead market and capacity accepted by the results of capacity market.

Participation in the capacity market and the capacity payments is different for the old and new generation. New generators get regulated fixed capacity payments, while the old generators compete in Competitive Capacity Auctions (CCA).

Russia's electricity sector reform was accompanied by a huge need for new investment in the generation sector. During the first period of the reform in 2010−2015, the development of new generation capacity was governed through

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[14] All numbers and pieces of information based on Fortum Corporation website and Interim Report Q2/2013.

[15] Satu Viljainen, Mari Makkonen, Olga Gore, Dmitry Kuleshov (2013, 1 and 2).

government regulation. Investors have obligations concerning punctual commissioning of new generation while the government guarantees a return on invested capital for ten or twenty years starting from the year of commissioning of the power plant (thermal power plants have ten years guarantee, and the nuclear and hydro power plants have a twenty years guarantee). The capacity payments are regulated with fixed monthly payments. The capacity payments for new thermal power plants vary from €12500—30000 /MW per month, depending on the type and location of the new power plant. The present capacity mechanism in Russia is meant to be temporary, and it is designed to solve the problem of the immediate need for new investments in the generation sector. In 2010—2015, 40 GW of new generation will be launched through this mechanism.[16]

The sales, capacity payments and operating profit of OAO Fortum. The Nyagan power plant of OAO Fortum will produce approximately 9.8 TWh annually, after all three units have been commissioned. Based on prices between 2.13—2.3 cents per kWh, this means annual electricity energy sales of some €210—230 million. Apart from sales, the capacity payments will be added.

The CSA capacity payments received by OAO Fortum have had a positive impact on the company results. The comparable operating profit (including the CSA payment sand reversal of a CSA provision totaling €10 million) was €61 million in the first half of 2013 (correspondingly 52 million the first half in 2012). The comparable operating profit in 2012 was totally €68 million.

The average capacity payments for new capacity received by OAO Fortum have been almost €15.000 /MW/month during 2012 and 2013.[17] Thus, the CSA payments based on the Nyagam production unit (1250 MW) will be some €19 million /month (2012) and some €36 million /month (2013) for the whole investment program (2400 MW).

According to the CFO of Fortum Group Markus Rauramo, Fortum`s CSA-backed investment program is to be completed by the end of 2014, reaching about €500 million

operating profit (EBIT) in run-rate during 2015.[18] This point of view may include expectations of increasing electricity prices.

The power generation capacity of OAO Fortum in Russia was 3400 MW at the end of the year 2012 (in June 2013 it was 3825 MW).[19] Based on the investment program, the new capacity for electricity production will exceed 5100 MW in 2015.

OAO Fortum agreed with the Russian Government that the new capacity built after 2007 would receive guaranteed capacity payments and capacity support for 10 years. The agreed CSA structure basically guarantees a level of income for the new units. In case Fortum makes higher spread on electricity, CSA payments will be smaller, and vice versa. The CSA compensation levels are revised three years and six years after the commissioning of the units. So the CSA levels change. The CSA compensations are defined in order to ensure an adequate return on investment for Fortum.

A large part of the operating profit of OAO Fortum in 2013 is based on the CSA capacity payments made by the Russian government. This clearly has balanced the risks of the huge investment. The CSA payments for new capacity may vary slightly each year, because they are linked to Russia's long-term government bonds with a maturity of 8—10 years.

The expected return on net assets (RONA)

The return on net assets(RONA) of the Fortum Russian Division has been about 3 % in 2012 and 3.3 % during the last twelve months from 1.07.2012 to 30.06.2013. The net assets of Fortum Russian Division were some €3.8 billion at the end of 2012 as well as on 30.06.2013. After the investment program has been finished, the net assets of Fortum Russia Division will be some €4.3 billion. Based on Fortum estimates, the EBIT €500 million would mean that the average rate of return will roughly be 10—12 % $(500/4300 \cdot 100 = 11.6\,\%)$ annually in the future. The EBIT Q2/2012 was €77 million. The comparable EBITDA of the Fortum Russia division Q2/2013 has been some €200 million.

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[16] Satu Viljainen, Mari Makkonen, Olga Gore, Dmitry Kuleshov (2013, 1 and 2)

[17] Calculated from the FortumOyj Interim Report Q2/2013.

[18] CFO Markus Rauramo (19.07.2013).

[19] All numbers and pieces of information based on the FortumCorporations website and Interim Report Q2/2013.

Combining the risk variables of the investment

Fortum's extensive investment program in Russia is subject to possible penalties that can be claimed if the new capacity is substantially delayed or agreed. Major terms of the capacity supply agreement (CSA) are not otherwise fulfilled. The provision for possible current penalties amounts to €50 million. Paid penalties during Q1−Q2 2013 amounted totally to €16 million. Of course, there exist several risks which are classified and listed, for example, by Ke & Wang & Chan & Lam (2009).[20]

Here we will generalize the practical model presented by Savvakis (2012),[21] who followed Herzt (1979), introducing the linear relation analysis between correlated risk measures. As we have noted before, the risks in Fortum's huge investment are versatile.

We shallcollect all relevant risk measures to an aggregate risk measure. We shallassume that all of the involved separate risk measures[22] are uncorrelated. Also all the p_i's and C_i's ($i = 1, 2, ..., n$) are assumed to be uncorrelated. Then we can express the expected currency value of all relevant risks together, with the expectation of the aggregate measure $E(R)$ as follows:

$$E(R) = \sum E(p_i)\,E(C_i),$$

where $E(p_i)$ = the expected probability of risk occurrence ($0 < p < 1$) of the risk i ($i = 1, 2, ..., n$); $E(C_i)$ = the expected costs impact of the risk iin terms of currency ($i = 1, 2, ..., n$).

The formula presumably attempts to simply replicate the reality.

$E(R)$ reflects to the agreed capacity payments CSA to OAO Fortum. These are negotiated between the agreeing parties, based on mutual risk evaluations.

The Negation Curve can be mathematically formulated as follows:

$$\text{CSA} = f\{E(R)\} \text{ where } (\partial \text{CSA}/\partial R) > 0.$$

In case risks are zero, the offered CSA payments will be zero as well. On the other hand, we know that there is a maximum which the Russian Government can accept (≈€30000 /MW/m). OAO Fortum has agreed a level of some €15000 /MW/m). These points describe the Negotiation Curve detailed enough (see Fig. 6).
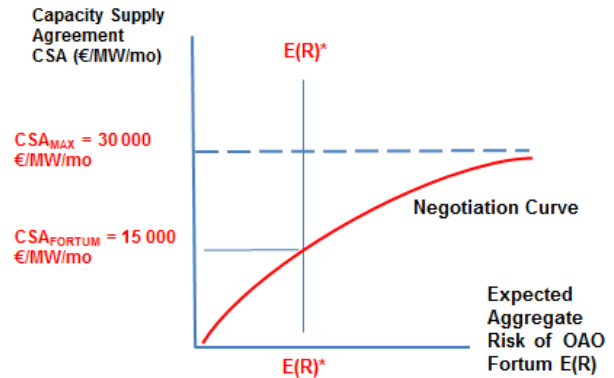
Fig. 6. The Negotiation Curve

Formulating this way, the level of CSA (€/KW/month) would be an output measure which can be a reflection of the expected aggregate risk in currency value, calculated from several original investment risk variables. The PPP negations can thus be based on choosing an acceptable level for CSA payments for both agreeing parties.

However, we need to take a note that in reality there still exist many risks which cannot be covered by the CSA arrangement. The range of investment risks is especially wide.[23]

The PPP arrangement of OAO Fortum (Russia)

When we insert the OAO Fortum case into the framework presented earlier, we have the situation described in Fig. 7.
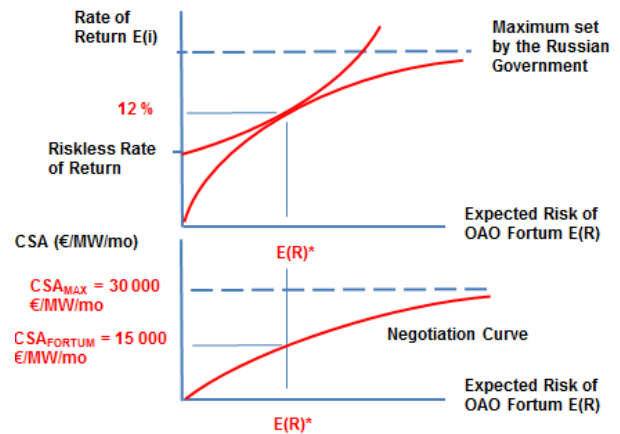
Fig. 7. Capacity Supply Agreement (CSA) based on expected risks of OAO Fortum

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[20] Ke & Wang & Chan & Lam (2010).
[21] Savvakis (2012, p. 9).
[22] See the analysis of Ke & Wang & Chan & Lam (2010).

[23] See, for example, the classification and analysis of Ke & Wang & Chan & Lam (2010).

The agreement line in Fig. 6 is assumed to be defined by the constant utility risk/return relation of the Russian Government.

The CSA arrangements have had an important role in balancing the risks of the OAO Fortum new investment. The rate of return of the new investment seems to be about 12 %, given the fact that CSA payments from the Russian government are on the level of 15000 €/MW/month.

In case OAO Fortum had been expecting a higher risk level, they would have asked for higher CSA payments. However, not more than $CSA_{MAX} \approx 30000$ €/MW/m would have been accepted to the agreement. In case the risk evaluation was be mutual, the Russian Government might have accepted also other alternatives based on the negotiation curve. In case of zero risks expected mutually, the PPP parties would not have CSA payments at all.

D i s c l a i m e r . The analysis in this case study has been done independently from Fortum. The content does not represent the opinion, forecasts or predictions of Fortum or its management. Any liability of Fortum as to the content, accuracy or completeness of the information is hereby excluded.

Conclusion. In this article we have analyzed Public-Private Partnership arrangements mainly based on the micro-economic theory. Based on the analysis, we can suggest that a detailed mutual planning stage (including mutual risks analysis and expectations of the benefits) should precede the project agreement.

Above we have introduced a science-based method to share the risks and profit level in a PPP project in practice by introducing the negotiation curve as a tool for defining acceptable levels in a project.

The PPP agreement itself should include the following items:
− making the PPP agreement to define partial occupancy and gradual transfer of ownership;
− allowing third partners to hire (or lease) the object for alternate uses;
− using a portfolio approach by joining several objects;
− designing the objects innovatively proper for many kinds of uses;
− assuring acceptable rate of return of the private investments by public subsidies;
− areal tool (or tools) for sharing the risks between the private and the public entity in the project.

When expectations of the project risks and project rewards are similar on both sides, it is possible to find a solution for the sharing of risk in a PPP project. In the equilibrium point, the ratio of marginal utilities of both of the agreeing partners equals.

There are also methods for reducing the risk by practical methods which we have shown above.

As larger construction projects in general, larger PPP plans can also be divided into many stages, where each stage separately can form an independent PPP project.

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UDC 330

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FORMATION OF THE INTELLECTUAL POTENTIAL ON THE BASIS OF THE NATIONAL INNOVATIVE ECONOMY STATE SUPPORT

К.С. Плис

ФОРМИРОВАНИЕ ИНТЕЛЛЕКТУАЛЬНОГО ПОТЕНЦИАЛА НА ОСНОВЕ ГОСУДАРСТВЕННОЙ ПОДДЕРЖКИ ИННОВАЦИОННОЙ ЭКОНОМИКИ СТРАНЫ

The article focuses on the formation of the intellectual potential in Russia. Analyzed is the state policy in the field of science, the key trends and prospects having been identified. Particular attention is paid to the development of universities as incubators of the national intellectual resource. Identified and described are the peculiarities of the knowledge-based economy.

INTELLECTUAL POTENTIAL; KNOWLEDGE ECONOMY; STATE SUPPORT; INNOVATION; UNIVERSITY; COMPETITIVENESS; BUSINESS-ENVIRONMENT; SCIENCE.

Статья посвящена вопросу формирования интеллектуального потенциала в России. Проведен анализ политики государства в области науки и выявлены основные тенденции и перспективы. Особое внимание уделено развитию вузов как инкубаторов интеллектуального капитала страны. Выделены и описаны характерные особенности экономики знаний.

ИНТЕЛЛЕКТУАЛЬНЫЙ ПОТЕНЦИАЛ; ЭКОНОМИКА ЗНАНИЙ; ГОСУДАРСТВЕННАЯ ПОДДЕРЖКА; ИННОВАЦИИ; ВУЗ; КОНКУРЕНТОСПОСОБНОСТЬ; БИЗНЕС СРЕДА; НАУКА.

At the end of XX century the mankind entered the phase of constructing the post-industrial society, in which the increasingly important role is played by the economy based on the priority of human capital due to the socio-economic revolution developing worldwide.

At the basis of each socio-economic revolution there are internal technological systems, scientific − technical conceptions and production relations.

For the post-industrial society of great importance, first of all, are information technologies and computerized systems, high production technologies, as a result of the new physical-technical and biological-chemical principles, as well as innovative technologies, innovation systems and the innovative arrangement of various areas of human activity based on them.

The final result, in our opinion, should be the creation of a new form of the economy organization − the knowledge-based economy based on the state support of the intellectual potential formation. Creating the knowledge-based economy is the strategic direction of development of Russia in the XXI century. *The key to economic growth in the modern world is knowledge*. It is the intellectual capital that ensures the economic and social welfare of the country.

The intellectual capital as a notion appeared not so long ago. In 1969, D.K. Galbraith defined the term «intellectual capital» as something wider than «pure mental capacity» of man, including certain intellectual activity. Since then, researchers have repeatedly revised and expanded the definition of the intellectual capital. For example, E. Brooking argues that «the intellectual capital is a term referring to intangible assets, without which the company cannot exist, *increasing competitive advantage*.

Components of the intellectually capital are human capital, structural capital and customer capital.

We should agree with the opinion of Professor E. R. Schislyaeva that one of the

factors increasing the efficiency of the HR management system is the optimal planning of human resources based on staffing needs, variable costs on personnel, their development, as well as assessment of the effectiveness of each individual employee performance [1, p. 109].

The latter stipulates the investment approach to the accumulation of the intellectual capital of the company, which is impossible without state-supported organizational system of innovations in the human capital. Thus, the question arises about the state support to ensure the formation of intellectual capital on the basis of the innovation-driven economy.

Innovations are seen as a new or significantly improved product (goods and services) or process, introduced into practice; a new sales method or a new organizational method in business practices, workplace organization or external relations [2, paragraph 12 p. 2].

The process of forming the intellectual capital of the organization as such is the organizational and managerial innovation that provides the timely technological transformationby the changes in the company management in order to improve the control system capacity for technological innovations.

At the same time organizational and managerial innovations are determined by the needs of innovation development in the industrial-technological sphere [3, p. 255].

Proceeding from the fact that the organizational and management innovations achieve their goals depending on the amount of the intellectual potential, which has been invested in the innovations initially [4, p. 267], while the innovations involve the continuous current of different solutions developed and upgraded in certain areas, it can be shown that the formation of the intellectual capital is provided by the flows of knowledge within the national innovation system, supported by the state.

The team of scientists from International Graduate School of Management supervised by Professor E.R. Schislyaeva have reviewed the concepts of national innovation system well-established in foreign literature [3, p. 257].

In general, obvious is the trend of the evolution in the concept of national innovation system from the «network of cooperating institutions in the public and private sectors»

(Freeman, 1987), to the concept of «interacting elements and relations within the nation state» (Lundvall), 1992), further on to the «interaction of the institutions» (Nelson, 1993) and after that to the «body of knowledge of national institutions» (Patel and Pavitt), which ultimately led to the realization the national innovation system as «a system of interconnected institutions, supposed to create, store and transfer knowledge» (Metcalfe, 1995).

Alongside with this[3, p. 256 − 257], it is shown that the approach to the national innovation system should not be limited to the inclusion innovative companies, research institutes and universities into the state system without separately allocated self-regulatory organizations (self-regulatory organizations), as carriers (proponents?) of innovation, as well as the main organizers of the interaction of the business communities and consumers in the long term results of basic research conducted in the academic environment.

Having analyzed the modern tendencies of economics development in the leading Western economies we can state that an innovation economy is the economy of a society based on knowledge, innovations, new machines and technologies, on the readiness to implement them into various fields of human activity.

It highlights the special role of knowledge and innovation, first of all, of scientific knowledge. In the innovative economy under the influence of scientific and technological knowledge, the traditional spheres of material production are transformed, modifying their scientific and technical facilities, due to the fact that the production which is not based on new knowledge and innovations becomes unsustainable in the innovation economy.

The knowledge based economy is primarily determined by the continuous growth of R & D in the overall costs incurred by public and private companies, together with a continuous growth of the academic research institutes plough-back.

The research results demonstrate the stable growth of the intellectual capital, which is not connected directly with material values and is determined primarily by the human and structural capital (registered patents on-hand, instructions and methods of work, the system of the company organization and so on).

The economic policy plays the major role in the development of the innovation process, while dissemination of knowledge and innovations require a strong research base, which would be able to generate new ideas and new forms of cooperation between the research and production sectors.

The formation of effective mechanisms of knowledge commercialization, which is understood as the process of transforming knowledge into a product, service or activity supposed to be profitable, makes it possible to rapidly solve such strategically important for the country tasks as maintaining the economic growth and competitiveness in world markets, the increase of employment, preserving the environment and improving the quality of health care.

Diagram 1 shows a significant dynamics of expences for research. This indicates that the direction of public policy in this area is correct.

Of paramount importance for the knowledge based economy are prediscovery and specific developments. Diagram 2 shows the decrease in the number of organizations engaged in research and development.

Diagram 1

Financing science from the federal budget [5]
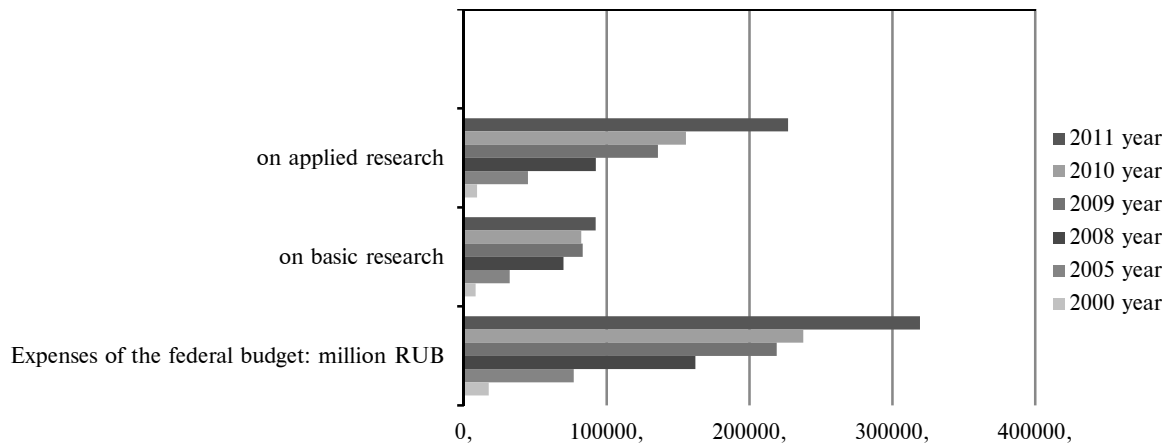
Diagram 2

Organizations performing scientific research and development [5]
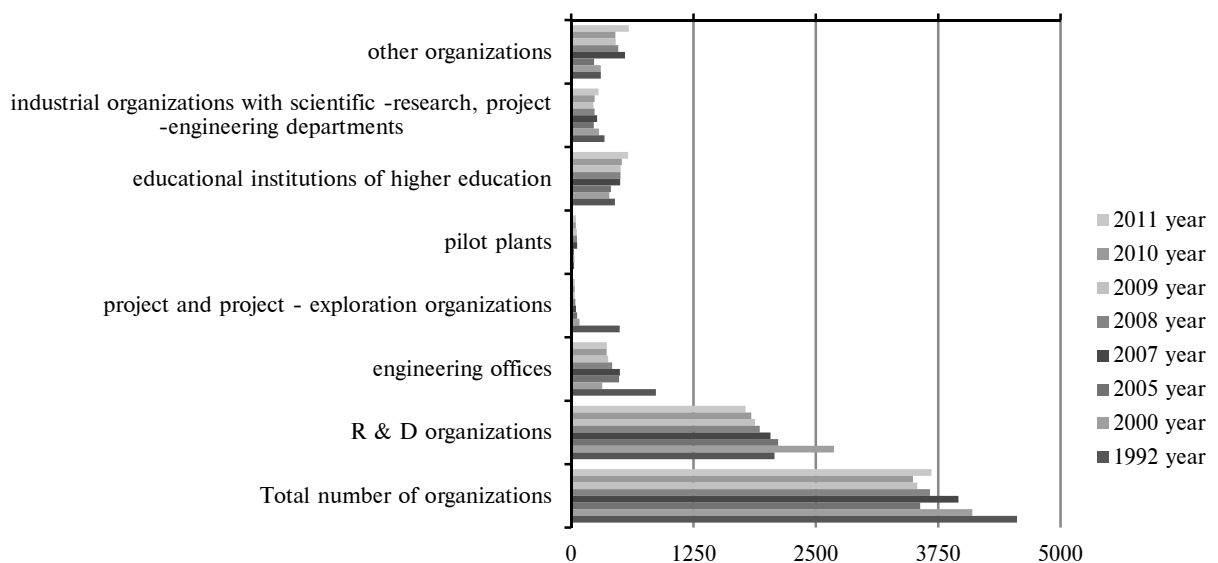
The number of personnel employed scientific research and development
(at the end of the year; thousand persons) [5]
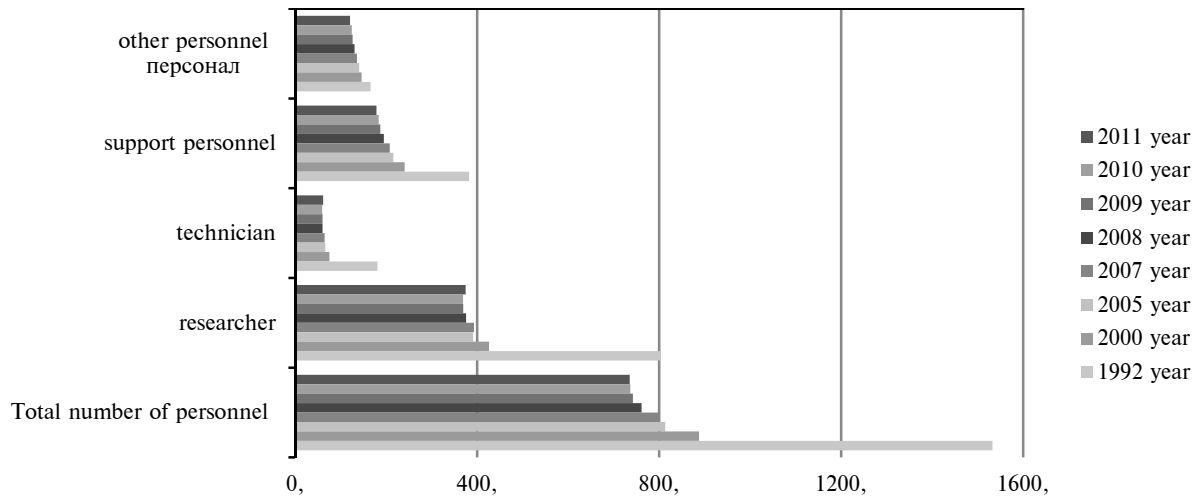
Diagram 3 shows the decrease in the number of personnel engaged in research and development. The decline of these indicators is unacceptable for a country committed to develop the knowledge based economy. Reducing the number of organizations provides more control over their activities, and therefore, over the allocated resources, at the same time it is a slight advantage in comparison with the emerging shortage.

Nowadays the innovative development becomes the most important element of social and economic development of countries and regions. At the microeconomic and macroeconomic levels, the innovations are becoming increasingly important for sustainable national economic development, because it allows enterprises to respond to the increasingly complex requirements of customers, ahead of the competition in the domestic and international markets, to raise their productiveness.

Innovation is the end result of R & D with the aim to obtain economic, social, environmental, scientific, technical or other effects.

In modern conditions it's necessary to transfer to the effective restructuring of the economy, formation of competitive innovation economy based on knowledge.

The end result of this transition should be the creation of a new form of economic organization − the innovation economy.

Innovation infrastructure is the main tool for building an innovative economy, it is able to raise the country's economy at a very high level. Based on this understanding, innovation infrastructure is presented as a set of interrelated, complementary production and technical systems, organizations, firms and related organizational and management systems necessary and sufficient for the effective implementation of innovation and implementation of innovations. [6. p. 112]

The steady economic growth is achieved through knowledge based innovations. (Fig. 1).

The state scientific-technical and innovation policy is aimed at development and effective use of the scientific-technical and innovative potential, as well as material and financial resources allocated for the creation of high technologies, promoting the development of innovative projects, high-tech, competitive products and the resulting expansion of the tax base for the benefit of the population.

However, the development of science, the use of its achievements cannot be ensured by the market mechanism. It is necessary to have the comprehensive state support for research, which is explained by the fact that purely commercial interests of individual private enterprises rarely match the national economic interests, together with that being conducted in more specialized areas. State measures in support of science incarnate the national policy in science and technology. It is a set of principles and practices aimed at the formation and development of scientific and technological potential of the

Increase the standard of living

Innovative breakthrough

State support

Accounting for changes in the market

Strategies

Organizational capabilities
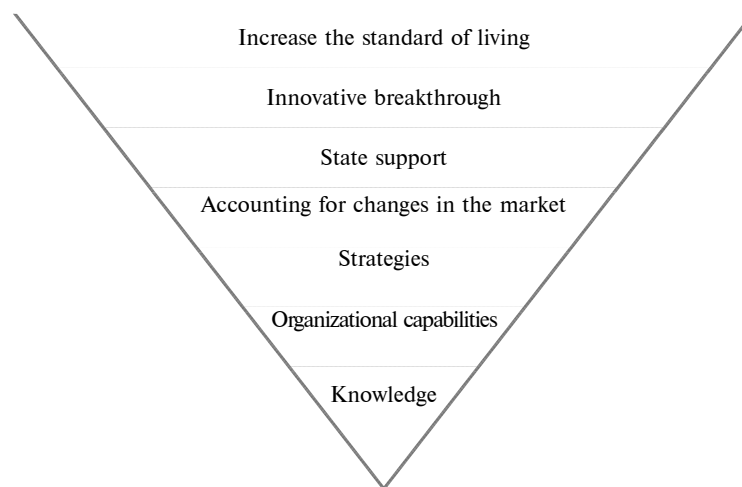
Knowledge

Fig. 1. Influence of knowledge on the growth of living standards.

country in order to achieve the strategic goals of the company. The objectives of the Science and Technology Policy are: government support of the national science; encouraged development of its priority areas being of national importance; providing conditions for the implementation and effective use of scientific advances in the field of production. The ultimate goal of science and technology policy is to ensure economic growth, the country's competitiveness in the world market, solution of social problems, economic security.

Unfortunately, the state policy in the field of science is not always appropriate. It is impossible to disagree with the R.S. Grinberg's opinion that supporting the desire to reform the State Academy of Sciences, Russia will soon be stripped of its own national fundamental science. The scientific and educational potential of the Russian Federation will be alloted the same fate as the USSR [7—9].

Education and science in the country are directly interlinked. But science is less inert than the educational system, and during the years of reform, it has undergone very significant changes.

For formation and advance of the national innovation economy it is necessary to develop the appropriate infrastructure: technology parks, innovation and technological centers, innovative-industrial complexes, science cities.

Today in Russia there are more than 80 industrial parks mainly at higher educational institutions, and this is not by accident.

Since the 1990s, innovative activities in Russia have been closely connected with the system of higher education and are implemented along two main directions:

− implementation of innovative programs;
− creation and development of different scientific-technical and innovative organizational structures (technoparks on the basis of leading national universities, innovative-technological centers, innovative-industrial complexes, certification and commercialization, innovative businesses).

Science is a special field of activities, whose very existence and development is included into the state needs. In the modern world science is the major strategic resource to develop knowledge based economy.

The main factor determining the effectiveness of science in the national innovation system is the effective cooperation between the academic community and business environment.

In 2005, the volume of innovative products was the largest in St. Petersburg (10410.7 mln.), Novgorod (9956.1 million) and Vologda (10106) areas. Considering the volume of the innovative products output in 2009, the top leader was St. Petersburg (49295.8 mln.), the rate of the index being reduced in other regions, with it being even lower than 900 million rubles in some of them [5].

It is not by accident that St. Petersburg occupies the leading position. In year 2013 the Ministry of Education and Science of the Russian Federation held a competition for participation in implementation of the program to increase competitiveness of Russian Universities «5 in 100». Following the results of the competitive selection there were selected 15 best Universities of Russia.
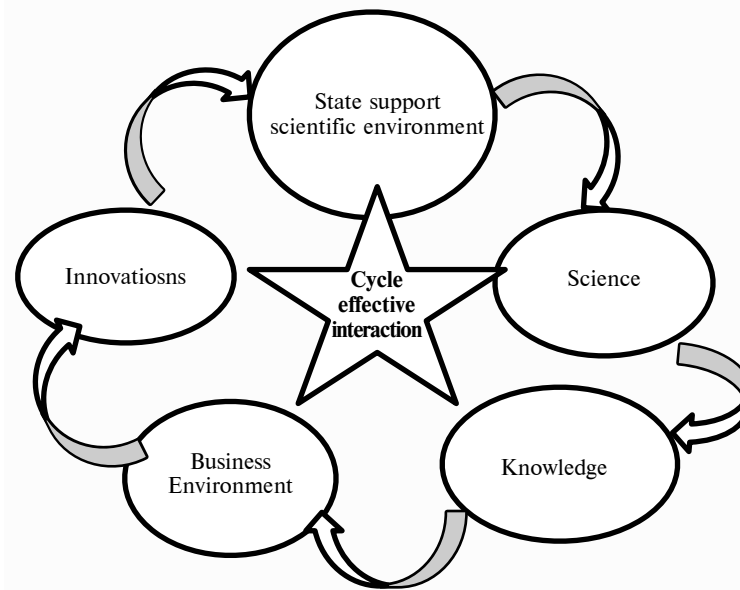
Fig. 2. Mechanisms for effective interaction between the state
and the business environment for the success of innovations

The list includes 3 Universities from St. Petersburg: Saint Petersburg Electrotechnical University «LETI», St. Petersburg national research state Polytechnical University, St. Petersburg state University of information technologies. The number of Russian universities, which will be provided support by the state to improve their competitiveness reduced to 14.

At the end of March at the conference «St. Petersburg for education and reform: education and cities of the world» the Deputy head of the Ministry of education of the Russian Federation Alexander Povalko informed the audience about it. From the list was excluded St. Petersburg state electrotechnical University (LETI) who failed to «defend» their road map (their competitability programs).[10]

The main aim of the program − by 2020 to make it secure that at least five Russian universities enter the list of the top hundred leading universities in he world according to the QS World University Rankings. The SPbSPU is actively implementing the program «5 in 100», the SPbSPU strategic goals being upgrading and development as a modern dynamically progressing university and a globally competitive research and educational center striving to integrate multidisciplinary research and world-

class technology and to be among the world's leaders in education [11].

Implementation of this program will be an effective starting point for increasing the competitiveness of higher education in Russia, the SPbSPU being an incubator of intellectual potential of the country.

All this must be considered in the search for the answers to the challenges that the modern epoch throws to Russia.

The support and encouragement of scientific, scientific − technical and innovative activities have recently become an important strategic goal of the Russian Federation. Effectiveness and feasibility of these actions are indisputable.

The necessity of state support can be considered as generally accepted, but it does not simplify the search for new methods, schemes and mechanisms adequate to the objectives of the state development, priorities of the science policy and the state of the economy in general.

Based on the analysis in the article, it can be seen that there can be traced some improvement in the government support. One of the innovative methods of state support of the intellectual capital development has been recently found and is currently being successfully implemented. The program of state support for increasing the competitiveness of universities «5-100-2020» is an

innovative way of development of science in Russia.

So what are the next steps of the government that will be focused on the efficient development of the Russian science?

Obviously, the basis of the Russia development should become creation of a new form of economy — the state supported knowledge based economy aimed at the formation of the intellectual potential.

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UDC 005.334:330.131.7

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THE DUAL NATURE
OF PROBLEMS CONCERNING ECONOMICS OF QUALITY

Д.С. Демиденко, Т.И. Леонова, М.С. Бабарин

ДВОЙСТВЕННЫЙ ХАРАКТЕР ПРОБЛЕМ ЭКОНОМИКИ КАЧЕСТВА

The article dwells upon two main approaches (directions) of optimization problems concerning economics of quality related, on the one hand, to maximizing quality under conditions of limited resources, on the other — minimizing quality costs by restricting the level of quality required. Mathematical interpretations of problems are presented, methods of linear and dynamic programming are considered.

ECONOMICS OF QUALITY; OPTIMIZATION PROBLEMS; MATHEMATICAL INTERPRETATION; OPTIMIZATION OF QUALITY; NATURAL SCARCITY.

Рассматриваются два основных подхода (направления) оптимизационных задач экономики качества, связанных, с одной стороны, с максимизацией качества в условиях ограниченных ресурсов, а с другой — с минимизацией затрат на качество при ограничении на уровень требуемого качества. Представлены математические интерпретации задач. Рассмотрены методы линейного и динамического программирования.

ЭКОНОМИКА КАЧЕСТВА; ОПТИМИЗАЦИОННЫЕ ЗАДАЧИ; МАТЕМАТИЧЕСКАЯ ИНТЕРПРЕТАЦИЯ; ОПТИМИЗАЦИЯ КАЧЕСТВА; ОГРАНИЧЕННОСТЬ РЕСУРСОВ.

One of the most important aspects of economics of quality is finding optimal economic decisions related to quality of various objects [1]. At the same time dual nature of problems concerning economics of quality appears, in quality sphere the necessity to determine the maximum level of quality may arise under conditions of constraints or, on the other hand — finding minimal costs related to reaching quality required.

Optimization problems of economics of quality contain, as a rule, parameters / indicators of quality of products or services as variables. At the same time, to public evaluation of the quality it is usually applied the criterion of «the positive trend» by the principle «the more quality — the better» that determines the necessity for commitment to improving indications of quality of products and services, and corresponds to the all-pervading principle of increasing social utility and quality of living.

Considerably more rarely it is applied the criterion of opposite tendency, namely, the tendency to decreasing, restricting growth or even minimizing quality, though this tendency in certain cases is well economically justified as, in a wide sense, quality limitation causes resource saving.

That kind of «duality» is inherent at the same time to many other fields of economic science, as well. Here an example of financial management of an enterprise / organization may be introduced.

In particular, it is a well-known «Markowitz problem» related to the management of portfolio investments performance. On the one hand, management may be directed to maximizing profitability of assets included in the investment portfolio, on the condition that the risk not to gain the required profit of supportable level will be retained. On the other hand, management may be aimed at minimizing portfolio risk, in particular the risk not to gain the required profit from assets included in the investment portfolio so that assets profitability level will be acceptable.

The dual nature of problems concerning economics of quality drives to differentiate two **principal directions** or two fields in economics of quality, such as:

− The 1-st direction − maximizing quality within limited resources;

− The 2-nd direction − cost minimization within limitation of quality level.
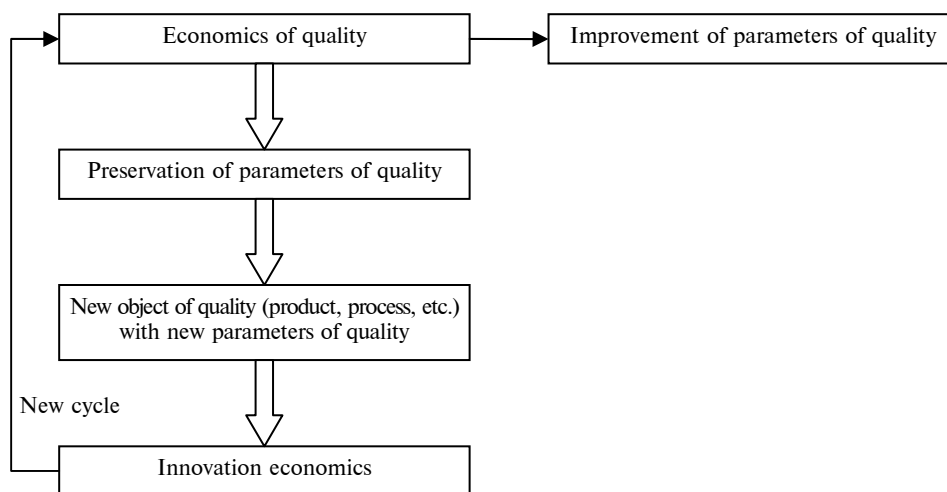
Fig. 1. Interrelation between «economics of quality» and «innovative economy»

Let us consider the content of those directions, that have different benchmarks, mechanisms of costing and results forming and mathematical interpretation.

The first direction of optimization problems of economics of quality reflects an increase (improvement) in parameters / indicators of quality of products / services corresponding to «the positive trend» of quality, according to the principle «the more quality — the better.» At the same time if there are cases when improvement of quality parameters is not necessarily connected to improvement of quality, then they are transformed to standard situation corresponding to «the positive trend».

Costs for achieving improved parameters of quality are mainly the costs of production or that production phase where improved quality is created / implemented. Those costs should not exceed fixed limits of costs. They include also reserves created for compensating the risk of «non-achievement of the required parameters of quality».

The limit of costs can be as well an object of the optimal allocation— one part of reserves can be oriented to compensate risks in the event of their implement, while the other one — to implement programs to reduce probability of «non-achievement of the required parameters of quality». The choice of optimal allocation of costs' limit, i. e. the correlation between directions of costs, can be specified as separate optimization problem of economics of quality being out of scope. The success of quality improvement programs which a propos generally represent engineering, technical,

organizational programs, rather than economic content, is achieved with certain probability.

Thus the «chain» of costs / losses is formed, and a series occurs converging to a certain final value of costs / losses. If the series does not converge, then the programs mentioned above ought to be excluded from the optimal plan of probability reduction programs of «non-achievement of the required parameters of quality», they have to be replaced with other programs from «the bank of programs», which forming is not an economic problem.

It is of importance to note that when optimizing programs, aimed at improving parameters / indicators of quality of products / services, it is appeared mutual supplement of «economy of quality» and «innovation economics», as it is shown in Fig. 1. We believe here is exactly the border of the interaction between two important aspects of enterprise management, that, as one may see from the analysis provided, is not neatly defined, and hence requires roll over studies which are beyond the scope of the present research.

Mathematical formulation of the conditions of quality optimization problem of the 1-st direction may be represented by the following formulas (1):

$$\sum_{i=1}^{n} Q_{ij}(P_{ij}) \to \max; \quad \sum_{j=1}^{m} P_{ij} \le L;$$

$$P_{ij} = \begin{bmatrix} P_1 \\ P_2 \\ P_3 \\ Pm \end{bmatrix},$$

$$(1)$$

where m − is the index of products (services) provided, their quality and prices; n − is the index of the number of consumption subjects; Q_{ij} − is the quality of products (services) in conventional units; P_{ij} − is the prices of products (services) in rubles.

Proving the statements above, let us consider quite clear and realistic example of optimization of services' provision program with regard to quality of a travel company. Assume, that a travel agency should provide the service of hotel accommodation for a group of tourists, consisting of two customers, i. e. to provide sleep. Herewith the agency should provide the highest possible quality of services for the group and take into account the limited current budget. The selling prices of the service with regard to their quality are given in Tab. 1.

Table 1

The total of prices and quality of service

Service no.	Price of service (monetary units) P_{ii}	Quality of service Q_{ii}
1	9	3*
2	5	2*
3	3	1*
4	1	−

The quality of service (Q) is determined by the category of hotel (number of stars *), the price of the service (P) depends on it. In this example existing limit of resources $L = 10$ m. e. is spread between two tourists ($n = 2$), the number of quality parameters and, correspondingly, the number of prices (j) is fixed and equal ($m = 4$).

This optimization problem is non-linear as it contains only discrete variables, so the methods used for solving a linear optimization problem can not be applied. Variables of the problem (P) can have only specific values indicated in the problem formulation. For solutions we propose to apply the method of dynamic programming (Bellman method [3]) though for large-scale problems, specific computational procedure should be developed. The quality of service rendered by travel company in this case is defined as «summed-up quality», as the sum of «stars», if we nominally take the star level as absolute utility of each hotel. Such approach is not always possible as it is more correct to assess the quality of services per tourist,

however in this case the number of tourists remains constant, so the customary indicator can be used as the target one. Although in general, quality indicators are not always additive (i. e. they can be figured up), and in those cases one has to search an independent decision.

The simplified approach to the solution, that is possible when the allocation of a limited resource is performed between two tourists, is given in Tab. 2.

Table 2

The options of a limited resource / budget allocation between two tourists

The 1-st tourist	The 2-nd tourist	The achieved summed-up quality of service («the sum of utility»)
9 m. e.	1 m. e.	3* + 0* = 3*
5 m. e.	5 m. e.	2* + 2* = 4*
3 m. e.	7 m. e.	1* + 2* = 3*
1 m. e.	9 m. e.	0 + 3* = 3*

From the Tab. 2 one can see that the optimal solution is allocating the limit of costs between tourists equally, so that the maximum quality value 4* is being achieved (an average of 2* per a tourist).

The problem is turned out to be more difficult when the same limit of resources is allocated between, for example, three tourists.

The problem can be solved by the traditional method of dynamic programming (Bellman method [2]).

The sample solutions are presented in calculation Tab. 3−5. The first step of the solution consists of allocating the limit between two tourists − the first and the second one. Each diagonal in the table corresponds to the remainder of the resource limit set for the given option of allocation. As it follows from the Tab. 3, in the case of two tourists the solution corresponds to the one presented above − the limit is spread equally between tourists (5 m. e. per each), at the same time the maximum quality value equaled to «4*» is achieved that corresponds to the previously obtained result. The Tab. 4 shows results of intermediate optimization while the Tab. 5 presents the final results of the solution for the problem of optimal allocation of resources' limit between three tourists.

T a b l e 3

The 1-st step of allocation between tourist 1 and 2

Tourist 2	Tourist 1											
	−	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	1	1	2	2	2	2	3	3	
1	0	0	0	1	1	2	2	2	2	3		
2	0	0	0	1	1	2	2	2	2			
3	1	1	1	2	2	3	3	3				
4	1	1	1	2	2	3	3					
5	2	2	2	3	3	4						
6	2	2	2	3	3							
7	2	2	2	3								
8	2	2	3									
9	3	3										
10	3											

T a b l e 4

The intermediate optimal results for tourists 1 and 2

L	10	9	8	7	6	5	4	3	2	1
Q	4	3	3	2	2	1	1	0	0	0

T a b l e 5

The final step of the algorithm

Tourist 3	Tourist 1 + 2										
	0	1	2	3	4	5	6	7	8	9	10
0	0	0	1	1	1	1	2	2	2	3	4
1	0			0	1	1	2	2	3		
2			0	0	2	1	2	2	3		
3		1	1	1	2	2	3	3			
4	1	1	1	1	2	2	3				
5	2	2	2	2	3	3					
6	2	2	2	2	3						
7	2	2	2	2							
8	2	2	2								
9	3	3									
10	3										

The solution result is found by the rule determined above − in reverse order towards the course of the solution process. For example according to the Tab. 5, when allocating all limit of resources, the maximum gained value of quality is 3* (the maximum value on the longest diagonal of the table). There are few of those values, so any of them can be chosen. Let us choose the value that corresponds to allocation of 2 resource units to tourist 3 and 8 resource units to tourists 1 + 2, those are distributed among the tourists 1 and 2 in a ratio of 5 resource units to tourist 1 and 3 resource units to tourist 2- that is exactly the optimum allocation providing the maximum indication of quality − 3*.

The second direction of optimization problems concerning economics of quality operates the criterion of minimum costs for increase (improvement) of quality (within the limits of costs) while observing minimum requirements for quality.

In that case, the optimal plan for improving quality will be that of minimum cost for its implementation while observing the required guarantees of quality. This approach can be applied both for products and services.

Mathematical interpretation of the problems of economics of quality related to the second direction may be represented by the expression (2), wherein the choice of product (service) is made in a general way.

$$Price / quality \text{ (the quality parameters} \\ \text{of the product)} \rightarrow minimum \quad (2) \\ \text{under the constraint:} \\ \text{the quality parameter of the product} \geq \\ \geq \text{the permissible value of the parameter} \\ \text{for all quality parameters.}$$

Under real conditions, the formulation and solution of the problems above is necessary, for example, when the state order is performed according to which the services are performed for the state. In terms of studying economics of quality, those services can be characterized by parameters (indicators) of price and quality. In that case, there is also objective conformity that the price (as of others) of services is a function of the parameters of its quality by the principle «the better quality of the service is − the more expensive the service is». With forming the plan / portfolio of services within the state order, the requirement to minimize the cost / price of

services while observing the required guarantees of their quality is well economically justified.

In analytical way the expression (2) can be simplified and represented as the formulas (3):

$$Z(X_1...X_n) \rightarrow \min$$
$$X_i \geq \bar{X}_i, \ i = 1...n \tag{3}$$

or in the matrix way (4):

$$Z \cdot X \rightarrow \min;$$
$$X \geq \bar{X}, \tag{4}$$

where $Z(X_1...X_n)$ is function of the cost (price) of the product (service) depending on parameters of its quality; $X_1...X_n$ − quality parameters of the product (service).

The economic substantial formulation of the problem of product quality optimization is as follows: «it is necessary to determine at what minimum cost (price) of the service the required level of parameters that define its quality is achieved». Thus, the criterion for selection of the product (service) from a number of possible alternatives is the minimum of price while observing the quality parameters required.

The optimization task (3), (4) can be considered as the linear one, if we assume that the function of the product (service) cost is of linear nature. In that case, the analytical form of the minimization problem can be represented as follows (5):

$$Z(X_1...X_n) = \sum_{i=1}^{n} Z_i X_i \rightarrow \min;$$
$$X_i \geq \bar{X}_i, \ i = 1...n. \tag{5}$$

In the formulation above we have to deal with the linear optimization task, its solution can be practically obtained by any of the accepted analytical or approximation methods.

The linear formulation (5) also provides the opportunity for analytical conclusions by means of constructing the inverse (dual) problems [4]. For the considered direct problem of the optimal plan by the level of quality, the problem of determining the optimal quality of the product parameters will be dual in regard to the direct problem. The economic meaning of the dual

variable (y) can be characterized as «the price of quality unit» for each quality indicator. The dual problem of optimization implies maximizing the volume of prices related to the quality provided products (services) in totality under condition that the price of obtaining the unit of quality parameter will not exceed the cost of the unit of the quality parameter (indicated as z) − making sense limit of resources.

The analytical form of the dual problem is as follows (6):

$$\sum_{i=1}^{n} y_i \bar{X}_i \rightarrow \max;$$
$$y_i \leq z_i, \ i = 1...n. \tag{6}$$

When analyzing the formulation (6) and (1) one may come to the conclusion that problems of economics of quality by two directions are basically interrelated and provide the volume of the optimal level of quality within limited resources.

Main conclusions of the present paper developing theoretical foundation for economics of quality are as follows:

1. In economics of quality when making optimization one may distinguish between two types of optimization problems: either to maximize the value (utility) from the quality under the conditions of constrained resources or minimize costs with limitations for the required level of quality;

2. The problems of economics of quality by two directions are interrelated and provide the solution for finding the optimal level of quality, however for practical purposes one has to apply various formulations of direct problems in each specific case;

3. Generally, the formulation of problems of economic optimization of the quality of products / services in a linear way is based on assumptions being far from reality due to the fact that virtually problems by their economic meaning are integral-valued, so it is more preferable to apply methods of dynamic programming.

The practical implementation of the approaches mentioned is possible when finding the optimal plan for the production of products or provision of services of varying quality.

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UDC 331

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RELOCATION AS A MODERN MANAGEMENT TREND ON LABOR MOBILITY

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РЕЛОКАЦИЯ КАК СОВРЕМЕННАЯ ТЕНДЕНЦИЯ УПРАВЛЕНИЯ МОБИЛЬНОСТЬЮ ТРУДОВЫХ РЕСУРСОВ

Migration processes are the basic element of the human resource internationalization. In particular, it is an instrument to develop relocation processes. In modern conditions relocation is one of the most effective solutions to the problem of qualified staff shortage, which is common for Russia, especially for certain regions.

STAFF; ORGANIZATION; PROFESSIONALS; RELOCATION; ELEMENTS OF THE RELOCATION SYSTEM.

Интернационализация человеческих ресурсов способствует повышению трудовой мобильности персонала, в частности развитию процессов релокации. В современных условиях релокация является одним из наиболее эффективных решений проблемы нехватки квалифицированных кадров, которая характерна для России.

ПЕРСОНАЛ; ОРГАНИЗАЦИЯ; СПЕЦИАЛИСТЫ; РЕЛОКАЦИЯ; ЭЛЕМЕНТЫ РЕЛАКАЦИОННОГО ПАКЕТА.

In modern conditions the problems of labor mobility, in particular the formation and development of personnel relocation systems are paramount. Firstly, this is related to the state policy in the field of labor mobility. Today the Government of the Russian Federation approved a plan to increase labor mobility.

Secondly, the urgency to improve the management of labor mobility is caused by staff shortages at enterprises of various industries in the regional labor markets.

Thus, the development of the theory and practice of labor economics involves the study and development of concepts that reflect the main aspects of the labor market, such as labor mobility and personnel relocation.

Today there is no commonly accepted definition of the term «relocation». In general, personnel relocation means transferring, move of a person to other locality, changing the habitation, conditioned by a more advantageous job offer in another city or country. From the enterprise's or recruitment agency's point of view, relocation is moving specialists from one city to another, or from one country to another with adaptation in the place of arrival and with additional services [1].

Under the relocation of staff, we understand the process of the labor territorial movement within and outside the organization associated with the change of the employment place.

The introduction of the «personnel relocation» concept along with other concepts that reflect the process of labor mobility, allows for more efficiently and in detail interests and needs of individual enterprises in relation to labor mobility.

First of all, relocation is considered to be the mobility of highly trained professionals; therefore it is usually random. In modern terms relocation is one of the most effective solutions to the problem of qualified personnel shortage, which is common for Russia, especially for certain regions. Relocation of specialists allows solving many problems of recruitment and personnel deficiency, but it is also a rather difficult and expensive process for an enterprise.

Relocation can be both internal (at the domestic level) and external (international), there is also intra-group relocation.

Internal relocation considers migration of specialists from one region of the country to another one. It takes place from unbalance in human resources endowment in different regions of the country. Usually the concentration of highly skilled specialists is typical for metropolises, less often for regional centers. Often there is no possibility to attract a specialist

in an outer region. Relocation in this case is staff scarcity solution.

Researchers assert that the basic complication in developing relocation is a sufficiently low level of mobility among Russian people, who tend to question their decision and suffer a rather long adaptation process in another city.

In 2013 the Recadro company conducted survey on the subject «Relocation: are you ready for moving?». About 2000 respondents, who were in a job search took part in this poll. According to the research, only 35 % of the respondents were ready to move, 65 % weren't ready to change the place of residence for the sake of an interesting and highly-paid job. As the poll showed, the age of people who are ready for relocation is in the range from 31 to 35 and from 36 to 40 years. So this fact breaks the stereotype that job seekers aged till 25 years are more mobile. The research showed that young specialists targeted at a job in the city of residence and do not plan ti move to another city. This tendency is also common for specialists at the age of over 45. As for gender, men are more mobile, than women. About 65.9 % of men are ready to change the place of residence. As for the territory, residents of the North Caucasian, Far East and Siberian federal districts are the most inclined to migration in order to get a job. Residents of the Central, Northwest and the Southern federal districts are absolutely static [2].

The most mobile personnel were top managers, 74.7 % of whom could move to another city if a challenging job was offered. The second place, though greatly lagging (37.6 %), is occupied by engineers. 71.4 % of the white-collar staff aren't ready to relocate and 83.3 % of the blue-collar staff.

As for the geographical directions which are more popular for job seekers' moving in 2013, the situation is clear and natural: Moscow (25.2 % of respondents); St. Petersburg; Krasnodar. 5.9 % of job seekers in Russia do not mark out any promising directions for relocation. Thus a small percentage of respondents, only 4.8 % wish to leave the Russian Federation [2].

The international relocation considers migration of specialists with changing the country of residence. This type of relocation can be used in the case of absence of such specialists in a particular country or if the company is ambitious to invite highly qualified specialists. International relocation is a compicated and costly process. It is necessary to consider a set of economic, political, geographical, historical, socio-cultural, legal factors. Moreover, an important problem is administrative barriers generally connected with the migratory legislation of host countries. It is possible to regard all packages of measures which are accepted for the international appointment of a new employee as adaptation. All this falls within the competence of the employer, it is in his/her interests to relocate a specialist more comfortably and effectively so that the new employee could show high performance, facilitating migration and adaptation processes.

Intra-corporate relocation can be both internal, and international. In this case staff migration in the multi-national, global companies is considered. When opening a new office in a new city or the region, or branch opening in a new country in the course of the international expansion, the company is often interested in employing its own specialist for a new position. The company needs someone who is already familiar with the company's business processes. In this case the company proposes to relocate the acting employee. Intra-corporate relocation is used generally by major national or transnational companies, because they have numerous staff or specialists trained inside this very company

It is important to estimate accurately an relocation role in the formation of the modern economy. There have been created a lot of quickly developing new economies for the last 20 years, which generally resulted from democratization and liberalization of countries' political systems. First of all, they are the countries of BRICS − Brazil, Russia, India, China and the Republic of South Africa. In the situation when the economic growth is so fast that gross domestic product doubles, or sometimes even trebles every year. However, no legislative, social and cultural changes catch up with this growth. Therefore, for example, if a country, with most population working for the government, turns to a free market, this country will not have time to train highly qualified specialists. But such a country has an urgent necessity in highly qualified personnel, which ism related to primary capital accumulation. According to the economic history, such a country will be in great demand

for highly qualified specialists in 50-10 years. If during the primary capital accumulation stage high rates of the economic growth were caused by the market formation from scratch, when the market is formed, there comes time for business process optimization, for competent management and new technologies. There comes time of highly qualified specialists, but their quantity is not enough. From now on, this leads to the problem of relocation. This might be the relocation that provides the second growth stage of the national economy, a stage of the high-quality economic growth.

Western scientists regards the phenomenon and practice of relocation as most important and are actively studying this subject. In the modern HR management system relocation takes an important place. Relocation is a complex system with all the problems and difficulties, which take place in the course of migrating for an advantageous job. However, there are many pitfalls in relocation. Certainly, an employee will have problems, because migration is always stress,

We will consider the largest elements of the relocation system. i\

Housing aspect. Certainly, having replaced the country or the region of residence, first of all, an employee needs accomodation. Therefore, the company buys an apartment or a house, or leases (it is western practice). In Russia the employer sometimes compensates 70 % of the hire charge. In each case the rank of the specialist and his job title are very important. The offer of relocation, with all the benefits provided, will be constituted according to the interest of the company in the employee.

Transfer organization. The employee also needs transfer organization. In some countries where expats can be regarded as the income source, a new employee is quite often presented with an armored chauffeuredcar, in other countries an employee can do with a private car.

Family. It is necessary to mention the worker's family. Relocation is usually used for long-term hiring, therefore relocation often considers moving an employee together with all his family — wife and children. Their needs also should be satisfied; after all, the decision of the employee's family can be conclusive in the relocation issue. It is also necessary to find a job for a spouse. Also the family influences the choice of accomadation in the target country. When it comes to children, it is necessary to find suitable kindergarden, or school, and in those countries where there is shortage of specialists — there are also complexities with child care facilities.

Relations. Naturally, the company will not look for new friends for an employee at a new job, but it is also a very significant barrier in relocation. The employee experiences the fresh start when almost all communications, friendly, relationships break.

Socio-cultural aspect. Between cultures of different countries, there are significant differences, ranging from social practices to national traditions. It is worth remembering about the language barrier, it is necessary to take care of an interpeter or language courses. It is also important to take into account a cultural component in the life, related to leisure of the employee and his family.

Infrastructure. This refers only to the basic level. The employee and his family should have an access to stores and goods, which can provide the lifestyle, the employee and his family are used to.

Security. Different countries have different criminal situation, in some countries it is necessary for the company to secure the employee and his family, by providing an armored car, guard etc.— All this help the specialist to concentrate on his/her service duties.

Medicine. Nobody is insured against various problems with health. A job seeker certainly will be interested in available medical care in a new country, both for him and for his family.

Adaptation. Adaptation goes through each of the above described categories. An employee gets adapted to everything: country, people, customs, languages, colleagues, residence. Adaptation can take a lot of time and become painful, or imperceptible. The easier the adaptation is, the faster the employee will be able to get down to work, which the employer is interested most of all.

Despite a set of difficulties in the course of relocation, there is a number of aspects which are the main motives to it. Among them are high salary, generous perks, international experience, major assignments, serious career prospects. For young specialists it is a challenge for self-realisation, responsibility for a new project.

Relocation is often a new step in the career and a stress in a different environment. Moving for a job to another country is a not only spatial movement. In addition to tempting career prospects and monetary compensations, a new employee expects a set of household problems which have to be solved in advance. They concern the family life (housing, school for children, and work for the spouse), medical insurance, communication, interests, etc. Therefore, the international companies give a considerable support to their employees when moving. Even under such circumstances international transfers are often unsuccessful — from 25 % to 50 % depending on the country and preliminary training of the manager [3]. It leads to money loss and time consumption from the company and to failure in the international career of the specialist. If the purpose is to build business, career and to gain experience, household disorders cannot help the achievement. The long-term stress can be enough to spoil the work in a new environment. Therefore, it is necessary to think of moving to another country in advance, without haste, otherwise mistakes, miscalculations are inevitable.

The international history of relocation is longer than a decade. The modern HR management system considers relocation as a difficult process which should be planned accurately in advance, each detail should be studied. In such an resource-intensive and important action all mistakes and miscalculations must be minimized.

When the company, through a recruitment agency or headhuner, finds a needed specialist, the first stage of the relations begins. This stage begins with the meeting of the employee and the company at the interview. The second stage, preparation of the relocation offer and actually offer to the employee about relocation. In the relocation offer all details of the forthcoming job are usually specified. Precise terms of the hiring agreement, salary and perks, and the most important accommodation conditions in the new country are specified. Everything is stipulated: accommodation (real estate), social (availability of necessary organizations, such as school, kindergarden, polyclinic etc.), family (conditions of relocation for the wife and children, job for the wife, and educational institution for children), security (criminal situation in the region of relocation and measures undertaken), additional (measures for acceleration and facilitation of adaptation, for example, language or other course, availability of an interpreter and/or personal assistant) and others. The relocation offer is also accompanied by the country and region profile. Moreover, the employee can be offered a trial trip to the target job destination. A three day trip includes: the region of a new job, introduction to future colleagues, and creating the first impressions of the country in order to understand a rhythm of life. This practice is becoming more and more popular. It is possible to call this practice «trial trip». No doubt, the trial trip is fully paid by the employer.

Not every, even the major, company will be able to organize the transfer of the new employee and his family. Those firms, whose HR departments are insufficiently competent in relocation, can use services of specialized companies. The free market has precisely felt the world relocation tendenc. The market response includes opening of a number of companies offering the relocation services for employees.

Relocation services include a number of internal business processes on moving workers, their families or even the whole departments to a new place. Other questions, connected with employees, are under authority of HR specialists, working on the outsourcing terms.

Such services can include provision of housing services, in cases when the worker moves within the confines of the country or the state, and also services of the international resettlement which include planning of all processes connected with future work abroad. The agency offers relocation services, completely manages resettlement process, including preparation of all necessary documents (the visa, long-term residence permits), search of new housing, school for children, works for the spouse. Also the agency provides a language teacher to the family who will tell new emigrants about the culture of the host country. Services of such companies are rather costly for the employer.

It is easy to calculate visible expenses of resettlement. Real costs represent the amount of all direct and indirect expenses connected with moving, but many financial corporate systems

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are not intended to track relocation monetary consequences.

Short term relocation, as a rule, requires lower costs, but an amount of expenses remain invariable, regardless of relocation period. They are generally costs of the initial and final relocation stages: benefit for moving; cultural trainings; language lessons; family support; housing search; transfer to the place of destination.

Thus it is worth understanding that long-lasting involvement of the specialist can reimburse the stated above expenses, hereby increasing variable expenses:
- benefits for buying goods and services;
- service of housing;
- overheads payment;
- additional education;
- trips to the native country;
- taxes.

Conclusions:

Due to developing the processes of labor mobility in Russia and in the world, the relocation processes have great importance in the human resource management system of the modern enterprise. The definition «personnel relocation» proposed by the authors, allows us to consider the processes of HR movement and their effectiveness, both in terms of personnel management policies, and public policy management labor mobility.

Relocation represents a consequence of the modern economy development and part of a modern human resources management system. At present we are in the humanistic HR management system where the dominant style of relations is «the company for the employee». Partly for this reason, every above-listed barrier and relocation difficulties are in the employer's liability sphere. The employer spends a number of resources for a long, difficult and expensive process of relocation and is authorized to expect efficiency and competitve return on the investments.

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SOCIAL PARTNERSHIP IN EDUCATION

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СОЦИАЛЬНОЕ ПАРТНЕРСТВО В ОБРАЗОВАНИИ

The paper considers an interaction mechanism between labor and educational markets in the national economy. Weak points of this mechanism in Russia are revealed. It examines essential characteristics of social partnership and the need to use this institution to improve effective interaction of the two markets. Relevant conditions to establish social partnership are looked into. The paper describes macro and micro level factors that restrain interaction among educational institutions, businesses and state in socially important markets. Actions to forge effective social partnership are proposed.

INNOVATIVE ECONOMY; EDUCATIONAL MARKET; LABOUR MARKET; SOCIAL PARTNERSHIP; HUMAN CAPITAL.

Рассматривается механизм взаимодействия рынка труда и рынка образовательных услуг в национальной экономике, выявляются точки разрыва в данном механизме в России. Раскрываются сущностные характеристики социального партнерства и обосновывается необходимость использования данного института для налаживания эффективного взаимодействия двух рынков. Определяются необходимые условия для становления социального партнерства. Приводятся факторы макро- и микроуровня, сдерживающие взаимодействие образовательных учреждений, бизнеса и государства на социально значимых рынках. Предлагаются меры по налаживанию эффективного социального партнерства.

ИННОВАЦИОННАЯ ЭКОНОМИКА; РЫНОК ОБРАЗОВАТЕЛЬНЫХ УСЛУГ; РЫНОК ТРУДА; СОЦИАЛЬНОЕ ПАРТНЕРСТВО; ЧЕЛОВЕЧЕСКИЙ КАПИТАЛ.

An innovative character of economic development is based on information and intellectual resources of the society and implies a large differentiation of economic subjects and their interrelations. It entails a growing role and growing requirements for human capital. This is exactly why the most important challenge today is to increase adaptation abilities of human capital.

Effective interaction of the two kinds of market can be provided only on condition that there is a flexible and effective mechanism to accommodate direct and inverse links. Its basic element is mainly economic subjects through which the relevant practical actions are taken to support the interaction mechanism. One of the promising forms to accommodate interests of economic subjects is social partnership. In this respect it looks absolutely timely to do any research of the role and forms of social partnership in terms of the two markets' interaction.

The research area becomes even more relevant due to the fact that subjects of the markets in Russia are just accumulating experience in accommodating common interests.

This paper is aimed at analyzing the role of social partnership in providing effective interaction of the labor market and educational market in the context of challenges and opportunities.

The following objectives have been set for the current research:
— to look into the problems of the labor market and educational market interaction;
— with the help of theoretical and methodological analysis of social partnership to mark out its essential characteristics as a specific type of social interaction;
— to define and justify conditions contributing to effective interaction of educational institutions, businesses and state in the field of the labor market and educational market interaction;
— to diagnose «sore spots» in establishing social partnership relations and examine the causes constraining new forms of social partnership;
— to propose actions to improve the social partnership mechanism.

The labor market, as a system of relations between employees, employers and the state, performs important functions in the national economy. It regulates labor demand and labor supply, stimulates professional, inter-industry, in-process and social mobility, and provides social protection of employment. In its turn, the educational market can be seen as a system of relations between households, employers who make a demand for educational services, educational institutions and the state. Its key role in the turnover of GGP is interaction between demand for educational services and their supply.

Both markets are independent economic systems. However, they are closely interrelated. Speaking about underlying reasons behind this connection, we have to mention the following. First, they function in a single market and are open systems. Their openness is apparent since they experience constant changes in the external environment. Among prerequisites of these changes there are economic ones: need for more active investment in human capital, demand for growing competitiveness at the micro and macro levels, volatility of the economy; social ones: need for fewer high social risks in the markets, provision of successful integration of a person into the society, and European labor and educational space; technological ones: constant and active changes in the structure of the national and world economy, fast-growing information flow, appearance of new forms of employment; institutional ones: need for diminishing high transactional costs of market subjects through creation and consolidation of institutions that help reduce uncertainty of the economic environment and decrease the degree of information asymmetry.

Second, both markets actively participate in the system of human resource reproduction. The educational market enables inclusion of a person into the professional education system, which forms the future structure of labor supply in the labor market. The labor market is a final step in involving population into the system of efficient employment.

Third, the degree of training of a specialist in the educational market is assessed by the environment of labor service consumption rather than by the educational environment itself. So, the labor market, eventually, determines major education quality standards in terms of change in demand for certain professions and refined competences that applicants for definite jobs should have. Consequently, the existing dynamics of the demand in the labor market represents a non-price factor of supply and demand in the educational service market.

Forth, in the labor market education can be seen as a signal about potential abilities of a candidate for a vacant job. The signal function of education was initially studied in the research of M. Spencer. In his opinion, the role of education is not so much as to develop abilities and skills of those who study, but rather help a person to signal about their abilities and capacities in the labor market [12]. The concept of education as a signal is based on two assumptions. Firstly, the labor market is characterized with information asymmetry. Thus, at the moment of hiring, abilities and skills of a potential worker are unknown to the employer. Moreover, acquiring and cross-checking additional information entails certain transaction costs for a business. Secondly, there is a direct dependence between ability to study and ability to work that the future employee demonstrates. Thus, the obtained education is a signal to the employer about the abilities of the future worker. Consequently, the employer can expect a bigger delivery from a worker with a higher level of education. The level and quality of education is confirmed with a corresponding educational document. So, the signal function of education contributes to a more efficient selection and distribution of labor resources through a lower degree of information asymmetry for the employer. However, significance of the signal function of education constantly changes in the labor market.

Thus, interaction between the labor market and educational service market is objective and represents a space where economic and social interests of all the subjects in both types of the market intermingle. The mechanism of interaction between the markets has a number of direct and inverse links.

When looking into theoretical fundamentals of the interaction between the markets, we have to agree with the authors who say that the interaction is asymmetric from the very beginning and shifted towards the labor market [6, 10, 16]. The labor market is an external

factor for the educational service market. It is the labor market that generated initial impulses to changes in the system of education, since changes that occur dynamically in the structure of production dramatically transform the structure of employment and diversify demands for the professional qualification level of the employed and their mobility.

Therefore, if there is no information about the labor market and its trends, the educational market is unable to define its strategic goals. To transfer external impulses into internal stimuli of its development, it has to know to what extent the personnel training in the current economy corresponds (by its qualities) to the present and future demands of the labor market.

If the labor market delivers initial impulses, then internal factors of the educational market development determine the response: relevant supply of educational services. Through its tools, it helps create a corresponding supply of educational services and satisfy the demand for certain quality of labor services that appears in the market. To adapt education for new labor market conditions some tools can be used, such as change of standards, better quality of education, a bigger variety of educational services, smaller time lag between appearance of the demand for certain specialists and the period, when this demand is met, etc.

Speed and correspondence of reaction depend mainly on such factors as efficiency of educational institutions, quality of the teaching staff, educational market transparency for potential investors, high level of integration between businesses and educational institutions, formation of a single educational space in the country (goals, objectives, standards, accreditation and licensing), etc. As a result, the educational service market plays an important role in accommodating interests of employees and employers and in providing correspondence of the employed population by its quantitative and qualitative parameters to the structure of the demand for labor services in the national economy.

When assessing the mechanism of interaction between the labor market and educational market, it is worth considering two important issues. The first issue is a regional aspect. The matter is that accommodation of qualitative parameters for the two types of market is impossible in principle as the labor market produces demand for specialists at the regional level in the first place. Economic subjects decide on investment in education considering not only demand for future jobs and competences in a definite regional market but also the demand in other regions' labor markets. Consequently, each educational institution has to understand what labor market it works for: either for this particular regional segment or other segments of national and international markets. The second aspect refers to the presence of time lags. Due to them, the two markets interact discretely. The longer is the period when educational services are provided, the bigger is the time lag within which the two markets adapt to each other and the higher is the probability of structural disproportions in the professional training of human resources. The need to shorten time lags causes the need for improved projections of the demand for the qualified labor force.

Thus, the labor market and the educational service market have to cooperate. The essence of economic activities of the latter one is to assist to all the subjects of the labor market in solving problems.

Labor and educational markets interaction is featured with breakdown of direct and inverse links. Broken coordination in the development of the markets is proved by the deficit in engineering staff in the key sectors of the Russian economy. In 2008, according to the data from human resources services, the deficit in engineers in Russia was 25 % from the existing demand [14]. The deficit has not diminished today. The economy needs twice as many engineers as there are in the labor market now and 4 times as many highly-qualified engineers [14].

At first sight, the lack of engineering staff is mainly caused by insufficient scope and quality of training. However, this hypothesis is partly worn down by the survey conducted jointly by the State University − Higher School of Economics and Rosstat. It shows that engineers account for 30 % of all workers with higher education. The total number of students that are trained in engineering is about 23 % of the total number of students [14]. That is why, without denying that there are problems in the field of professional training of engineering staff, let us look at the problem of deficit in engineers in terms of the labor market. The survey has

revealed that about 60 % of engineers do not work within their specialty and half of this number occupy the positions of workers that do not require higher education at all [15]. Therefore, deficit in engineers is explained to a large point by the factors of the labor market development, namely: low social status of engineering work, relatively low salaries and limited opportunities for professional and personal growth in the conditions of the raw material vector of the economic development; big proportions of «overtraining» that results in moving people with higher education into positions that do not require such a level of competence.

«Overtraining» means a higher level of education comparing to the level of demands made to the worker on the part of the functions he or she performs. Disproportion between the obtained diplomas and the occupied position means «overinvestment into human resources». For the economy this means worse labor production, for the worker it entails decreased income and growing dissatisfaction with labor. Today, in the Russian labor market, every fourth graduate does a job that does not require higher education. Most of the downshifting highly trained personnel drift to the pool of specialists with secondary level of qualification. To do these jobs one does not have to have education higher than the one provided by secondary technical school. Every tenth university graduate ends up here. Moreover 5.5 % of university graduates occupy front line positions in trade, 6.3 % operate as blue-collar workers [10, p. 21−22].

Appearance of many overtrained workers in the Russian economy is primarily caused by a gap between the two markets. On the one hand, there is still an extensive demand for higher educational services in the educational market. Herewith, it is hard to provide high level of training in the conditions of such a large scale. On the other hand, over the last decade new workplaces have appeared mainly in the field of trade and services which do not demand higher education from the employed. Workplaces in the production sector, in particular in the processing industry, are modernizing very slowly. Employers play a rather important role in the growing number of the «overtrained». Analysis of their requirements reveals that more than 70 % of managers are interested in hiring a worker with a higher level of education than the job requires [9, p. 25]. This interest can be explained by a bigger creative potential, better ability for innovations and performance of such workers.

According to the Russian monitoring of economic position and health of the population (RMEZ) in 2008, 36 % of respondents worked in exact correspondence with the specialty they had been trained for, 19 % − in approximate correspondence and 45 % people were employed for the jobs that had nothing to do with their education [6, p. 50]. Inconsistency between the qualification and actual employment means that the money invested in education is used inefficiently and the competences obtained in the educational market are not applied. Absence of demand in the labor market for the specialists trained in the educational service market is called «occupation-education mismatch».

We have to say that this mismatch is objective, due to constant structural changes in the economy, time lag in the educational field, etc. Nevertheless, its profoundness in the Russian economy starts causing serious concern. Even today, about every fourth Russian worker has never been employed by their specialty and every third one turned it down when building their career [6, p. 52]. This situation is the result of low quality of education, irrelevant training profiles, relatively low quality of workplaces, living standards, etc. All these causes, taken together, signal about serious unbalance between the two markets.

Decreased relative size of additional income for a higher level of education. The issue about how investment into education helps getting a higher salary is important for any economy. The way it is settled says for the mission and value of education in the society, significance of the human capital in contributing to the increased competitiveness of the national economy.

In the opinion of Professor R. Kapelyushnikov, in Russia the level of education is the most important determinant of the salaries that people earn. Thus, according to the data of 2008, workers with incomplete secondary education made much less money than those with complete secondary education, the gap was about 20 %. At the same time, university graduates earned about 40 % more than those who finished secondary school. This is not that much, if we take into account the fact that in the majority of the developed countries the

premium for higher education varies within the limits of 50 to 100 % [6, p. 65]. Moreover, analysis of the income change in time has shown, that over the last 15 years, the relative increment in earnings from secondary education has fallen a little whereas the increment in earnings from higher professional education has not changed a lot for women and gone down considerably for men. One more worrying symptom is a considerable decrease in premium for higher education for males [6, p. 66]. Thus, connection between the level education and the level of earnings seems to be quite inconsistent, which can entail rather far-reaching consequences: few stimuli to improve professional and qualification level and, as a consequence, appearance of a knowledge irrelevance syndrome.

Thus, all the aforementioned phenomena show that the cooperation between the two markets is rather weak. There are no clear signals from the labor market to the educational service market.

These problems give evidence that the labor market does not sent clear signals to the educational market. So, the educational market is used to doing without external impulses from the labor market. Demand for educational services is determined by quite different things. Actually, today the interconnection between the two types of market is defined by the major consumer of these services – individual consumers. As a result the educational system has to consider these requirements. Nowadays educational institutions prefer to use such strategies of economic behavior which mostly focus on the demand from individuals rather than demand on the part of the labor market.

So, most educational institutions have only limited information about what employers want, how important they find the quality of education, certain degree level, status of the educational institution, etc. In this relation educational institutions adapt slowly to the requirements of employers, they are inflexible to the changes in the labor market in terms of correspondence of the structure of volumes and profiles of professional training, levels of necessary competences. The situation is getting even worse due to the fact that the educational system is, in principle, a system «with delay».

Thus, internal factors of the educational market development generate unbalance between the structure of demand for personnel in the labor market and that of supply of competences in the educational market.

Considering all the above-mentioned, a reasonable question about efficiency of educational signals in the labor market may appear. In the conditions when educational institutions demonstrate low adaptability towards current demands of the labor market, value of education as an information signal is becoming insignificant. Apart from this, a weaker signal function of education in the labor market is also caused by devaluation of diplomas due to the large scale of higher education. Extension of access to higher education results in the situation when the degrees of a Bachelor or Master stop being a rare thing. So, one can agree with S. Roschin that today education in the labor market is rather a background than a signal system that reveals information about an applicant for a position [16].

As a rule, educational signal is taken by a Russian employer as a guarantee of development of personality and individual qualities at a certain level rather than professional competences. At the same time, the signal unit is most frequently the quality of a degree and the name of an educational unit, which comes out as a kind of brand in the labor market.

The existing breakdown of direct and inverse links, which is the consequence of inefficient performance of the two types of market, can inhibit creation of innovative Russian economy in future. That is why it is so important to coordinate all subjects in the educational and labor markets.

One of the most promising forms of collaborative activities of the state, business and educational institutions in the field of education is social partnership, which implies the practice of joint decision-making and balanced, shared responsibility.

The category of «social partnership» in scientific literature, legal documents, scientific and methodological papers has a variety of definitions, which is conditioned by different fields of science. With respect to interaction of the two types of market, social partnership can be seen as:
– an interaction mechanism of educational institutions with different structures, subjects for the purpose of self-development, self-organization;
– a form of interaction of educational institutions with external environment;

– a «transparent» translator of social services commissioning to the educational system.

Thus, essence of the notion that is being examined comes down to its representation as a specific activity, an interaction system, relationship between different subjects to obtain a common effect.

There have to be certain pre-requisites so that an institution of social partnership could appear. In the paper by I. Osadchaya, who was one of the first to touch on this theme, the following conditions are marked:
– democracy and civil society;
– an objective need for interaction;
– tested mechanisms and procedures of social dialogue;
– institutional representation of group interests, legal and political establishments of government in respect of regulating the interests of participants in such relationship [7, p. 148].

In our opinion, the most important conditions are the latter two. Let us look into them in more detail. All subjects of social partnership have their own interests, their own ideas about objectives and role of professional education in the modern society. So, getting involved in partnership relations, the state has to regulate the labor market and the educational market, but it also has to contribute to the interest of business in establishing long-term relationship with educational institutions. As for educational institutions, they need to learn how to estimate potential benefits of future partners and substantiate prospects of collaborative activities for them rather than just ask them for money. In other words, social partnership as a system of long-term relationship between the state, business and educational institutions for the purpose of increasing adaptation abilities of the educational system, getting flexibility and social security system in the labor market [7, 11] is only possible when:
– each interacting party is interested in collaborative activities and search for ways to ease social problems;
– there is mutually acceptable control and consideration of all participating partners' interests;
– responsibility is balanced and shared by partners.

Thus, the problem of benefit which each economic subject can obtain from social partnership is one of the major ones in this field.

The main momentum that drives collaboration is mutual interest of the state, professional education and business in training professionals whose knowledge, skills and professional competences comply with requirements of modern innovative economy.

Social partnership is good for professional educational institutions as it would help them consider demands of employers in a better way, react to changes in the labor market more promptly, increase quality of educational services and, eventually, it would let institutions perform their main function – provide high quality training of specialists that are in demand in the market. As a result, there is lower quantitative and qualitative unbalance in the labor market which is very good for business. Business will be able, on the basis of university education and at a charge, to have highly qualified staff trained to the level and by profile that correspond to its requirements, including prospective lines of business development. In addition, employers will have an opportunity to diminish transactional costs when searching for a suitable employee, expenses on their retraining as well as costs related with measuring the quality of education an employee has received.

A well developed system of social partnership contributes to better innovative activities of an educational institution. Partners can be seen both as co-authors of innovative development of educational institutions and as partners in implementing innovative processes, producing innovative products and promoting them in the market.

Moreover, the system of social partnership can be used for mutual services. Thanks to joint efforts in socially significant directions, business gets support and trust of the government, forms positive image of companies and create conditions to lobby its own interests. If an educational institution participates in social partnership it can result in a bigger value of its own brand.

Interaction of educational institutions and business has to be built as an inter-sector partnership. As for certain forms of interaction between educational institutions and business, there are quite many of them and they are well covered in scientific literature. Domestic experience in development and interactions of

business and educational institutions has been deeply analyzed in the paper by N. Kelchevskaya and M. Srogovich «Developing a Mechanism for Interaction of a University and an Enterprise is an Objective Need of the 21 Century» [5, p. 112]. The paper reveals more than 10 forms of practical interaction between interested parties. The authors emphasize that the same forms of interaction between higher school and business are applied both in Russia and abroad: internships of students at an enterprise, programs of joint training of specialists. Employers can also have an impact on reforming the educational system as a whole if they lobby their interests in governmental bodies, participate in developing professional standards, qualification requirements and educational programs. Even today, associations of employers (for example, Delovaya Rossiya) take an active part in elaborating rankings of higher and secondary educational institutions. Their assessments influence image, reputation and, consequently, competitiveness of educational institutions. In a number of regions economic clusters having educational institutions as their members start being created. Moreover, for the time being the state has the leading positions in this cooperation. The major fields of interaction between businesses and professional education are defined by governmental documents and documents issued by the Ministry of Education and Science of Russia and by regional programs of professional education development at the regional level.

Monitoring of employers that was done in 2013 by the National Research University «Higher School of Economics» showed that the basic forms of interaction were still, first, practical training and internship programs for students, second, open days and job fairs, and, third, joint training programs customized for companies. Thus, in comparison with the previous year the share of companies that organized practical training for university students grew from 24 % to 31 %. This number increased from 21 % to 30 % for those who trained college students and the number of companies who participated in practical training for vocational schools rose from 15 % to 23 % [8, p. 56]. Up to 30 % of companies took part in open days and job fairs that were organized by

universities, colleges or vocational schools. The number of companies that came into agreement for training specialists and workers in professional education institutions of different levels grew by 1.5−2 times [8, p. 57]. As for the new forms of cooperation, only less than 8 % of enterprises have had experience in joint projects with universities and colleges such as, for example, applied Bachelor's programs. So far not more than 10 % of employers have been involved in one more form of networking for companies and professional education institutions − development of professional standards. Less than 10 % of the organizations that took part in the survey have participated in managing educational institutions through representation in collegial boards [8, p. 51−52].

The following forms can be mentioned as an example of effective initiatives in business and professional education interaction:

− support given by business to continuous education programs, for example, Presidential Program of Training Managers for Enterprises of National Economy of Russia;

− participation of business in the guardianship boards of universities for the purpose of implementing its own requirements for contents of education and its results. Such an opportunity has been given to business with a recently passed law on autonomous institutions [4];

− creation of endowment funds in education in order to establish a new structure in universities that are able to integrate innovative projects of business and education interaction, strengthening material and scientific basis of universities, etc. [2−3]. There are already endowment funds in MGIMO-University, Financial University under the Government of the Russian Federation, Moscow Institute of Physics and Technology, Skolkovo School of Management, European University in St. Petersburg, Graduate School of Management, St. Petersburg University, Siberian Federal University, Southern Federal University;

− organization of network forms of interaction between universities and enterprises, including working out and implementing joint educational programs, based on new technologies of knowledge translation and development of practical skills. We have to say, that although there are not so many examples of such contacts, but still some of them are there. For example, the governmental

corporation «Rosatom» has been interacting with 15 universities headed by the National Research Nuclear University «MEPhI» to train specialists for atomic industry [17]. Recently the Ministry of Education and Science of Russia has signed an agreement with Roscosmos about setting up a consortium consisting of 38 universities and 16 biggest enterprises in space industry [17].

St. Petersburg has positive experience of social partnership, for example, in setting up technological parks. One of them operates on the basis of St. Petersburg State Polytechnical University (first stage). New technologies are applied there by medium-sized businesses. Thus, a certain industrial scientific environment is being created around the university.

Foreign companies, working in the Russian market demonstrate their understanding of the necessity for active participation of employers in the professional education system. Schneider Electric, a big international corporation and leader in its field, interacts with more than 30 universities all over Russia. They include Moscow Power Engineering Institute, Bauman Moscow State Technical University, St. Petersburg Polytechnical University, National Kazan State Power Engineering University, etc. There are quite a number of forms for cooperation. They include joint educational centers where modern technologies of electric power management are studied in terms of the company's equipment, Schneider Electric scholarships, international competitions «Go Green in the City», that help students get advanced experience in practical application of energy efficient solutions directly from the specialist of the leading world company in this industry, international internship programs, etc. [13].

Thus, in recent years interest of business to educational practice has grown, the same as an ambition to play a growing role in it. This trend corresponds to the general world practice. However, this interaction has not got a stable basis so far, it does not focus on the long-term prospective and is often based on personal contacts and connections [9]. According to the data of monitoring employers in 2013, employers choose practical training and internship programs for students as the most promising form of cooperation for their companies: for 46 % of the surveyed companies this type of cooperation is interesting.

Almost one fourth of managers find it helpful to have a chance and organize programs of applied training in their company jointly with an educational institution. However, the employers are still minimally interested in direct management and direct intrusion into the policies of educational institutions: only 6 % of managers would like their companies' representative to take part in the work of college boards of educational institutions. A rather limited number of employers are ready to participate in development of professional standards [8, p. 51−52]. Thus, it is obvious that in future businesses will keep interest towards less expensive and risky forms of interaction.

In this paper we are going to analyze and reveal the points where interests of business and educational institutions go apart at macro and micro levels.

The macro level has been chosen due to the fact that the labor market and educational market actively participate in GDP circulation. We are attributing causes of the macro level as follows:

− turbulence of the microeconomic environment. Many companies in these conditions have a narrow horizon of planning. So it is difficult to expect from an employer a request both for specializations and competences and relevant number of workers that will be in demand in five years;

− lack of regulatory and legal framework. In these days there is no law which would clearly regulate long-term relationship between educational institutions and employers. For instance, the legislation administering contract relations in the educational field is poorly developed;

− absence of tax concessions and other incentives at the federal and regional levels for businesses and enterprises that invest material and technical and financial resources in development of universities;

− slow process of establishing modern institutions of the labor market and educational market and low level of the state support in interaction of professional education and business, etc.

At the micro level, creation of an effective mechanism of social partnership is being slowed down by such factors as:

− detachment of university science from advanced practices and innovative technologies, including pedagogical ones;

− lack of trust between parties and tendency to shift responsibility for possible failures on the potential partner;

− excess regulation − insufficient flexibility, low adaptability of curriculums, unwillingness of many professional education institutions to mold new competences of their graduates that would help them adapt, be mobile and socially secure;

− differences in approaches towards management of production processes in the system of professional education and in business;

− heterogeneity of such a social group as employers. Small and mid-sized business is not ready yet to build up long-term relationship with educational institutions.

In order to get over the abovementioned problems it is possible to suggest a number of solutions that can be implemented within a relatively short period of time.

First, it is reasonable to set up a system of concessional taxation for companies that assist educational institutions. Goal-oriented state support of employers' initiatives aimed at building up mechanisms of social-state governance of the professional education system and assessment of its performance. Second, setting up an integral national system of competences and specializations, including professional standards, in line with current international trends as a substantive basis for interaction of professional education and business. Third, presence of microeconomic projections for the amount and structure of the labor market, employment by jobs and specializations with their further converting into employment projections by level of education and qualification. It is principally important that such projections should be well-founded, available for all interested parties and constantly up-to-date. Forth, provision of channeling for funding educational programs and extension of rights and responsibilities of educational process participants. Fifth, development of innovative and technological potential of educational institutions, including development of technological marketing, long-term forecasting of technology, elaboration of new approaches to assessment of universities depending on their role in the innovative and technological complex of the country.

Finally, an important role is allocated to further development of the legal framework for interaction of professional education and business, its concrete definition, creation of stable partnership procedures. For example, for further stimulation of legislation of regional three-party committees it would be reasonable to take the following steps:

speed up passing through the State Duma the Code of Labor of the Russian Federation, laws «On Social Partnership in the Russian Federation» and «On Associations of Employers» for further improvement of social and labor relations and social partnership.

define at the federal level the degree of responsibility of employers for non-compliance with the terms of agreement;

initiate, according to the procedures established by law, introduction of additions into the article «Terms of Reference of Local Government» of the Federal law «On General Principles of Local Government in the Russian Federation» of the following content: «local government bodies create conditions to develop social partnership and they are participants in the territorial agreements» [1].

Thus, when tackling the existing problem concerning the breakdown of direct and inverse links between the labor and educational markets it is essential that not only the state but also business should participate which can be achieved in terms of interaction based on social partnership.

The analysis done in the paper allows us to make four conclusions.

First, today there is breakdown of direct and reverse links between the labor market and educational market which is confirmed with low quality of educational services unbalance between supply and demand for competences in the labor market, decreased motivation to improve mobility and a weakening signal function of education in the labor market.

Second, even though there are problems of interaction, social dialogue of higher professional education and business is beneficial for both parties and contributes to development of human capital. Moreover, today's quality of interaction and partnership of business and educational institutions has become one of the conditions for successful promotion of a company, region and country to economic stability, social wealth, and mature civil society.

Third, to develop social partnership in the field of the labor and educational markets' interaction, it is important to pay special attention to maintaining permanent interest and motivation of social partnership participants by increasingly diversifying forms of interaction.

Forth, the degree of integration of social partners can be different. It is crucially important that this interaction is not a common one, but interaction of partners to get the effect for the sake of which they have joined together in partnership. Only in this case social partnership will stand, on the one hand, as a tool of control and, on the other hand, as a means of diagnostics and problem-solving for effective interaction of the two markets and, as a result, increased adaptive capabilities of human capital.

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THE CHARACTERISTIC OF FOREIGN TRADE POLICY TOOLS FOR SUBNATIONAL UNITS

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ХАРАКТЕРИСТИКА ЭКОНОМИЧЕСКИХ ИНСТРУМЕНТОВ ВНЕШНЕТОРГОВОЙ ПОЛИТИКИ, СУБНАЦИОНАЛЬНЫХ ОБРАЗОВАНИЙ

The article describes the directions of the external economic activity of the sub national governments in a number of states. Such an activity includes the development of the trade and investment policy as well as foreign economic relations. We discuss coordination of the trade policy between national and regional levels and its implementation by the territorial units. We also describe the way of regional government's participation in the foreign economic activity. We conclude that the regional government's international activity hardly undermine international obligations of the Russian Federation. Experience of other countries is useful for the regional governments of the Russian Federation.

FOREIGN ECONOMIC ACTIVITY; FOREIGN TRADE POLICY; EXTERNAL RELATIONS OF SUBNATIONAL LEVEL; INTERNATIONAL OBLIGATIONS; SUBJECTS OF THE RUSSIAN FEDERATION.

Описаны направления внешнеэкономической активности субнациональных правительств ряда государств, включая Россию. Это разработка торговой и инвестиционной политики и развитие внешнеэкономических связей, координация торговой политики между национальным и региональным уровнями, реализация торговой политики, как собственной, так и национальной, территориальными единицами, участие региональных правительств во внешнеэкономической деятельности. Рассмотрен опыт других стран, открывающий некоторые направления для развития внешнеэкономических связей российских регионов.

ВНЕШНЕЭКОНОМИЧЕСКАЯ ДЕЯТЕЛЬНОСТЬ; ВНЕШНЕТОРГОВАЯ ПОЛИТИКА; ВНЕШНИЕ СВЯЗИ СУБНАЦИОНАЛЬНОГО УРОВНЯ; МЕЖДУНАРОДНЫЕ ОБЯЗАТЕЛЬСТВА; СУБЪЕКТЫ РОССИЙСКОЙ ФЕДЕРАЦИИ.

The international economic activity of territorial parts in the federal states has a variety of forms. The task of the federal government is to conduct a uniform external policy. To date, publications analyze international economic relations of sub national units in the developed countries. Canada draws attention of many researchers. Publications on Russia concern the 1990's. At present time we need a new approach to the study of external relations in the Russian regions. This interest is justified by the necessity to incorporate the regional activity into the WTO rules and regulations and into the national system of export support. The external economic activity of regions was investigated in publications in connection with the border trade and the paradiplomacy. The term «foreign economic relations of regional governments» implies a specific approach equal to «external ties».

Nevertheless, all the sub national governments elaborate strategies of the foreign economic activity development and they develop support programs for local enterprises, which is a part of the national state's international policy. They promote foreign investments through tax remissions, hereby acting in the sphere of regional competence.

Authors, writing about the USA and Canada, point out at the problems connected with the independent position of Canadian provinces and the USA states in the international economy. International relations were transformed as a result of the globalization at the end of the XX century. It involved regions of the national states into the international relations, which showed that some «powers, legislatively affiliated to them, naturally overstep their territorial borders». [1] John Kline describes «new federalism» in the United States and notes that, «despite the

constitutional exception of the states from the sphere of foreign affairs, penetration of global economic interdependence exceeds legal borders of states». [2]

The aim of this article is to create a framework for a versatile approach to the regional government's actions in the international economic sphere and to apply this framework to the regional level of the Russian Federation. In a federal state, unlike unitary one, there is a government level represented by lands, cantons and subjects. This particular level is an object of research in this article. International economic policy elements, specific for this level, are the subject of the study.

Most publications on this subject relates to a certain range of developed states. Thus, it is possible to assume that the democratic culture and political traditions of these countries brought a phenomenon of the regional international activity to life. This article compares the Russian Federation with several developed states. According to the Constitution, Russia is a federal state and consists of 85 subjects. They are: republics, regions, areas, cities of federal significance, autonomous regions and autonomous areas.

The advantage given to the federal level by the constitution provides the unity and territorial integrity of the national state. [3] The federation type is one of the factors which define the authorities' distribution in the country. It can be as follows:

− multinational, owning the broad rights of self-government (Canada, Switzerland, India), or territorial (USA and Germany);

− descended from the associations of independent territories (the USA) or transformed into the federation from the unitary state (Switzerland, except for the Jura canton);

− symmetric, with the identical legal status of territories or asymmetric (the USA, Brazil, Argentina, Germany, Austria);

− multicultural (India and South Africa) or monocultural;

− real, having federal relations in the state (Germany, the USA), and «fictitious» (Brazil, Mexico, Venezuela);

− «strong» where the federal center has extensive authorities (the Russian Federation) and «weak» [4]. Researchers name Bosnia and Herzegovina «the weakest federal state in the world» [5].

As it seems, the international activity is rather inherent to sub national governments of multinational federations where territories such as Quebec in Canada have a right for self-government. The origin also matters. The subjects of the federation which arose from the unitary state can hardly transfer authority to the center; rather they can expect the center to delegate authority to them. In the asymmetric federation certain subjects possess a wider range of powers than other ones. Tatarstan as a republic has the largest list of authorities while the Khanty-Mansi Autonomous Area has a subordinated status as a part of the Tyumen region and it has less authority. Both of them are exclusively endowed with the natural resources. «Federalism is a matter of relations», − Y.P. Boyko [6].

Features of the economic interaction of the territory with the world are formed on the basis of characteristics which distinguish one region from another within the federation. Orientation on the international relations is obvious for the territories endowed with certain export resource. Both in Australia and Canada the regions endowed with resources, develop especially close international relations because operation with natural resources to a high extent depends on foreign investments and export markets. So, 40 years ago, Queensland and Western Australia, two peripheral Australia states, found out that their development was a concern of the international community: «The mineral boom tended to strengthen communications between remote states of Australia, on the one hand, and the foreign markets and financial centers of Japan, the USA and Europe, on the other hand, instead of strengthening relations between these states and the industrial Southeast of Australia» [7].

We determine the following aspects of the international economic activity of the sub national units:

1. Development of trade and investment policy and the development of foreign economic relations;

2. Trade policy coordination;

3. Trade policy implementation;

4. Participation in the international economic activity.

The development of trade and investment policy and the development of foreign economic relations. Countries form their international economic policy at the level of their customs unions or economic unions, and in the absence of economic integration − at the national level. Sub federal governments involvement in the trade policy was historically peculiar to Canadian provinces. Ties of Quebec were mostly political, educational and cultural in 1960's and 1970's. Other provinces of Canada always placed emphasis on the economy. In the 1980's all of them were concentrated mainly on economic problems. Provinces were interested in promoting trade and attracting investments. British Columbia had a broad incentive program. All the provinces created trade policy groups coordinating activity of various agencies and making recommendations to prime ministers who had extreme interest both in multilateral and bilateral (Canada − USA) trade issues.

In the 1970's Alberta acted as the leader having formulated suggestion to include all the provinces as partners in the federal trade negotiations with other countries. Up to the middle of 1980's the provinces' participation in GATT and negotiations on free trade between Canada and the USA reached an exceptional level [8].

Jennifer Keefe identified three mechanisms which help Canadian provinces participate in a trade policy process of the country: consultations, ratification and participation in delegations at the negotiations [9].

N. Skoutaris notes: «despite popular belief, national states don't possess monopoly of authorities at the area of foreign affairs» [10]. In his article he tries to understand how various European constitutional orders permit the creation of a «subnational constitutional space» which allows their constituent territories to be active in the international sphere. His work is focused on the constitutional orders of those EU countries where regional level possesses the right to participate in the formation of the international policy. These EU member states include federal Austria, Belgium and Germany, and also Italy, Spain and the United Kingdom. Though the Austrian lands have only very limited authorities to conclude the agreements, their ability to influence the formation of foreign policy is stronger. With regard to the EU problems, the

Austrian Constitution goes quite far and establishes requirements for the national government to inform regional and local authorities about these matters both directly and indirectly through the Bundesrat. While federal cultures of Austria and Germany are based on long-term cooperation of different levels of the government and guarantee constitutional obligations to inform and consult the regional level, the Belgian political system has led to the establishment of a really substantial procedure of coordination. Responsibility to enforce the federal legislation is distributed between the «center» and autonomous authorities in the systems where sub national units possess legislative authorities guaranteed by the constitutions. In this case it is hardly surprising that there are special mechanisms to ensure compliance of regions with the international obligations in the EU member states. It is essential for the EU, because a member state can become responsible for noncompliance with the EU directives even if the fault falls at the sub- state level. According to article 16 (4) of the Austrian Constitution, all the territories should take necessary measures for the international agreements implementation within the sphere of their competence. The territories have to make up losses for their illegal actions if the federation has to appear in the EU court.

The Federal law «On the basis of the national regulation of the foreign trade activity» [11] in the Russian Federation defines spheres where sub national governments is allowed to act. They are: negotiations with foreign counterparties, conclusion of the agreements and the formation of foreign trade activity programs. Programs of the international economic activity in some regions are components of social and economic development strategies. In some cases regional governments issue a program as a separate document if this activity prevails.

With regard to the investment policy, the legislation of the Russian Federation gives the territorial units a right to pass laws and regulations concerning the limits of the regional authority and the common authority of the federation and regions. Subjects of the Russian Federation can provide incentives, guarantees and finance for foreign investors at the expense of Russian Federation subjects budgets and extra budgetary funds. The tax legislation of the Russian Federation allows territorial subjects to

dispose a part of the profit tax they obtain on condition that the budget remains at least 13.5 of 18 % of the profit. The difference between these values can be provided in the form of tax remissions to the investor.

The regional legislation usually doesn't differentiate domestic and foreign investors. The Republic of Bashkortostan is among the exceptions [12]. The law lists foreign investment activity support measures such as guarantees, tax cuts, information support, infrastructural assistance and organizational and legal support.

Trade policy coordination. The international economic activity of the regions can support the whole state foreign policy if it is coordinated. According to the research, there were used about three dozens of formal mechanisms to coordinate provinces involvement in the international economic relations in Canada, and a number of special arrangements were reached in response to the specific problems of the provinces. As a result, several techniques were developed to represent the interests of the provinces. For example, the Embassy of Canada in Washington formulated a special position from which inquiries of the provinces could be considered. While efforts of provinces to receive independent representation in GATT were rejected, representatives of the provinces received the invitation to join the Canadian delegations in the ILO, UNESCO and to participate in the work of subcommittees of the joint commissions with the EU and Japan [2].

In the United States one program, often mentioned by researchers as the early attempt to stimulate the federal cooperation with the states in foreign policy, started in 1976 due to the efforts of Senator James Person who acted as the author of the legislation change. The idea was to delegate staff members of the International Department to other state and private institutes, including governments of the states and local governments on the temporary basis [2].

The Russian Federation has the same as the United States number of subjects of the federation which have their own responsibilities.

The problem of the policy coordination between the federal and subnational level is of current importance for both countries. According to the legislation of the Russian Federation [11], the federal executive authority is expected to coordinate draft plans and programs in the field of the foreign trade activity development which could infringe interests of sub national units on those aspects which are placed in their competence.

Executive authorities of the subject of the Russian Federation are obliged to inform the federal body on all the actions undertaken concerning their joint competence in the field of the foreign trade activity. The procedure of this coordination is established by the special law [13].

Trade policy Implementation. The researcher of the American federalism John Kline points out foreign trade policy implementation as a problem. In the USA the legislative priority of the national government was never questioned in this aspect but sub national states were capable of mobilizing internal political instruments in the legislative sphere to prevent execution actions in the international sphere by the national government [2].

The Russian Federation's law «On the basis of the national regulation of the foreign trade activity» defines several methods at the disposal of the federal authorities, which are tariff and non-tariff measures, bans and restrictions on trade in services and in the objects of the intellectual property rights and also economic and administrative measures directed to the international trade activity support. This regulation is carried out by the federal executive authorities.

In the sphere of the policy implementation, the law prescribes to territorial governments some support for the benefits of enterprises, namely: the maintenance of representatives of the territorial subject of the Russian Federation at trade missions of the country; establishing their own offices in other countries; implementation of the regional programs of the international trade activity; information support; development of insurance funds.

In 2003 OECD published a report about the local and regional governments participation in the trade policy in Russia [14]. According to this report, some regional governments actively promoted international trade and investments, while others established barriers for international and sometimes interregional trade and it was obvious during the crisis of 1998.

Those barriers to trade with other areas which were generated by the financial crisis did

not last long. Some protectionist initiatives never left a discussion stage.

At that time one of the main priorities of the government was not to undermine obligations which were already reached during the WTO negotiations because of the regional laws and methods. The research shows that the federal authorities took steps to bring regional laws in accordance with the Constitution of the Russian Federation and the federal laws, after consultations with the regional governments concerning obligations on the international trade. OECD review gives some examples of those inadmissible measures at the regional level.

The conclusion of the report shows that regional governments which pursue open market policy will less possibly interfere with the decisions of local export producers. Referring to the central government support of the trade policy compatible to multilateral disciplines, more liberal regional governments will probably strengthen the federal policy rather than undermine it.

Finally, authors of the 2003 review stated that Russia's accession to the World Trade Organization hit the headlines of all the mass media, and regional officials participate in numerous seminars on the WTO policy. The first thematic research conducted by OECD in 1998 showed that the WTO and its disciplines were actually unknown to the majority of regional administrations. The situation changed a few years later.

The experience of 1998 shows that protective tools are involved in a foreign trade policy during crises. During the crisis of 2008-2009, the regional authorities supported the local industry by tax cuts, subsidizing and lobbying cancellation of export duties. In March 2009 the government of the Russian Federation appealed to the regional administrations to submit their offers at the «round table» meeting concerning the development of Russian regions in the conditions of the world economic crisis consequences. Responses were presented by the 44 territorial subjects of the Russian Federation. They concerned the expansion of regional authorities; government procurements and state trading enterprises; protection of competition; subsidizing; budgetary relations; customs and tariff regulation; taxation; measures directed to a foreign trade efficiency increase; complex

measures of the certain industries protection; certification and marking; sanitary and phytosanitary measures; transport tariffs; restrictions for expats on the labor market. This list depicts a circle of problems which the federal government had to solve.

The year of 2013 was the period of the Russian regions' adaptation to the situation of the WTO membership. Regional governments had to develop adaptation plans. Owing to a large number of subjects it makes sense to structure them according to the typology of the social and economic development by the Ministry of Regional Development. The typology includes the world cities, the centers of federal significance as well as raw, old industrial, background, crisis and special regions.

Efforts to form financial export support institutes are made in Moscow, as it is the financial centre of the country. It is important both for Moscow — the leading region in the foreign trade of the Russian Federation in, — and for other regions where services of Vneshekonombank and the Agency of Export Insurance are offered. Plans of several regions adaptation to the WTO membership include the interaction with the specified financial structures of Moscow.

Saint Petersburg also has financial institutions specialized in crediting export-import transactions. The Eurasian Bank of Reconstruction and Development presented in Saint Petersburg target credit lines to the financial institutions which lend corporate clients — exporters and importers. Saint Petersburg and the Northwest federal district, as a whole, traditionally provide transport infrastructure and sea access to the foreign market for various regions of the country. Revival of the international trade in connection with its liberalization has to affect positively the business environment and a city economy.

Raw materials regions of the country see the opportunity to advance local brands and environmentally friendly products onto the foreign market after the WTO accession. Product competitiveness is planned to be raised due to the introduction of international quality standards.

Adaptation programs of the federal centres such as the Leningrad region, Sverdlovsk region and the Republic of Tatarstan contain more specifics regarding to protective measures, rather

than advance onto the markets with their own products. The special attention to the programs of most regions is paid to the «green» basket of agricultural subsidies. The state federal program of the agriculture development until 2020 provides the regions with an opportunity to accept their own programs and subprograms of the agricultural support in the forms of the «green» basket. The adaptation program of the Leningrad region involves all the subprograms offered by the federal program.

Thus the centers of the federal significance put forward many useful initiatives in the field of the foreign trade policy, necessary for other regions. Among those initiatives are monitoring import volumes of industrial goods and the dynamics of purchase prices dicrease of agricultural products. This will allow introducing all the necessary well-timed safeguard measures. Whith raw materials regions, which already have an access to foreign power markets, using the WTO membership for the active promotion of their new products, with the federal centers working out plans to protect domestic markets, it is crucial that old industrial regions realize the threat of mass downsizing in certain industries and they are concerned about the destiny of mono towns.

As for the background districts, in spite of the fact that it is the most numerous group of the Russian Federation subjects, they accepted only a few regional adaptation programs. Plans of the «background» subjects which are more or less successful, do not follow any certain policy. Foreign economic activity isn't of great importance for crisis regions and specialized regions.

The analysis of the adaptation plans showed that the raw materials regions having a wide experience in the foreign trade activity, see new opportunities while those subjects of the federation which still rely on the domestic market are hardly ready for changes, brought with trade liberalization.

Participation in the foreign economic activity. Creation and development of the state enterprises network was a key element in the economic policy of the Quebec government from 1960's. Despite limitated funds available, the government of Quebec carried out intervention in a large number of economic sectors

(electricity, finance, steel, mines, forest industry, and oil production). Corporate taxes were among political tools available to the province government. The «Societe de Developpement Industriel» as a state corporation of the province, had at its disposal the largest part of the budget of the Ministry of Trade and industry.The Department of Overseas Trade was established in 1983. The institutionalization of the foreign economic policy in Quebec occurred through creating state enterprises. Later the privatization program started. It gained its strength after the Liberal party victory in 1985. Nevertheless, the state enterprises didn't disappear. They were only reorganized. There was no resolute change in the policy. The state enterprises remained the primary tool of the Quebec economic policy. The «Caisse de depot et de placement du Quebec» started investing in the USA. «Sosiete Generale de Financement» had partners from other industrial countries which invested in the aluminum mine in Becancour. «Hydro-Quebec» sold the major part of electricity to the northeast United States. One can affirm that civil officers in Quebec created the effective state mechanism of the economic policy in the open economy [15].

Authors who studied Canadian state enterprises in 1986 noted that from the 1960's the provincial governments in Canada became producers of goods and services at the national and international markets. Provinces owned several hundred corporations, 15 of them were among the first 400 firms by sales. Another example given in the article of John Kline in 1986 is Lower Saxony which had 20 % of Volkswagen assets and had two representatives in the board of directors. It involved the government directly into the international trade and the company's investment decision making [2].

In the United States interests and roles of the states weren't so clear. The governments of the states in the USA traditionally were less involved in business operations, but administrations of quasi-public ports provided many states with the economically important trade centers [2].

The legislation of the Russian Federation doesn't treat the government of the regions as main participants in the international trade activity. Article 11 of the Federal law «On the basis of the national regulation of the foreign trade activity» allows territorial subjects of the

Russian Federation to carry out foreign trade activity only in cases stipulated by the federal laws. Among the federal laws, related to economic activity but not to foreign trade, are the laws «On the special economic zones in the Russian Federation» and «On the agreements of the product partition».

The regional governments are involved in organizing the special economic zones activity. The Government of the Russian Federation receives the claim for the establishment of a special economic zone from the supreme executive body of the Russian Federation subject.

The agreement has to be concluded between the governments of two levels. By this agreement the territorial subject of the Russian Federation is obliged to transfer the land and other real estate objects located within the borders of a special economic zone to the management body which is appointed by the national government for a certain period of zone functioning. Functions of the authorized body are carried out by the Ministry for Economic Development of the Russian Federation. Financing the infrastructure in the special economic zone is effected both at the expense of the federal budget and budgets of the subjects of the Russian Federation. These obligations can be fulfilled by contribution to the authorized capital of the company which manages a particular economic zone. Development of the unified state policy in the area of forming and functioning particular economic zones and their management are assigned to the Ministry for Economic Development of the Russian Federation. The Ministry can delegate several authorities to the executive authority of the subject of the Russian Federation or Management Company; all three of them constitute the unified centralized control system of the specific economic zones. The supervisory board has to be established to coordinate their activity. The members of the board are representatives of the Ministry for Economic Development, executive bodies of the government of the Russian Federation subjects, Management Company, residents of a particular economic zone and other organizations [16].

According to the «On the agreements of the product allocation « law, the Russian Federation and the foreign investor make an agreement. The investor is entitled to search, explore and obtain mineral raw materials on the sites specified in the agreement, The federal laws specify the list of sites and the right of their use.

The State Duma consider drafts of the specified federal laws. The legislative body of the Russian Federation subjects where the territories with the corresponding sites of subsoil are located has to approve it. Within its competence a subject of the Russian Federation regulates legislatively participation in the agreements on product allocation. Development of conditions to use the subsoil, preparation of draft agreements and negotiations with the investor are carried out by the commission with participation of the executive authority of an appropriate subject of the Russian Federation. Federal laws establish the distribution of the state output share between the Russian Federation and the subject of the Russian Federation in which the subsoil is located [17].

Conclusions. The article describes the directions of the external economic activity of the sub national governments of a number of the states including the Russian Federation. These directions include developing the trade and investment policy, and foreign economic relations; coordination of the trade policy between national and regional levels; implementation of the trade policy − both own and national − by territorial units; participation of regional governments in the foreign economic activity. Russia is the federation of a strong type which has traditions of the unitary state. Due to this matter, the problem of coordination at the external economic arena between the authorities of two levels is not an urgent one. Having a large number of subjects of the federation, it is necessary to have some unified framework set at the national level. Such a framework is presented in Russia by a variety of federal laws.

Regional programs of the foreign trade activity is the main tool which territorial subjects have in the field of trade policy. In the field of investment policy territorial subjects of the Russian Federation can pass regulating laws and provide tax remissions.

The external economic policy is coordinated by the initiative of both federal and regional authority depending on circumstances.

However, international agreements, made by the regions, has to be also coordinated. This provides uniformity of the national state foreign policy.

The mechanism of the country's international economic policy at the regional level was developed with the analytical support of the OECD. The national government pays special attention to measures taken by territorial subjects of the Russian Federation during the periods of crises and also during the adaptation of the country to the WTO membership conditions. The analysis of the adaptation programs confirmed the OECD opinion. They are sure that the territories which actively develop external economic relations recognize the advantages of trade liberalization.

The regional governments in the Russian Federation can't directly act as participants in the international economic activity if it isn't specified by laws. Laws determine such participation in the form of special economic zones management. These laws also allow them to obtain a part of the mineral resources within agreements on product allocation.

Thus, the present mechanisms created in the Russian Federation don't undermine the international obligations of the country. The experience of other countries reveals some directions for development of foreign economic relations in the Russian regions.

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UDC 330

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ECONOMIC POLICIES AND TAX REGULATIONS IN THE REGION: COURSE OF DEVELOPMENT AND THE TRANSITION TO A KNOWLEDGE ECONOMY

А.И. Котов

ЭКОНОМИЧЕСКАЯ ПОЛИТИКА И НАЛОГОВОЕ РЕГУЛИРОВАНИЕ В РЕГИОНЕ: КУРС НА РАЗВИТИЕ И ПЕРЕХОД К ЭКОНОМИКЕ ЗНАНИЙ

The ongoing now in Russia tax policy does not produce a sufficient effect as an incentive for the economic development of the companies and the country as a whole. Taking into account that the investment activities of business entities (entrepreneurial business) are carried out in the regions, the article discusses the issue of increasing the role of tax regulation as an incentive to encourage investments, choosing the tax system in St. Petersburg as an example.

ECONOMIC POLICIES; TAX REGULATIONS; REGION; DEVELOPMENT; KNOWLEDGE ECONOMY.

Проводимая в настоящее время в России налоговая политика не оказывает достаточного влияния на экономическое развитие субъектов хозяйствования (предпринимательства), осуществляемое в регионах. Рассматривается вопрос о повышении стимулирующей роли налогового регулирования для привлечения инвестиций на примере налоговой системы Санкт-Петербурга.

ЭКОНОМИЧЕСКАЯ ПОЛИТИКА; НАЛОГОВОЕ РЕГУЛИРОВАНИЕ; РЕГИОН; РАЗВИТИЕ; ЭКОНОМИКА ЗНАНИЙ.

1. Introduction

In the context of geopolitical and economic challenges having recently increased dramatically, particularly relevant is the need for the economic policy aimed at ensuring the sustainable growth of the national economy and the achievement of high rates of the socio-economic performance indicators. In this regard, the effective measures of the economic, institutional and administrative nature implemented by the state authorities of the Russian Federation to the benefit of the economic activity agents seem to be the only way to ensure sustainability of economic development and attainment of social objectives under the current circumstances.

In a series of measures that have a significant impact on the economic development, a special place belongs to the tax regulation as a form of the state regulation of economics through tax policy within the framework of the tax system formed in accordance with the law. In compliance with the procedure for establishing, administration and collection of taxes and fees, the tax regulation has a direct impact on both business entities (business) activities, as well as on the economics as a whole. In particular, the tax revenues provide considerable resources for the consolidated budget of St. Petersburg.

So, according to the 2011, 2012 and 2013 results, the share of the tax revenue in the budget of St. Petersburg was 71, 77 and 78 %, respectively. Since the effect of tax incentives can be both of the fiscal and stimulating nature, obvious is the need to select such instruments of

tax regulation, which, on the one hand, would optimally meet the needs of the economic development and business, and, on the other, would not get in conflict with the social needs and interests of society. Having a direct impact on the amount of budget revenues and the level of the tax burden on the economy, tax regulation is thus the most important regulator of social and economic development of the region and the country as a whole. Tab. 1 presents the data for the relation between the incomes of the budget (the extended one) of the Russian Federation and the gross domestic product for the period from 2009 to 2013.

Table 1

**Incomes of the budget of the RF
in 2009−2013 as % of GDP**

Years	2009	2010	2011	2012	2013
Incomes, total	35.04	34.62	37.48	37.91	36.11
Tax revenues and payments	30.88	31.12	34.54	34.99	33.31

These data show that the amount of the tax burden, which is characterized as a share of the GDP, varied over the past 5 years in the range of 30.88 % in the crisis year to 33.31 % in 2013, not falling below 30 %.

2. The tax system of St. Petersburg

As it follows from above, as soon as the tax regulation is aministered within the framework of the current tax system, let us consider the basic components (elements) of the tax system by the example of St. Petersburg. By the tax system of St. Petersburg we will imply a part of the Russian tax system that ensures the formation of the consolidated budget of St. Petersburg by tax revenues. Thus, the elements of the tax system of St. Petersburg are primarily regional and local taxes, namely: corporate property tax, tax on gambling, transport tax, land tax and individual property tax. These taxes, in accordance with the Tax Code of the Russian Federation, are regulated by regional laws of St. Petersburg.

In addition, federal taxes with special tax regimes, namely: the simplified taxation system, including that based on the patent, and the system of taxation in the form of a uniform tax

on imputed income for certain types of activities − are also elements of the tax system of St. Petersburg. The taxation system of St. Petersburg includes the corporate profits tax on the amounts payable to the budget of St. Petersburg. An important element of the tax system of St. Petersburg are also tax benefits installed in order to promote and support business entities (business) activities.

The use of tax incentives is regulated by the tax policies pursued by the executive authorities of St. Petersburg, which are most important part of the tax system in St. Petersburg. The tax system of St. Petersburg also includes an individual income tax and excise taxes referred to the federal laws and paid to the budget of St. Petersburg in total for the first tax payment and partially for to the second. The structure of the main elements of the tax system in St. Petersburg and a list of legislative acts regulating taxation in St. Petersburg are demonstrated in Tab. 2.

3. Tax policy as a tool of tax regulation

As noted above, taxation is regulated by means of the fiscal policy which is a coordinated effort of public authorities to ensure sustainable socio-economic development. At the same time, in St. Petersburg, there is currently no documented form of the taxation policy, tax regulation being carried out in accordance with the laws of the Russian Federation and St. Petersburg. So, according to the legislation of St. Petersburg for regional and local taxes there are determined such elements of taxation as: tax rates, procedure and terms of tax payments. For the simplified system of taxation different tax rates may be established by the legislation of St. Petersburg, ranging from 5 to 15 percent, depending on the categories of taxpayers.

The taxation system in the form of a uniform tax on imputed income for certain types of activities is put into effect by the laws of St. Petersburg in respect to certain activities stipulated by the Tax Code. St. Petersburg legislation also provides for the establishment of a reduced rate of corporate income tax (13.5 %), payable to the budget of St. Petersburg. Besides, the relevant municipal law regulates the relations concerning the deferred tax payments within the investment tax credit.

Table 2

The structure of the main elements of the taxation system of St. Petersburg

Names of the St. Petersburg taxation system elements	Regulatory document
1. Corporate Property Tax	Law of St. Petersburg of 26.11.2003 No. 684-96 «On the Value property of the organizations'
2. Individual property tax	Tax on personal property law of the Russian Federation from 09.12.1991 «On taxes on personal property» St. Petersburg Law of 11.11.2003 No. 625-93 «On some issues of taxation in St. Petersburg»
3. Land Tax	Law of St. Petersburg of 23.11.2012 No. 617-105 «On Land Tax in St. Petersburg»
4. Transport Tax	Law of St. Petersburg of 04.11.2002 No. 487-53 «On the transport tax»
5. Corporate profits tax	the Tax Code
6. Simplified Tax System	Law of St. Petersburg of 05.05.2009 No. 185-36 «On establishment of the territory of St. Petersburg tax rate for legal entities and individual entrepreneurs, applying the simplified taxation system»
7. Patent System	Law of St. Petersburg of 30.10.2013 No. 551-98 «On introduction of the territory of St. Petersburg of the patent system of taxation»
8. Uniform tax on imputed income	St. Petersburg Law of 17.06.2003 No. 299-35 «On introduction in St. Petersburg tax system in the form of a uniform tax on imputed income for certain types of activities»
9. Individual income tax	the Tax Code of the RF
10. Excise taxes	the Tax Code of the RF
11. Tax benefits	Act of St. Petersburg of 14.11.1995 No. 81-11 «On tax benefits» St. Petersburg Law of 26.06.2002 No. 316-28 «On investment tax credit»

However, despite the current legislation, it would be reasonable also to possess a document that would determine the main directions of the taxation policy considering the long-term goals of socio-economic development of the region. This document is to establish the general requirements for the tax system, the principles and conditions of changes in tax legislation. In this case, the document must contain the sections dealing with the assessment of the level of the tax burden and fiscal conditions for entrepreneurship in the region, as well as the measures of tax regulation for a medium-term (long-term) period, including the establishment (cancellation) of tax benefits.

4. Tax Benefits

Tax incentives, as an integral part of the tax system in St. Petersburg, play a significant role in the socio-economic development of the metropolis. The purpose of tax benefits, as it is commonly known, is to reduce the taxpayer's tax obligations to the state. According to the Tax Code of the Russian Federation, tax breaks and levies may be made available to both individuals and legal entities. According to the character of their impact on the economy, tax exemptions and tax collections can be divided into supporting and stimulating. While the supporting benefits are provided depending on the level of social security (for certain categories of the population) and social significance (social, scientific, socio-oriented and a number of other organizations) of taxpayers, the benefits of stimulating character necessarily are linked with the conditions aimed at motivating business entities (business) to take measures to ensure the economic development. Herewith, it is obvious that in order to ensure the economic growth is necessary to provide first and foremost such a system of tax breaks which is most conducive to increasing the investment attractiveness and

business interests in the development of the investment activities.

Granting tax exemptions in St. Petersburg is regulated by the law of St. Petersburg «On tax benefits.» According to the Office of the Federal Tax Service of Russia in St. Petersburg the lost income to the budget of St. Petersburg in connection with the provision of tax benefits in 2013 amounted to 16.269 billion rub., having increased by the same period last year by 9.8 %. In this case, the amount of tax benefits granted in the current year amounted to: in corporate property tax 11552 mln rub., tax on personal property 0.1 million rubles, corporate profits tax 2541 mln rub., land tax 1769 mln rub., transport tax 398 mln rub. With account of these tax costs (lost income) St. Petersburg budget is estimated to be 4 % of the budget of St. Petersburg (at the end of 2013), which is higher than that of the Russian Federation (2.9 %). The amount of the granted tax benefits in 2012 is demonstrated in Tab. 3.

T a b l e 3

Tax benefits granted in 2012 under the legislation of St. Petersburg

Type of tax	Amount of tax credit, mln rub.
1. According to the corporate profit tax	3254
2. According to corporate property tax	10691
3. According to the tax on personal property	0,1
4. According to the land tax	485,9
5. According to the transport tax	377,6
6. Total	14808,6

5. Tax advantages and investment incentives

Due to the imperfections of the system of evaluating the effectiveness of the currently provided tax advantages, it is not possible to reliably estimate their influence on the development of investment activities, despite the fact that a number of articles of the above mentioned Act are of a stimulating nature in reference to the investment activities. In particular, regulations of Articles 11 − 8, 11.9 and 11 − 11 set the reduced rates of the corporate profits tax, payable to the budget of St. Petersburg, equal to 13.5 %, depending on the

economic activities of production and investment, at 800 mln rub., 50 mln rub. and 15 mln rub., respectively.

In turn, in order to stimulate investments in accordance with Article 11-1, some organizations are exempt from the property tax payment in the case of the cultural heritage of regional importance when works are done under the contract, depending on the amount equal to 700 mln rub. and more, as well as organizations engaged in certain activities who have invested 800 mln rub. or more within a certain period of time for the aforementioned activities on the territory of St. Petersburg.

The tax rebate stimulating the fixed assets formation, in fact, applies to the investment tax credit provided under the Tax Code of the Russian Federation for a period of one year up to 5 years on the corporate profits tax, as well as on regional and local taxes. The procedure of granting it in St. Petersburg is regulated by the St. Petersburg «On investment tax credit» law, which was enacted at the end of 2012. It should be noted that since this law was been inured, the tax credit in the form of an investment has not been provided to any business entities, which indicates either a lack of demand for it, or the excessive requirements in the current legislation for businesses to apply for it.

Analyzing the available data about the impact of tax benefits on the investment activities development, we can point out the following. In general, the system of tax incentives operable in St. Petersburg is designed to encourage large-scale projects (total investment is over 800 mln rub.). The most significant amount of extended benefits refers to Article 11 − 8 (setting a lower tax rate of 13.5 % on the corporate income tax). Nonetheless, for the period from 2011 to 2012, the share of investments in the economy of St. Petersburg, supported by tax benefits under this item, has not exceeded 10 % (about 37 billion rub.).

At the same time, more than 600 billion rub. received for a specified period in the St. Petersburg economy in the form of investments has never been stimulated by tax incentives. This fact in itself defies any logical reasoning: why will tax incentives be provided for the investments in the amount of 801 billion rubles, whereas for investments in 790 billion rubles they will not?

According to the results of 2013 the volume of investments in fixed assets reached 366.9 billion rub., which makes up 14.1 % of the gross regional product of St. Petersburg. However, this is not enough to ensure a more dynamic economic growth estimated to be at least 5 % per year. Such growth can be achieved only by attracting the additional investment of at least $ 150 billion rub. per year with the current prices, which in its turn requires a fundamental change in the attitude to the investor on the basis of a new economic policy aimed at stimulating investmentsss with tax benefits among other things.

Particularly relevant is the need to encourage investments under the conditions of the deteriorating market access for financial services and the changes in the costs of borrowing. In such a case, the creation of additional preferences for investments is not just a gesture of goodwill, but a precondition for development. At the same time, it is neccessary for us not only to develop, but also to solve the problems of municipal services that have been accumulated over the previous decades. This process should be guided by the following principles:

6. The basic principles of granting tax exemptions for fostering the development

1. Purpose orientation which implies taking a decision about granting tax benefits exclusively for the purposes of social and economic development, provided this cannot be achieved by other means, which is supported by rationale;

2. Rationalization which involves predicting the consequences of decision-making about the tax benefits, as a rule, on the basis of the estimated (quantitative) data concerning, on one side, tax expenditures, and, on the other, the results achieved.

3. Motivation suggests the need to create the environment enabling business entities (businesses) to invest in the business development, forming thus a competitive advantage for investments.

4. Differentiation implies dependence of the level of tax benefits provided to encourage the development on the amount of investments made by a business entity (business).

5. Performance evaluation requires periodic (regular) assessment of the effectiveness of tax benefits in relation to the indicators set out in the prescribed manner.

6. Term structure involves the establishment of the duration period of tax benefits, depending on the amount of investments made by business entities (businesses).

7. Stipulation implies the existence of certain conditions that lead to the provision of tax incentives and resulting, as a rule, from the objectives of socio-economic development (eg, breaking even or creation of high-performance jobs).

7. The principal directions of tax regulation in St. Petersburg

The need to optimize the tax regulation is caused, on the one hand, by the need to ensure the achievement of socio-economic development, as defined in the Strategy for Economic and Social Development of St. Petersburg until 2030, and on the other − by the presence of negative trends hampering the economic growth. At the same time, because of the difficulty of forecasting the external economic factors and the ever-changing conditions on the global market, the tax system structuring and the up-grading of tax regulations should be conducted regularly and possibly in advance. In this regard, given the current situation, the taxation policy in St. Petersburg concerning the encouragement and development of investment activities should be focused on the following main tasks.

The first and perhaps one of the most important tasks is the formation of such a system of tax regulation, which is best suited to reach the goals of socio-economic development designated by the strategy for economic and social advance of St. Petersburg for the period up to 2030.

The second task is to develop a system of tax incentives for a larger number of the entities (businesses) who make investments in the development at the expense of lowering the upper limit of investments (now over 800 million rub.).

The third objective is development of a graduated scale of tax benefits, depending on the volume of investment into development (according to the principle «more invested − more got») made by a business entity (business).

The fourth objective is development of additional tax incentives for business entities (businesses) carrying out the work under the contract in case of the cultural heritage of regional significance.

The fifth challenge is development of the necessary regulatory and methodological support for the calculation of performance indicators of the provided tax incentives, as well as other documents to substantiate and forecast the results achieved.

The sixth task is to prepare the proposals to clarify the conditions for the use by business entities (business) of investment tax credits granting under Article 66 of the Tax Code the right to defer payment of the tax for substantiated reasons.

The seventh task is developing the necessary regulatory support for the changes in reference to some real estate objects for which the tax base is defined as their cadastral value.

The eighth task is the activities aimed at abolition of inefficient tax exemptions and tax benefits that are not claimed by taxpayers.

The ninth task is the on-going analysis and preparation of proposals aimed at up-grading of the tax regulation, able to provide a more efficient operation of business entities (businesses).

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RUSSIAN STATE POLICY OF FOOD SECURITY

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ГОСУДАРСТВЕННАЯ ПОЛИТИКА ПРОДОВОЛЬСТВЕННОЙ БЕЗОПАСНОСТИ РОССИИ

The article considers the Russian state policy in the field of food security of the country. The analysis of the actions taken by the public authorities, to ensure the independence of Russia from the Western food supply. The situation and proposals for the development of food security in Russia was studied.

STATE POLICY; PLANNING; STRATEGY; STATE MANAGEMENT; FOOD SECURITY.

Рассмотрена государственная политика России в области обеспечения продовольственной безопасности страны. Проведен анализ действий, предпринятых органами государственной власти для обеспечения независимости России от западных поставок продовольствия. Изучена сложившаяся ситуация и подготовлены предложения по развитию продовольственной безопасности страны и регионов России.

ГОСУДАРСТВЕННАЯ ПОЛИТИКА; ПЛАНИРОВАНИЕ; СТРАТЕГИЯ; ГОСУДАРСТВЕННОЕ УПРАВЛЕНИЕ; ПРОДОВОЛЬСТВЕННАЯ БЕЗОПАСНОСТЬ.

Today Russia, our country, is not able to feed its own population with domestic products, even with basic ones- bread, meat, fish, etc. Almost all food products that we can see on shopboards of groceries are often made from foreign raw materials [1, 2]. Despite these facts, Russia became a member of the WTO on 22 August, 2012. Russia's entry into the WTO has always been observed from different viewpoints, both positive and negative.[1]

Nevertheless, it is clear that climatic and other features, from the macroeconomics point of view, justify production of any product in the country with its lowest cost, but do not take into account political and other factors. This leads to the relevance considering the food security issue and the need to resolve this problem on a nationwide scale.

Thus, we set ourselves the following main tasks:

− To analyze the food security of Russia with regard to imported products.

− To identify the global trend of food consumption.

− To review the existing legislation of the Russian Federation considering food security.

− To determine the approaches to tackle Russian food security problems.

Let us remind that the most prolific year for meat in the Soviet Union was 1990 − according to Rosstat data, the country consumed nearly 13 million tons, with 10 million tons of domestic products. Since then meat production in Russia has been steadily deteriorating (the worst indicators were shown in 2000). Since 2001, the consumption of meat has begun to grow together with the amount of import [4].

Also note that a number of other food products that are present on shopboards and labeled as «Made in Russia» are, in fact, not domestic.[2]

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[1] WTO − is an international organization which was created on January 1, 1995 for the purpose of international trade liberalization and regulation of trade and political relations between the member states. Objectives of the WTO − the establishment of general principles of international trade: equality, reciprocity in decision-making, transparency of decision-making, the existence of liabilities and the ability to impose restrictions (for example, only for products that do not impair the environment or are salubrious, etc.) [3].

[2] For example, cucumber «Pickles», which can be found in retail outlets, are actually grown in China and only canned in Russia. Another example − are some meat products, which are in fact made of imported meat.

Of course, we have always bought imported meat, even in the period of the Soviet Union. However, we used to buy less (−1.5 million tons per year in 1980, and 3.17 million tons in 2007−). According to «Meatland Food Group», in 2009 about 70 % of the St. Petersburg market was taken by imported meat products, including the poultry, 70 % of which was domestic. Nearly all sausage products are made from the imported meat. [4] One of the reasons for such a situation is the lack of funding for stock-raising farms, the lack of effective tax and preferential arrangements.

Today, our meat market is diversified. It was originally a thought-out policy to buy meat from different countries at the same time. The reason is that the meat from one of the countries may one day no longer meet our internal requirements in response to changing conditions and requirements. In that case, the procurement is effected throughout the New World and partly in the Old World.

However, some experts believe that Russia is quite capable of almost overfeeding its citizens with meat [2, 4, 5].

After the global financial crisis the world economy faced a more serious problem, referred to as the new term «agflation» − the rise of prices for agricultural commodity. Dramatically increased prices for food products are forcing the biggest exporters to restrict supplies to the world market in order to reduce inflation in their own. In 2007−2008 experts have already predicted the oncoming food crisis.

Experts see the reasons for a sharp increase in food prices in two main mutually influencing circumstances: energy price hike, which makes up a significant share in food production expenses and the increase of food consumption in India and China.

In Russia, in August 2014, the Federal Antimonopoly Service began checking the validity of the rise in fuel (energy) prices, which have grown almost simultaneously in 56 regions of the country [6].

The rapid development of the economic well-being in the most populated countries of the world also increases the demand for energy resources, which they do not produce. In addition, the Indians and the Chinese have begun to consume more pork and dairy products, which sharply reduced the availability of these products in the market. Droughts and

ethanol production reduced world food supplies more substantially. A tremendous amount of corn and other crops is required for the production of a new type of fuel, therefore the number of fields planted with corn used for food production in the world was drastically reduced.

Experts saw the need for changes after many countries had begun to experience serious food shortages[3] [7].

The World Bank even drew attention to the need for a «new course» in the global food policy: to help poor countries in short term, and to develop competitive agricultural production wherever possible in a long term.

It is not possible to develop agriculture immediately, so among those who announced food blockade or limited food exports were such major suppliers as India, China, Egypt, Thailand, Vietnam. Of course, productivity increases and falls from year to year cause embargo and its cancellation on different types of food supplies.

Globalization, which is aimed at the creation of the market with equal opportunities for all, with shared resources, shows the inconsistency so far. American farmers, who received in 2007−2008 Government subsidies of about $ 119 billion, reduced the cost of agricultural commodities dramatically, forcing manufacturers in other countries to shut down their production due to low profitability and inability to compete with the Americans. This conflict has already been a problem of the WTO members negotiations on agriculture [7].

In Russia, the food situation is relatively stable, for example, in Moscow food stocks at wholesalers should be enough for at least three months of autonomous existence (in St. Petersburg − not less than two months), in addition in nearby areas since 2008 agricultural holdings are being created to provide the transition to self-sufficiency in food. Nevertheless,

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[3] Series of protests in 1990s against such sharp increase in food prices took place in Haiti, Egypt, Afghanistan, Bolivia, Yemen, Mozambique, Indonesia, Senegal, and in several other countries. Destabilization of the political and social situation in dozens of countries from Asia, Africa and Latin America is a serious threat to all market economy in the world: production of different products is reduced, because there are factories of many large companies in these countries, and general inflation is increasing.

UN officials pay attention to significant territories of vacant fertile land [7].

The Russian President signed a decree No. 120 «On approval of the Food Security Doctrine of the Russian Federation» on January 30, 2010 (hereinafter − the Doctrine) in order to implement the state policy in the field of food security of the Russian Federation, aimed at providing the population with food supplies, the development of domestic agricultural and fishery complexes, rapid response to internal and external threats to the stability of the food market, effective participation in the international cooperation in the field of food security [8, 9].

On the basis of the Doctrine, the Russian government should develop and adopt a plan of actions to implement the provisions of the Doctrine and prepare reports to the President of the Russian Federation containing the analysis, evaluation and forecast for food security. Public authorities have already developed a number of programs in this area, here are some of them:

− The Order of the Government of the Russian Federation of 03.07.2014 No. 1215-r «On Approval of the Concept of development of domestic food aid in the Russian Federation»;

− The Order of the Ministry of Agriculture of Russia of 23.05.2014 No. 166 «On approval of the branch program «Development of the milling industry of the Russian Federation for 2014−2016»;

− The Order of the Ministry of Agriculture of Russia of 23.05.2014 No. 170 «On approval of the branch program «Development of the oil and fat industry of the Russian Federation for 2014−2016»;

− Government Decree of 15.04.2014 No. 314 «On approval of the state program of the Russian Federation «Development of the Fisheries Industry»;

− Government Decree of 15.04.2014 No. 315 «On Amendments to the State Agriculture Development Program and the regulation of agricultural products, raw materials and food for 2013−2020»;

− Government Decree of 15.04.2014 No. 328 «On approval of the state program of the Russian Federation «The development of industry and increase of its competitiveness»;

− Government Decree of 12.10.2013 No. 922 «On the federal target program «Development of agricultural land reclamation Russia for 2014-2020»;

− Government Decree of 15.07.2013 No. 598 «On the federal target program «Sustainable Development of Rural Areas for 2014−2017 and for the period up to 2020»;

− Resolution of Chief State Sanitary Doctor of the Russian Federation of 09.07.2013 No. 33 «On supervision over production and sale of milk and dairy products» and others.

The Doctrine also provided further Russia's accession to the WTO under terms consistent with the national interests of the Russian Federation, which should contribute to food security of the country, according to the plans of its authors.

Among the indicators of food security in the Russian Federation and the criteria for their evaluation a system of indicators to assess the state of food security in three areas is highlighted: in the sphere of consumption; in the production and national competitiveness; in the sphere of management.

The important point for the assessment of food security as a criterion is the specification of the share of domestic products for various product groups (Tab. 1):

Table 1

Specification of the proportion of domestic products for various product groups

grain − not less than 95 %	fish products − not less than 80 %
sugar − not less than 80 %	Potato − not less than 95 %
vegetable oils − not less than 80 %	edible salt − not less than 85 %
meat and meat products (in meat equivalent) − not less than 85 %	milk and milk products (in milk equivalent) − not less than 90 %

The Doctrine is necessary for effective socio-economic development of the country and regions in which attention is paid to the internal and external factors that may affect the country's food security [8−10].

Immediately after the adoption of the Doctrine in 2010 a serious drought happened in Russia, which resulted in severely affected crops. However, even in these conditions, neighboring Belarus managed to completely provide itself

with food grain, while in Russia the crops were destroyed due to the abnormal summer heat, that could be the evidence of possible illiterate actions of domestic agricultural producers [11].

Next, we need to analyze the situation with the production and consumption of certain types of products in Russia.

Consider Tab. 2, which contains data on the yield of some crops in Russia.

As we can see from Tab. 2, grain yield has virtually not increased over the last 3 years, except for corn. Potato yield has not changed much, and vegetables declined slightly. We now move on to Tab. 3.

According to the statistics, we can see the actual growth of meat production. This year, according to the Russian Minister of Agriculture Nikolai Fyodorov, the country can overcome one hundred million's milestone for the production of grain [12].

Our country has 20 % reproducible fertile lands of the world with 55 % of the world reserves of natural humus, 20 % of freshwater resources. The Value of these resources exceeds the reserves of our non-renewable hydrocarbons several times. Accordingly, in certain circumstances, Russia is able to increase the production of cheap food products dramatically and start selling food rather

Table 2

Crop yields in the Russian Federation (in the agricultural organizations; quintals per hectare of harvested area)*

Grainsandlegumes	2011	2012	2013	2012/2011	2013/2012	2013/2011
Wheat	23,5	18,7	23,4	79,57 %	125,13 %	99,57 %
Rye	19,9	15,2	19,4	76,38 %	127,63 %	97,49 %
Barley	23,1	19,6	20,3	84,85 %	103,57 %	87,88 %
Oats	18,6	14,7	16,9	79,03 %	114,97 %	90,86 %
Graincorn	44,7	43,5	51,9	97,32 %	119,31 %	116,11 %
Millet	14,6	10,9	12,6	74,66 %	115,60 %	86,30 %
Buckwheat	10,0	7,9	9,6	79,00 %	121,52 %	96,00 %
Rice	51,8	55,5	50,3	107,14 %	90,63 %	97,10 %
Legumes	17,4	13,6	12,6	78,16 %	92,65 %	72,41 %
Total Cereal	223,6	199,6	217	89,27 %	108,72 %	97,05 %
Potatoes	196	182	198	92,70 %	108,70 %	100,77 %
Fieldvegetables	254	234	234	92,13 %	100,04 %	92,13 %

* According to the Federal State Statistics Service as of 24 March 2014. URL: http://www.gks.ru/wps/wcm/con nect /rosstat_main/rosstat/ru/statistics/efficiency/#

Table 3

Production of livestock per 100 hectares of agricultural land in the agricultural organizations of the Russian Federation**

Groups of goods	2010	2011	2012	2011/2010	2012/2011	2012/2010
Livestock and poultry for slaughter (live weight), tons	5.0	5.4	6.1	109.04 %	112.97 %	123.18 %
Milk, tons	11.7	11.8	12.2	101.11 %	103.53 %	104.68 %
Eggs,*** thousand pieces	97.7	99.2	102.0	101.50 %	102.86 %	104.40 %

** According to the Federal State Statistics Service as of 14 May 2014. URL: http://www.gks.ru/wps/wcm/ connect/rosstat_main/rosstat/ru/statistics/efficiency/#

*** Based on 100 ha of sown area of grain and leguminous crops

than hydrocarbons. However, in 2014 the share of imported food in Moscow makes more than 80 %. Positive indicators for beef are not observed, as well as for dairy products, import of which makes about 8.5 million tons of milk. Fish production of domestic origin is 70−75 %, while imports − 25−30 % [12].

Among advantages, we can distinguish the grain production and consumption. So, we consume an average of about 70 million tons of grain per year. In 2013 the country harvested 92.4 million tons of grain. Grain is exported to Egypt, Turkey, United Arab Emirates. Incidentally, the Egyptian revolution in 2011 played its own role for the embargo on grain exports imposed by Russia after the «unprecedented» drought, during which, as we have noted, Belarus produced 100 % of the grain for their own consumption [11, 12].

Due to the purposeful policy of the Russian Government, cheap loans for agricultural producers and agribusiness (2/3 of the Central Bank rate), today the share of imports in Russia is only 10 % of poultry (in 2013 produced 3.8 million tons against 700 thousand tons in 1999) and 25 % of pork (in 2013 produced 2.8 million tons against 1.57 million tons in 2005). For other products − according to Rosstat, Russia

produces 4 million tons of vegetable oil annually, mainly sunflower. This is twice as many as in 2003. Export of vegetable oil is impressive − about 1.5 million tons (mainly in Turkey and Egypt). Egg production has increased (41 billion pieces in 2013 against 36.6 billion in 2003, domestic consumption − 39 billion pieces), however, in the last three years stagnation has been observed a in this industry [12].

Despite the outwardly optimistic figures of physical volumes, the price structure of Russia's foreign trade in food production is not rosy. A characteristic feature − export of goods with low added value (the so-called soft commodities − agricultural raw materials like wheat) and imports of niche products of high quality. For example, Russian export of wheat − mainly supplies of cheap, often forage varieties to Egypt (exception − a high-quality wheat of Altai), imports − expensive wheat from France and Canada. As for fish − raw materials are exported, and expensive kinds of fresh fish, mainly from Norway and Chile are imported.

Note that the main success is mainly due to interest rate subsidies on loans from the budget.

Some pictures of Russia's dependence on imports can be seen in Tab. 4 [2].

Table 4

Russia's dependence on foreign products to certain groups in 2013

Product (thousand tons) in 2013	Production	Import	Export	Consumption of the population	Self-sufficiency
Sunflower oil	3284.0	18.1	570.0	7925.0	1.71
Buckwheat	834.0	1.5	61.0	560.0	1.49
Wheat	52091.0	1086.0	13798.0	35500	1.47
Rye	3360.0	0.1	47.0	2600	1.29
Eggs	41300.0	150.2	510.2	39500.0	1.05
Potatoes	30199.0	506.0	41.0	30304.0	0.99
Milk	30700.0	266.8	21.8	34775.0	0.88
Poultry	3816.0	523.0	53.0	4368.0	0.87
Onion	1985.0	306.0	1.3	2289.0	0.87
Carrots	1605.0	266.0	0.1	1971.0	0.86
Sugar (whitebeetroot)	4400.0	443.2	5.0	5350.0	0.82
Pork	2829.7	601.0	0.3	3836.0	0.74
Beef	1632.2	581.6	1.2	2342.0	0.70

N o t e . Consumption − excluding industrial consumption. Self = production / consumption. According to Rosstat, Ministry of Agriculture, the Federal Customs Service, the National Meat Association, the Institute for Agricultural Market Studies.

Dependence on imports is unlikely to be overcome for additional reasons. True proportion of imports in agricultural products is higher if the entire production chain is taken into consideration. It is clear that today we need to revive the scientific school of plant breeding and genetics, and agriculture, which is closely linked with industry in turn.

Unfortunately, according to some experts, up to 80 % of the seed potatoes in large holdings are imported, plant protection products (pesticides, herbicides, fungicides) − are imported by almost 100 %. 90 % of the active ingredients for producing pesticides, herbicides, fungicides on Russian chemical plants, are purchased abroad. Vegetable seeds are almost all imported. Greenhouse industry is 100 % imported[2].

Despite the claims of the Government of the Russian Federation that import from the West will not harm Russia, the opposite is becoming increasingly evident. For example, Kaliningrad region is already concerned about potato yields in the next year and drew attention of the Ministry of Agriculture of the Russian Federation on the shortage of potatoe seeds and the need for their procurement in the European Union. The Ministry of Finance is also beginning to recognize the damage caused by the sanctions of the West. In particular, the main concern is the payment for loans from foreign countries and the making money transfers of the Russian companies on the international level. [13, 14].

Note also low numbers and quality of domestic production and agricultural machinery, which leads to the need to acquire it abroad, which is better. Imported equipment, even from neighboring Belarus, often breaks down less often than the domestic one.

Thus, with some of the main products − grain & potatoes − we do provide ourselves completely or almost completely, and with other products and raw materials − we don't. On the one hand, we can direct the surplus of grain not for export, but for the development of the livestock − for forage, but on the other hand, we are integrated into the global economy, which does not let us do this (we must export, that is, we need to increase the production of grain).

If we imagine that the West today stops the delivery of products to Russia, admirers of exotic food and delicacies will be the first to suffer, stock of specific products will last for several months, and then the country will need help from Asian countries.

It is obvious that our country needs a few years to create its own food security,, which it may not be enough.

Industry and trade must be socially oriented − so government support should be aimed primarily at the poultry production − it is cheap, and pork − it is technological. We need to develop our farms for the production of beef and milk, increase the cultivation of apples, revive the vineyards and other crops that may be grown in our country.

The Federal Law of 28 June 2014 No. 172-FZ «On the strategic planning in the Russian Federation», in our opinion, does not properly take into account the strategy for food security, whereas it is included in some way in the «National Security Strategy» referred to in the law.

In our opinion to resolve the food security problem in Russia, it is also necessary to take a range of measures. Firstly, we need to modify the system of social and economic planning throughout the country. This requires implementation of complex, interrelated actions in various fields [15−18]. Secondly, we need to develop the industry in the country, so we can use its agricultural equipment, as well as modern equipment for the production of semi-finished products and alike. Thirdly, the state support to farmers and a ban on the use of agricultural land for other purposes is needed, as well as assistance in their development, including the attraction of private farmers. Fourthly, it is necessary to decrease the fares for fuel and energy, and power plants need total renovation. Fifthly, the establishment of state trade enterprises with a market share of 5−10 % will allow the Russian government to restrain retailers with market mechanisms, as well as provide personnel in the field of trade. Finally, it is necessary to revive the system of training in this area, including increased funding for a number of SRIs for providing safe and high yielding crops.

Strategic food security is possible even if we are isolated from the Western countries. If we are going to produce not only potatoes and bread, but also meat in its diversity (poultry, pork, beef), a variety of grains, fruit, including apples, pears, grapes, berries and vegetables: onion, tomatoes, cucumbers, cabbage, etc., we will feed the population.
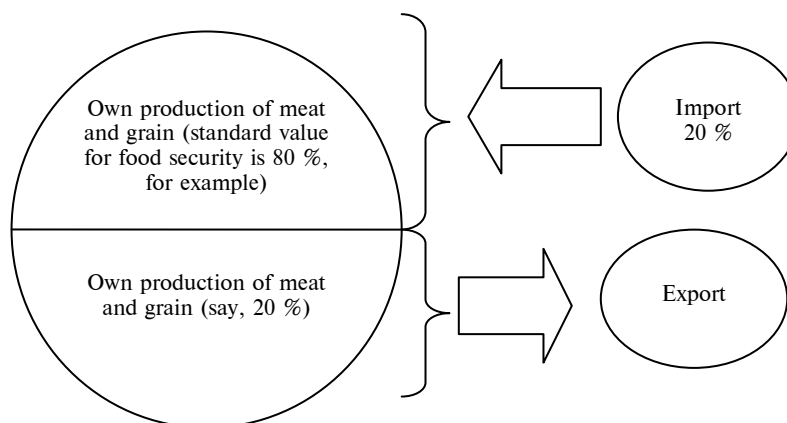
Schematic representation of Russia's food security

The general scheme of Russia's food security can be represented in figure.

In figure we have tried to reflect that in an ideal case, Russia should produce 100 % food for their own needs (which may be produced in Russia taking into account the climatic and other characteristics), but can actually produce even more than 100 %. Taking into consideration that the Russian economy is integrated into the Global economy, exports are inevitable. Thus, the ability of Russia to export 20 % (this figure may change) food from 100 % + surplus in excess of 100 %, is shownas an example. Thus, Russia has 80 % of food for its own needs. Accordingly, we need to import 20 % of food products. But, in the case of foreign conflict, Russia will not be able to export their food and will send it to the domestic market, thereby ensuring food security.

The fact that Russia exports a number of products, even those which cannot be produced 100 % domestically, is unacceptable. For example, Russia exports fish and sugar, despite the fact that it is not enough for their own needs. The Increase of production up to 100 %, or slightly more than 100 % will allow painless export for the country, in addition, in the case of military or political conflicts, our state would be sure it is able to feed its population. For example, Russia produces grain more than 100 %: 100 % of the grains we consume themselves, and the surplus safely sell or directed for animal feed. The question, if it is possible to exceed the threshold of 100 % of its own production and to which extent, is controversial and requires further study, but it is clear that the level of overproduction should be small, so that in case of any sanctions, decline in production would not strongly affect the development of the economy, as well as the level of unemployment. But even if Russia cannot provide 100 % production of food products because of external reasons, it is necessary to own enough strategic resources to increase food production up to 100 % within a year.

State food security policy must create the conditions of self-sufficiency and independence on external factors.

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PROVIDING THE FINANCIAL SUPPORT TO THE TASK OF THE TECHNOLOGICAL SECURITY PROVISION IN THE FARMING SECTOR OF UKRAINE

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ФИНАНСОВОЕ ОБЕСПЕЧЕНИЕ ТЕХНОЛОГИЧЕСКОЙ БЕЗОПАСНОСТИ АГРАРНОЙ ОТРАСЛИ УКРАИНЫ

Ukraine is an agrarian country, judging by its historically established type of economy, its natural resources, national mentality — and the high share of farming products in its gross domestic product. All these factors make the problem of funding the technological security in the farming sector most urgent. In order to simplify the process of raising funds for the farming sector, we suggest the following: working out unified integrated norms of goal-oriented public financing of high priority development areas; in order to modernize farming enterprises: defining clear rules of regulating public funds allocated for these goals; motivating enterprises to attract investment into innovations; offering preferential loans or partial refunding of loan interests from local or regional budgets — for the enterprises which have adopted innovative technologies, etc. Thus, technological security of the farming sector requires a range of mutually agreed actions. Changes are mostly needed in such areas as legislation, statutes and regulations, institutional management environment and implementation of innovative and technological activities in the farming institutions and organizations, the mechanism of financial assurance and fiscal support. The essential issue here is a program of high-priority development areas in the farming sector for technological modernization and strengthening the national R&D potential. Besides, a special significance is given to the process of establishing an executive control body to manage the technological security of the sector, and authorizing it to ensure the highest practicable level of security in the national agriculture. It seems to be obvious that science-based technological modernization of agriculture in the country shall contribute to the sustainable development of its agro-industry and to the stable growth of the gross domestic product due to the production of competitive farming products.

TECHNOLOGICAL SECURITY; FINANCIAL SUPPORT; THE FARMING SECTOR OF UKRAINE; TECHNOLOGICAL MODERNIZATION; GROWTH OF THE GROSS DOMESTIC PRODUCT.

Рассматриваются мероприятия по упрощению привлечения финансовых ресурсов в аграрную отрасль Украины. Важнейшим при этом является разработка программы приоритетных направлений развития аграрной отрасли в сфере технологического обновления и укрепления научно-технологического потенциала. Особое значение приобретает также процесс формирования органа управления технологической безопасностью аграрной отрасли и наделения его полномочиями, достаточными для обеспечения оптимального уровня безопасности сельского хозяйства. Ведь научно-технологическая модернизация сельского хозяйства позволит обеспечить стабильное развитие агропромышленного комплекса и будет гарантировать прирост валового внутреннего продукта через производство конкурентоспособной аграрной продукции.

ТЕХНОЛОГИЧЕСКАЯ БЕЗОПАСНОСТЬ; ФИНАНСОВАЯ ПОДДЕРЖКА; СЕКТОР СЕЛЬСКОГО ХОЗЯЙСТВА УКРАИНЫ; ТЕХНОЛОГИЧЕСКАЯ МОДЕРНИЗАЦИЯ; РОСТ ВАЛОВОГО ВНУТРЕННЕГО ПРОДУКТА.

Since Ukraine is an agrarian country — if we are to judge by its historically established type of economy, its natural resources and the nation's mentality — and since the share of farming products in its gross domestic product is quite high, the problem of tackling the key issues of ensuring the country's technological security becomes more than urgent in this light.

Taking into account that there is no universally accepted definition of the term «technological security of the farming sector', we suggest our own interpretation as follows: it is «such a state of the scientific, technological and industrial potential of the sector which allows us to ensure sustainable operation of the sectoral economy sufficient for reaching and maintaining

proper competitiveness of farming products and for ensuring economic self-sufficiency due to innovation technology».

The gist of technological security of the farming sector can be revealed through its key factors. This requires: enhancing innovation activities at farms and processing companies; revealing the existing threats to sectoral interests and estimating their impact; assessing potential risks; applying the system analysis methods to assess the current state of all the elements of technological security in farming; formulating a state policy on the improvement of technological security with a view to ensuring sustainable development of the farming sector; establishing a system of monitoring and control of how technological and innovation policy is being implemented and what results are achieved both on the sectoral and governmental level.

Currently the farming industry of Ukraine has been operating and developing in the conditions of uncertainty and under the ever increasing pressure of the scientific and technical progress which creates a highly competitive environment, which in its turn brings about multiple threats to the national, economic and technological security. This is the reason why there is a need to work out and deploy a managerial and economic mechanism to ensure the security of farming in the area of technological progress; a tool capable of timely detecting and eliminating all and every existing threats.

To achieve technological security in the farming sector, this device implies identifying a combination of institutional, economic, managerial and statutory methods to reconcile the interests of private businesses and those of the national economy. It should − with regard to the particular nature of farming and to the implementation of research and engineering developments − lead to the improvement of farming efficiency to the level as would be sufficient to ensure economic security, part of which is the technological one.

The essential function of this mechanism is : enhancing the intellectual potential of agriculture; wide implementation of highly efficient farming methods and technologies and resource-efficient cropping systems; manufacture of competitive science-intensive farming products − which in combination should secure growth for the sectoral economy.

The organizational and economic mechanism of technological security in farming includes the following components: organizational framework; managerial functions, substantiation of the implementation of efficient forms and methods of technological security development, improvement and enhancement of the technological security; means of controlling the threats and levers to eliminate them; indicators and assessment criteria; statutory, financial and informational/statistical support.

In order to establish the mechanism of technological security, one has to adhere to a set of principles as follows: rule of law; systemacity; complexity; timeliness; substantiated and adequate protection measures and sectoral interests; delineation of authority and obligations among executors who bear responsibility for the enhancing of the technological potential of farming; using the intergovernmental systems of collective security; cooperation between the executive bodies of the government and the businesses; democracy of control. This mechanism must include four levels of action: governmental, regional, sectoral levels and the level of individual farming enterprises.

The governmental level (macro-level) of technological security is where the science-based, engineering and innovation strategy is shaped for the development of the farming sector, which in its turn provides support for businesses through the statutory framework, the basic budgetary, tax-related and food policy regulations, the technology transfer and intellectual property rights protection.

A government activity, by choosing the innovative economic development generally, is channeled to the achievement of the following tasks:

− defining and shaping: build-up and development of a new economic model based upon science-intensive technologies;

− motivation: using fiscal policy levers to stimulate businesses, organizations and executive authorities to implement innovation;

− organization: concrete activities of the government to ensure the establishment and efficient operation of the innovation infrastructure [8, p. 49].

At the governmental level, a number of measures have to be applied to regulate and stimulate innovation activities: state-sponsored programs aimed at increasing the demand for research and development in farming; projects to promote and encourage innovation among

individual agricultural enterprises; development of reasonable financial and taxation systems [2, p. 103]. Proceeding from the aforesaid, we can assert that the key role of the government in the area of technological development is to establish a legal framework capable of regulating and controlling technological security of the farming sector. Legal regulation of the technological security is needed to ensure normalization of the protection of all the stakeholders' interests in the agribusiness on the basis of clearly defined and unified criteria, rules and standards.

The meso-level — i. d. regional — is the one we have already considered in [3] where we suggested the establishment of an executive controlling body in charge of technological security in order to enhance the innovation potential of the farming sector.

The sectoral level of the organizational and economic mechanism of technological security of the farming sector is, logically, the extension of the activity promoted by the legal framework and the result-oriented approach to the innovative strategy of the country. Among the key tasks we can list the following: 1) developing a range of sectoral programs concerned with the issues of enhancing the technological level of farming enterprises; 2) setting up the infrastructure for research and development and innovation activities (collaboration between farmers and research institutions involved in the development of science-intensive products and in the training of high-qualification personnel); 3) financial incentives to widen and enlarge the components of this infrastructure [8].

The microlevel of technological security requires a designed system which should help to implement such modernization policy. The system must include: innovation activity management; strategic planning of change, analysis of the current and perspective potentials of innovation; assessment of the risks o f innovations to be implemented; personnel management, further personnel training; provision of funds for research and development; implementation of effective marketing services at the farms [4].

Ensuring innovation and technology development of the farming sector means financial, investment and governmental support which, unfortunately, is currently underfinanced and done at random. Underfinancing of technology development has been caused by:
− unreasonable distribution of budget funding between individual areas of action within innovation and technology policies;
− financing of R&D and innovation programs without reliance upon an integrated and balanced scorecard;
− dedicated budget programs do not fully correspond to the tasks and goals of the institutions in charge of their implementation;
− dissipation of resources on multiple programs and putting them in the hands of many executors and controllers, which wholly contradicts the idea of resource concentration and channeling them to high priority areas of innovation development of the sector;
− nonexistence of reliable efficiency assessment of how such scientific and technology programs are implemented;
− a weak motivation for business enterprises to participate in the financing of R&D projects and programs.

Table 1

Funding for R&D in the farming sector in Ukraine and in other countries, 2007−2013, million USD [7]

Country	2007	2008	2009	2010	2011	2012	2013
Germany	588.431	689.724	822.344	967.78	954.817	906.658	938.174
Norway	39.032	154.992	170.005	168.087	176.662	185.209	204.268
Denmark	82.615	69.756	71.071	69.717	77.914	66.844	75.606
Russia	242.119	144.423	327.688	−	−	−	−
Romania	65.687	115.348	73.81	151.994	97.225	80.228	38.692
USA	2325.1	2332.0	2629.0	2628.0	2211.0	2386.0	2218.0
Ukraine	43.078	59.293	57.211	65.746	68.486	76.118	-
Finland	107.432	107.287	111.854	109.254	106.938	109.387	106.455
France	265.167	304.906	337.315	364.275	435.7	342.099	364.569
Japan	1072.58	1126.14	1169.52	1120.82	1058.81	1006.47	970.182

By the level of its national expenditure on R&D in the farming sector, Ukraine does not measure up to that of the leading global economies (see Tab. 1). Ukraine's total R&D funding in 2012 was 313 times lower than that in the USA and 13.2 times lower than that in Japan. On the other hand, the last 6 years' dynamics show that this indicator in Ukraine has risen considerably − by 77 %.

Comparison of the key technological security indicators in different countries demonstrates: non-existence of a comprehensive public support for R&D innovation in farming; weak agroscience; insufficient innovation activity among Ukrainian researchers; insufficient demand for innovative products; inadequate system of funding for R&D institutions; inconsistency of the investment support for innovation activities in the sector.

The presence of multiple innovation-funding recipients in the country and in some of the sectors of its economy does not represent the efficiency.In this context, one has to establish an effective system of funds distribution and application which will ensure reasonable financing of technology modernization in the farming industry.

The key roles in the distribution of funding in Ukraine are performed by the following public bodies:

− Ukrainian Cabinet Council: develops the draft of the budget and accounting law and ensures its enforcement;

− Ukrainian Ministry of Finance: prepares the draft law and submits it to the Cabinet, implements the unified government budgetary, financial and fiscal policy;

− Ukrainian Parliament (Verkhovnaya Rada): passes the budget, controls its implementation;

− State Agency on Investments and Development: prepares suggestions concerning the amount of budget funds to be used for financial support of individual businesses;

− special-purpose government-supported foundations: designed to raise additional funds to finance government programs;

− regional and local public authorities: carry out governmental, regional and sectoral development programs, report on the implementation of such programs.

Thus, we suggest setting up an executive body in charge of the issues of technological security which will earmark necessary funds and distribute them among executors in accordance with specified priority areas of work.

Financial and investment support for the processes of technological security may have different sources; see their scheme in the Tab. 2.

T a b l e   2

Financial sources of ensuring technological security in farming

Source	Components
Public funds	Target refunding from the budget; preferential loans; tax credit
Own funds	Reinvestment of profits; demising, selling of property, selling of science-intensive products, company's funds
Borrowings	Loans; bond issue; leasing
Raised funds	Securities issue; shares and contributions of/by the shareholders; venture capital financing; foreign investment; joint innovation and investment projects, grant awards; charitable contributions

In order to simplify the process of raising funds for the farming sector, we suggest the following:

− to develop unified integrated norms of goal-oriented public financing of high priority development areas;

− to define clear rules of control over public funds in order to modernize the farming enterprises;

− to motivate the enterprises to attract investment on their innovation;

− to offer preferential loans or partial refunding of loan interest from local or regional budgets − to the enterprises which have implemented innovative technologies, etc.

We suggest that the main levers of implementation of fiscal policy focused on improving the technological security in farming should be as follows:

− a change of the tax assessment base: cutting taxes and mandatory payments through the increase of contributions to funds which are included in the cost of production;

− cutting taxes and duties/fees to the budget for the manufacturers of science-intensive products;

− tax exemption and tax concession;

− accelerated depreciationd as a means of the active technical modernization promotion;

− the simplification of the tax system for foreign investors, in order to create a favorable investment climate;

− offering tax deferrals;

− reducing the amount of tax statements and administrative burden on tax payers [10].

By taking the above suggested steps, the government shall build a bridge between the activities in the area of technology and the strengthening of the economy, which in its turn will lead to the increased potential for transferring and implementing of foreign technologies. This will also bring about the synergy of interests of the institutionalized organizations and farming enterprises in such areas as security, science, technology and engineering at all the stages of the process of technological security provision.

Thus, ensuring technological security of the farming sector requires the carrying out of a range of mutually agreed actions. A change is mostly needed in such areas as legislation, statutes and regulations, institutional environment for the management and implementation of innovative and technological activities of institutions and organizations in the farming sector, the mechanism of financial assurance and fiscal support. Essential here is a program of high-priority development areas in the farming sector for technological modernization and strengthening of the national R&D potential. Also a special significance is given to the process of establishing an executive control body to manage the technological security of the sector, and of vesting it with the authority to ensure the highest practicable level of security in the national agriculture.

Respectively, the implementation of the suggested ways and methods of improving the sectoral technological security − as part of national economy control and management and its appropriate funding − shall significantly improve the efficiency and competitiveness of Ukrainian farmers through the deployment of the latest engineering and process solutions in the production of science-intensive products and reduction of the dependence of the Ukrainian farms upon the imported technologies, materials and equipment. In addition, monitoring of the above mentioned processes and mechanisms is needed.

The main goals of the technological security monitoring in farming are as follows:

1) To evaluate the state and dynamics of technology development and the level of security in the farming sector.

2) To reveal and identify destructive changes in these processes and strengthen the overall potential of the sector.

3) To identify the causes for, sources, nature, consequences and the impact of the threatening factors upon the production, material and technical and research and development potential of the farming industry.

4) To predict the consequences of the impact of the threatening factors upon the technology potential of the sector.

5) To carry out systems analysis of the situation and its trends.

6) To develop a set of objectives to eliminate the threats [9].

The users of the monitoring data − depending on the degree of disclosure of the information obtained during the investigation − can be internal and external.

The system of monitoring and control of the process of ensuring technological security can be conventionally broken down into two complementary components: 1) direct monitoring of the present security status; and 2) monitoring of the general process of security at all levels of its organizational and economic mechanism.

To assess the initial level of technological security, one will have to carry out a comprehensive diagnostics with the goal of identifying the key threats, and then to work out and plan strategic and tactical measures to overcome them.

Considering the organizational and economic mechanism of technological security in the farming sector, we can identify a number of steps or stages of control over the process of security improvement:

1) Identification of the goals and objectives of monitoring and control

2) Building up a system of technical and economic parameters by which technological security is to be evaluated with the regard to the specific features of farming

3) Collection and processing of information to characterize the state of the investigated object

4) Revealing the factors which characterize the more promising areas of the technological security development

5) Modelling and shaping a security strategy

6) Analysis of the security indicators by individual component

7) Monitoring threats to the technological security

8) Working out suggestions to prevent potential and eliminate all the existing threats [1].

The key areas of monitoring on how the mechanism of technological security works in the farming sector are as follows:

− Inspection of the plans and accounting/reports (strategic development programs, plans of measures, financing estimates, predicted efficiency indicators)

− Examination of the current reporting

− Online monitoring using information systems

− Monitoring measures (programmes and projects assessment, international cooperation) [5, p. 130].

The executive body in charge of the technological security in farming carries out examination of and controls how the measures are taken which have to ensure such security; all this is to identify and take alternative managerial decisions. Therefore, we suggest that the process of technological security monitoring should be viewed as a system of managerial decisions to implement technological security measures using the functional approach. Ongoing monitoring will help timely detect even the weakest signals of the negative deviations, analyze and improve strategic measures to enhance efficiency of technological security in farming, including the financial ones.

Proceeding from the aforesaid, monitoring and control of the technological security in farming is a complicated multilevel structure. It includes a complex of measures to diagnose the key threats which may increase the level of negative factors in farming beyond tolerance, and to control how the planned organizational and economic measures of the technological security are taken. Definition of the principles, goals, and milestones of the monitoring as well as the distribution of the results obtained during the investigation, will allow us to analyze the situation better and take reasonable and efficient managerial decisions. The advantage of this system of monitoring and control is the ongoing detection and elimination of those problems which may arise at each of the stages of the innovative technological development of farming and implementation of its security.

Therefore, in accordance with today's requirements, we have to solve an important problem − namely that of the financial support for technological security in farming − the problem of the highest priority because upon its solution depends the successful economic development of Ukraine and maintenance of its national security on appropriate level. It seems to be obvious that science-based technological modernization of agriculture in the country shall contribute to the sustainable development of its agro-industry and to the stable growth of the gross domestic product due to the production of competitive farming products.

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FORMATION OF THE COMMUNICATION CENTER FOR IMPLEMENTATION OF NEW PROGRAMS OF THE ARCTIC EXPLORATION

Д.А. Радушинский

ФОРМИРОВАНИЕ КОММУНИКАЦИОННОГО ЦЕНТРА ДЛЯ РЕАЛИЗАЦИИ НОВЫХ ПРОГРАММ ОСВОЕНИЯ АРКТИКИ

At the moment the implementation of new large scale programs of the Arctic exploration are under consideration. The article analyzes the conditions and prerequisites for economic cooperation with various groups of interested countries, as well as the nature of the communication technologies that integrate the necessary resources — modern technology, finance, design and manufacturing facilities, etc. — within the concept of the Arctic cluster in the North-West region of Russia with its center in St. Petersburg.
COMMUNICATION; COMMUNICATION CENTER; REGIONAL DEVELOPMENT; ARCTIC CLUSTER; ARCTIC RESOURCES.

Рассматривается вопрос о реализации новых масштабных программ освоения Арктики. Проанализированы условия и предпосылки экономического сотрудничества с различными группами заинтересованных стран, а также технологии коммуникационного характера, позволяющие интегрировать необходимые ресурсы — современные технологии, финансовые средства, проектные и производственные мощности и другое в рамках концепции арктического кластера в Северо-Западном регионе России с центром в Санкт-Петербурге.
КОММУНИКАЦИЯ; КОММУНИКАЦИОННЫЙ ЦЕНТР; ТЕРРИТОРИАЛЬНОЕ РАЗВИТИЕ; АРКТИЧЕСКИЙ КЛАСТЕР; АРКТИЧЕСКИЕ РЕСУРСЫ.

Introduction. The issue of accelerated development of the northern territories of Russia has been recently considered by the expert community and the state authorities. According to some scientists and government officials, updating points of growth of the economic potential associated with the Arctic is a priority for sustainable development of the country. The urgency of developing problems of Arctic areas is connected both with the improvement of the modern approach to territorial development, and the revelation of the coherence of the global vector of investments, — implemented in both cases on the international basis. Comprehensive Development of the Arctic territories, and their importance in the international relations of Russia, as well as the development of certain types of industry and services in the region are considered by such authors as: Agarkov S.A., Avakian S.V., Voronin N.A, Goldin V.I., Dubarenko K.A., Ivanov S.M., Ivashov L.G., Lukin Y.F., Nikora E.V. Polovinkin V.N.,

Rohchin V.E., Saveliev S.B., Fomichyov A.B., Shiyan G.N. and others. The aspects of creating an Arctic cluster in St. Petersburg and the general questions of the sustainable development of mining regions are covered by the author. The issue of creating a communication center for the exploration of the Arctic has not been considered in scientific literature.

We give definitions of some basic concepts used in this paper:

— arctic resources — fuel and energy and other mineral resources on the territory of the Arctic zone, the economic feasibility of exploration and development of which is the subject of research; Arctic resources include onshore and offshore transportation routed including the Northern Sea Route and its ground support;

— territorial development — the mode of existence of the territory (urban or rural), in which the territory represented by its entities (enterprises, institutions and people) gets the features improved in comparison with those of

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the previous period, the quality of life including. The improvement comes through the development of the territory «growth points» and implementation of appropriate policies pursued purposefully in the activities of public authorities, institutions and private companies.

This study is based on the fundamental research in the field of marketing communications, on the materials of the research and practice conferences «Topical issues of protection and security» (Navy Research Center «Naval Academy named after admiral Kuznetsov»), on the works of the research department of the Institute of Military History «Securing Russia's national interests in the Arctic» (vol. 9, part. 2), on the publicly available information in business press, on the author's analysis.

New program for the Arctic exploration. The economic basis of the «new wave» of the Arctic exploration is often called the development of hydrocarbon deposits of the continental shelf, as well as the development of navigation along the Northern Sea Route (NSR). Opportunities for this arise, as indicated by several authors, due to the expected warming by 2020−2030.

According to various estimates, the continental shelf of the Arctic contains 13 to 30 % of all offshore hydrocarbon reserves in the world: 90 billion barrels of oil, 1.669 trillion cubic feet (47.3 trillion cubic meters) of natural gas and 44 billion barrels of gas condensates [1]. Russia's share in the total volume of undiscovered Arctic oil reserves is estimated at 40 percent, natural gas − 70 percent. Industrial development of the Arctic shelf can provide a significant increase in hydrocarbon reserves.

In view of these facts, as well as the growing activity of other economies in the Arctic region, by the President's Decree of February 20, 2013 was approved the «Strategy of the Russian Arctic development and national security protection for the period up to 2020» (hereinafter − the Strategy). [2] According to the Strategy, the purpose of the Russian Arctic development − is to ensure the national security onshore and offshore within the macro-region, to consolidate the role and place of the Arctic in the national economy on the basis of innovative modernization of economy and sustainable economic growth. In this case further on we are talking about the way «to ensure the global

competitiveness of the Arctic zone of the Russian Federation ... by switching to the principles of self-development and use of internal (endogenous) capacity, of interregional and international cooperation development « (Strategy, 3rd stage).

To achieve the goals of the Strategy, Department of Regional Development (Minregion) has developed a draft for a state program «Socio-economic development of the Arctic zone of the Russian Federation for the period until 2020», which was submitted to the State Duma for approval in late 2013.

The funding for implementation of the program in the optimal version in the period of 2014 to 2020, according the project, was about $ 1.8 trillion rubles, including more than $ 1 trillion rubles invested by business, 650 billion rubles − by the federal budget, 63 billion − by the budgets of the seven Arctic entities (subjects) of the Russian Federation [3]. As collaborators of the program in addition to ministries and entities of the Russian Federation have been appointed the largest domestic companies: «Vnesheconombank», «VTB-Leasing», «Gazprom», «Lukoil», «United Shipbuilding Corporation» (USC), «Rosneft», «Rusnano» «Rosatom» RZD «Sberbank».

According to the draft of the program, by 2020:
− the share of the Arctic zone of Russia's GDP is expected to increase from the present level of 5.6 % to 14 %, which is almost three times;
− the volume of freight traffic along the NSR is expected to increase from 3 to 63.7 million tons, which is more than twenty times;
− per capita income of the Arctic zone should increase by more than 2.5 times, exceeding 76 thousand rubles.

However, after six months of discussion, this government program was adopted in the version excluding the budgetary funding and without collaborators − co-executers (look at State Program of the Russian Federation, «Socio-economic development of the Arctic zone of the Russian Federation for the period up to 2020» approved by the RF Government Decree of April 21, 2014 N 366). Thus, to date, the goals and objectives have been established by the Strategy for the Development of the Arctic zone of the Russian Federation and the program of its social and economic development in the current

version, but at the federal level there have not been approved any mechanisms (activities, the volume of financial resources, responsible executors) to achieve them. The intensity of development of the Arctic resources in such a situation will be more dependent on the interest of the major companies operating in the region, and on the implementation of certain public projects in the sphere of defense, development of icebreaker communications over NSR, infrastructure, etc., which receive state funding at the moment.

It should also be specified that a number of scientists believe inconsistent the expectation of the prompt warming and improving the availability of economic resources of the Arctic. So, Avakian S.V., Voronin N.A., Dubarenko K.A. point out: «The concept of global warming and melting ice in the Arctic Ocean have created an illusory assumption that modern climate processes over the coming decades could open the Arctic zone for maritime navigation and mining, which will form a new geostrategic reality. This scenario is the only one offered in the «Strategy...» ... while none is provided for the case of the climate cooling in the coming decades ... In the absence of reliable forecasts of the global climate we should be prepared for the different scenarios of the development of processes in the marine Arctic, including the climate cooling» [4, p. 68, 71]. These considerations may also explain the allocation waiving of the public funding for the implementation of the mentioned above program of activities of the Ministry of Regional Development (at least in 2014−2016).

There are also other factors affecting the choice that the programs of intensive development of Arctic resources under development may be delayed or «clipped.» So, if there are more available and cheaper sources of hydrocarbons than the resources of the Arctic shelf, preference will be given to the first. When the cost of oil extraction on the Arctic shelf is about $ 170 per barrel [5, p. 170] preference, in particular, may be given to *shale* technology of gas and oil extraction. Besides, there should be considered the emergence of alternative sources or methods of energy generation, switching to which may be preferable from an environmental point of view in comparison with the traditional raw hydrocarbons.

Thus, there are three main points of view on the prospect of accelerated development of the Russian shelf Arctic resources:

1. Optimistic (authors of the «Strategy..»): Immediate development is advisable in the view of 2020, when there will appeara new economic «Arctic reality». It is necessary to pay efforts in advance, to foresee the actions ahead, to invest into innovative technologies.

2. Restrained (management of companies and agencies currently involved in the development of the Arctic): a suitable policy should be established based on the diversification of the strategic partnership with companies from West and East and a balanced approach to the choice of alternative technologies for the cost-effectiveness of resource extraction : this policy should also correspond to the pace of development of world trends.

3. Pessimistic (part of the scientific community): expectations of a significant and imminent increase of the economic attractiveness of offshore resources in the Arctic are not justified; significant investments into new programs nowadays are not promising.

Competitors and allies of Russian companies in the development of the Arctic resources. The accelerated melting of ice which took place in the 2000s has made the Arctic a more attractive area of the world ocean. During this period a number of states greatly intensified their economic activity in the region. There emerged a tendency to global stand-off for resources of the Arctic zone, which is manifested in two planes.

Firstly, there was a question about the internationalization of the spaces assigned to the Arctic states: the countries concerned, such as China, who does not have the territorial access to the Arctic Ocean, make suggestions for the transfer of the rights to the international bodies and the application of the principle of «common heritage of mankind», by analogy to the Antarctic, with the control of activities in the Arctic seas. In this situation, Russia's alliance with the countries of the Arctic Council (AC) who share the Arctic shelf is expedient in order to counteract the overwhelming expansion in the Arctic region by the «third» countries.

On the other hand, in the framework of the five states that had their own Arctic sector there is formed a bipolar model, since 4 of 5 active

players on the Arctic area (Denmark, Canada, Norway, the United States) are the members of NATO, who claims to lock-down and strengthen their positions in the Arctic. In this regard, justified seems a view expressed by L.G. Ivashov that at present, in order for Russia to keep the control over the share of resources which are located on her sector of the shelf, it is necessary to form an alliance with the strong «third-party» players: «The candidates capable to compile the future block are, to my mind, China, India, Japan, and possibly Germany, «[6].

Currently at the level of business Russian companies really diversify their cooperation activities in the Arctic. So, in 2013, there were signed the agreements, according which «Rosneft» and the Chinese state-owned oil corporation CNPC would invest 270 billion dollars within 25 years into their joint projects on the Arctic shelf and in Eastern Siberia. [7] On the other hand, folowing the agreement of «Rosneft» and ExxonMobil, the parties intend to construct 60 platforms for offshore oil extraction in the Arctic [8], as well as to create a Research and Design Center for the purpose of accumulation of advanced developments in oil and gas offshore extraction.

For the government and major mining companies in Russia there is a need to cooperate with the various «players» in the Arctic region, who can be both competitors, and allies or partners. The following groups of key players with whom Russia may have certain relations can be outlined,.

Group 1. A group of countries concerned about the joint extraction of the Arctic resources and / or transporting goods along the NSR, especially Asia-Pacific countries − China, South Korea, Japan, Vietnam, and India and Brazil, if they show interest in the Arctic cooperation. This group of countries can be a source of funds to finance the projects of production and transportation, based on the use of Russian technologies, acquiring shares in projects. A number of countries in the group could act as donors of technologies − in the field of robotics production (Japan), in shipbuilding (South Korea)

Group 2. A group of European countries that do not have access to the Arctic Ocean, but having potential interest in joint projects for extraction and production of hydrocarbons,

includes primarily Germany, as well as Finland, France and others. This group of countries in addition to financial resources can be a supplier of the technologies, such as deep sea drilling, construction of platforms and other technologies, where Russia has a backlog. Establishment of joint ventures with this group of countries includes their entry into projects with an agreed valuation of the intellectual property provided as their share.

Group 3. A group of countries that used to have «the Arctic sector» shares − the United States, Canada, Denmark, Norway. Relations of global partnership (twinning arrangements) with these countries at this stage concerning resources development are unlikely to arise, while more likely are neutral relations and competition − for resources, investment, technology and consumers. At the same time, certain ambitions of «outside players» in the Arctic, in particular the Chinese party, as well as the contradictions that arise within the «Arctic Five» can be resolved or balanced only in the framework of co-produced mechanisms of the «civilized» and just solution to the points of controversy. −

Group 4. It is also necessary to highlight the role of the major European and international mining companies (BP, ExxonMobil, Total, Texaco and others.) Their policies are based on the strategic guidelines for the increase in their own market value and entering into joint projects with the maximum degree of control of all the resources available. Since it is the major international mining companies that are holders of advanced technologies for the extraction of offshore resources, the interests of the Russian party lie in the fact that for the adequate remuneration (share in the profits of the project) to involve these companies into joint ventures with the possibility of the technologies transfer. For this it is necessary to demonstrate the value of Russia's intrinsic scientific capacity in this area.

The project of fully robotic oil and gas extraction without surface platforms. «Rossiyskaya Gazeta» on March 14, 2014 promulgated an article «A look into the abyss» by Deputy Prime Minister Dmitry Rogozin, curator of the Russian military-industrial complex, where he said that there is similar groundwork for the globally unprecedented

technology of offshore oil and gas extraction in the Arctic without surface platforms. To date, the technology of extraction of natural resources on the continental shelf requires the «aerial coverage.» The drilling equipment and technological systems attached to the bottom are controlled either from watercraft, or from surface platforms. Concurrently, these platforms are limited by the depth of mining − a maximum of 100 meters.

The developments mentioned by D. Rogozin provide for founding of autonomous underwater «cities» with their own traffic, power supply service, communication lines. «The main elements of these complexes are going to be exploration submarines and water-carriers, the equipment for drilling, exploration, the product processing, power supply, operation and maintenance, integrated safety and security, on the all-round automated base,» − said Deputy Prime Minister.

The pioneer of this technology is known to be Norway where within a public-private partnership project WS Seabed Rig they are already testing prototype elements of the automated underwater rig. Many experts believe that in Russia development projects on mining in the Arctic shelf can be economically viable if there appear a «breakthrough» technology for cheap oil and gas production on the ocean floor. Concurrently, the practices of the 2000s show that the cost of the indigenous independent development on a platform of «Prirazlomnaja,» for example, was twice as high as the costs of the analogous equipment declared by European companies.

Thus, it would be potentially more cost-effective to borrow the best in global companies, adding Russian own unique solutions. Reliance only on our own developments, according to experts of the Arctic and Antarctic Research Institute, may lead to the effect that the project announced by D. Rogozin will need long time and high costs to be implemented. «In addition to creating the extraction and transportation technology proper, we will have to solve the environment and security problems (you never know how robots will behave), to develop new materials, etc.» It is a considerable restraint on Russian companies to buy and borrow technologies from large West-European companies ready to co-operate, is a set of

official and unofficial bans, acting within the NATO structures, the European Union and the organizations who impose restrictions on cooperation with Russia, including the ones previuos to the sanctions regime in 2014.

Creating a communication center of the Arctic cluster. As noted by several authors, the government is able to administer a significant support to the processes of integration of business structures, by creating institutions and development strategies [9, 10], preparing the infrastructure.

The concept of the cluster territorial economic development is a popular scientific approach at the moment, which is the subject of many hundreds of scientific papers (see for example [11, 12]). The Arctic cluster in the North-West region of Russia with its center in St. Petersburg can be defined as a set of scientific, implementation and innovative subjects, as well as of a variety of service companies, public authorities and representation agencies of the foreign partners engaged in the issues of the Arctic shelf resources development and improvement of navigation along the NSR and in the Arctic seas, geographically located in the North-West Federal District.

Currently in St. Petersburg there have been established pharmaceutical, medical, automotive, shipbuilding clusters, an electronics cluster. The cluster approach is also introduced in the Development Strategy of the Arctic zone of the Russian Federation until 2020.According to the Strategy, «the meaningful effect of clusters and cluster policy for the regions of the Russian Arctic consists in their ability to impart the knowledge-intensive features to the traditional resource development, to promote the diversification of single-industry economy, to contribute to the dynamic development of transport, energy and communications infrastructure, the growth of small and medium-sized businesses» [2].

The «Arctic cluster» project initiated by St. Petersburg authorities may be seen as a specific instrument for the regional development. It is in St. Petersburg, where scientific and industrial organizations that have a direct relation to the exploration of the Arctic in the Soviet and post-Soviet period are concentrated. To date, an important objective of such cluster creation is

organization of international cooperation in the Arctic resources development.

Attracting foreign companies to work together on development of the shelf exploration technologies is extremely promising for both the city and the North-West region, as well as for the Russian Federation as a whole. Communication policy, which is the epitome of a marketing strategy and marketing research [13, p. 109], in the context of a venture is an essential tool for its product promotion and investment opportunities. For local (regional) authorities, as Sam Black, a classic of PR, says, «public relations help elected officials to show a constructive attitude toward their responsibility to inform the public and the outside world about the policies pursued by local authorities...» [14, p. 236-237].

Under the current conditions of uncertainty with the new programs of the Arctic exploration, the communication aspects, allowing to draw attention to the proposal of St. Petersburg at the federal and international level, may come to the fore. In our opinion, the main stages of the formation of a communications strategy promoting the Arctic cluster project in the North-West region of Russia with its center in St. Petersburg could be the following.

1. Formation of the holistic conception of the cluster, covering various scenarios of climate forecasts in the Arctic in 2020 to 2030's. The efforts to formulate the conception of the Arctic cluster in 2013 year were intensified, however, as at the 2nd quarter of 2014 the conception has not been externalized.

2. Formation of a package of investment proposals and public exposure of these proposals, as well as the information about the cluster creation, on the federal and international level. Incorporation of this information into the program of investment proposals «I invest in SPb» («Invest in St. Petersburg») and road shows held by the municipal Committee on urban investments and strategic projects for foreign investors.

3. Provision of the task-specific information about the scientific and technological potential of companies in St. Petersburg and North-West, in the prospect for attracting foreign companies to cooperate. At present, for example, in the Research Institute named after Academician Krylov there is established an engineering center

for the Arctic areas (creating ice marine equipment, platforms, etc..). This should ensure the concentration of available scientific and experimental base and practical experience of Russian shipbuilders. Foreign specialists with the relevant expertise will also work, together with Russian experts, within the framework of the Arctic engineering center.

The Strategy of socio-economic development of St. Petersburg until 2030 (Strategy 2030), developed in 2013, includes a short section entitled «Development of the Arctic cluster» which says: «Under the Arctic cluster is understood the pooling of resources of governmental bodies, academic and business communities of the Arctic states on the mutually beneficial conditions for the region development»[15, p. 90]. Within the framework of the above-mentioned relations with different groups of countries, however, it has been found that the most promising in terms of investment and technology to Russia can be cooperation not with the Arctic countries but with the «third» countries interested in penetrating the Arctic and with companies who accommodate advanced technologies for offshore arctic operations.

Absorbing the Arctic hydrocarbon reserves, today Russia is cooperating with companies in France, Great Britain, Holland, Germany, capable of being full-fledged partners in terms of both scientific and technological, and financial capacity [16, p. 97]. The next stage of such cooperation can occur with boosting cooperation with the Nordic countries — Norway and Finland. Today in Norway they are working at the technologies of onglacial and subglacial shelf development. Finland has considerable experience in the development of ice-reinforced engineering equipment. In St. Petersburg it is possible to work together to improve these technologies.

Besides, Petersburg has got the potentialities to become a center that would focus not only at design and industry, but also can become a powerful management structure aimed at development of the Arctic. In this case, St. Petersburg could become a platform for the coordination of efforts for the development of the Arctic shelf with the interested European partners, and potentially with partners from Asia-Pacific countries. The strategic partnership agreements for the development of the Russian

Arctic resources with governments of the major European countries such as Germany and France, and with major European companies could result in the creation of joint management structures in St. Petersburg. However, the possibility of such strategic partnerships will be determined by factors like climate change in the Arctic, and skillful actions for the implementation of a communications strategy to promote new development programs in the Arctic, including the «Arctic cluster» project in the North-West region.

Shipbuilding companies already included in the «USC» (United Shipbuilding Corporation) and the shipbuilding cluster of the city (40 % of production capacity and 75 % of applied science Russia), as well as specialized research institutes and educational institutions, can become the base for design and production of the «Arctic cluster» in St. Petersburg. The cluster can be additionally staffed with management companies, shipping agents, brokers, insurers, financial investment groups. St. Petersburg as a cultural center of the North-West region of Russia is a convenient platform for interaction with foreign businessmen and politicians.

The relationship of these enterprises and public authorities in the framework of the «Arctic cluster» implies far-reaching public-private partnership (PPP) combined with a variety of links formed between the participants [17, 18]. With such a large-scale set of elements that can be employed for the «Arctic cluster» project it becomes feasible to found a communication cente which should link the involved authorities, government agencies, private and public companies, foreign partners. As the key aspects of the communication center of the Arctic cluster can be distinguished the following:

− The international character resulting from the function of coordination of interactions with foreign partners;

− Focus on the mechanisms and legal forms of PPPs;

− A significant component of PR which should provide the involvement a «creative class» as professionals, as well as leading companies and foreign governments as a business partners to implement the prospective development in the Arctic.

These proposals were presented by the author and discussed at a number of scientific −

practical conferences, such as «Ensuring national interests of Russia in the Arctic: Challenges and Prospects» (December 4, 2013), «Actual problems of protection and security» (April 1-4, 2014) and others.

In 2013, the efforts to establish the Arctic cluster were intensified. On April 2, 2013 the first meeting of the Polar Commission on the establishment in St. Petersburg Arctic cluster under the leadership of the President of the State Polar Academy A.N. Chilingarov was held. On August 1, 2013 the Committee on Economic Policy and Strategic Planning in St. Petersburg (KEPiSP) held a working meeting with representatives of the Polar Commission. On September 19, 2013 the Committee on Industrial Policy and Innovation in St. Petersburg (KPPiI) held the first meeting of the Polar Commission working group to establish the conception of «The Arctic territorial innovation cluster.» On November 26, 2013 it was announced that in the near future the building of the Arctic cluster will undergo the registration phase [24]. In the 3d quarter of 2014 the draft of the Arctic cluster conception is still under work by experts who in 2013 drafted the strategy of socio-economic development of St. Petersburg until 2030 (Strategy 2030).

The main conclusions. The economic basis of the «new wave» of the Arctic exploration is often considered to be the development of hydrocarbon deposits of the continental shelf, as well as the development of navigation along the Northern Sea Route (NSR). The intensity of development of the Arctic resources today depends on the major companies operating in the region, and on the realization of certain state projects. In the absence of reliable forecasts of the global climate one must be prepared for different scenarios of climate processes in the Arctic, including cooling. When considering the economic feasibility of the development of the Arctic shelf, we cannot exclude the emergence of new technologies in Russia (extraction of shale hydrocarbons) and alternative sources or methods of energy production. Switching to new technologies or sources of energy may be preferred from an environmental and / or environmental standpoint.

There are three or four groups of key players with whom Russia may implement some or

another kind of relationship while planning the Arctic cooperation. Russia is interested to involve large foreign companies in joint ventures with the possibility of technology transfer for the adequate remuneration (share in the profits of the project). To reach that it is necessary to demonstrate the value of Russia's own scientific capacity in this area. However, there are restrictions on Russia to buy and borrow advanced technologies.

An important goal of creating the Arctic cluster in St. Petersburg is organization of international cooperation in the development of the Arctic resources. The main stages of the formation of a communications strategy to promote «The Arctic cluster» project in the North-West region of Russia with its center in

St. Petersburg would be: formation of a holistic conception of the cluster, covering various scenarios of climate forecasts in the Arctic in 2020-2030: formation of a package of investment proposals and public exposure of these proposals and information about creating a cluster on the national and international levels; providing specific information on scientific and technical backup experience accumulated by enterprises of St. Petersburg and the North-West, the potential to attract foreign companies for cooperation. St. Petersburg could be in this case a platform for the coordination of efforts to develop the Arctic shelf with the interested European partners, and potentially − and with partners in Asia-Pacific countries.

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PROBLEMS OF MODELLING AS A TOOL OF ORGANIZATIONAL AND INDUSTRIAL ENGINEERING IN THE ENTERPRISE

В.В. Глухов, Д.А. Сюняева

ПРОБЛЕМЫ МОДЕЛИРОВАНИЯ КАК ИНСТРУМЕНТА ОРГАНИЗАЦИОННО-ПРОИЗВОДСТВЕННОГО ИНЖИНИРИНГА НА ПРЕДПРИЯТИИ

The article discusses the features of modelling in process approach. Process engineering and reengineering are considered to be the mainstream of this work. The article describes the problems that arise during the information transfer from the real object or business process to its model.

MODEL; MODELLING; BUSINESS PROCESS; SYSTEM DISCRIPTION; BUSINESS PROCESS MAP.

Рассмотрены особенности построения моделей при процессном управлении. Основными форматами при этом являются инжиниринг и реинжиниринг процессов. Описаны основные проблемы на этапе перенесения информации от реального объекта или бизнес-процесса к ее системной модели, а также последующего правильного отражения в бизнес-процессах.

МОДЕЛЬ; МОДЕЛИРОВАНИЕ; БИЗНЕС-ПРОЦЕСС; СИСТЕМНОЕ ОПИСАНИЕ; ОТОБРАЖЕНИЕ БИЗНЕС-ПРОЦЕССА.

Organizational and production engineering. The concept, principal stages and use. Process approach used in the organization is aimed to increase work efficiency by introducing the proper chain of interactions, by clear understanding of inputs and outputs at different stages of works and by ensuring the quality of the results obtained at each stage. The process approach is used to manage the entire system of production with its variety of business processes. Thus, companies focusing on organizational and business engineering recognize the need for engineering production systems as well.

The concept of engineering is closely related to the concept of quality management. The concept of engineering first appeared in the consortium of companies which included Polaroid and Boss. The centre for management quality introduces this approach and regards conceptual engineering as a process of identifying the customer requirements and selecting the product or service that best meet these requirements.[1]

Conceptual engineering consists of five principal stages: understanding the consumer environment, transforming this understanding into requirements, applying the requirements to the relevant operational level, and the selection and development of concepts.

In this paper, the concept of engineering is explained primarily in terms of developing conventional production business models and their subsequent implementation in operating activities based on process approach.

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[1] Evans J. Quality Management. Moscow, Unity, 2007. 374 p.

Today there is a great number of different definitions and approaches to engineering found in textbooks and media sources. Let us consider the key definitions of engineering. Engineering (English «engineering» − from the Latin «ingenium» − ingenuity, invention, knowledge) is a form of international commercial relations in the field of science and technology, the main direction of which is the provision of bringing research and development to the production stage.[2]

Another definition of engineering is 'works and services, i. e. preparing technical specifications; doing research; drafting design proposals and feasibility study for industrial and other facilities; conducting engineering survey works; developing engineering designs and drawings for the construction of new buildings and reconstruction of existing industrial and other facilities; developing the in-plant and intradepartmental design proposals; designing machinery, equipment, installations, devices and products, such as composition development of alloys and other materials and their testing; development of technological processes, techniques and methods; counselling the process of installation, commissioning and maintenance of equipment and facilities in general; advice on economic, financial or other issues'.[3]

Engineering also includes consulting services, research, design and engineering of computational and analytical nature, preparation of feasibility studies, providing recommendations in the field of production and management. Such works and services are performed ad hoc by the engineering companies on a contractual basis.[4]

Let us consider the principal stages of business modelling: diagnostics, design, implementation. The current state of an organizational model («as is»), as well as the objectives and control of the organizational model changes, are described at the stage of diagnostics. The development of the organizational model options such as «as it should be» takes place at the stage of design followed by options modelling in answering the question «what if ...», evaluation and selection of options on the specified criteria and development and selection of the option implementation strategy. Implementation stage focuses on the reorganization and development activities, monitoring and evaluation of the results and management of change.

The above can be represented in Tab. 1.

Each of the above stages has its own level of significance, therefore, in order to develop sustainable management in the framework of the described processes, it is important to minimize the inaccuracy of data transfer and interpretation for modelling actions and situations.

The documentation relevant for the analysis and the ability to communicate with all the involved participants of business processes are important at the stage of diagnostics. Thus, the stage of diagnostics can be conditionally divided into a sub-stage of «information gathering», and a sub-stage of «the analysis of findings». In practice, the findings often facilitate a better understanding of the main issues for further work.

Why it is more advisable to use the term «modelling» rather than «designing» can be explained as follows: designing is building a concept of the future facility; while modelling is reliable reflection of the current business processes, so that others could work with them and the process of updating and improvement of business processes would be as close to reality as possible.[5] In other words, designing is closer to re-engineering changes in the enterprise, while modelling is closer to engineering changes.

The very concept of engineering is connected with a process, phenomenon or object description. Thus, the concept of business engineering is focused on the business nature of the activities described. The description, in its turn, may have different gradations: description of the process vertically, horizontally, in more detail, in less detail, etc. Being an instrument for engineering the organization's activities, modelling is aimed at improving the quality and efficiency of its work, and, as a final result, at increasing customer satisfaction from the products and services.

[2] Big Encyclopedic Dictionary, edited by I. Lapin, E. Matalina, R. Sekachev, E. Troitskaia, L. Khaibullina, N. Iarina. Moscow, ASTREL, 2004.

[3] Prakhov B.G., Zenkin N.M. Invention and Patenting. Kiev, Tekhnika, 1981. 208 p.

[4] Raizberg B.A., Lozovskiy L.Sh., Starodubtseva E.B. Modern Dictionary of Economics. 2nd ed. Moscow, Infra-M, 1999. 479 p.

[5] J. Evans. Quality Management. Moscow, Unity, 2007. 374 p.

Table 1

Stages	Stage content	Methods, tools, actions
Diagnostics	1.1.1. Comprehensive functional and information analysis of the organization: interaction with the external environment; qualitative and quantitative indicators of the performance evaluation; composition, quality and degree of functions and business processes fulfilment; material, financial and information flows; structure of the organization (organizational, legal, financial, etc.); existing and required resources	SWOT and STEEP analysis. Development and analysis of functional and structural information model of the existing business processes organization (SADT-model). BPR tools. Conducting FCA to identify areas of imbalance «function − cost», definition of cost centres, etc. Dynamic analysis of load and resources allocation, etc. Methods to encourage creative activities («brainstorming», etc.). Working groups meetings with the assistance of external consultants («facilitators»)
	1.1.2. Detection and systematization of problem symptoms	
	1.1.3. Identification of the current problems of the organization	
	1.2.1. Definition of the hierarchy and priority of the reorganization objectives (the desired model state). 1.2.2. Development of constraints in order to achieve each objective: setting time and resource constraints (personnel, financial, material, etc.)	Development of objectives tree. Prioritizing in objectives definition. Expert methods of assessment Table 2
Designing/ modelling	2.1.1. Development of functional and structural information models of rational organization of business processes. 2.1.2. Design of various options of the organizational structure and related management systems	SADT- modelling. BPR tools. Comparison with other organizations Table 3
	2.2.1. Modelling various options of the organizational model («what if...») for all its components. 2.2.2. Prediction of the personnel response to the result of each option implementation	Modelling resources allocation dynamically. Modelling economic financial parameters. Conducting FCA
	2.3.1. Evaluation and selection of options using a consistent set of criteria and constraints	Multi-criteria expert estimation. Development of the «profile» of each organizational model option.
	2.4.1. Analysis of external and internal environment factors of the organization, influencing the development and selection of the change management strategy: deadlines; available resources; positions of the changes initiators; degree of personnel loyalty, etc.	Kotter and Schlesinger model of «strategic continuum». Lewin model of «force field analysis»
Implementation	3.1.1. Mobilization of the resources. 3.1.2. Provision of staff involvement in the process. 3.1.3. Coordination of actions of the process participants	Distribution of responsibilities. Ensuring effective communications. Mentoring and individual counselling. Analysis of the role and career planning. Process counselling and activities for team building
	3.2.1. Analysis of actual and expected values of the criteria for achieving objectives. 3.2.2. dentification of discrepancies and development of corrective actions	Working groups meetings with the external consultants. «Planned − actual» control. Auditing. Interviews with individuals or focus groups
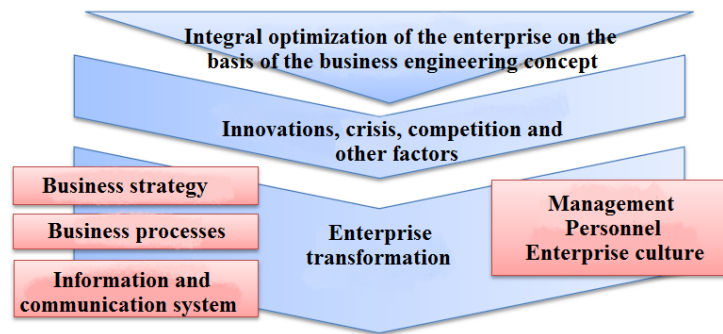
Fig. 1. The representation of the concept of business engineering

Business engineering aims to produce the optimal solution taking into account all the constraints and requirements. This may be the most reliable solution within the given constraints, the simplest one in terms of safety, or the most effective one according to the economic indicators. Therefore, the search for solutions, associated with the analysis of various options in this process, is certainly connected with expert modelling.

The representation of the concept of business engineering is shown in the diagram (Fig. 1).

The components of business engineering include the following: management of transformations at the enterprise, differentiation of solutions level and integrity. So, the principal methods of enterprise transformation within business engineering include: 1) multiperspective enterprise modelling, i. e. information systems of the enterprise, which are closely aligned with the enterprise's strategy, are used and maintained upon this method; 2) Gallen's principles of business engineering; 3) architecture of integrated information systems (ARIS), i. e. work with the enterprise transformation through five prospects of ARIS to consider the business process in different terms, perspectives of organization, performance perspectives, perspectives of data, functional perspectives, perspectives of process management; 4) a semantic model of a three-dimensional object that includes a plan of the enterprise (external perspective), business process model (internal perspective), specifications model of application system (resources perspective).

Thus, the attention should be paid to every stage of engineering modelling that is used in any enterprise, management and production activity within the process approach.

Modelling in modern production systems. General concepts. Generally, modelling implies the study of knowledge objects in their models, the development of models for real objects, processes and phenomena in order to find the explanation of these phenomena and to forecast the various states of these phenomena in the future. Today, there are more than twenty kinds of modelling, each of which is aimed at solving some specific problems.

The Encyclopaedic Dictionary gives the following definition of the model and modelling:[6] Model is a device reproducing and imitating the structure and operation of any other «modelled» device for scientific, production or any other purposes. In a generalized sense, the model is any image or analogue (conceptual or conventional: image, description, diagram, drawing, chart, plan, map, etc.)

Modelling implies studying any phenomena, processes or systems of objects by building and studying their models; models are used to determine or specify the characteristics and rationalize methods for building newly constructed objects. Modelling is one of the main categories of the theory of knowledge: any method of scientific research − theoretical (which uses different kinds of symbolic and abstract models) and experimental (using the subject model) is substantially based on the modelling idea.

The key definition of those given above is the fact that the model is a certain image of an existing phenomenon. The image, in its turn, is inextricably connected with the subjective perception of an expert creating this model, while the perception is connected with the description or, more precisely, with the opportunity and ability to describe the image seen. From this, it follows that the modelling process involves three basic elements:[7]

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[6] Big Encyclopedic Dictionary, edited by I. Lapin, E. Matalina, R. Sekachev, E. Troitskaia, L. Khaibullina, N. Iarina. M.: ASTREL, 2004.

[7] Kleiner G.B. Modelling of decision-making mechanism in the enterprise // Economics and mathematical methods. 2002, no. 3.
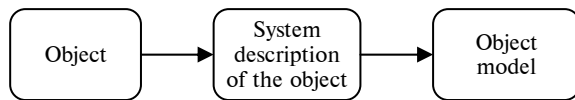
Fig. 2. Problems of modelling in modern production systems

Nowadays the trend can be observed worldwide, according to which everything that happens in the organization is modelled and represented in different terms and formats. However, in practical management, modelling is not always an effective means of describing the objects and phenomena, which is pointed out by the specialists in the field of engineering and mathematical modelling.[8]

The model development should be inextricably connected with the objectives pursued. As a rule, enterprises resort to modelling due to the fact that problems with production, management and strategy that can not be solved for a long period of time entail financial losses and, finally, destabilize the enterprise. Another aspect of the same issue is the fact that building models allows enterprises to predict the development of the current state of an object or phenomenon, and, thus, gives them a chance to change this state in their favour. Thus, two main closely related problems of modelling are the following: the analysis aimed at dealing with the crisis and the reduction of uncertainty in making future decisions. Both of these problems form the basis of modelling, i. e. search and reception of information about the object in due time.[9]

The model understood as a simplified representation of reality requires some measure or criterion to assess its adequacy. Search for this criterion in most cases is a problem that is neglected by enterprises in a number of modelling issues.

It should be noted that there is always a certain discrepancy between the real object and its model. A model is a theoretical entity in some way related to reality that can be independently discussed and analysed.[10] This fact refers to philosophical problems described in the numerous works of I. Kant,[11] the essence of which can be summarized as follows: the researcher is unable to reliably and confidently judge the object as he perceives it subjectively. Each new researcher will perceive this object in his own way.

The relationship between an object and its model in Fig. 2 is indirect, since there is a system description of the object between them. In this case, the gap between the object and its system description can be very significant. For example, the system description of the enterprise may actually reflect only production processes, while the processes of reproduction of resources are not reflected as they are beyond the interests of the researcher.[12]

Following the logic of difference in objectives definition in modelling, it should be noted that restrictions and assumptions are necessarily introduced in model development, and only few parameters that can fully describe the object are selected from the entire set of parameters. It follows from this, that prior to the preparation of any kind of model all (in an ideal system of model development) parameters must be converted into a matrix. This matrix will have transposing properties in view of the fact that, in terms of the purposes, the elements will change places and therefore change their priority.

In practice, it is impossible to fully identify all the parameters of the object, especially when it comes to large production systems. It is much easier to model the operating principle of gears than to create a model of implementation of design on development and implementation of a corporate geographic information system. In addition to the inability to identify all the parameters of the object, there is a problem connected with the fact that, given the large number of variables of the object, the model will be unmanageable and difficult to implement. This may result in a setback from the original

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[8] Astakhov A.S. Whether the economic estimates have been specified with the methodology development. *Economics and mathematical methods*, 2000, no. 4; Goldshtein G.Ia. Problems of using mathematical models in the management of economic and production systems. Collected works «System analysis in the economics». Taganrog, Publishing Office of TSURE, 2000; Rapoport B.M. Optimization of Management Decisions. Moscow, TEIS, 2001. 249 p.

[9] Tychinskiy A.V. Problems of modelling application in SES. *Materials of the VI All-Russian scientific conference of students and post-graduate students*. TSURE, KRES-2002.

[10] Ayres R.U. Technological Forecasting and Long-range Planning. N.Y.: McGraw-Hill Book Co, 1969.

[11] Immanuel Kant. Critique of Pure Reason. Translated from German by N. Lossky, verified and edited by Ts.G. Arzakanian and M.I. Itkin; Notes of Ts.G. Arzakanian. Moscow, Eksmo, 2007. 736 p.

[12] Tychinskiy A.V. Innovation management of companies: modern approaches, algorithms, experience. TSURE, KRES-2006.

goals of modelling and the loss of the modelling contents in its simulation. In this case, the following question is relevant: is it always necessary to take into account all the parameters of the object to obtain the desired model?

We suggest that it is necessary in the case of specific production and technical tasks associated with the work of any tools, machines and industrial complexes. As for modelling companies' activities or individual directions of their development, there are some specific features such as:[13]

− instability of statistical characteristics, variability of composition and non-stationary nature of factors that effect the course of the processes modelled at microeconomic level;

− instability of the external environment of the enterprise;

− presence of significant subjective component (influence of decisions taken at the enterprise) in the composition of factors of microeconomic processes;

− difficulty of applying statistical methods and approaches to modelling micro-objects, in particular, difficulties of forming a uniform general population of similar objects;

− possibility of adding «external» quantitative statistical information about the values of modelled indicators of «internal» quality information obtained directly from the insiders;

− absence of continuity in modelling, which is characteristic of macroobjects modelling, insufficient number of publications describing the progress and results of modelling this micro object.

Ultimately, the main problem in modelling is the probabilistic nature of the object parameters used to build an adequate model. This is expressed by a number of factors: irregular production; internal organizational changes that may adversely affect the production; irregular supplies of productive resources; unstable political and financial situation in the country of manufacture; changing market conditions, etc.

In this case, most companies resort to the analysis of trends and dynamics of the phenomenon considered. However, this leads to some averaged estimates, which can not provide the better quality of the model. When developing virtual models of the enterprise, the researcher will inevitably come to the need to take into account the economic system and conditions in general. Taking into account that any economic system is multidimensional and the real conditions are constantly changing and do not always meet the standards, mathematical programming can not fully reflect the conditions of practical implementation and, thus, can not always predict possible losses with sufficient certainty.[14]

To illustrate the difficulties of building the model at the enterprise, let us consider the following example.

The end product is obtained following several principal stages, from the product design on paper to its delivery to the consumer. After the approval of the technical task, it is given to the production department for the development of this product. The production department will send requests to the warehouse for spare parts and other necessary raw materials, or contact the procurement department with the same request. At the final stage of production, the sales department or distribution department will proceed with the delivery of the end product to the consumer.

Today, if the researcher has the task to develop the most beneficial model for a manufacturer, the number of states of each subsystem is so great that the search for the optimum is possible only through the methods of mathematical alignment using moving averages of the initial function.[15]

Production department. Possible load time of equipment, sequence of processes performed on the equipment, amount of work in progress, number of spoiled products and performance of quality department.

Warehouse. Available stocks of raw materials, limitations of products stock.

Sales department or distribution department. Sales figures projection, advertising, distribution facilities, competition.

Thus, it is practically impossible to achieve the optimum that would be the basis of the described model. In this regard, some researchers believe that this approach may be replaced with an approach that uses approximate solutions.[16]

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[13] Kleiner G.B. Modelling of decision-making mechanism in the enterprise. *Economics and mathematical methods*, 2002, no. 3.

[14] Skurikhin V.I., Zabrodskiy V.A., Kopeichenko Iu.V. Adaptive control systems for machinery production. Moscow, Mashinostroieniie, 1989. 199 p.

[15] Greshilov A.A., Stakun V.A., Stakun A.A. Mathematical Methods for Forecasts Building. Moscow, Radio i sviaz, 1997. 112 p.

[16] Motskus I.B. Multiextremal problems in designing. Moscow, Nauka, 1967.

In this case, there is a search for areas most closely resembling the optimum, but not the optimum itself.

Even in the late 1960s, scientists noted that the law of the objective function distribution in designing a system with a large number of arguments tends to converge to normal if the objective function (or its monotone transformation) is expressed by a number of terms, each of which depends on a limited number of variables. This condition is satisfied in most cases of EPS management. This enables us to use such optimization methods in managing companies' activities, which minimizes the foreseeable risks associated with the company's management and the possible losses due to finding the solutions (control system engineering costs).

To summarize, it may be concluded that high level of importance of modelling inevitably involves uncertainties and assumptions that are assumed at the initial stages of model development and accompany the modelling process to the very end. Thus, we can conclude that building a model is the process of adaptation. Any modelling involves the following stages: problem identification, problem settlement, the model development and its verification.

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METHODOLOGICAL ASPECTS OF THE INDUSTRIAL ENTERPRISES STRATEGIC DEVELOPMENT MANAGEMENT EFFECTIVENESS

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МЕТОДИЧЕСКИЕ АСПЕКТЫ ОЦЕНКИ ЭФФЕКТИВНОСТИ УПРАВЛЕНИЯ СТРАТЕГИЧЕСКИМ РАЗВИТИЕМ ПРОМЫШЛЕННОГО ПРЕДПРИЯТИЯ

Proposed method for evaluating the effectiveness of strategic management, based on a synthesis of qualitative and quantitative characteristics of the enterprise activity, allows you to fully determine the level of effectiveness of management of strategic development. The main results include the transition from the common qualitative (linguistic) characteristics in the evaluation of this type of management to quantitative, to lighten the immediate assessment process and not high complexity of the analysis of results. The developed system of indicators has been tested in several local enterprises from Volgograd region in Russian Federation and has shown it's effectiveness. In addition, we propose a general mechanism for action for increasing the indicator of the industrial enterprises strategic development management effectiveness.

VALUATION; EFFICIENCY; STRATEGIC MANAGEMENT; INDUSTRIAL ENTERPRISE; QUANTITATIVE INDICATORS; QUALITY INDICATORS; «TREE OF THE INDICATORS»; «BRANCH OF THE TREE OF THE INDICATORS»; INSTRUMENTS AND MECHANISM OF MANAGEMENT

Предложена методика оценки эффективности стратегического управления, основанная на синтезе качественных количественных характеристик деятельности предприятия, позволяющая в полной мере определить уровень эффективности управления стратегическим развитием. К основным результатам можно отнести переход от широко распространенных качественных (лингвистических) характеристик в оценке данного вида управления к количественным, простоту непосредственного процесса проведения оценки и невысокую сложность анализа полученных результатов. Разработанная система показателей апробирована на нескольких предприятиях региона и показала свою действенность. Предложен общий механизм действий предприятий по улучшению показателя эффективности управления стратегическим развитием.

ОЦЕНКА; ЭФФЕКТИВНОСТЬ; СТРАТЕГИЧЕСКОЕ УПРАВЛЕНИЕ; ПРОМЫШЛЕННОЕ ПРЕДПРИЯТИЕ; КОЛИЧЕСТВЕННЫЕ ПОКАЗАТЕЛИ; КАЧЕСТВЕННЫЕ ПОКАЗАТЕЛИ; «ДЕРЕВО ПОКАЗАТЕЛЕЙ»; «ВЕТВЬ ДЕРЕВА ПОКАЗАТЕЛЕЙ»; ИНСТРУМЕНТЫ И МЕХАНИЗМ УПРАВЛЕНИЯ.

Business activities in different spheres in the current market context involve finding and developing peculiar approach and strategies. For confident development a company should have such a ratio between costs and results of production which would allow it to be profitable in the long term; to seek new forms of capital investment, markets for their goods, works or services (GWS); to modify and improve its products to meet the requirements of the market; to find more effective ways to communicate with existing and potential customers; to implement reasonable trade policy; to apply fundamentally new methods of management.

It should be noted that by the term «strategic management development», many scholars such as D. Norton [5] R. Kaplan [5] M. Hazan [1] R. Chase [8], N. Ekviline [8], I. Ansoff [4], C. McConnell [6], S. Brue [6] P. Samuelsen [7], mean, in the first place, such kind of a company management which contributes to the company's strategic objectives, rather than the more common synonym of this term, defining it from the standpoint of urgency and symbolysing long-term goals of the company. Besides, there are many definitions of the term «efficiency». One of them determines 'effectiveness' of the relative effect, of the productivity of the process, operation of the project, defined as the ratio of the effect, the result, to the costs, expenses, contributing, ensuring, its acquisition. Another definition states that production efficiency is the market value of

the manufactured goods divided by the total costs of the company assets. It is difficult to evaluate the effectiveness of management, because there is no single view at the term of «efficiency» yet, however the effectiveness of management can be defined also as achievement of the best possible result using the control system with a given level of the operation costs to achieve the desired result, or reaching the required result with the lowest possible expences on management; the means by which the system of the facility management ensures the efficiency of the object managed, the effectiveness of the enterprise strategic development management being understood as such kind of management that contributes to the achievement of its strategic objectives at the lowest costs.

At the moment there is an uncertain situation about the criteria for evaluation of the industrial enterprises strategic development management effectiveness as a whole. Vagueness, ambiguity, lack of the concrete criteria of management effectiveness and the relevant indicators hampers the assessment of the real level of management. In its turn, this does not allow to determine the necessary specific effective management actions, at the same time effective management being impossible without the evaluation of the resulting effect, which makes the postulate of classical management. Thus, the study of criteria and indicators of strategic development of industrial enterprises actualizes this scientific research and determines the following tasks:

− to develop a methodology of evaluation of the strategic development management effectiveness at industrial enterprises;

− to test the developed methodology of evaluation of the strategic development management effectiveness at industrial enterprises;

− to identify ways of improving the strategic development management at industrial enterprises on the basis of tested results of the strategic development management effectiveness at industrial enterprises.

The industrial enterprise in the modern market economy is a part of a socio-economic system, functioning of which is due to the interaction of controversial factors of the external and internal environment, which, in turn, requires from the enterprise management

to apply the adequate methods for monitoring their condition, evaluation and taking into account while making decisions that will ensure the company homeostasis, competitiveness and operational effect.

In business management the complex of human, information, material, financial and other resources through their optimization should provide the balanced external and internal environment of the company. In this case, the parameters of the environment include the volume and intensity of demand, consumer preferences, competitive threats, the level of technological development, government regulation, potential risks − all of which makes up the starting point for the analysis in the system of strategic decisions that determine the requirements for the internal resources of the organization, its objectives, organizational structure, communication system, etc.

The strategic approach to the evaluation of industrial enterprises management effectiveness allows to provide the quantitative assessment of the qualitative components, using the qualimetric methods of company analysis, which are based on various expert evaluation methods [3]. Given considerable uncertainties of the dynamic environment, no traditional formal methods (factor analysis, a method of deviations, standard, etc.) afford an opportunity to make management decisions that ensure the effective functioning of the enterprise in the future. Thus, the necessary condition to identify and improve the use of resources of the enterprise is the introduction of an effective management system which can adapt to changing external and internal environment, embracing the entrepreneurial and organizational activities of the economic entity within their market behavior [3].

The industrial enterprise management is the management of the enterprise internal factors in total (the human resources, socio-economic and organizational factors), as well as their level of application and internalization, which, in turn, allows to optimize the cost and quality of the produced goods, operations or services, that is why process of management is impossible without the presence of a certain closed steady or developing system, within which the functions of management are realized. Moreover, in

contrast to the extensive development, characterized by the quantitative growth of the means of production and material resources on the previous technical basis, the intensive varient implies the inherent qualitative changes in the factors of production and transfer of the extended reproduction to the new technical foundation.

The industrial enterprise strategic development management is based on the following principles:

− The need to determine the ratio of the number of the goals achieved to their total number;

− The need to determine the ratio of «the performance «to «the costs» (or «exits» to «inputs» in terms of the systems theory);

− The need for compliance to the standard, which is known, among other names, as «benchmark».

− The need to ensure a certain satisfaction level of the participants with the process

Based on the stated above principles of the industrial enterprise strategic management, we have proposed the methodology of evaluation of the industrial enterprise strategic development management effectiveness which according to our reckoning should include a synthetic set of hierarchically grouped qualitative and quantitative indicators.

In accordance with the methodology of evaluation of the industrial enterprise strategic development management effectiveness (EIESDME) is carried out in several stages.

The first stage of evaluation is collecting the quantitative information about the object of analysis. The information is mainly obtained from various forms of the accounting (statistical) reports, records of planning and economic departments of enterprises, statutory, regulatory and other documents and is characterised by the quantitative data. Typically a complete package of information is the publicly available financial statement.

Fig. 1. The methodology of evaluation of the industrial enterprise strategic development management effectiveness

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The second stage is characterized by the collection of qualitative information about the object of evaluation. This kind of information mainly contains surveys and expert evaluations of the enterprise employees, whose opinions and experience of work in the industry allow to draw conclusions about their high level of expertise and knowledge as a whole. They can be managers and / or their deputies, heads of relevant economic services and departments, chief accountants and, in special cases, production line supervisors. The hands-on collection process of the necessary information for evaluation is done in the form of interviews / questionnaires according to specified conditions and within the quantitative interpretation of linguistic assessments by the scale of Harrington, the method which can be seen at Tab. 1 [2].

Table 1

Qualitative characteristics of evaluation of the features of the strategic enterprise resources quality structure by Harrington

Gradation of evaluation of feature	Qualitative characteristic of evaluation features
1.0	Maximum level
1.00−0.80	An excellent and reasonable level that exceeds the optimal commercial level
0.80−0.63	A good and acceptable level which is providing the optimal commercial level
0.63−0.40	Not good, but still an acceptable level (to ensure the competitiveness of the enterprise should be raised)
0.40−0.30	Bordering on an unacceptable level
0.30−0.10	An unacceptable level (prevents ensure the competitiveness of the enterprise)
0.00	A totally unacceptable level

At the third stage, estimating requires processing of the received data and the subsequent entry into the PC. To process the information we can use such software as mathematical complexes MathCad and MathStat; office applications OpenOffice Calc, MS Office Excel; software package Statistica and others [3].

At the final stage, after the receipt of the corresponding values of the complex evaluation of the industrial enterprise strategic development management effectiveness through the above three stages, follows the interpretation from the quantity evaluation to the quality one and recommendations are developed for each object of analysis. Calculations of complex indicators in qualimetry require using various kinds of mediums: harmonic average, geometric average, quadratic average, arithmetical average. The most widespread comprehensive evaluation of quality is based on the arithmetical average and geometric average. The main feature of the geometric average − it becomes zero if the evaluation of one of the properties is equal to zero. However, in our opinion, the use of the geometric average in the calculation of the complex index evaluation of the industrial enterprise strategic development management effectiveness is irrational, because at zero value of any component of analyzed indicator the composite index becomes zero.

Highly important in the development of the evaluation system is to determine the weight of individual components of the integral index EIESDME. In most cases, the indicator components are not equal as to their weight. However, in our opinion, all the elements of the developed complex EIESDME should be considered identical in weight, because, from the standpoint of qualimetry the properties of one level in the hierarchy in the evaluation of the test objects are equal and, therefore, the weight cannot be included in the final formula.

It should be noted that when of evaluating of the industrial enterprise strategic development management effectiveness in dynamics within the time range one should be guided by the generally accepted rule of this kind of questionnaire to avoid large fluctuations in the evaluation of complex indicators between the periods of these evaluations.

The initial level of performance evaluation of the industrial enterprise strategic development management effectiveness consists of a series of hierarchically ordered sub-indicators, which, in turn, are divided into the indicators of a lower order [3].

Schematically, the structure of the performance indicator of strategic enterprise management is presented in Fig. 2.

A   T   P   F   Q   S   I   C

EIESDME
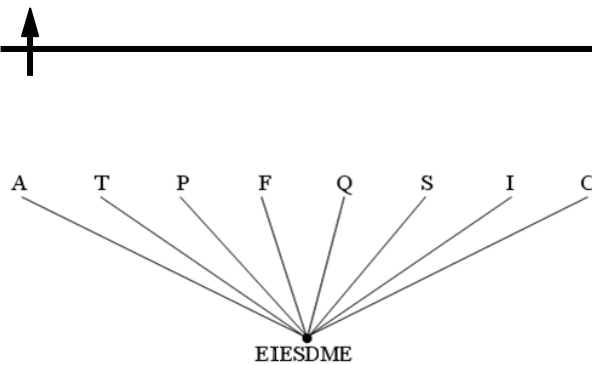
Fig. 2. Evaluation indicator of the effectiveness
of management of strategic development
at industrial enterprises

Proposed integrated indicator of the industrial enterprise strategic development management effectiveness is based on the estimates contained in [2, 3], and the Harrington's scale of the qualitative characteristics of evaluation properties of the structure as a strategic enterprise resource.

The first set of indicators of EIESDME is:

A − Indicator of commodity assortment management;

T − Indicator of transaction management costs;

P − Indicator of pricing management;

F − Indicator of the foreign economic activity;

Q − Indicator of quality management;

S − Indicator of staff management;

I − Indicator of investment management;

C − Indicator of cost management.

In their turn, the considered indicators are divided into several levels of a lower order forming a hierarchical structure of components of the complex industrial enterprises strategic development management evaluation. It includes:

A − Indicator of commodity management assortment is divided into: Indicator of consumer satisfaction; indicator of market capturing; indicator of marketing.

T − Indicator of transaction costs management consists of: indicator of legal support of transactions; indicator of generated order of market relations and indicator of potential partners aspiration for cooperation.

P − Indicator of pricing management includes: indicator of the pricing policy compliance to the type of the market; indicator of matching the pricing to the product life cycle (PLC); compliance indicator of the pricing policy to the general objectives of an organizational system and acceptance indicator of pricing for consumers.

F − Indicator of the foreign economic activity comprises: indicator of monitoring national economy rate; indicator of international marketing and indicator of opportunities of growth of foreign economic activity.

Q − Indicator of quality management is divided into: indicator of quality management system and indicator of opportunities to improve the quality system.

S − Indicator of Staff Management comprises the following: the indicator of the staff structurecompliance to the needs of an organizational system and indicator of formation of stable staff interest in results of operation of an organizational system.

I − Indicator of investment management is comprised of the index of investing into company's own activities and the index of foreign investments of the organizational system.

C − Indicator of cost management includes: orientation indicator of an organizational system for the rationing of costs and indicator of strategic cost analysis.

Subsequently, these indicators are also divided into still lower ones, according to the hierarchical structure of the methodology of the industrial enterprises strategic development management effectiveness, which have mainly quantitative characteristics.
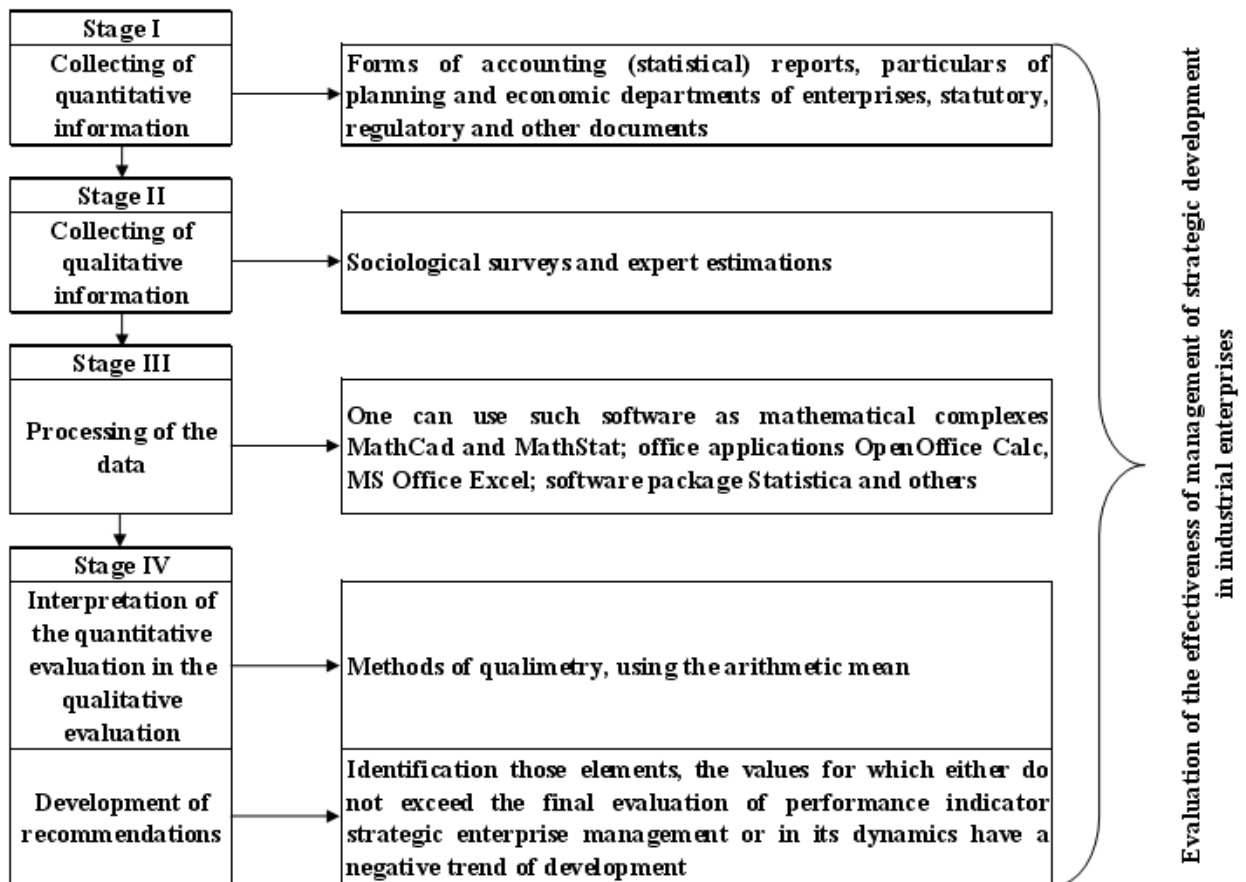
Approbation of the proposed methodology of evaluation of the industrial enterprise strategic development management effectiveness was carried out by three companies engaged in the production of various products of one of the regions of the Russian Federation − Volgograd region. In accordance with the method of analysis and evaluation of the industrial enterprise strategic development management effectiveness we have identified the strengths and weaknesses in the economy and also made recommendations about the choice of destinations for using the reserves to improve the strategic management quality.

To determine the value of the indicator evaluating the industrial enterprise strategic development management effectiveness all the obtained components were summarized in Tab. 2.

Analysis of the indicators included in the industrial enterprises strategic development management effectiveness indicator allows to conclude about the level of efficiency of the industrial enterprise strategic development management. We shall summarise the evaluation results for each of the enterprises into Tab. 3.

Table 2

Evaluating the industrial enterprises strategic development effectiveness

Year	Quarter	The changes of the effectiveness indicator of strategic enterprise management (EIESDME)		
		Enterprise #1	Enterprise #2	Enterprise #3
2006	I	0.8820	0.6463	0.6038
	II	0.8770	0.6388	0.5975
	III	0.8807	0.6563	0.5900
	IV	0.8985	0.6513	0.5775
2007	I	0.8834	0.6663	0.5750
	II	0.8812	0.6688	0.5763
	III	0.8703	0.6675	0.5725
	IV	0.8720	0.6763	0.5738
2008	I	0.8494	0.6750	0.5075
	II	0.8479	0.6800	0.5050
	III	0.8448	0.6750	0.5013
	IV	0.8517	0.6713	0.5125
2009	I	0.8242	0.6638	0.5163
	II	0.8195	0.6538	0.5250
	III	0.8238	0.6475	0.5100
	IV	0.8226	0.6488	0.5213
2010	I	0.8274	0.6463	0.5150
	II	0.8210	0.6525	0.5250
	III	0.8261	0.6513	0.5300
	IV	0.8314	0.6525	0.5288
2011	I	0.8302	0.6520	0.5285
	II	0.8304	0.6518	0.5283
	III	0.8300	0.6514	0.5282
	IV	0.8301	0.6516	0.5280
2012	I	0.8306	0.6523	0.5196
	II	0.8308	0.6521	0.5208
	III	0.8310	0.6580	0.5227
	IV	0.8329	0.6576	0.5246
2013	I	0.8311	0.6522	0.5286
	II	0.8314	0.6519	0.5285
	III	0.8310	0.6520	0.5283
	IV	0.8311	0.6518	0.5285

Table 3

The results of the industrial enterprises strategic development effectiveness evaluation

Enterprises	Interpretation of the values of the EIESDME
Enterprise #1	An excellent and reasonable level that exceeds the optimal commercial level
Enterprise #2	A good and acceptable level which is providing the optimal commercial level
Enterprise #3	Not good, but still an acceptable level (to ensure the competitiveness of the enterprise should be raised)

Summarizing the results of approbation of the methodology for assessing the effectiveness of industrial enterprises strategic development management it should be noted that its dynamics for a number of years may be due to a variety of circumstances, both internal and external, which may include, inter alia, regional factors or random samples of regional enterprises in other business entities — in this case, results of the evaluating and conclusions about the effectiveness of the their management with the necessary recommendations will be different. One can assume that for other enterprises from other regions (for example, regions with depressed nature of the economy or the economy characterized by persistent recession) the results of evaluating the strategic development management effectiveness will also be different, which, in its turn, depends on the specificity of a particular case. It will call for the development of recommendations of another kind, requiring from the enterprise's management to take adequate decisions corresponding to the current situation.

It is also necessary to note the impact of the global financial crisis on the strategic development management effectiveness at all considered companies, which in varying degrees has had the negative impact on the performance of each group of indicators included in the evaluation.

The general mechanism of action of enterprises to improve the integral index of strategic development management efficiency, taking into account special events of the institutional, industrial and economic character, is shown in Fig. 3. It should be noted that this is a generalized mechanism of actions that does not involve specific rare and complex individual cases that can be discovered at other enterprises.
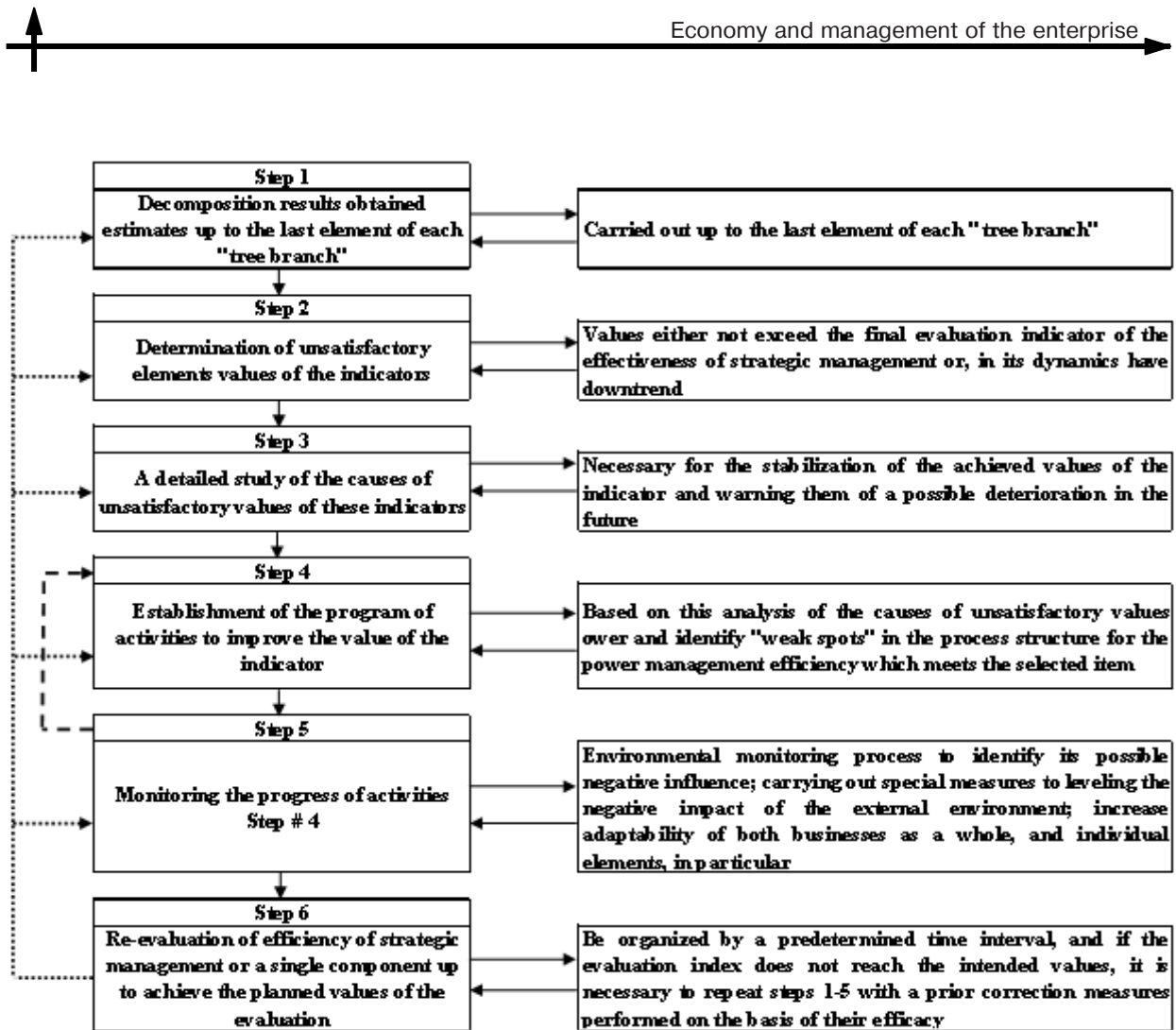
Fig. 3. The common mechanism of action for improve the index of effectiveness of the strategic development

Thus, this article presents evidence that in order to improve the industrial enterprises strategic development management efficiency it is necessary to organize the diagnostic system which includes the monitoring, evaluation and correction of the enterprise resources, in which, alongside with the traditional methods of design and management decisions, the method of qualimetry should be included.

Developed is a methodology of the industrial enterprises strategic development management effectiveness, which includes a synthetic set of hierarchically grouped qualitative and quantitative indicators. Suggested are specific recommendations on the analysis and evaluation of the industrial enterprise strategic development management effectiveness. The essence of the methodological and practical suggestions, recommendations is that they are aimed at solving problems related to the mobilization of internal resources to overcome the crisis, to improve the efficiency

and competitiveness of enterprises, primarily working at the consumer market for goods, operations and services. Results of evaluation of the industrial enterprise strategic development management effectiveness allow to identify the strengths and weaknesses of economy, to clarify the level of use of reserves to improve the strategic management quality.

Methodological and practical recommendations can be used in selecting strategic directions of development for enterprises engaged in different activities, and contribute to reduction of company's costs and improvement of the quality of the produced goods, operations and services. The results of research also can be used for determining the recommendations for constructing of a permanent (operational) system of the industrial enterprises strategic development management effectiveness, as well as finding solutions to the problems encountered in the implementation of such systems in all kinds of organizations.

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APRAISAL FEATURES OF INTAGIBLE ASSETS CONTRIBUTION TO THE PERFORMANCE OF AN INTERNATIONAL COMPANY

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ОСОБЕННОСТИ ОЦЕНКИ ВКЛАДА НЕМАТЕРИАЛЬНЫХ АКТИВОВ В ПОКАЗАТЕЛИ ДЕЯТЕЛЬНОСТИ МЕЖДУНАРОДНОЙ КОМПАНИИ

The subject of this research are non recognized assets in the accounting (which is known as intellectual capital) which represent as a significant part of company assets contributing to company performance and value. The object of the study is the international auditing company KPMG. Based on this study we have evaluated the effect of the value of intangible assets on key performance indicators such as profit, reinvestment rate, invested capital and return on equity. The investigation has shown that the net effect of fair recognition of capital costs on intangible assets of the company for that they are significant competitive advantages is most evident in the estimates of return on equity and reinvestment rates.

INTELLECTUAL CAPITAL; INTAGIBLE ASSETS; HUMAN CAPITAL; COMPANY'S PERFORMANCE; COSTS CAPITALIZATION.

Предметом исследования в настоящей работе являются активы, не признаваемые в бухгалтерском учете (интеллектуальный капитал), но представляющие значительную часть общих активов и дающие значительный вклад в показатели деятельности и стоимость компании. Объектом исследования является международная консалтинговая и аудиторская фирма КПМГ. На основе результатов исследования проведена оценка влияния нематериальных активов на ключевые показатели деятельности компании — такие, как прибыль, ставка реинвестирования, рентабельность собственного капитала, инвестированный капитал. Исследование показало, что чистый эффект от правильного учета капитальных затрат на нематериальные активы компании, для которой они являются значимыми конкурентными преимуществами, наиболее сильно проявляется в оценках ставок реинвестирования и рентабельности капитала.

ИНТЕЛЛЕКТУАЛЬНЫЙ КАПИТАЛ; НЕМАТЕРИАЛЬНЫЕ АКТИВЫ; ЧЕЛОВЕЧЕСКИЙ КАПИТАЛ; ПОКАЗАТЕЛИ ДЕЯТЕЛЬНОСТИ КОМПАНИИ; КАПИТАЛИЗАЦИЯ ЗАТРАТ.

Introduction. Nowadays, assets based on knowledge determine the competitiveness and success of companies within all sectors of the economy. Knowledge, skills, employees' creative activities, computer hardware and software, an organizational structure, customer relationship, brands play a significant role in business life [1]. The relevance of this work is explained by the increasing role of intangible assets (intellectual capital) in the creation of the company's values.

The evaluation and measurement of such assets could become a real problem for investors. It is necessary to understand the peculiarities of their accounting and reporting as they may differ significantly from the standard approaches adopted in manufacturing companies.

The aim of the research is to study the contribution of intangible assets in company's performance.

The object of the study is the international auditing company KPMG.

The subject of the research are assets not recognized in the accounting (intellectual capital) represented as a significant part of company assets contributing to company value are

1. Interpretations of intangible assets (intellectual capital). The most popular point of view in relation to the definition of intangible assets is presented in the majority of works where terms «intangible assets» and «intellectual capital» have different meanings [2−7].

Authors cling to the notion [9] that intellectual capital (intangible assets) should be divided into two subgroups: recognized and non-recognized intangible assets in accounting. It is the most appropriate interpretation of intellectual capital. T.A. Garanina proposes to

use a «balance sheet approach» as the definition of intangible assets. The main idea is that «intangible assets» and «intellectual capital» mean the same things but from different perspectives. For instance, the term «intangible assets» is used taking into consideration the existence of assets and the term «intellectual capital» is used taking into consideration the source of asset value formation. While the revaluation of recognized and non-recognized in accounting intangible assets the revaluation surplus is not originally included in the Balance Sheet line «Intangible assets», so the organization increases assets by the size of the fundamental value of the identified intangible assets. And since assets are revalued by a certain amount, the liability balance should be increased by the same value.

It is proposed to reflect the revaluation of intangible assets in the balance sheet as the part of company's equity. «Intellectual Capital» represents the intangible component of the company's capital. This revaluation causes increase in the cost of capital and hence the value of the company for shareholders [9].

2. Composition and structure of intangible assets. For the diagnostics and subsequent measurements of the identifiable and unidentifiable in accordance with accounting and reporting standards of intangible assets of the company, it is important to understand the structure of intangible assets. This issue is controversial and there is no consensus among researchers how to determine the notion «intellectual capital» [10−13].

The approaches of different researchers to the issue of the intellectual capital structure are based on the classification of intangible assets developed by the International Federation of Accountants [14]. It proposes to determine three structural components within intellectual capital: human, organizational (structural) and capital of relations.

Human capital consists of knowledge, skills and employees' experience as well as the ability of a company to benefit from their knowledge, skills and experience.

Organizational (structural) capital is not reflected in the financial statements and involves everything in organization that remains with the firm even when employees leave. This is the most diverse part of the IC. This includes

intellectual property rights, information resources, working procedure, the management system of the company, etc., as well as the organization's ability to derive the economic benefits.

Capital of relations is the set of resources associated with the firm's external relations, i. e. relationships with customers, suppliers, partners, creditors and other stakeholders as well as the organization's ability to derive economic benefits from the resources associated with firm's external relations. This capital includes trademarks and service marks, brand names, a business reputation, the presence of insiders in partner organizations or clients, regular customers, repeat customer contracts and etc. [7].

3. Value and measurement of intangible assets. For the effective management of intangible assets it is important not only to define the concept and to analyze the structure of intellectual capital but it is also important to know how it could be assessed. The question of intellectual capital evaluation worries a lot of researchers and it is quite controversial. There are lots of models and methods to measure the value of intangible assets, but each of them can be attributed to one of four main approaches proposed by K. Sveiby.

1) Direct Intellectual Capital Methods − DIC;
2) Market Capitalization Methods − MCM);
3) Return on Assets Methods − ROA;
4) Scorecard Methods − SC.

One of the most illustrative assessment instruments defining the role of intangible assets in the company value is the market value of the companies for which intangible assets are the main factors of competitiveness in the market (pharmaceutical, consulting or technologic companies). Nowadays the number of companies where intangible assets represent the main factor of their value has been growing steadily [13]. However, organizations with intangible assets have their unique features.

One of them includes a specific representation of intangible assets in accounting in comparison with physical assets. Accounting is based on a clear distinction between capital and operating costs. Any expenses aimed to generate long-term economic benefits are capitalized, in other words they increase the value of company assets. Those expenses whose benefits are evident only in the current reporting period are charged to operating

expenses and thereby they reduce net income. This division can be observed in a manufacturing company as follows: money spent on the manufacturing equipment which will be operated for a few years are defined as capital expenditures; labor costs and the purchase of stocks are defined as current costs.

However, these principles do not work when a company has a large share of intangible assets. Pharmaceutical and technology companies make the most significant investments in research, research and development. Companies specializing in the production of consumer products invest into brand building. Consulting and auditing companies mostly spend their money on staff recruitment and training. In spite of the fact that these examples demonstrate that spent money is aimed to long-term benefits, they are classified as current expenses in accounting. It is explained by the fact that it is difficult to measure benefits from such investments in monetary terms. Consequently, the value of such assets and the net income of a company seem to be too low.

Thus, approved standards to calculate profits, capital expenditures, assets in accounting are applicable mostly to manufacturing companies where the proportion of intellectual capital is not as significant as, for example, in high-tech companies. Applying standard accounting methods to the latter results in the situation where the financial statement do not present a clear and true picture of the company's business and its value.

In order to adequately evaluate the company with a significant part of intangible assets, it is necessary to record capital expenditures correctly and recalculate the fundamental operating rates of their activities.

4. Solutions to the problems related to the valuation of the companies with intangible assets. To determine the value of the company with a significant share of intangible assets it is necessary to reallocate current and capital expenditures and then make adjustments to the financial statements, namely in the Balance Sheet (Statement of Financial Position) and Income Statement (Profit and Loss Statement)

To solve this problem it is necessary to determine which of expenditure incurred should provide the future growth of the company, i. e. which costs should be capitalized. For example,

the results of scientific research are quite difficult to measure in monetary terms, therefore, as a rule, all development costs are written off as current expenses. As a result, assets caused by research and development are not reflected in the balance sheet as the assets of the organization that influence on the cost of capital and company profit. Within this approach the authors recognize R&D expenses as a capital expenditure regardless of how uncertain they may seem.

For companies that provide professional services (consulting, audits), capital costs are represented by different training courses as a qualified staff is the most important asset of the company.

We should be careful and cautious while charging such expenses to capital ones. An essential condition to reallocate operating expenses to capital costs is the assurance that the effect produced by such investments will be appreciable for several years.

The capitalization procedure of costs on the intangible assets formation can be described as follows:
− To identify the period when the effect from expenditures recognized as current will be appreciate;
− To assess the value of assets obtained as a result of expenses incurred. Then the given sum is added to the carrying value and is used in the calculation of a lot of coefficients and rates which are important for the company assessment;
− To calculate the operating profit including capitalization costs and reducing operating expenses that make the income lower.

Thus, our approach has the following features:
− a direct method to measure the components of intangible assets in monetary terms is applied;
− measurements can be made for each company regardless of the presence or absence of a quoted market price of its shares;
− received quantitative data can be easily checked and compared with those of other companies.

5. Valuation of KPMG's intangible assets. We have chosen the international company KPMG providing audit, tax and consulting services as the object of our investigation. This choice is conditioned by the prevailing competitive advantage of a consulting company

is its intellectual capital, mainly knowledge and skills of employees. A high quality of services is achieved by significant competitive advantages, a vast experience, a stable highly-qualified staff, diversification, a successful application of proven techniques, providing IFRS services, a huge scale of the customer base, deep knowledge of the issues and possession of industrial enterprises, high corporate and information culture. In other words, KPMG is a typical example of a company with a high proportion of intangible assets.

To achieve the purposes of our investigation we have used the consolidated financial statements of the group of companies KPMG LLP Europe consisting of firms-members of KPMG network from 19 countries. [15] The estimation of some specific indicators that are necessary to analyze the role of intangible assets in the company's value was based on the extrapolation of data obtained from one firm member of KPMG network, namely the North-Western Regional Centre KPMG included in KPMG CIS (ZAO KPMG − a legal entity in Russia and CIS).

5.1. *KPMG profile.* KPMG is one of the largest professional services companies in the world and one of the Big Four auditors, along with Deloitte, Ernst & Young (EY) and PricewaterhouseCoopers (PwC). Its global headquarters are located in Amstelveen, the Netherlands. [1]

KPMG employs 152,000 people [3] and has three lines of services: audit, tax, and advisory. Its tax and advisory services are further divided into various service groups.

The trademarks of KPMG International are the KPMG logo and the slogan «cutting through complexity».

KPMG CIS is a part of KPMG Europe LLP − an international organization that provides professional services in audit, tax and financial advisory services which are designed to help national international clients in risk management and the successful implementation of activities in any economic environment. As of 2011, September the total number of staff in the KPMG CIS was approximately 3,400 employees. There are 18 offices of the company operating in CIS.

KPMG is a registered trademark of KPMG International and the name under which the company generally known − members. The rights of member firms to use the name and the trademark were embodied in KPMG International agreements.

5.2. *Correction of KPMG financial statements based on costs reapportionment.* Applying the approach of real value of intangible assets reflection described in paragraph 3 to the company chosen, we consider recruiting and training employees costs to be capital expenses as highly qualified consultants are the main value of the company and provide benefit for years.

In some cases it is advisable to include some part of the costs on staff incentive and additional social packages into the capitalization. However, in our case, the data on such costs were not available.

For capitalization and assessment of the human capital it is necessary to:

1) Calculate recruiting and staff training costs;

2) Make an assumption how long the effect from incurred costs will be seen and calculate the capital invested in employees;

3) Calculate the correct book value of equity and make appropriate adjustments to financial statements.

P h a s e I . Within the approach to study the role of intangible assets in the formation of the company value we should to evaluate the part of the intellectual capital of the company KPMG capitalized, − namely, human capital − in monetary terms. To measure it we will use the method providing for the direct calculation of the original cost of the components of human capital, namely the company's cash spent on recruitment and training.

Cash invested in company KPMG's human capital development is determined according to the following formula:

$$HC = C_{rec} + C_{edu}, \qquad (1)$$

where HC − human capital; C_{rec} − staff recruitment cost; C_{edu} − staff training costs.

The analysis of a personnel movement in the Northwest regional center ZAO KPMG has shown that the average turnover rate is 14 %. This figure is within the norm we take into consideration the general industry trend of audit services and the specific character of the labor market. However, it means the constant necessity

for recruiting new staff and consequently it causes the significant costs to attract new employees.

In order to calculate the staff recruitment cost (C_{rec}) we have identified the components of this account cost and calculated them:

$$C_{rec} = 3\ 826\ 984\ \text{€}. \qquad (2)$$

Please refer to Appendix 1 for a detailed calculation.

Auditing services are directly related to the qualifications of people who provide them. So KPMG take the question very seriously providing its employees with training and certification ACCA («Association of Chartered Certified Accountants») at the expense of the company. Getting this Certificate confirms the professional knowledge, skills and professional values in accounting. Learning is provided through passing professional exams (four exams per year of employment). The results of such examinations affect the annual evaluation of employees and their further promotion.

Similarly to recruitment cost calculation we have approximately measured the annual staff training cost:

$$C_{edu} = 57\ 501\ 815\ \text{€}.$$

Please see on the Appendix 2 for a detailed calculation.

Thus, having measured the main components of human capital of KPMG Company we can assess it in monetary terms:

$HC = 3\ 826\ 984 + 57\ 501\ 815 = 61\ 328\ 799\ \text{€}$

P h a s e I I . In order to evaluate and capitalize intangible assets properly it is necessary to make an assumption how long effect of the costs incurred will last. This is called the amortization period for these intangible assets. Taking into consideration that employees leave KPMG after they have worked there for 3 years on average, the amortization period of selected assets will be equal to three years.

When the amortization period is determined the next step is to collect data on the costs to create human capital over the past years. It means years that compose the depreciation period of these costs. Thus, if the amortization period is 3 years, then we need to collect the

costs to create intangible assets for the previous 3 years. Making adjustment for inflation of the euro in 2012, 2011 and 2010, as well as changes in the number of employees in 2009 (a rising trend), we have calculated the approximate cost of human capital in 2009, 2010, 2011 and 2012. See the table in Appendix 3.

T a b l e 3 . 1

Presents the costs for recruiting and training staff
(year −1 indicates a year ago; −2 − two years ago, etc.).

Year	HC cost	Unamortized portion		Depreciation for the year, thousands of euro
		%	thousands of euro	
Current	61 329	100.00	61 329	
−1	56 504	66.66	37 666	18 833
−2	51 367	33.33	17 121	17 121
−3	46 624	0.00	0	15 540
	Total		116 115	51 493

To simplify the calculations we assume that for the amortization of intangible assets in KPMG a linear method is used. It means that each year a third part of original value of the assets is written off. As a result of our calculations the accumulated depreciation for 2013 will amount to 51.493 thousand euro. The amount of unamortized costs for the previous 3 years, which is equal to 164.331 thousands of euro, compiles the capital invested in intangible assets.

P h a s e I I I . The company's assets increase by the same amount of the capital invested in intangible assets calculated in the previous step. Consequently the book value of company's equity will increase too (the data are taken from the consolidated financial statements, KPMG LLP Europe [15]):

Corrected book value of equity =
= Stated book value of equity +
+ Capital invested in capitalized intangible assets =
= 459 million + 116 million = 575 million euros

Then it's necessary to correct the profit of the period that it could reflect recruitment and training of employees costs capitalized. Thus, firstly we restore the expenditure incurred, which were expensed as current expenses of the period and add them to profits. After that we should

deduct depreciation accrued from capitalized cost. So we could calculate corrected net income and operating profit:

$$Corrected\ operating\ profit =$$
$$= Declared\ operating\ profit +$$
$$+ Cost\ of\ intangible\ assets -$$
$$- Amortization\ of\ intangible\ assets =$$
$$= 896\ million + 61\ million - 51\ million\ euro =$$
$$= 906\ million\ euros$$

$$Corrected\ net\ income =$$
$$= Declared\ net\ profit + Costs\ for\ IA -$$
$$- Amortization\ of\ intangible\ assets =$$
$$= 861\ million + 61\ million\ rubles -$$
$$- 51\ million\ rubles = 871\ million\ rubles.$$

The increase in corrected operating profit is observed in those companies where the capital invested in intangible assets increases every year.

5.3. *Effect of intangible assets capitalization on the performance of KPMG.* The company's index ROE has changed after making adjustments to the carrying amounts of capital and operating profit of the company (see Tab. 2).

Table 2

The return on equity

Index		Before IA capitalization	After IA Capitalized
Operating profit, EUR mln	[1]	891	906
Net profit, EUR mln	[2]	861	871
Equity, EUR mln	[3]	459	575
Return on equity, ROE	[4] = [2]/[3]	188 %	151 %
Return on equity before tax	[5] = [1]/[3]	194 %	158 %

In spite of being impressively high net profit ratios of KPMG (ROE is more than 100 %), however, they decreased significantly after adjustments to the balance sheet and the financial report.

The process of the capitalization to create intangible assets costs, whose effect will be evident in the future, consists of the correction of actual financial statements and in the recalculation of basic indicators used while assessing the company's value, such as income, investment rate and profitability.

Let us consider changes in these figures in detail:

1) Profit. On conditions that costs on capitalized intangible assets are growing every year, we get profit larger than the original one if we add capitalized costs by deducting accumulated depreciation to the stated profit. For instance, in KPMG the expenditures on searching and training staff have increased over the last three years from 46 million euro to 61 million euro and the profit has increased by 10 million euro.

2) Reinvestment. The same scheme works in reinvestment. Having made adjustments to the financial statements the reinvestment rate usually increases.

3) Capital invested. The depreciated value (a historical cost of IA less accumulated depreciation) of intangible assets (an unamortized portion of creating intangible assets costs) is capitalized and thereby it increases the cost of equity and the total capital of the company. This effect of capital increase is enhanced with the increase in the depreciation period. Therefore, it is not so evident in consulting companies in comparison with e. g. pharmaceutical companies (where the term of the approval of new medical devices is approximately equal to 10 years).

4) Return on equity. As the capitalization of current expenditure causes changes in both profit and capital invested it is difficult to predict whether it will impact on the ROE. But if the company's ROE increases due to the capitalization of costs, we may come to the conclusion that the intangible assets, whose creation costs have been capitalized, bring more profit to the company in comparison with traditional investments.

Conclusion. The conception of intellectual capital includes not only recognized in the accounting intangible assets such as trademarks, patents, licenses, but also assets that directly determine the company's ability to exist in the market and get profits: an organizational structure, business processes, the qualifications and experience of the employees, customer loyalty, database vendors, etc.

Despite a fairy large number of scientific papers devoted to the studies of an influence degree of intellectual capital on company performance, the issues of transparency and reliability of company financial statements with a significant part of the intangible assets, as well as the problem of the reflection of the real value and success of the company, these problems still remain unresolved.

Based on this study we have evaluated the effect of the value of intangible assets on key performance indicators such as profit, reinvestment rate, invested capital and return on equity.

The investigation has shown that the net effect of fair recognition of capital costs on intangible assets of the company for that they are significant competitive advantages is mostly evident in estimating reinvestment rates and return on equity.

The methods of assessing the cost of human capital and adjustments to the company performance, described in this paper, is of interest primarily for companies with high personnel costs, whose business is largely determined by a qualified staff. It refers to information technology, consulting, education and others.

The described advantages of the approach are to use the direct method of measuring the value of the components of intellectual capital in monetary terms for a particular company with further company performance which brings the opportunity, first of all, for investors to assess the company adequately.

Nowadays, however, the role of knowledge is continuously increasing in all sectors of the economy and it is reflected in the increasing costs of the company on staff training. We have shown in our study that these amounts being technically the costs are actually effective capital investments and no doubt the top managers of companies should take into consideration it while approving corporate budgets.

Appendix 1

Calculation of cost on recruitment

No.	Cost item	Clarification	Estimated Cost for a single country*) or office **), rub.	Estimated Cost for the Group, rub.
[1]	[2]	[3]	[4]	[5] = [4]*143* or [5] = [4]*19**
1	Using the services of agents recruiting	Agency fee in the amount of 20 % of annual salary to hire staff	700 000	100 100 000*
2	Finders Fee	Remuneration for the employee which is a proposed candidate for the position		
3	Use of information resources, such as HH.ru, Linkedin, etc.	Payment for access to databases of candidates and convenient search		
4	Carrying out first rounds	Payment of an electronic recourse to conduct online test	1 000 000	19 000 000**
5	Holding job fairs for students, graduates and young professionals; Career days; Competitive activities for students	Advertising: streamers, banners, printed products, publications; Gift branded products; rent, stands; catering staff, guests	2 000 000	38 000 000**
			Total rub.	157 100 000
		The average exchange rate for the euro for 2011-2013 according to the CBR		41.0506
			Total Euro	3 826 984

Appendix 2

Calculation of cost on staff training

No.	Cost item	Clarification	The approximate cost of one exam, rub.	Estimated Cost for 1 person per year, rub.	Estimated cost of training employees for the year rub.
[1]	[2]	[3]	[4]	[5]=[4]*4	[6]=[5]*32300
1	The main course (Block course)	Payment 3-day workshop with a trainer, including access to electronic materials, the possibility of visiting the webinar exam preparation and work on the bugs Mock exam, writing Tests, Mock Exam	12 150	48 600	1 569 780 000
2	Tutorials and Online support (Classic package all papers)	Payment provided training programs; access to electronic knowledge base eBook Study System with power for self (Study Question Bank); two tests with answers; Intermediate test with answers; Mock exam with answers; Tips for the exam; Help tutor	1 400	5 600	180 880 000
3	Exam	Exam Payment opportunities to pass the exam	4 720	18 880	609 824 000
				Total rub.	2 360 484 000
	The average exchange rate for the euro for 2011-2013 according to the CBR				41.0506
				Total Euro	57 501 815

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UDC 330

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PROCESS AND PROJECT ORIENTATION OF THE ORGANIZATION AS A MANAGEMENT STRATEGY

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ПРОЦЕССНО-ПРОЕКТНАЯ ОРИЕНТАЦИЯ ОРГАНИЗАЦИИ КАК СТРАТЕГИЯ УПРАВЛЕНИЯ

The paper deals with aspects of forming business architecture of the organization management. The authors use a self-acting university as an example and develop a strategic map, according to which a system of business processes and portfolio of projects aimed at the implementation of strategic goals are formed. Process and project orientation is considered as the foundation of the organizational strategy. Systematizing scheme of business processes, project portfolio and organizational structure elements represent the basic elements of the organization's business architecture.

SELF-ACTING UNIVERSITY; PROCESS MANAGEMENT; PROJECT MANAGEMENT; STRATEGIC MAP; UNIVERSITY STRATEGY MANAGEMENT; ENTERPRICE BUSINESS ARCHITECTURE.

Рассмотрены аспекты формирования бизнес-архитектуры управления организацией. Разрабатывается стратегическая карта организации на примере автономного вуза, в соответствии с которой формируется система бизнес-процессов и портфель проектов, направленных на реализацию стратегических целей. Процессно-проектная ориентация рассматривается как основа организационной стратегии. Систематизирующая схема бизнес-процессов, портфель проектов и элементы организационной структуры выступают в качестве базовых элементов бизнес-архитектуры управления организацией.

АВТОНОМНЫЙ ВУЗ; ПРОЦЕССНОЕ УПРАВЛЕНИЕ; ПРОЕКТНОЕ УПРАВЛЕНИЕ; СТРАТЕГИЧЕСКАЯ КАРТА; СТРАТЕГИЧЕСКОЕ УПРАВЛЕНИЕ ВУЗОМ; БИЗНЕС-АРХИТЕКТУРА ПРЕДПРИЯТИЯ.

Introduction. The effective operation of modern organizations and enterprises are inextricably connected with process management. Back in the early 1930s, the idea of re-orientation of the enterprise structure from a functional organization to a process approach appeared, which eventually led to the emergence of concepts such as business process management and business process optimization.

The more organizational units are involved in the business process, the more complex it becomes to control this process, allowing for that the process model exists only «in the heads» of its executors and supervisors. Process management involves modeling the main processes of the organization with the help of special tools and provides planning, management and control of them.

If business processes are aimed to deal with recurring tasks aimed at achieving a stable result, the unique challenges require a different management approach, which is implemented with the help of project management.

Project management is the application of methods, tools, techniques and competences to a project (ISO 21500 international standard) [11].

There are many approaches to management of projects, under which certain standards and methodologies of project management developed. Most common of them are PMBOK (The Project Management Body of Knowledge by Project Management Institute, USA), P2M (A Guidebook of Project and Program Management for Enterprise Innovation, based on Japanese experience), PRINCE2 (Projects IN Controlled Environment, Great Britain) and others. In the Russian Federation A National State Standard R 54869 − 2011 «Project Management: Project Management Requirements» was constituted in January 2012 [8].

Business processes functioning and project implementation not only provide the current activities of the company, but also act as an important component of strategic management. Identifying and developing key business processes and projects which encourage the

organization to achieve its strategic goals will improve the effectiveness of strategic management.

Some specific conditions of using a process-project approach to organization management is largely dependent on the scope of its activities, which necessitates the development of not only the general concepts, but also industry-oriented solutions. In particular, the application of a process-project approach is helpful in the management of higher education institutions (hereinafter − universities), in which business processes (such as the educational process, preparation of teaching materials; administrative and economic activities, etc.) are realized pari passu with business processes (such as the development of new curricula; organization of scientific conferences; construction of new buildings, etc.) and require an integrated approach to their operation and implementation. Considering processes, projects and organizational structures associated with their implementation, as interrelated elements of the enterprise business architecture allows realizing the needed integrated approach.

The applicability of this approach in Russian universities is determined by the necessity to modernize the approach to management and administrative processes, as well as their coherent functioning with educational and research projects. Focusing on the strategic planning of the university, as well as the use of a process-project approach in its management also becomes relevant in the view of the task that has been set by the President of the Russian Federation in May 2012, which is about ensuring the entry of at least five Russian universities in the top one hundred of the world's leading universities according to QS world university ranking.

Literature review. As a theoretical framework for the strategic development, authors use the monograph, edited by A.V. Babkin [1], in which the basic tools and techniques of strategic planning in the economy and industry are given. Also, the authors adhere to the classical theories of the strategic development of the authors D. Norton, R. Kaplan, M. Porter [5, 6]. Their works give the detailed description of tools such as strategic map, value chain, used by the authors to develop a strategy for an autonomous university.

Modeling and management of business processes is the main subject of the works of J. Becker, V. Taratoukhin, L. Vilkov and others.

In work [2] they justify the necessity of modeling business processes in different organizations, including education, the basic steps and technologies of modeling are given that formed the basis of this article.

University management issues are discussed in [3] of the authors Y.S. Vasiliev, V.V. Glukhov, M.P. Fedorov. Here the various levels of university management are described, with issues of budgeting and cash flow management, social work and propaganda work with a potential student. However, systematizing scheme of business processes and strategic map of the university are not included in their work, which has become the aim of this paper.

Development of the organization strategic map. An important factor in the success of modern organizations is the ability to accurately formulate strategic goals, as well as to convey their content and importance to all employees. One of the most common tools of strategic management in the organization is a strategic map that allows documenting key strategic goals set by the top management of the organization, and «cascading» them to lower levels. Strategy maps for this purpose were first suggested in the article of the balanced scorecard authors Robert Kaplan and David Norton, and are still relevant for organizations that aim to realize strategic activity in a more efficient way [5].

The authors attempt to develop a strategic map of a Russian autonomous university (Fig. 1). The choice is made in favor of an autonomous university in the view of the fact that in recent years more and more universities of Russia will receive this status. The autonomous university has a right to dispose of their property, including real estate, is entitled to the consent of the owner to be the founder of other organizations, has the discretion to provide a variety of services, not only educational [7].

It should be noted that the strategic map is not just one of the elements of the balanced scorecard, but the first and key step of its implementation. The main goals of the organization, as well as key performance indicators, as reflected on the strategic map in accordance with the so-called «perspectives» (standard perspectives proposed by the authors are: «Financial», «Customer», «Internal Business Processes», «Learning & Growth»), display the relationship of individual elements of the enterprise (organizational elements, business processes).
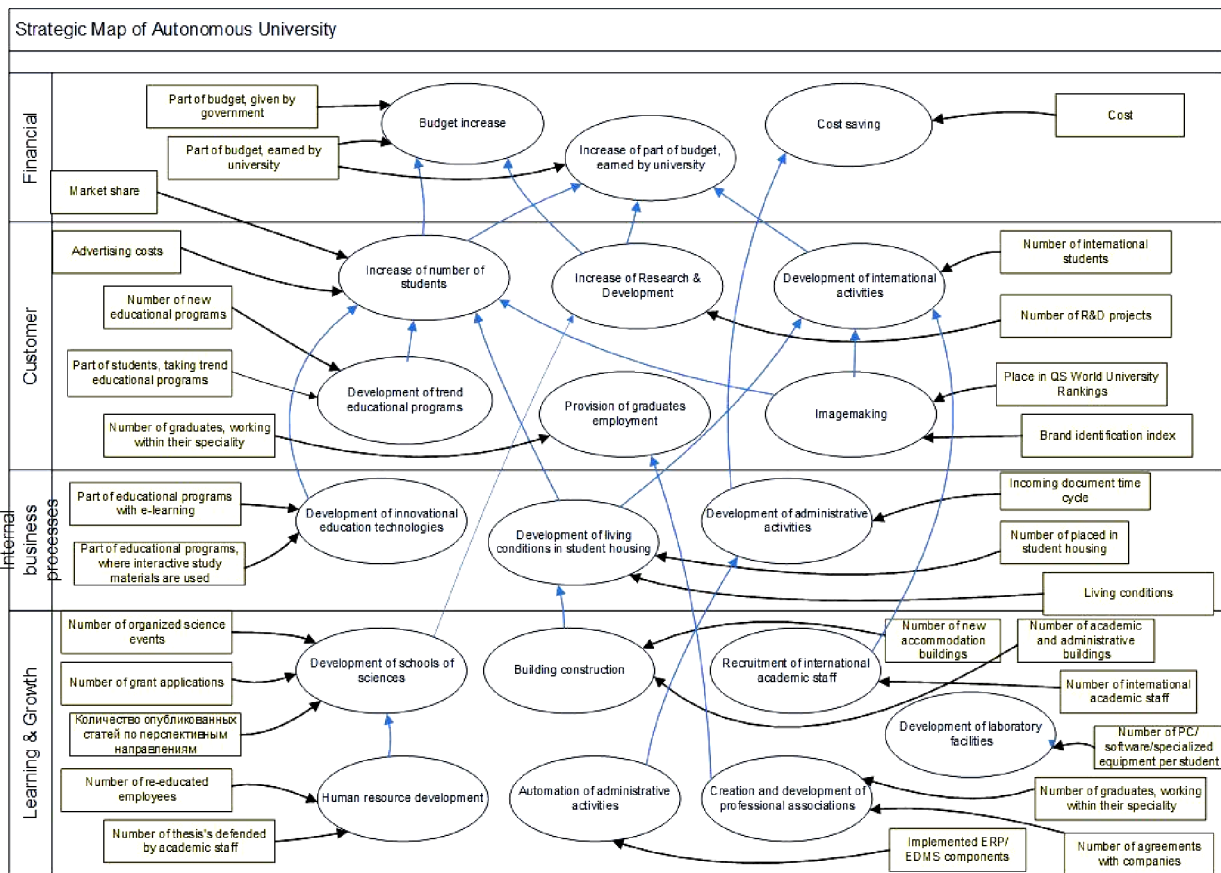
Fig. 1. Strategic map of an autonomous university

For example, the financial component of the proposed strategy map is composed of three main objectives: «Budget increase», «Increase of a partial budget, earned by the university» and «Cost saving». Thus, the purpose of the autonomous university is not only an increase in government funding (which is obtained by increasing the number of students supported by the government funding and increasing R & D funding from the federal budget), but also an increase in the overall budget a part of self-earned money (earned by students studying on a fee-paying basis, business contracts with enterprises and other activities that generate an additional income).

Achieving strategic financial goals is not possible without considering such goals as customer-oriented ones, such as «Increase of number of students», «Increase of R&D», «Development of international activities.» In its turn, the development of internal business processes of the university, presented in the form of goals «Development of innovational education

technologies», «Development of living conditions in student housing» and «Development of administrative activities» contributes to achieving the goals related to the attraction of new customers and improving the quality of services provided to existing customers.

It is crucial for the university to develop research activities. The main factor in the development of such activities is human resources – the faculty of university. In this regard, the perspective «Learning & Growth» consists of the following goals:

– «Human resource development «, which is measured by the number of employees who have received advanced training programs and/or defended their PhD theses;

– «Development of schools of sciences», where performance indicators are: published scientific materials (monographs, articles in scientific journals, conference papers), organized and conducted scientific events (conferences, symposiums, seminars and schools), as well as the amount of public funding allocated for scientific work.

Additional processes	HR Management
	Financial Management
	Administrative & support activities (IT-support, document workflow, methodological support etc.)
	Construction & housekeeping

| Main processes |

Educational activities → Research & Development → Marketing & acceptance of students → Interaction with business
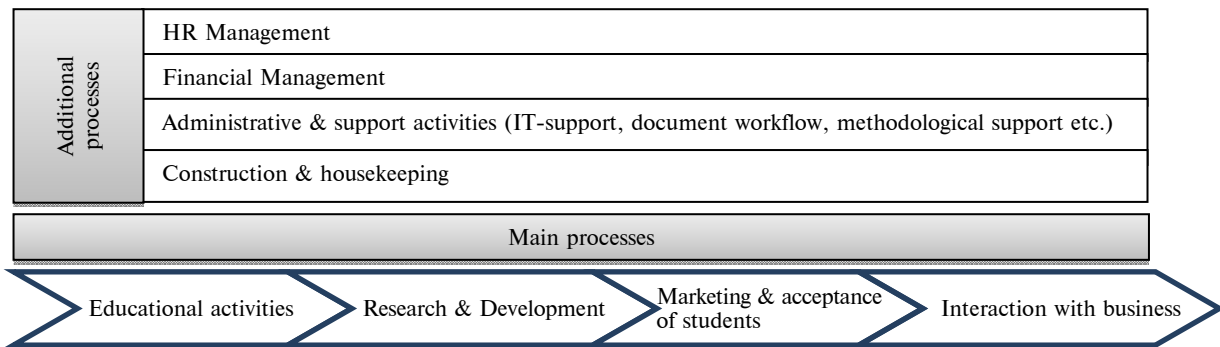
Fig. 2. University value chain

The development of scientific and human resources and the formation of scientific schools in accordance with the proposed strategic map have a direct impact on the customer goal «Increase of R&D», which, in its turn, is associated with two financial goals: «Budget increase» and «Increase of a partial budget, earned by the university».

Here appears the idea of a balanced scorecard: setting strategic goals and creating a strategic map should be done with paying special attention to those processes in the organization, which in some way create its value. Obviously, these processes for the university are scientific and educational activities, so the strategic goals and indicators of their attainability shown on the strategic map proposed by the authors are focused on them.

Organization value chain. Based on the model of the logic levels of the strategic layer and the business architecture of an enterprise [4], the authors propose to consider the possible models of business processes and portfolio of projects of an autonomous university. Since the university is a complex organization that brings together many separate organizational elements and carrying out various activities, it is reasonable to argue that the strategic goals are achieved both by business processes and projects. In conjunction with the organizational structure the business processes and project portfolio of an organization aggregate its business architecture [4].

The authors propose to start the identification of key business processes that contribute to the strategic goals of the university with the creation of value chain (Fig. 2) [6].

Based on the presented model of value creation, it is appropriate to highlight the main business processes of the university, the implementation of which furthers main goals of the strategy map:

− *Educational activities,* including educational services for bachelor, master and postgraduate programs, refresher courses, short educational seminars and trainings, etc.

− *Research & Development,* including the activities of research laboratories, research activities on grants and government contracts, scientific conferences and workshops, publication activity of the academic staff, defense of theses etc.

− *Marketing & admission of students,* including the analysis of the market and consumer behavior, propaganda work, preparation and placement of advertising materials, public relations activities, organization of the selection committee work etc.

− *Interaction with business,* including the study of the needs of business professionals, target training, joint activities (public lectures and master classes, conferences, job fairs), economic-contract work etc.

It is worth noting that one of the key business processes for today's universities is the process «Interaction with business». Inefficient functioning of this process is directly reflected on self-earned funds (due to an insufficient number of commercial contracts with organizations), as well as on the reputation of the university and its position in various rankings. In addition, the Ministry of Education and Science of the Russian Federation is planning to introduce a new performance indicator for universities in 2014 − the number of graduates employed by their major, which cannot be reached without interacting with the business environment. The authors, therefore, consider to assign this process to key business processes, contributing to the achievement of strategic goals and creating the value of the university.

Organization business processes. As a next step in the transition to a process- and project-oriented organization the structure of business processes of the autonomous university is given.

In order to visualize key business processes, a business process framework can be used (Fig. 3). This framework allows visualizing processes at different levels of the hierarchy and showing their relationships [2].

Designing the business process framework usually begins with determining the structure of the main processes. In accordance with the value chain the main business processes of the autonomous university are:
− Educational activities;
− Research & Development;
− Marketing & admission of students;
− Interaction with business.

There was chosen a more detailed level of abstraction for the business process framework, so the given business processes are specified. Furthermore, this framework shows supporting business processes (the lower layer) and strategic business processes (the upper layer).

This framework is a tool for the university strategic management. To support the operational management it is reasonable to make the decomposition of these processes with the level of detail, which is required by each separate organizational unit, that is responsible for the process execution. In the view of the requirement to limit the scope of the papers, the detailed decomposition of the business processes of the university is not presented in this paper.

All the processes involved in the business process framework, both main and supporting, are related to implementing the goals by the university, presented on the strategic map, which once again emphasizes the idea of a balanced scorecard.

Management of project portfolios. As mentioned earlier, the strategic goals of the university can be achieved not only through repetitive processes, but also through time-limited unique projects. There are a lot of different projects where the university is involved, which requires project portfolio management.

The projects included in the portfolio may also be combined within programs − a set of connected projects, aimed at defining strategic goals.

Thus, the portfolio of the university may contain several projects. In accordance with the developed strategic map, the authors propose the following approximate structure of the portfolio of the autonomous university of the Russian Federation:
• Program of strategic development:
− Projects of strategic development programs (for example, 5-100-2020),
• Program of education development:
− Projects of new curricula development,
− Projects of educational technologies development;
• Program of R&D development:
− Science projects;
• Program of international development:
− Projects of cooperation with leading international universities,
− Projects of academic staff mobility,
− Projects of students mobility;
• Program of marketing development:
− Projects of corporate identity development,
− Projects of educational project promotion,
− Projects of R&D promotion;
• Program of developing the interaction with business:
− Projects of interaction on the contractual basis,
− Projects of joint educational programs development,
− Projects of organizing joint events;
• Program of administrative & support development:
− Projects of EDMS implementation (if unavailable),
− Projects of enterprise information system (or its modules) implementation (if unavailable);
• Program of modeling, optimization and implementation of business processes:
− Projects of business process modeling,
− Projects of business process framework development,
− Projects of modeling and analysis «how is»,
− Projects of modeling «how should be» and developing the organization structure,
− Projects of process implementation;
• Program of construction & housekeeping development:
− Projects of academic building construction,
− Projects of administrative building construction,
− Projects of accommodation building construction.

| Strategic management and planning |
| IT Management |
| Controlling |

EDUCATIONAL ACTIVITIES

Development of curricula

Development of training agenda

Teaching process

Expulsions, movement of students

Diploma delivery

Academic mobility of students and profs

RESEARCH & DEVELOPMENT

Working on R&D projects

Organizing of scientific events

Defense of thesis's

Publication of science papers

International collaboration of scientists

MARKETING & ACCEPTANCE OF STUDENTS

Analysis of market
Advertising activities
Propaganda work
Public relations activities

INTERACTION WITH BUSINESS

Joint projects

Employment assistance for students and graduates

| HR Management |
| Financial Management |
| Administrative & support activities |
| Construction & housekeeping |

Fig. 3. University business process framework

Activities of financial management and human resource management are usually strictly regulated and include a recurring sequence of operations, which allows considering their realization only with the help of business processes.

The main problem in organizations focused both on processes and projects is the optimal allocation of resources. For the effective management of project activities and the minimum of its intersection with functioning business processes, the authors propose the use of roles and responsibilities, specified in the international standard project portfolio management MoP (Management of Portfolios) [10]:

Portfolio direction group − the governance body where decisions about inclusion of initiatives in the portfolio are made.

Portfolio progress group − the governance body responsible for monitoring portfolio progress and resolving issues that may compromise delivery and benefits realization.

Business change director (portfolio director) − the management board member who is responsible for the portfolio strategy and provides clear leadership and direction through its life.

Portfolio manager − someone, who coordinates the effective and efficient operation of the portfolio management practices and provides support to the other units and roles − including ensuring that they receive the information they require to enable them to discharge their responsibilities.

These roles and responsibilities are optional, the decision on the necessity of their presence in the university should be accepted depending on the specific conditions (availability of resources, possibility of hiring additional staff, size of the portfolio, and others).

In the management of individual projects the authors propose to adopt a more precise organizational structure in accordance with the PRINCE2 project management methodology (Fig. 4) [9]:

PROJECT BOARD

Senior Supplier

Executive

Senior User

Business, User
and Supplier Project
Assurance

Project manager

Change authority

Project support

Team manager(s)

Fig. 4. PRINCE2 project organization structure

Below we give a brief description of the roles presented in this organizational structure:

Senior Supplier − represents the interests of those designing, developing, facilitating, procuring and implementing the projects' products.

Senior User − is responsible for specifying the needs of those who will use the projects' products, for user liaison with the project management team, and for monitoring that the solution will meet the needs of users.

Executive − a person, ultimately responsible for the project, supported by the Senior User and Senior Supplier. This role is to ensure that the project is focused throughout its life on achieving its objectives and delivering a product that will achieve the forecast benefits.

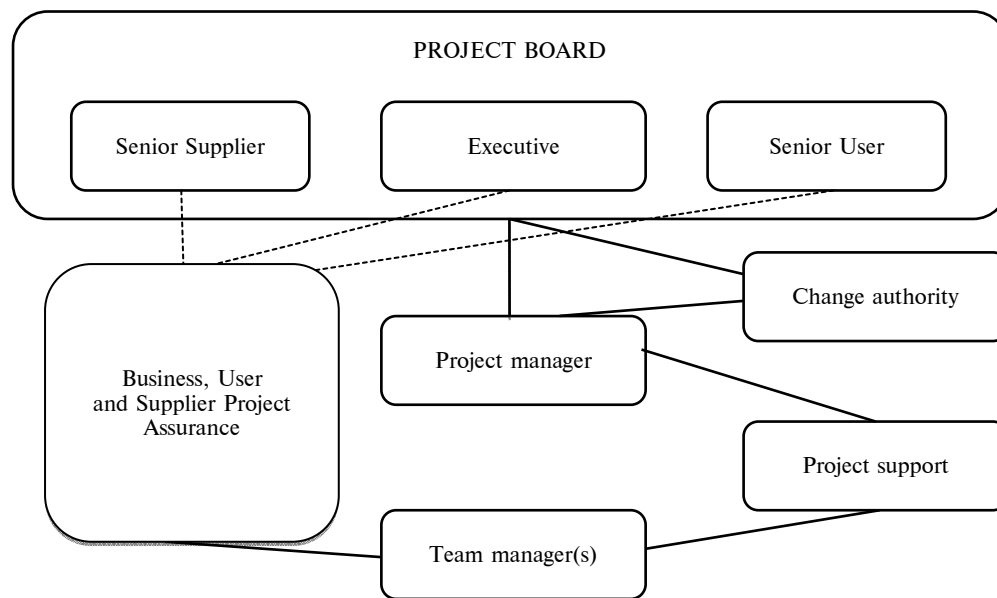These three roles act together as a Project Board, which is accountable to corporate or program management for the success of the project, and has the authority to direct the project within the remit set by corporate or program management. The Project Board is not a democracy controlled by votes. The Executive is the ultimate decision maker and is supported in the decision making by Senior Supplier and Senior User.

Business, User and Supplier Project Assurance − optional roles, occurring in big projects, where Project Board members need additional support in decision making. Giving consultations to Executive, Senior User, Senior Supplier where applicable.

Project manager − a person, responsible for a day-to-day work on the project.

Change authority − an individual or group, whom the Project Board may delegate authority to respond to requests for change or off-specifications.

Project support − optional role, which if not delegated to a separated person, is undertaken by the project manager. Responsible for the administrative support of the project (documentation, consultation on methodologies etc.).

Team manager − a person, responsible for ensuring production of those goods defined by the project manager. In large projects there can be many teams, which implies many team managers.

The implementation of a special organizational structure for university project activities, as well as the action of the project team members in accordance with the specific job descriptions allows optimizing the balance of resources between the realization of standard business processes and unique projects.

In their forthcoming works the authors plan to make a more detailed analysis of the business process system and project portfolio supported by specific examples.

Conclusions. This paper is an attempt to define the core elements of organization's business architecture and has the following conclusions:
− a strategy map that reflects the goals of the autonomous university and key performance indicators of these goals is developed;
− a value chain of university is designed in accordance with its strategic map;

— the business process framework of the university is given;

— an approximate composition of the project portfolio of the autonomous university is given,

the roles and responsibilities of managing a portfolio of projects and individual projects in accordance with international standards MoP and PRINCE2 are defined.

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PROVIDING FINANCIAL SUSTAINABILITY
OF CORPORATE INDUSTRIAL FIRMS

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ОБЕСПЕЧЕНИЕ ФИНАНСОВОЙ УСТОЙЧИВОСТИ
КОРПОРАТИВНЫХ ПРОМЫШЛЕННЫХ ФИРМ

Building up the balance between material and financial flows of individual enterprises of corporate industrial firms specifies production and economic relations and proportions. In order to optimize the contribution of enterprises to overall performance results it is used industrial and economic indicators characterizing product manufacturing, distribution and sale, material supply mechanisms and resource support. These indicators evaluate significance of each enterprise through firm-wide economic results.
CORPORATIVE FIRM; ACTIVITY; INDICATORS; PRODUCT DISTRIBUTION; BALANCE; MATERIAL AND FINANCIAL FLOWS.

Построение баланса материально-финансовых потоков отдельных предприятий корпоративных промышленных фирм дает характеристику производственно-хозяйственных связей и пропорций. Для оптимизации вклада предприятий в общие результаты используются показатели производственно-хозяйственной деятельности, характеризующие производство, распределение и реализацию продукции, механизмы материально-технического снабжения и ресурсного обеспечения. Эти показатели дают оценку значимости каждого предприятия в общефирменных экономических результатах.
КОРПОРАТИВНАЯ ФИРМА; ДЕЯТЕЛЬНОСТЬ; ПОКАЗАТЕЛИ; РАСПРЕДЕЛЕНИЕ ПРОДУКЦИИ; БАЛАНС; МАТЕРИАЛЬНО-ФИНАНСОВЫЕ ПОТОКИ.

Large corporate industrial firms are the backbone of today's social and economic system of any developed country. Industrial corporations are the only forms of integrating financial, industrial and trade capital with branched participation system. However it should be noticed unlike other popular forms of integration and entrepreneurship organization in modern market economy, particular large industrial fi`rms, under the control of a head company, combine legally and economically individual firms and enterprises, relating to different economy branches, banks and other credit organizations, industrial, trade and transport companies. Participants of such corporations independently perform on domestic and international markets, and functions of investment strategic management, production and sales and financial control as well are delegated to the parent company.

Among the aims of forming industrial corporations, special attention should be paid to strengthening their domestic and international market shares, enhancing sustainability, efficiency and competitive performance. Possibility to form gross corporate entities enables to organize effective using and reallocating human, technological and financial power, provides necessary facilities for optimizing production-partner contacts in high-tech goods turnout, fosters expanded investment and export potential. In the context of modern market economy it is high money that is able to provide employing novel technologies and peak production efficiency. But it requires to design new modern approaches to solving problems dealing with managing improvement of huge industrial firms peroformance through appropriate choosing destinations and mechanisms of increasing its performance efficiency [2, 5, 10].

Resource providing current and perspective performance of corporate industrial firms is the key management task. It implies forming management mechanism by way of joint efforts of individual enterprises, models of total costs optimization, and is intended to increasing efficiency of restricted resources employment and maximizing its eventual operating outcome. However resource starvation and low quality of its employment don't enable business entities to successfully develop and implement corporate strategy.

For adjusting optimal production and economic relations and proportions between enterprises of corporate industrial firms on condition that resource providing is justified it is necessary that the material and financial flows balance should be built up; the scheme of this model can be seen on the Fig. 1 [1, 4, 6−9].

Square matrix of f_{ij} elements shows fixed assets value created by i enterprise and used by j enterprise of the firm. Here are following correct pars:

$$\begin{cases} F_j = \sum_{i=1}^{m} f_{ij}; \ F_i' = \sum_{j=1}^{m} f_{ij}; \ F_j = F'; \ if \ j = i; \\ \sum_{j=1}^{m} F_j = \sum_{j=1}^{m} F_i', \end{cases}$$

where F_j is fixed assets value used by j enterprise; F_i' is fixed assets value created by i enterprise.

In I quadrant $\|x_{ij}\|$ square matrix means flows of material and supplies and producer services in enterprises of the corporate industrial firm, x_{ij} means costs material and supplies produced by i enterprise and consumed by j enterprise. For this quadrant equals (1) are also true. In II quadrant it is shown the utimate product, and that of i enterprise is equal to:

$$Y_i' = C_i + K_i + E_i.$$

	1	2	...	j	 4	m	Sum
1 ⋮ m			$\|\|f_{ij}\|\|$				F_i'
Total			F_j				$\sum_{j=1}^{m} F_j = \sum_{i=1}^{m} F_i'$

i	j							Consumption	Investments	Revenue	Total	Ultimate consumers		
	1	2	...	j	...	m						1 2 ... n	Total	
1 · m			$\|\|x_{ij}\|\|$				X_i'	II C_i	K_i	E_i	X_i	$\|\|e_i\|\|$	E_{ij}'	
Total			X_i'				$\sum_{j=1}^{m} X_j' = \sum_{i=1}^{m} X_i^n$	$\sum_{i=1}^{m} C_i$	$\sum_{i=1}^{m} K_i$	$\sum_{i=1}^{m} E_{i\,i}$	$\sum_{i=1}^{m} X_i$	E_i	$\sum_{l=1}^{n} E_l = \sum_{l=1}^{m} E_i'$	
U	III			U_j			X_j^m	II C_i	K_j	E_j	X_j			
D				D_j			$\sum_{j=1}^{m} D_j$	$D^{(C)}$	$D^{(K)}$	$D^{(E)}$	ΣD			
W				W_j			$\sum_{j=1}^{m} W_j$	$W^{(C)}$	$W^{(K)}$	$W^{(E)}$	ΣW			
P				P_j			$\sum_{j=1}^{m} P_j$	$P^{(C)}$	$P^{(K)}$	$P^{(E)}$	ΣP			
Total				X_j			$\sum_{j=1}^{m} X_j$	C	K	E	$C+K+E$			

	1 2 ... j ... 4 m	Sum	Consumption	Investments	Revenue	Total
1	$\|\|k_{ij}\|\|$	K_i'				
...						
m						
Итого	K_j	$\sum_{j=1}^{m} K_j = \sum_{i=1}^{m} K_i^*$				

Total	Suppliers	1		j								
	1 ... n		1 2 ... j ... m									
U_i''	$\|$Ъ$u_{il}'^*\|$	1 · m	$\|\|u_{ij}\|\|$	U_i^*	$U_i^{(C)}$	$U_i^{(K)}$	$U_i^{(E)}$	U_i
$\sum_{i=1}^{n} U_i = \sum_{i=1}^{m} U_i'^*$	U_i	Total	U_i		$U^{(C)}$	$U^{(K)}$	$U^{(E)}$	$\Sigma_{\downarrow}(i=1)^{\uparrow}m \equiv U_{\downarrow}i^{\uparrow''}$

Fig. 1. The scheme of balance model between material and financial flows of the corporate industrial firm

Here C_i, K_i и E_i is ultimate product of i enterprise arrived correspondently to consumption fund, capital construction and export.

Total cost of ultimate product of the industrial firm will be equal to:

$$\sum_{i=1}^{m}(C_i + K_i + E_i).$$

Gross product sum of i enterprise is also equal to:

$$X_i = X_i^* + Y_i' = \sum_{j=1}^{m} x_{ij} + C_i + K_i + E_i.$$

III quadrant shows the net product, amortization charges and import to the industrial firm. Here U_j is cost of imported product used by j enterprise; D_j is amount of amortization charges of j enterprise; W_j is wage of j enterprise; Π_j are net earnings of j enterprise (profit).

IV quadrant shows redistributing ultimate and net product between consumption fund, capital construction and export.

Total product of j enterprise will be equal to:

$$X_j = X_j' + U_j + D_j + W_j + \Pi_j.$$

Here also $X_j = X_i'$, if $j = i$.

Under the III and IV quadrants there are $\|K_{ij}\|$, $\|u_{ij}\|$ and $\|u_i'\ell\|$ matrixes.

K_{ij} shows product quantity of i enterprise invested in capital construction of j enterprise; u_{ij} are items imported by i enterprise and consumed by j enterprise; $u_i'\ell$ are items imported by i enterprise from ℓ supplier ($\ell = 1, 2, ..., n$).

To the right of $\|u_{ij}\|$ matrix there is distribution of the product imported by i enterprise and consumed as an ultimate product.

To the right of II quadrant there is distribution of the product sold by i enterprise between ultimate consumers (ℓ, $\ell = 1, 2, ..., n$).

Totals and results in each quadrant are calculated by summing either in columns or rows of corresponding matrixes.

By using the balance we can calculate and analyze total proportions and highlights of the industrial firm indefinable in usual accounting. It mostly refers to highlights, specifying production and distribution of the firm's product:

$$\sum_{j=1}^{m} U_i = \sum_{i=1}^{n} U_i^*$$

− balance of consumed and manufactured (gross) product in the industrial firm

$$\alpha_R = \frac{\sum_i (C_i + K_i)}{\sum_i X_i};$$

− highlights specifying the role of a supplied product and incompany production in providing the incompany consumption

$$\alpha_E = \frac{\sum\limits_i U_i''}{\sum\limits_i (C_i + K_i)};$$

$$\alpha_X = \frac{\sum\limits_i (C_i + K_i) - \sum\limits_\ell U_\ell}{\sum\limits_i (C_i + K_i)};$$

− highlights specifying the role of sold production in industrial firm's economy

$$\alpha_B = \frac{\sum\limits_\ell E_\ell}{\sum\limits_i X_i} \text{ − towards gross product,}$$

$$\alpha_k = \frac{\sum\limits_\ell E_\ell}{\sum\limits_i Y_i'} \text{ − towards ultimate product.}$$

Calculating production-consumption balance can be done also for each enterprise represented in the balance. For analyzing each enterprise's role in production and consumption of the firm, consider the following highlights:

share of sold production in industrial firm's specialization by *i* product turnout

$$\gamma_i = \frac{E_i'}{X_i};$$

share of supplied production in general consumption of *i* product in the firm

$$\delta_i = \frac{U_i''}{C_i + K_i};$$

coefficient specifying supplied and sold *i* product

$$\lambda_i = \frac{U_i'' - E_i}{X_i}.$$

Balance of these coefficients is equal to:

$$\lambda_i = \frac{\delta_i - \gamma_i}{1 - \delta_i}.$$

For analyzing enterprises' correlation degree in both product consumption of other enterprises and distribution of its production it is calculated highlights of incompany turnover between enterprises (L_{ij}):

$$L_{ij} = x_{ij} + x_{ji},$$

where x_{ij} is volume of product supply of *i* enterprise to *j* enterprise, or in matrix form:

$$L = X + X^T.$$

Enterprises' correlation degree can be defined with firm incompany turnover coefficients:

$$\ell_{ij} = \frac{L_{ij}}{\sum\limits_i L_{ij}}.$$

Coefficient $\ell_{ij} > 0,5$ means dominating correlation between *i* and *j* enterprises.

Based on these highlights a range of other total proportions in the industrial firm economy can be calculated. However, because economical literature and practice don't still suggest recommendable values of highlights considered above, specifying resource providing of the firm, it is necessary, through monitoring undustrial firm performance − object of research − to form initial statistical database taking into account branch specific nature and market behavior. Based on ready-made information by considered total of value highlights, with a glance to their forecasting, it is developed the system of managerial decisions on production and economic performance of both individual enterprises and firms in general.

Besides, inter-form comparison of calculated highlights can be of especial importance. The comparison of balances of the material and financial flows of industrial firms can be carried out by highlights considered above.

Moreover one can consider one of the methods of assessing cost structure similarity in several industrial firms. This method can be coefficient usage of mean difference in costs of each enterprise

$$\rho_i = \frac{\sum\limits_i (\alpha_{ij}^\alpha - \alpha_{ij}^\beta)}{\frac{1}{2}\sum\limits_i (\alpha_{ij}^\alpha + \alpha_{ij}^\beta)},$$

where α_{ij} is coefficient of direct costs on products in i enterprise per one unit of j enterprise's product; α, β are industrial firms' indexes.

The more value of ρ_i is, the more differences are in production costs structure for i enterprise in compared firms.

Summing up for identifying production and financial relations and proportions between enterprises of corporate industrial firms it is built up the balance between material and financial flows. On its basement highlights of production and economic performance of the firm are analyzed and can't be determined by accounting data. It concerns mainly those highlights specifying production and distribution of the product created in corporate unit and used for defining each enterprise's role in total firm performance results. Therefore the suggested model of resource providing performance of corporate industrial structures is the economically mathematical tool for complex corporate system management, which implementing enables to increase efficiency and sustainability of operating and developing corporate industrial firm of different branches of national economy.

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THE INFLUENCE OF CASH FLOW PROBABILITY CHARACTER ON INVESTMENT PROJECTS ASSESSMENT

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ВЛИЯНИЕ ВЕРОЯТНОСТНОГО ХАРАКТЕРА ДЕНЕЖНЫХ ПОТОКОВ НА ОЦЕНКУ ИНВЕСТИЦИОННЫХ ПРОЕКТОВ

This article is focused on the possibility of the option theory for assessment of investment projects, cash flows being of probabilistic nature. We discuss the main methods used for assessment of real option value: Black–Scholes model, binominal model, and analyze their benefits and drawbacks. Particular attention is paid to the main characteristic of options for investment projects, creating an additional value, an additional effect.

INVESTMENT PROJECT; OPTIONAL APPROACH; ADDITIONAL COST; CASH FLOWS; PROBABILISTIC NATURE.

Рассматривается возможность применения теории опционов для оценки инвестиционных проектов, денежных потоки которых имеют вероятностный характер. Рассмотрены основные методы оценки стоимости реальных опционов – модель Блэка–Шоулза и биноминальная модель, проанализированы их достоинства и недостатки. Особое внимание уделяется основной характеристике вариантов инвестиционных проектов, созданию дополнительной стоимости, дополнительного эффекта.

ИНВЕСТИЦИОННЫЙ ПРОЕКТ; ДОПОЛНИТЕЛЬНАЯ СТОИМОСТЬ; ТЕОРИЯ ОПЦИОНОВ; ДОПОЛНИТЕЛЬНЫЕ РАСХОДЫ; ДЕНЕЖНЫЕ ПОТОКИ; ВЕРОЯТНОСТНЫЙ ХАРАКТЕР.

The paper considers the possibility of applying the option theory to investment projects assessment, cash flows of which have probabilistic nature. Capital investment options are usually called 'real options' as opposite to financial options granting a right to buy or sell financial assets. The option approach was originally used for assessment of financial assets because the latter is based on the principle of ownership rather than management.

The main difference between financial asset assessment and that of real asset (being the basement for investment projects) is the investor's position. In general shareholder is a passive participant of creating cash flows [1]. In case of absence of shareholder's controlling stake, his role is narrowed down to monitoring changes in the company and making decision whether to sell shares or hold them at a later stage.

Corporation's financial manager plays an active role in cash flow generation. He/she can effectively influence the process of getting net present value on the project (i. e. can delay investment expenditures or in some cases sell assets at their liquidation value). If cash flow values deviate from figures forecasted, financial manager has certain leverage helping him to return the project to original parameters. In other words, financial manager can generate options himself, i. e. embark on steps towards evening-out project losses or fulfilling new opportunities offered by taking this investment project. Using the method of real options for decision making on investment projects helps manager take into account the possibility of reacting to changing external conditions i. e. it becomes possible to resolve uncertainty in keeping with original assumptions.

The following investment project options are selected for analyzing:
– abandonment option (an option to sell project assets, in fact to abandon/cancel the project);
– timing option (an option to delay the investment project, i. e. to delay expenditure on purchasing or generating real assets);
– strategic investment option (an option of new investment opportunities);
– corporate growth option.

Hereafter the paper discusses main methods used for assessment of real option value (Black—Scholes model, binominal model) and analyze their benefits and drawbacks.

Investment project options. An option is simply a contract enabling for its holder to purchase or sale common stocks at a certain set price. In a large variety of option contracts the most widespread are the 'call' options and 'put' options.

The 'call' option is a contract granting to its holder the right to buy a specified amount of assets at a fixed price (or 'strike price') on a certain date or until its expiry. The 'put' option is a contract granting to its holder the right to sell a specified amount of assets at a fixed price (or 'strike' price) at the time of or before set date expiry [2].

The main feature of all investment project options is creation of additional value/effect.

The term «real option» arose after the methodology by which Black—Scholes theory was applied to real assets, had been developed. The concept of 'real options' (often called as ROA or Real Options Analysis) provides an opportunity to reconcile two opposite sides. Still ROA gives rich conceptual framework for decision making with using, inter alia, quantitative methods specified above.

On investment projects the following types of options are possible:
— abandonment option (an option to sell project assets, in fact to abandon/cancel the project);
— timing option (an option to delay the investment project, i. e. to delay expenditure on purchasing or generating real assets);
— strategic investment option (an option of new investment opportunities);
— corporate growth option.

According to rendering time (exercise of right to sell/buy) all options are divided into two categories: the 'American' and 'European' ones. The holder of an «American» option can use his right for selling or buying at any time before date expiry while the holder of the 'European' one can exercise his option only at a set date.

The application of the real option method to investment projects assessment seems to b reasonable if the following conditions are carried out:
— the project result is exposed to very high degree of uncertainty;

— company's financial manager is capable or has the right to make flexible managerial decisions in case of occurring new input data on the project;
— financial outcome of the project depends on decisions made by its financial manager through project assessment according to the discount cash flow method, NPV value is negative or just above zero.

It makes no sense to use the method of real options towards projects having a high net present value and a high degree of credibility. In fact, very few long-term investment projects display such characteristics. The method of real options is most popular in science-intensive/high-tech/extractive industries involving heavy marketing/new product promotion costs.

The option to sell project assets/abandonment option (or convert assets to other sort of production). If project allows its financial manager to build upon selling its assets at their net or current market value in case of undesirable course of events, this project should be valuated higher than the similar one assuming no opportunity for abandonment. Not all projects can provide such a chance. But if there is one (i. e. this right does exist, or an agreement for the purchase of project's non-circulating assets is negotiated so that one can recover assets), it ensures larger cash flows for the project and, inevitably, a higher net present value. In assessing investment projects an opportunity to sell assets has to be taken into account, while in negotiating a contract meaning saleability it is required cost assessment on this contract, i. e. assessment of an option to sell committed assets of the investment project. Here is one of the variations used for option assessment:

Option value = (Value of the project allowing the sale of assets) − (Value of the project not allowing the sale of assets (assuming that investment costs are irreversible)) = = (NPV with the option) − (NPV of irreversible costs).

Because here we are virtually talking about a «put» option, so option pricing models can be used.

Option to delay investment expenditure. A range of projects implies that expenditure-related decisions have to be taken immediately: the «now or never» principle is applied here. The external

environment may be uncertain, and some events may generate new input data, such as: adoption of a new taxation system, introduction of new export taxes whose rate remains currently unknown, prohibition of this business activity or a product, etc. [3, 4]. In this situation company's financial manager ought to postpone his decisions until relevant defining events take place. Project allowing entirely or partially delay of investment expenditure provides a «call» option on its real assets for company's manager and fundholder. An opportunity to delay a project means larger cash inflows in future, i. e. leads to a higher net present value.

During investment project analysis a number of questions arise: Is there an option to delay available? What is the «true» NPV value of the project? What is the value of this option? Besides, there is the more practice-oriented question: How much can the right to delay cost? The general approach of real options assessment is being remained:

Option value = NPV of the project allowing a delay − − NPV of the project with immediate decisions.

Option on future projects. A range of investment decisions generates potential opportunities for increasing cash flows due to implementation of new high income projects [4, 5]. High-tech investment has a huge growth facility, but its results (NPV) are difficult to calculate. It often happens that company managers can only claim that investment in the high-tech sector or in human capital generates opportunities for new projects or ensures a higher flexibility for already working ones [6, 7].

In analyzing an investment project, the baseline NPV has to be adjusted by the net present value generated by various opportunities.

Adjusted NPV = baseline NPV + + NPV of abandonment option + NPV of the option on future projects + NPV of the option to delay.

A project displaying characteristics of an option on future projects is assessed by the 'call' option pricing model.

Corporate growth option. Steward Mayers suggested using real options to identify corporate growth. In his 1977 paper he considered future investments of a company as its real growth options. The author also noted that a company's value reflects expectations of future investment. Future investment is discreet, and its value depends on the net present value of future opportunities. One part of corporate value is the present value of future investment opportunities, if external conditions are going to be friendly. The second part of corporate value depends on the cash flow generated by already existing company assets. Thus, the company's value can be divided into a) the value of assets already committed, and b) the present value of future investments (of the corporate growth option) [7].

The market value of a company can be then defined as the present value of free cash flows (PV of FCF). In its turn, it presents the current value of future growth EVA that is the cost of future growth, the current rate of EVA and the value of capital invested (CI); putting together they give the value of operating cost. FCF is full cash flow generated by all company's assets regardless of financial sources used.

The method for calculation of the growth option involves such a parameter as economic value added (EVA). At the first step it is assumed that the market value of a company (V) = the value of capital invested (CI) + market value added (MVA):

$$V = IC + MVA.$$

MVA, in its turn, is the aggregate net present value of all investments, both current and future. At the same time MVA, as Yong and O'Brian have shown, can be viewed as the discounted value of economic incomes (EVA):

$$MVA = PV\,(expected\,EVA).$$

EVA is one of the versions of the method of residual income (RI) that includes the assessment of loan and equity, but implies entering of updating in accounting:

$$EVA = NOPAT - (CI \times WACC),$$

where NOPAT is the net operational profit after tax; CI − capital invested and WACC − weighted average capital cost.

Further on, the expected EVA value for each year can be divided into two parts:

1. EVA-equivalent for the current year with assumption that the company is not growing (Current-level EVA).

2. Residual component describing the growth potential (EVAGrowth):

$$PV = (\text{expected EVA}) = PV(\text{Current} - \text{Level EVA}) + PV(\text{EVAGrouwth}).$$

Now we can describe the market value of a company as follows:

$$V = CI + PV(\text{Current} - \text{Level EVA}) + PV(\text{EVAGrouwth}).$$

The sum of the first two components — is the value of commercial assets. PV (EVA Growth) — it is the present value of growth potentials of a company, or the real option of the company's growth. By solving this equation for PV (EVA Growth) and taking into account the market value of the company we get the estimate of the growth option value (GOV):

$$GOV = \frac{V - CI - PV(\text{EVA}_{\text{Current level}})}{V} = $$
$$= 1 - \frac{CI + PV(\text{EVA}_{\text{Current level}})}{V}.$$

The corporate growth option allows making comprehensive assessment of a company's investment activity regarding its market value.

Methods for real option assessment. The conception of real options allows to assess project's opportunities quantitatively and thereby include them into the value of the investment project. Quantitative assessment plays a key role in any investment decision making; in most cases when additional opportunities are assessed only qualitatively and instinctively, they are simply ignored when comparing quantitative project parameters, and at its best reserve additional benefit of the project all other things being equal. For quantitative assessment the method of real options uses the same parameters as the traditional theory of investment project assessment.

Cash flows specify quantitative part of the project. At the same time the bigger the expected value of cash flows, the bigger the value of a real option. The term 'investment cost' refers here to the amount of money needed for project implementation. At the same time, the value of a real option is inversely proportional to the cost of the investment. Increase of time before the project implementation opportunity expires brings up the value of the real option as its holder has more time to exercise it.

Price volatility is also directly proportional to the value of a real option. In general, high volatility means a higher probability of both getting raise income and bearing losses. However, real options enable to reduce losses and retain opportunity to get extra profit, which make them even more valuable in a high volatility environment. The economic significance of this lies in the fact that more risky projects include wider opportunities for extra profits, and higher risk-free interest rate all other things being equal leads to a higher price of the real option and, correspondingly, of the entire project. Although to describe an impact of this project is a bit more complicated. On the one hand, all other things being equal, interest rate development causes decreasing current value of future cash flows which, in turn, reduces the price of real option. On the other, this also diminishes the current value of investment costs needed in future for real option implementation.

For assessment of real options two main methods are used, as described below: the Black—Scholes model and the binominal model.

The Black—Scholes model of option assessment. In their famous paper, Fischer Black and the Nobel Prize winner Myron Scholes presented their method and model for option assessment [8].

Their approach for the pricing of real option has its limitations:
— an assessed asset must be liquid, and there should be a market for the assessed asset;
— asset price dynamics must be balanced;
— the option can not be exercised before its expiry date (European type).

Application of the Black—Scholes model allows for real option assessment, whose price is higher if:
— value of cash flows is higher,
— project costs go down,
— option expiry time increases,
— risk rate increases.

The greatest influence on enhancement in option value is impacted by the discounted value of expected cash flows (DCF), i. e. for

increasing investment attractiveness it is necessary to enhance incomes rather than reduce costs. To use this model we have to obtain relevant reliable data for our calculation (time before implementation of opportunities put in the project, dispersion rate, etc.). Uncritical application of this methodology may have a negative impact on company's business and its competitive position. Maintenance of excessive flexible decisions can lead to frequent revisions of plans, loss of «strategic focus» and as a result – permanent inability to reach the strategic goals set for the company. Another issue of no little interest is correct accounting of the costs linked to generation and maintenance of real options. For instance, an opportunity to increase production (i. e. investment in excess capacity) may remain unused, and not all expenditures on the creation of such an option will be justified. Using the Black–Scholes model is also hindered by the fact that such calculations include many parameters of a purely estimating nature. The model fits to simple options assessment having only one uncertainty source and only one exercise date.

Real options cost assessment by the binominal model. Building up the binominal model helps obtain more correct results than by using the Black–Scholes one in a situation when there are several uncertainty sources or many decision-making dates. The model is based on two assumptions as follows: within one time interval there can be only two variants of the course of events (the best and the worst), while investors are indifferent to the risk involved.

Main problems with the binominal model are related to defining values of relative rise and drop in the value of business within each period, and also probabilities of positive or negative course of events. Real options cost assessment by the binominal model in a situation where a large number of decisions is taken during a year will be close to figures obtained by the Black–Scholes model.

Both models are equivalent from the mathematical point of view. However since the traditional economic analysis involves the «decision tree» model, the binominal one seems to be simpler in practice and more illustrative in its results. Its main disadvantage is clumsy and

lengthy calculations, on the other hand this allows to take into account all additional factors and scenarios of the project life.

When assessing real options cost by both Black–Scholes and binominal model we can use the Project Expert 7 ver. software package, which enables to carry out project scenarios by all factors chosen by its manager.

Conclusion. Implementing the method of real options for investment projects assessment is becoming increasingly popular. The result of the present study is grounding the use of the option theory to investment project efficiency assessment in the market economy. Features of the following types of options have been analyzed:

– abandonment option (an option to sell project assets, in fact to abandon/cancel the project);

– timing option (an option to delay the investment project, i. e. to delay expenditure on purchasing or generating real assets);

– strategic investment option (an option of new investment opportunities);

– corporate growth option.

We also would like to emphasize the so-called corporate growth option, whose application will help build the market value of a company in the light of investment process, which is particularly important in modern facilities of developing economy. The benefits and drawbacks of the key methods for real option value assessment (Black–Scholes model, binominal model) mentioned in the paper will allow financial managers to use them properly.

The application of the real option approach requires changes in company's management culture and approaches to business conduct, which may be difficult to implement in some companies. Yet, using this financial tool in the process of company management may help CFOs to pay more attention to identification and specification of alternative ways of company performance. Applying the conventional method of discounted cash flows causes a situation where a financial manager implementing a project feels it hard to abandon actions already planned and can not see new opportunities potentially bringing more profit to the company. Uncritical application of the methods

of real option cost assessment may negatively impact company's business and its competitive position. Maintenance of excessive flexible decisions can lead to frequent revisions of plans, loss of «strategic focus» and as a result — permanent inability to reach the strategic goals set for the company. It is crucial to remember that by implementing real options increase of production may remain unclaimed on the market, which means that not all option costs will be justified.

It can be said that the area of application for real options is unlimited, and that we can find real options wherever there is uncertainty. It seems quite realistic that in 2 or 3 years the number of companies using this approach for investment efficiency assessment will grow significantly.

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THEORETICAL ASPECTS OF EVALUATING SOCIAL-ECONOMIC EFFICIENCY OF INVESTMENTS IN PUBLIC SERVICES

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ТЕОРЕТИЧЕСКИЕ АСПЕКТЫ ОЦЕНКИ СОЦИАЛЬНО-ЭКОНОМИЧЕСКОЙ ЭФФЕКТИВНОСТИ ИНВЕСТИЦИЙ В ОБЩЕСТВЕННЫЕ УСЛУГИ

The article focuses upon theoretical approaches to evaluating efficiency of investment projects in regard to public life taking into account all elements of public services provision system. The methodology proposed is based on calculation of social-economic and budget efficiency investments. Payment of social efficiency is based on accounting lower prices caused by cost savings arising as a result of investments, and improving service quality. Calculation of budget efficiency of savings assumes costs for providing public services over budget investment to economic efficiency of public services.
INVESTMENTS OF PUBLIC SERVICES; ECONOMIC EFFICIENCY; SOCIAL EFFICIENCY; BUDGET EFFICIENCY; BUDGET.

В статье обоснованы теоретические подходы к оценке эффективности инвестиционных проектов в сфере общественной жизни, с учетом всех элементов системы предоставления государственных услуг. Предлагаемая методика основана на расчете социально-экономической и бюджетной эффективности инвестиций. Оплата социальной эффективности основывается на учет более низкие цены в результате экономии средств, возникающих в результате инвестиций, и повышение качества услуг. Расчет бюджета экономии средств бюджета предполагает расходы на предоставление государственных услуг по бюджетной инвестиций экономической эффективности государственных услуг.
ИНВЕСТИЦИИ ГОСУДАРСТВЕННЫХ УСЛУГ; ЭКОНОМИЧЕСКАЯ ЭФФЕКТИВНОСТЬ; СОЦИАЛЬНАЯ ЭФФЕКТИВНОСТЬ; БЮДЖЕТНАЯ ЭФФЕКТИВНОСТЬ; БЮДЖЕТ.

The relevance of the issue chosen is motivated by the fact that at the present stage in order to ensure economic growth it is necessary to achieve significant gains in efficiency of organization management and to increase efficiency of its economic activity. It is necessary to consider that enterprises of public services operate within a particular economic area created by the government, and also to take into account high social significance of public services requiring to include efficiency of consumer services.

Formerly authors have been examining these issues from a variety of angles: economic security, risk management, training, improving efficiency of budget expenditures [4, 6, 11—13].

Considering organization system of public services production, it is necessary to advert the objectives and actions of each of its elements [5]:
— direct producer;
— end-users;
— local authorities.

It is a company — a service provider that is the main subject in generation system of public services (Figure). Economic behavior of enterprises causes the response of other participants in the system. Consumers purchasing services meet their needs fully or partially depending on the level of their ability to pay, the amount and quality of services provided. Local governments perform their functions of the implementation of their mandates. They compensate the company the costs incurred — subsidies and provide grants for the public if the level of income does not allow the consumer to acquire necessary volume of services. Having all the necessary powers of attorney, local authorities set tariffs for basic services in order to protect consumers from increase of services' cost by enterprises. Such an approach allows showing interdependence and interaction of subjects of public sector — elements of the production system and consumption of services (Figure).

Interdependence and interaction of subjects of public sector − elements of the production system and consumption of services
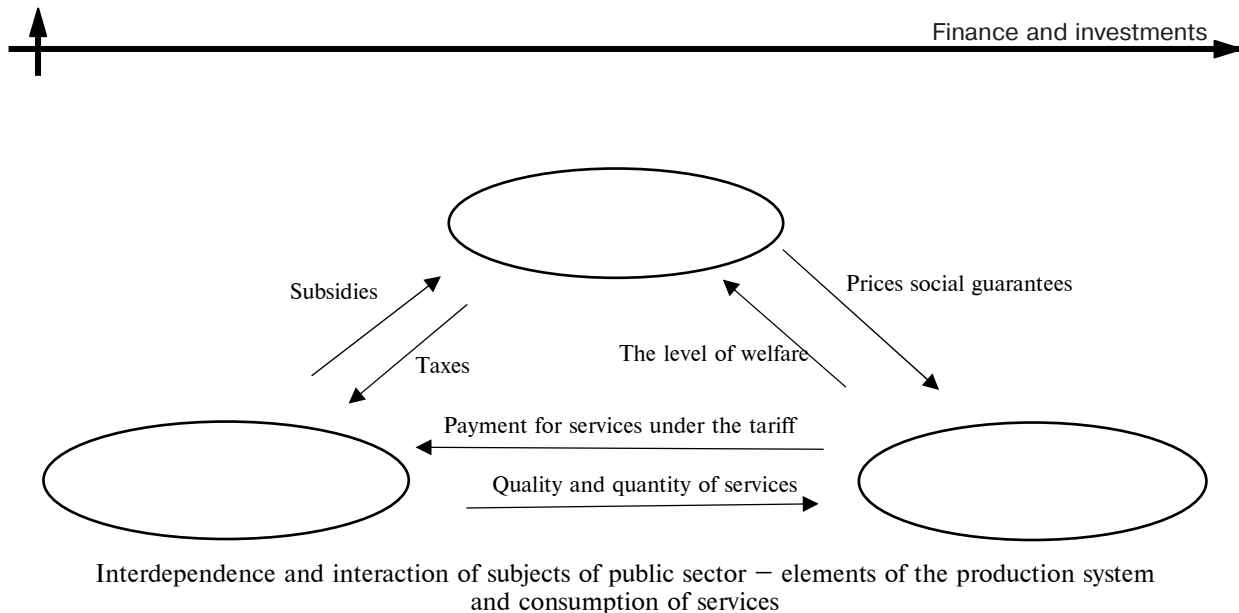
Therefore in order to determine efficiency of public services production within the model presented above it is necessary to conduct comprehensive analysis of efficiency considering all elements service delivery system.

In these terms, determining efficiency of the system is narrowing down to calculation of three types of efficiency: economic, fiscal and social. Using only the indicator of economic efficiency does not allow to judge about the efficiency of the model as a whole. High social importance of public service requires to have in mind efficiency of consumer services, and provision of services using the funds of budget determines the necessity of calculation of budget efficiency [8].

Economic efficiency is considered to be as efficiency for the manufacturer and it involves evaluation of financial and economic activities of enterprises producing public services. As a rule, difficulties in determining cost efficiency do not occur because of using conventional evaluation methodology [2, 9, 15].

Budget efficiency is that of the system from local authorities' side. The main thing for them is the most complete fulfillment of liabilities assigned in accordance with the law at least costs [1]. In the system of public services production budget efficiency shows the influence of enterprise performance providing services on incomes and expenditures of the local budget.

From the consumers' viewpoint, system efficiency evaluation represents social efficiency. There is no unambiguous definition of the concept of «social efficiency» that causes certain problems in its definition. In broad sense social efficiency is satisfaction of population needs.

Social efficiency as well as the budget one is connected to enterprise performance providing services. From that side it shows social consequences of the company for the population in general, which are expressed in changing the level and quality of life. Social efficiency includes public importance and public utility of enterprise performance.

The social significance of enterprise performance is social-economic consequences of enterprise performance for the population in general, including consequences defined by percentage of the population which is guided by profits from sales. Social utility of enterprise performance is the degree of willingness of the population of the city to benefit from sales of the enterprise or organization, which is reflected in creating new products or their improvement provided for the public, as well as in the economic development of the city or improving environmental conditions. By the improvement of efficiency of goods, works and services we mean reducing their costs and, as a result, decreasing tariff, improving their quality, ensuring continuity of supply, expanding the target audience having access to them.

Social efficiency calculation can be represented as the ratio of the volume of consumer services to the costs of its acquisition. However when calculating social efficiency it should be considered whose needs a service satisfies.

By individual consumption we deal with self-interest of each consumer who is interested in satisfying his needs [8]. Entering into a direct relationship with the manufacturer the consumer effects on economic entity performance. Thus social efficiency is transformed into the economic one.

Methods of evaluation of the economic, budget and social efficiency of investment programs, performing production of public goods. It has been found that company is the main subject in production of public services — a manufacturer of services, economic behavior that affects and causes responses of other participants in the system.

Each of the subjects of the system has its own requirements to the quality of services provided. On the one hand, the level of customer satisfaction is a key indicator of the efficiency of services provided, because it can evaluate the level of services, i. e. social-economic indicators. On the other hand, manufacturers refer to the criterion of efficiency of technical and economic indicators.

The principle of economic efficiency should not be the main one and purpose of enterprise performance in public sphere. Herein increasing production efficiency can be achieved both by savings in operational costs and by making better use of existing capital. The most important factor in improving efficiency is a scientific and technical progress. Computer-aided manufacturing, the widespread introduction of advanced technologies, the creation and use of new materials help reduce labor and material costs, as well as an increase in production. In addition, production efficiency depends directly on cost-cutting drive. Resource conservation must become a crucial source for satisfying growing demand for fuel, energy and raw materials. Increasing production efficiency mainly depends on better use of fixed assets. Therefore increasing production efficiency is possible through the implementation of activities under the investment program of the company [14].

Project efficiency evaluation is basically necessary to determine the potential attractiveness of the project, feasibility of its adoption. It shows impersonal acceptability of the investment project from the viewpoint of economic efficiency, depending on financial capacity of its participants. In evaluating project efficiency we should take into account its social significance (social and economic efficiency), considering the scale of the investment project. Economic, social and environmental impacts of the projects influence the entire public. That is why project efficiency can be subdivided into two types: public (social and economic), which is necessary for the evaluation of socially significant projects; commercial, which evaluation is carried out in almost all the projects being implemented.

Public efficiency considers social-economic impact of investment project implementation for the whole society including both the direct costs of the project and the results of the project and the «externalities» — social, economic, and others [6].

Table presents indicators of social-economic and fiscal efficiency of the investment project in the field of public services. Calculating economic efficiency of the project it is widely used the following theoretically proved summarized indicators — NPV, IRR, PI, DPP.

To calculate social efficiency authors are invited to make additional components in the formula for calculating NPV, IRR, PI, DPP, taking into account cost savings of the population as a result of implementation of the investment project at the enterprise (OD) (watch Table). Cost savings of the population may occur as a result of the following factors:

— reduction of tariffs or prices for public services enterprises as a result of improving technology and economies of production costs;

— reduce the cost of consumers as a result of improving the quality of services, such as troubleproof, accidentfree and on-time provision of services.

The financing of such investment projects carried out by local authorities is assumed in the context of realization of public services.

If the present net value of the project is positive (NPV > 0), this means that the investment project will reimburse the cost of original budget of local governments, provide excess discounted economic benefits obtained as a result of saving production costs of public enterprises and social cost savings of the population, over the original budget expenditures.

Internal rate of return IRR is that discount rate at which the value of economic and social effects is equal to budget investment. In these conditions it is assumed that the discount rate is equal to the minimum value, i. e. risk-free rate of return, as all public services have social effects, which have qualitative nature and cannot be changed into monetary units. The value of IRR is compared with a set discount rate r. Moreover if the IRR > r, the project provides positive NPV. If IRR < r, the budget costs exceed economic and social impact measured.

Indicators of social-economic and fiscal efficiency of the investment project in the field of public services

Economic efficiency	Social and Economic Benefits	Budget efficiency
$$\text{NPV} = \sum_{t=0}^{T} \frac{Д t}{(1+r)^t} - \sum_{t=1}^{T} \frac{Kt}{(1+r)^t};$$ $$\sum_{t=0}^{T} \frac{Д t}{(1+\text{IRR})^t} = \sum_{t=0}^{T} \frac{Kt}{(1+\text{IRR})^t};$$ $$PI = \frac{\sum_{t=1}^{T} \frac{Д t}{(1+r)^t}}{\sum_{t=1}^{T} \frac{Kt}{(1+r)^t}};$$ $$DPP = \frac{\sum_{t=0}^{T} \frac{Kt}{(1+r)^t}}{\sum_{t=0}^{T} \frac{Д t}{(1+r)^t}} T$$ $Д_t$ − cost savings from enterprise investment project in period t; K_t − capital investments in the period t; r − The discount rate; T − the useful life of the equipment	$$\text{NPV} = \sum_{t=0}^{T} \frac{Д t}{(1+r)^t} + \sum_{t=0}^{T} \frac{Д н}{(1+r)^t} - \sum_{t=0}^{T} \frac{Kt}{(1+r)^t};$$ $$\sum_{t=0}^{T} \frac{Д t}{(1+\text{IRR})^t} + \sum_{t=0}^{T} \frac{Д н}{(1+\text{IRR})^t} = \sum_{t=0}^{T} \frac{Kt}{(1+\text{IRR})^t};$$ $$PI = \frac{\sum_{t=1}^{T} \frac{Д t}{(1+r)^t} + \sum_{t=1}^{T} \frac{Д н}{(1+r)^t}}{\sum_{t=1}^{T} \frac{Kt}{(1+r)^t}};$$ $$DPP = \frac{\sum_{t=0}^{T} \frac{Kt}{(1+r)^t}}{\sum_{t=0}^{T} \frac{Д t}{(1+r)^t} + \sum_{t=0}^{T} \frac{Д н}{(1+r)^t}} T$$ $Д_t$ − cost savings from enterprise investment project in period t; $Д_n$ − cost savings from the public investment project in period t; K_t − capital investments in the period t; r − The discount rate	$$\text{NPV} = \sum_{t=0}^{T} \frac{Д_6 + Э_{6c} + Р_6}{(1+r)^t}$$ $Д_6$ − local budget revenues in connection with the implementation of the investment program; $Э_{6c1}$ − budget savings by reducing costs due to realization of investment program, paid for from the budget; $Р_6$ − expense of the local budget for the implementation of the investment program; r − The discount rate; T − the useful life of the equipment
$r = r_f + r_{\text{риска}}$ r_f − risk-free rate of return; $r_{\text{риска}}$ − risk premium, %	$r = r_f$	

Profitability index or profitability (PI) shows relative efficiency of the project, or discounted value of the total social and economic effects of the project, based on the unit cost of investment. If PI > 1, the project is effective, i. e. save production costs and social benefits of the project exceed original budget investments, thereby ensuring positive value NPV.

Discounted payback period (DPP) is the minimum time interval from the start of the project, beyond which the integral effect becomes is non-negative in the future. In other words, this is the period (measured in months, quarters, or years), from which the initial investment costs associated with the investment project are covered by the total operating economies and social benefits.

Identification of budget efficiency of implementation of the investment project in the social sphere is made by selecting indicators from feasibility study of the investment project which are considered when calculating budget efficiency.

The value of NPV in calculating the budget will demonstrate the excess of discounted budget revenues as a result of enterprise performance and discounted budget savings over the cost of the local budget for implementation of the investment project (Table).

By revenues of the regional (local) budget in connection with the implementation of the project we imply additional tax and non-tax earnings in the regional (local) budget caused by usage of the investee.

Factors of budget savings from implementation of the investment project can be as follows:

− budget savings by reducing operating expenses − because of realization of the investment project − paid using budget funds, public subsidies and subsidies to the enterprise;

− budget savings by eliminating potential costs of the regional (local) budget for removal of negative environmental and social impacts that may occur in case of refusing to implement the investment project.

As budget savings by reducing operating costs can be considered the difference between operating costs of the local budget for the

operation of the investee prior to implementation of the investment project, and the cost of the local budget after starting implementation of the investment project for five years.

As budget savings by eliminating potential costs of the regional (local) budget for removal of negative consequences in case of non-implementation of the investment project can be considered such potential costs as:

− to eliminate the consequences of potential accidents, natural disasters;

− to provide material assistance to victims, costs of payment of fines and compensation;

− to additional costs for purchase of goods and services on the side at higher prices.

To conclude authors have examined the theoretical aspects of efficiency evaluation of the investment enterprise providing public services. Authors have proposed to use three directions to evaluate efficiency: economic, social and budget.

Social efficiency of the project investment is that due to modernization and reconstruction of existing production, net cost of service products will decrease, and consequently, it will be a decrease in economically justified tariffs or prices; at the same time it will be improved the quality of services provided for society. Budget efficiency is explained by excess of budget savings for public services over budget investments in improving economic efficiency of enterprises. Therefore it is necessary to carry out comprehensive analysis of efficiency, taking into account all elements of provision of services.

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UDC 330

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ALLOCATION OF A BONUS WAGE FUND ACCORDING TO PERSONNEL PERFORMANCE

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РАСПРЕДЕЛЕНИЕ ПРЕМИАЛЬНОГО ФОНДА ОПЛАТЫ ТРУДА ПО РЕЗУЛЬТАТАМ ВЫПОЛНЕНИЯ ЗАДАЧ ПЕРСОНАЛОМ

The paper pays special attention to the development of an economic and mathematical model to allocate the bonus fund when the company tries to encourage fulfillment of specific tasks as soon as possible. The economic and mathematical model in question is brand-new and represents a model of nonlinear optimization of allocating financial resources of a bonus fund throughout subdivisions according to the periods of task fulfillment by the company's personnel.

PERSONNEL FLOW; EMPLOYEE CREATIVE POTENTIAL; EMPLOYEE MOTIVATIONAL AND ETHICAL POTENTIALS; COMPANY'S BONUS FUND; OPTIMAL ALLOCATION OF REWARDS TO EMPLOYEES.

Рассматривается экономико-математическая модель распределения премиального фонда. Разработка является оригинальной и представляет собой модель нелинейной оптимизации распределения финансовых ресурсов премиального фонда по подразделениям в зависимости от сроков выполнения задач персоналом компании.

КАДРОВЫЙ ПОТОК; ТВОРЧЕСКИЙ ПОТЕНЦИАЛ СОТРУДНИКОВ; МОТИВАЦИОННЫЙ И МОРАЛЬНЫЙ ПОТЕНЦИАЛЫ СОТРУДНИКОВ; ПРЕМИАЛЬНЫЙ ФОНД КОМПАНИИ; ОПТИМАЛЬНОЕ РАСПРЕДЕЛЕНИЕ ВОЗНАГРАЖДЕНИЙ СОТРУДНИКАМ.

The movement of manpower (personnel flow), being an active part of the socio-economic system, is related to various organizational, managerial, financial, and informational aspects of a company's performance and development [1, 2]. It can be shown that the allocation of an organization's bonus fund should be effected allowing for the company's goals, traditions and available financial resources. It can be shown that the company's management is interested in determining the extent of participation for each employee, which determines his/her contribution into the firm's development. First of all, the firm can evaluate the contribution of each subdivision into the increase of the company's economic potential, which will allow evaluating the size of the bonus fund for a particular subdivision. Then the obtained amounts of the bonus fund can be allocated by potential priorities of the firm's employees who participated in implementing specific tasks. Enterprise management, targeted at enhancing its efficiency, requires a skill from the executives and managers to evaluate properly and to allocate optimally the enterprise's manpower in accordance with the given tasks [3, p. 105].

In the opinion of the Russian specialist in the sphere of economic analysis L.N. Molchanov, the process of analyzing manpower allows for a complex of generalized indices, such as manpower potential, labor activity of the personnel, motivation, creative potential etc. [4, p. 46–47]. Creative potential implies detection and evaluation of the following aspects:

– the number of rational proposals and inventions submitted by the workers, participation in developing innovations, professional contests, etc.

– the size of unused reserves;

– level of education, qualification, work culture;

– employee's aspiration to extend the professional profile, career;

– involvement in taking economic decisions, running the enterprise, operation of public organizations.

Motivational potential:

– labor satisfaction;

– labor attitudes;

– socio-psychological climate in the team;

– personnel turnover.

Ethical potential:
− labor discipline.

The following is referred to indices of the manpower potential:
− average headcount, real numbers of the personnel;
− integral labor utilization rate;
− balance of jobs and employees at an enterprise;
− professional and qualification potential;
− personnel's structure according to education;
− personnel's structure according to labor record;
− functional structure etc.

Psycho-physical potential is evaluated by the following values:
− personnel's gender-age structure;
− intensity, severity of labor;
− disease rates (general, occupational);
− performance indicators.

On the basis of analyzing labor indices it is possible to evaluate economic efficiency of labor at the level of an enterprise and its subdivisions, formulate guidelines to improve personnel management, forms, methods, procedures of cooperation with the personnel, and the corresponding changes in the functions and services ensuring personnel policies. Special attention should be paid to measures which increase labor efficiency, rational use of working time, efficient use of the wage fund, and monitoring of overall indices.

One of the factors to increasing efficiency of a personnel management system is optimal planning the manpower allowing for a need in personnel, variable costs of personnel, its development, and through the evaluation of labor efficiency activities for each employee.

An economic and mathematical model, which allocates optimally the bonus fund, can be built in accordance with the priorities of the employees economic potential and the use of the manpower (personnel flow) to ensure fulfillment of managerial tasks by the criterion of minimal time spent by subdivisions. Let us take P as a matrix of order $m{\times}n$, in which the value p_{ij} is at the position (i, j).

$$P = \begin{Bmatrix} p_{11} & p_{12} & \cdots & p_{1n} \\ p_{21} & p_{22} & \cdots & p_{2n} \\ \vdots & \vdots & p_{ij} & \vdots \\ p_{m1} & p_{m2} & \cdots & p_{mn} \end{Bmatrix}.$$

A matrix element p_{ij} denotes the time for task fulfillment assuming the i-th subdivision of the company (department sector, department, directorate) of the j-th task, including the time spent to compile respective documents (such as business plans of investment projects, various managerial reports and various documentation). It is required to draw up a plan of allocating the personnel flow, with the time to fulfill a managerial task is minimal.

Assume x_{ij} as the size of the bonus fund of the i-th subdivision (the size of financial resources included in the budget of the i-th subdivision paid as a reward to employees for the fulfillment of the j-th task. The total size of financial resources which can be directed at the payment of bonuses to the i-th subdivision amounts to d_i units, $i = 1, 2, ..., m$; the size of bonuses directed at the disbursements (without linking to any subdivision) for the fulfillment of a specific j-th task equals b_j units, $j = 1, 2, ..., n$. Then, d_i of the units is the size of the bonus budget allocated according to task significance.

The target function reflects the company's aspiration to award bonuses to those employees particularly who fulfill the tasks in the most efficient way. A set of tasks can be fulfilled by any subdivision of the company and is fulfilled by each subdivision over the time p_{ij}. Bonuses are allocated by subdivisions that fulfilled the set tasks as soon as possible. The competition of subdivisions (affiliates, employees' teams, workgroups) is implied a set of tasks within the shortest time. The moment, when the most time-consuming task of those which have been set is completed, must be minimal, when the bonus fund may be allocated by subdivisions. In this case the target function f with the time minimum criterion must be equal to the highest value of all time values which were spent on task fulfillment, i. e. $f(x_{ij}) = \max p_{ij}$, where the maximum is taken for those p_{ij} only with positive values of funds allocated for bonuses.

The formally considered task is written in the following manner:

$$f(x_{ij}) = \max p_{ij} \xrightarrow[x_{ij} > 0]{} \min;$$

$$\begin{cases} \sum_{j=1}^{n} x_{ij} = d_i, & i = 1, ..., m; \\ \sum_{i=1}^{m} x_{ij} = b_j, & j = 1, ..., n; \\ \sum_{i=1}^{m} d_i = \sum_{j=1}^{n} b_j, & i = 1, ..., m; \ j = 1, ..., n; \\ x_{ij} \geq 0, & i = 1, ..., m; \ j = 1, ..., n. \end{cases} \qquad (1)$$

The composed model is not a linear programming model. Similar tasks are solved by Mathcad tools in [5].

Assume that a certain company needs to make a plan of allocating the bonus fund by subdivisions to encourage fulfillment of managerial tasks so that the maximal time spent on the task fulfillment should be minimal. The time for task fulfillment, capacities of financing sources (subdivision's budget), and the amounts of bonuses for task fulfillment are given in tab. 1.

This task can be written in a mathematical expression as follows:

$$f(x_{ij}) = \max p_{ij} \xrightarrow[x_{ij} > 0]{} \min$$

with observance of the following restrictions:

$$
\begin{cases}
x_{11} + x_{12} + x_{13} + x_{14} + x_{15} + x_{16} + x_{17} + x_{18} + \\
\quad + x_{19} + x_{1,10} = 190; \\
x_{21} + x_{22} + x_{23} + x_{24} + x_{25} + x_{26} + x_{27} + x_{28} + \\
\quad + x_{29} + x_{2,10} = 180; \\
x_{31} + x_{32} + x_{33} + x_{34} + x_{35} + x_{36} + x_{37} + x_{38} + \\
\quad + x_{39} + x_{3,10} = 205; \\
x_{41} + x_{42} + x_{43} + x_{44} + x_{45} + x_{46} + x_{47} + x_{48} + \\
\quad + x_{49} + x_{4,10} = 210; \\
x_{51} + x_{52} + x_{53} + x_{54} + x_{55} + x_{56} + x_{57} + x_{58} + \\
\quad + x_{59} + x_{5,10} = 215; \\
x_{11} + x_{21} + x_{31} + x_{41} + x_{51} = 113; \\
x_{12} + x_{22} + x_{32} + x_{42} + x_{52} = 88; \\
x_{13} + x_{23} + x_{33} + x_{43} + x_{53} = 110; \\
x_{14} + x_{24} + x_{34} + x_{44} + x_{54} = 91; \\
x_{15} + x_{25} + x_{35} + x_{45} + x_{55} = 100; \\
x_{16} + x_{26} + x_{36} + x_{46} + x_{56} = 105; \\
x_{17} + x_{27} + x_{37} + x_{47} + x_{57} = 85; \\
x_{18} + x_{29} + x_{39} + x_{49} + x_{59} = 109; \\
x_{19} + x_{29} + x_{39} + x_{49} + x_{59} = 95; \\
x_{1,10} + x_{2,10} + x_{3,10} + x_{4,10} + x_{5,10} = 104; \\
\sum_{t_{ij} > r} x_{ij} = 0, \quad r = \overline{1, 50}; \\
x_{ij} \geq 0, \quad i = \overline{1, 5}; \quad j = \overline{1, 10}.
\end{cases}
$$

By solving the task, we will obtain tab. 2.

The total requirement in financing encouragement of the subdivisions is completely satisfied and equals to 1,000 ths rubles with the following equation:

$$\sum_{i=1}^{m} x_{ij} = \sum_{j=1}^{n} x_{ij}.$$

The minimal time spent on the fulfillment of the j-th managerial task by i-th subdivision is 19 days in this case.

The obtained amounts of bonuses in subdivisions for the fulfillment of specific tasks are subdivided among employees, involved in the tasks, for instance, allowing forthe priority of the employees' economic potential.

According to the Russian specialist in the sphere of manpower management Saichenko O.A.: human capital management is one of the basic factors which enhances a competitive ability of enterprises and which is based on motivation to achieve the strategic development goals [6]. The developed economic and mathematical model allows the bonus fund to be allocated, by both subdivisions engaged in the fulfillment of specific tasks and by employees engaged in the implementation of the respective tasks, depending on their priority of the economic potential calculated by the company using comparison models of employees' potentials. As the priority of the employees' economic potential to allocate the bonus fund in specific subdivisions, one can take a value of an individual's cultural capital developed by the Russian specialist in intellectual capital assessment Arfae A.V., calculated as the aggregate of assessments of intellectual capital, educational capital, ethical capital and social capital [7].

T a b l e 1

Time for fulfilling a task implies the fulfillment of as set of tasks by 5 subdivisions

Subdivisions	Time (days) p_{ij} for fulfillment by i-th subdivision (j = 1, 2, ..., 10) of j-th task (j = 1, 2, ..., 10)										Budgets of subdivisions, ths rubles
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
1	15	19	19	23	15	25	16	29	21	13	190
2	17	23	24	25	27	29	15	16	15	14	180
3	23	27	19	16	27	22	18	23	20	20	205
4	22	33	27	20	17	29	19	27	26	21	210
5	21	19	18	14	18	16	28	32	27	15	215
Bonus budget for task fulfillment, ths rubles	113	88	110	91	100	105	85	109	95	104	

Transport table obtained in the result of solving a task, ths rubles

Subdivisions	Volume of a bonus fund as calculated for i-th subdivision (j = 1, 2, ..., 10) to encourage fulfillment of j-th task (j = 1, 2, ..., 10) as soon as possible											Budget of the subdivision
	1	2	3	4	5	6	7	8	9	10	$\sum\limits_{j=1}^{n} x_{ij},\ j = \overline{1,10}$	d_i
1	86	0	0	0	0	0	0	0	0	104	190	190
2	27	0	0	0	0	0	85	0	68	0	180	180
3	0	0	0	69	0	0	0	109	27	0	205	205
4	0	0	110	22	78	0	0	0	0	0	210	210
5	0	88	0	0	22	105	0	0	0	0	215	215
Bonus budget for task fulfillment $\sum\limits_{i=1}^{m} x_{ij},\ i = \overline{1,5}$	113	88	110	91	100	105	85	109	95	104	**1,000**	**1,000**
b_j	113	88	110	91	100	105	85	109	95	104	**1,000**	—

The model in question is based on the mechanism of competition between the company's subdivisions for the result of the tasks. It is possible to solve the problem of allocating the bonus fund for the task fulfillment in no time and ensure the formation of organization's cultural environment allowing for the integration of various resource flows (the problem of package treatment of material flows, financial, and informational resources is considered in [8]). Thus various options to enhance efficiency of personnel performance should be considered through implementing organizational managerial innovations [9, p. 255] and taking into account that organizational managerial innovations imply the flow process; and obtained results depend on the amount of the intellectual potential which is embedded in the innovations upon their creation [10, p. 267].

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OPEN INNOVATION AND ICT TECHNOLOGIES: GREAT MODERN PHENOMENA AND ITS INTERCONNECTION

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ОТКРЫТЫЕ ИННОВАЦИИ И ИНФОРМАЦИОННО-КОММУНИКАЦИОННЫЕ ТЕХНОЛОГИИ: СОВРЕМЕННЫЕ ЯВЛЕНИЯ И ИХ ВЗАИМОДЕЙСТВИЕ

This paper deals with the analysis of main trends in ICT development and its influence on the modern business environment. Interconnected links between Open Innovation paradigm, ICT phenomena and coworking as a form of infrastructure for emerging business have been demonstrated.
OPEN INNOVATIONS; ICT; SOCIAL COMMUNICATIONS; CROWDSOURCING; COWORKING.

Статья посвящена изучению основных тенденций развития информационно-коммуникационных технологий и их влияния на современную бизнес-среду. Продемонстрированы взаимосвязи между парадигмой открытых инноваций, информационно-коммуникационными технологиями и коворкингами как формой инфраструктуры для зарождающегося бизнеса.
ОТКРЫТЫЕ ИННОВАЦИИ; ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ; СОЦИАЛЬНЫЕ КОММУНИКАЦИИ; КРАУДСОРСИНГ; КОВОРКИНГ.

Introduction. The term «Open Innovation» is currently popular in management literature. In recent years, the number of the use of this term in the literature has been exponentially growing. According to Stefan Lindegraad, *«In five to seven years, we will no longer talk about open innovation. The term «open innovation» will disappear and we will just view this as «innovation. The key difference is that innovation will have a much higher external input that we see today»* [1]. These words force us to look at the openness of innovation as a distinct phenomenon that has a significant impact on the development of methods, tools and business infrastructure.

The original idea of open innovation was formulated by Henry Chesbrough as follows: *the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation respectively.* He coined the term «Open Innovation» in the book «Open Innovation: The New Imperative for Creating and Profiting from Technology» [2]. In the most general terms, the nature of open innovation could be described by means of six open innovation principles (see table below, reference: Chesbrough, H. (2003).

Table 1

Open Innovation principles

Open Innovation Principles
If we create the most and the best ideas in the industry, we will win.
External R&D can create significant value: internal R&D is needed to claim some portion of that value.
We don't have to originate the research to profit from it.
Building a better business model is better than getting to the market first.
If we make the best use of internal and external ideas, we will win.
We should profit from others' use of our IP and we should buy others' IP whenever it advances our business model
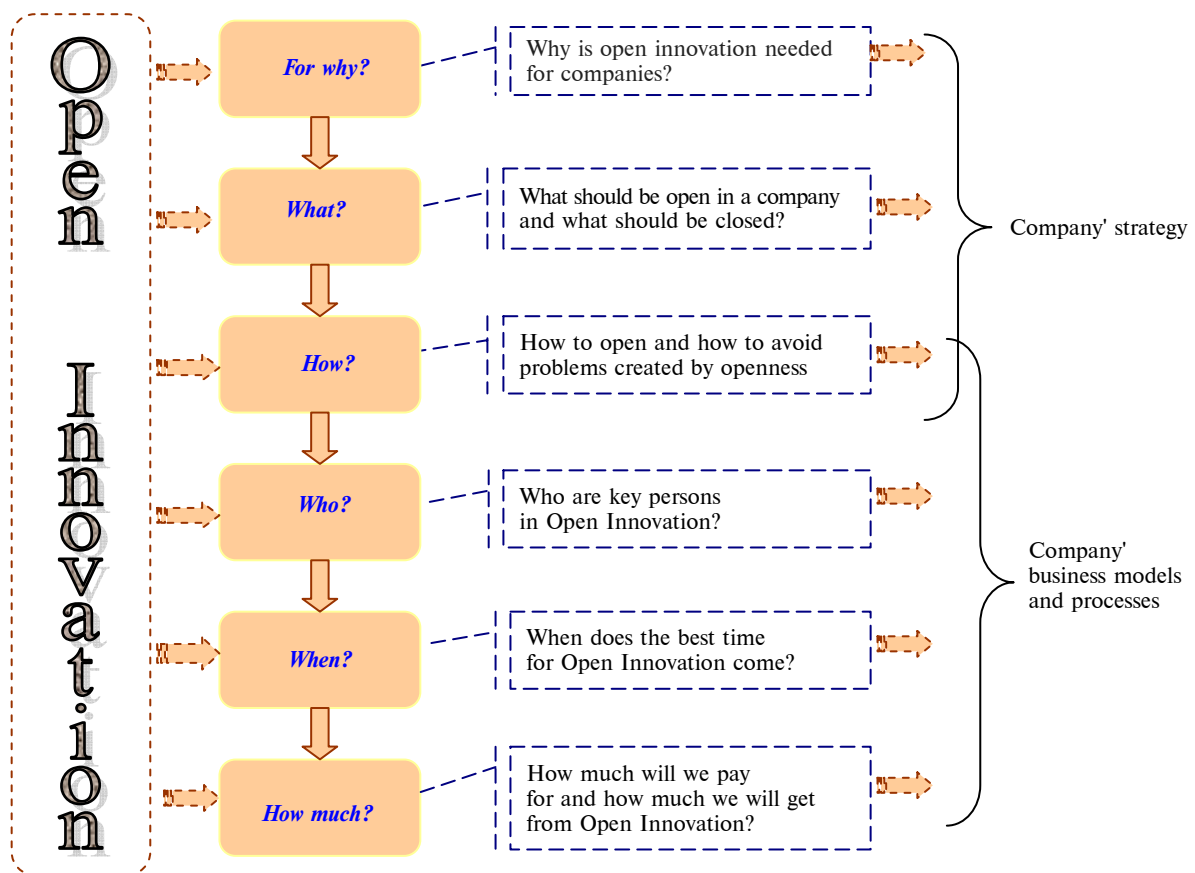
Open Innovation as a company strategy and business processes

Problem definition. Open Innovation seems to be is a simple concept. To develop new products and services companies should focus their activities on external expertise and ideas instead of doing everything themselves. However, as a lot of researches have rightly pointed out, the devil is in the details. To put into practice Open Innovation must be transferred from the concept level to the level of a management technology and business processes. The following logical progression of questions must have clear and reasonable answers to be used in business practice (Figure).

A lot of studies of open innovation topics have been devoted to answer the question «Why is open innovation needed)?» [3−6]. The shortest and most intelligible answer to this question was given by Marko Torkkeli, Professor at Lappeenranta University of Technology: «You must be open or you will be closed». This aphorism reflects the realities of the modern world where the competition exists in the new constantly changing conditions and the openness to market requirements and trends in science development becomes a key factor of the competitiveness of a company.

The question «Why Open Innovation?» corresponds to the level of the company's mission development. Being used in business, the Open Innovation principles can be based on a winning strategy for companies. To be used in practice the Open Innovation paradigm must be supplemented by the relevant principles of the company's strategy. Strategy's level corresponds to the questions «How?» and «What?». It means that to use Open Innovation Principles in the company's strategy they must be accompanied by answers to relevant questions. (see Tab. 2).

The questions mentioned above have come under review in management and the answers to them have been received in relation to the traditional management. Open Innovation as a new business paradigm makes us find new answers to these questions. Henry Chesbrough proposed the basis for this search comparing open and closed innovation. Later this comparison

Table 2

Fundamental questions on Open Innovation

No.	Open Innovation Principles	Fundamental questions
1	If we create the most and the best ideas in the industry, we will win	How and where could we find the best ideas that will help us win?
2	External R&D can create significant value: internal R&D is needed to claim some portion of that value	What is internal R&D needed to claim the maximum of the value of external R&D?
3	We don't have to originate the research to profit from it	What should be done to originate research profitable for us?
4	Building a better business model is better than getting to the market first	What should we do to build the best business model?
5	If we make the best use of internal and external ideas, we will win	How could we combine internal and external ideas to get profit?
6	We should profit from others' use of our IP and we should buy others' IP whenever it advances our business model	How could we get others' IP and what should be done to get profit from our IP?

has become very popular and continues to be used in a number of papers to explain the essence of open innovation [7−11]. However, it often falls out of consideration the fundamental questions: What is the radical newness of the principles put forward by Henry Chesbrough?; Why was his work accepted by the scientific community and has gained an enormous popularity just in the early 21th century? Let us consider the impact of ICT on open innovation as just in the late 20th century and in the early part of the 20th century ICT phenomena began to have a substantial impact on different aspects of the business.

Problem analysis. To answer these questions Yury Nurulin analyzed global trends in the development of an external environment of an innovative business at the start, when, in fact, the concept of open innovation originated [12]. The following Great ICT Phenomena were selected. Let us study links between these phenomena and Open Innovation Fundamentals.

The phenomenon of personal computing means that thanks to the development of a microelectronics technology and personal computers, there is no an organizational barrier between a researcher and the instrument to solve scientific problems any more. In the scientific activities a researcher has got a direct access to the instrument (a computer) without mediators (computer operators, etc.). In business there is no need in performers (typists, draftsmen, clerks,

etc.), which are the mediators between the problem's formulation and its solution.

The phenomenon of open communication means that thanks to the development of information and communication technologies, organizational and financial barriers to exchange the information of any size and content disappear. This eliminates the necessity to exchange paper documents for their agreement, cancels any unnecessary business trips for holding meetings and guarantees the constant readiness of workers to share information materials, regardless of their geographical location. This phenomenon establishes the basis for an uninterrupted information exchange and also for business, especially for services in a mode of 365*24. It is known that an effective business is based on an effective communication and the key word «open» in the above-mentioned phenomenon reflects not only the communication level but also the business itself. To be used in practice this phenomena requires serious changes in business models, company's processes and staff mentality (business contacts should not be interrupted for lunch breaks, vacations, etc.).

The phenomenon of cooperative technologies consists of a computer supported cooperative work of the development team on a common project. It has become possible thanks to the development of concurrent engineering methods that provide a controlled access to different parts of the project for group members, the version management and the version of project

documentation and the implementation of the coordinated work in a sequential procedure. This phenomenon reflects the growing openness of the development process.

The mobile computing phenomenon is a phenomenon when in some cases thanks to micro- and nanotechnologies a direct link between a work place and the work content disappears. Mobile computing, at least, reduces the costs to maintain the business infrastructure by means of transferring some business processes from the company premises to private or public ones. The company can receive an additional effect of mobility due to the intensification of employees' labor and reducing time expenditures on commuting, business trips, going to banks, etc. However, the greatest effect on the development of mobility occurs when the number of information contacts of the staff increases, both within the organization and outside. Traditional vertically-oriented organizational structures of the enterprise create specific barriers preventing the employees from the open exchange of information, knowledge and ideas. It is quite a common situation if employees of neighboring departments of the same organization meet and discuss their team work not in the company office, but at conferences, third-party seminars, etc. As a result, companies suffer from the symptoms of group selfishness and informational isolation of their departments and other negative emotions for the lack of mobility. Thus this phenomenon has a significant impact on the work management and the company internal regulations, i. e. its business model (see OI Principle 4).

The phenomenon of distributed computing does not contradict but completes the phenomenon of personal computing and is inextricably linked with the phenomenon of distributed computing mentioned above. Thanks to the Internet personal computers could be connected in a complex that is focused on serious problem solving and it requires extensive computer resources. It shows that the medium is separated from a number of procedural knowledge that is expressed in information technologies of solving complex problem. To develop such procedural knowledge the technologies and software of distributed and high- performance computer systems are used.

In fact, the phenomenon of distributed computing reflects the cyclical nature of the society development. We could observe a return from personal to centralized computing at a totally new level, while the centralization is not determined at the physical level (a central computer located in a separate room and surrounded by the special infrastructure facilitates to prepare data for their use) but at the informational level (conditional, orientational and individual knowledge). Widely spread in recent years supercomputers and Cloud Technologies reflect this phenomenon and it requires our readiness to move our research task (i. e. our idea) outside. To originate necessary research we will use some outside equipment with an open access (see OI Principle 3). The openness provides additional effectiveness for users of this equipment if new business models could be implemented (see OI Principle 4).

The phenomenon of independence of the information from a medium appears when due to the Internet the users do not take interest in a physical medium of data and information they need. Saying that «the information is stored on the Internet,» we admit the fact that the information is separated from a medium. The user does not know and does not want to know which particular computer or memory element stores the information he needs. The main thing is to provide access to this information. A key factor in the competitiveness of the enterprise becomes not so much the possession of a powerful resource for the storage of the information as the possession of access to information on the Internet. To get the information about projects, resources, schedules, etc. we just need access to the Internet as a global storage of data and information. What is more important − we consider the Internet as global storage of *knowledge* or as an instrument for knowledge creation. The separation of the information from the physical media inevitably leads to weakening of links between the information and the subject. The numerous copyright infringement recorded on the Internet reflects this fact. Addressing these violations is evolving and will evolve. However, its effectiveness decreases while the transition from declarative to individual knowledge. Open Innovation paradigm reflects this process objectively. In fact, the strategy of intellectual

property (IP) *protection* within the framework of Open Innovation should be replaced by the strategy of IP *use*, replacing *restrictive and prohibitive* measures with organizational and economic measures to create *a balance of interests* for all subjects of innovation activities that corresponds to OI Principle 6.

In addition to the above we could mark **the phenomenon of social communication**, when social groups and nets have become a productive force. We could see a lot of examples when the opinion of social nets directly influences on art, politics and people behavior. Social groups are used in marketing (studying customer preferences), in research (searching for solutions to scientific tasks), in business (fund-raising and project execution), in innovation (searching for new ideas or solutions to business problems). This phenomenon is reflected in the group of methods combined by the term *crowdsourcing* which consists of words «crowd» and «sourcing». The idea of these methods is to appeal to a large group of people for services or information instead of formal requests by a company staff. The business-model of crowdsourcing is based on transferring some tasks to large groups of people both doers and suppliers (OI Principles 1, 2, 3, 4, 5).

Crowdsourcing is based on a well known statement that for all activities the most part of knowledge is outside of any organization specialized in this sphere. In contradiction to traditional methods, the number of participants in crowdsourcing is not limited by one focus-group. Using crowdsourcing a company could appeal to the majority of clients at the moment of problem solving without additional efforts and resources.

According to the use of results the following types of croudsourcing are selected.

Business. There are a lot of examples when large and medium companies use croudsourcing to solve designer's tasks, to search for innovation technologies, to create and support Internet platforms, to search for new product ideas and new commercial ideas for existing products and marketing and many other things.

Services. A vivid example is a freelance marketplace. The IT platforms that support this type of croudsoursing provide the connection of project customers and potential doers − freelancers (see *ScriptLance* [http://www.freelancer.com/],

Elance [https://www.elance.com/], *Guru* [http://www.guru.com/] *Free-lance.ru* [https://www.fl.ru/] etc). Customers formulate the tasks and work conditions, select doers from freelancers offering their service. To do it customers have to open their tasks and ideas for everybody that means that Open Innovation principles are fundamental for this approach. Another example is tourism where crourdoursing is becoming more and more popular.

Social sphere. As an example searching for missing people or providing the assistance to the victims of natural or man-made disasters could be mentioned.

Fund-raising. We could see a lot of examples of a collective cooperation where volunteers, ready financially to support projects or ideas initiated by other people or organizations, are involved. The project idea is published on social nets with all the necessary information (project mission, tasks, the required sum of money and time limits, etc). If the project gains the required sum of money, the customer withdraws it from the account, thanks the sponsors and implements the project. Fund-raising may be used for seriously ill people including children or the rehabilitation of housing in flood-affected areas.

State-political sphere. Croudsourcing is traditionally used to discuss different public initiatives such as the support of entrepreneurship, the development of national policy, etc. and is carried out in the mode of voting or collecting some specific views. Due to the rapid development of social networks in recent years, crowdsourcing is used by politicians not only to collect information about the public mood in the society, but also as an instrument for a direct influence on the society for political purposes.

According to the technologies of network actions the following types of crowdsourcing could be selected as follows:

Crowdvoting − voting for different variants of the proposed solutions without the choice explanation and proposals for other variants. It is mostly used in politics, art and marketing.

Crowdstorming − commenting ideas, idea generation and also their combination. It is extensively used in innovation business and science.

Crowdslapping − splashing of negative emotions towards a company or a certain person that caused these emotions. It is used for the pressure

on competitors and the expression of personal animosity in social networks.

Crowdproduction − the development of the product that is important for a social group or a network (a distributed selection of the information such as road traffic, etc; collecting knowledge, for instance, in Wikipedia, etc.; the development of program products, etc). To develop new products and services croudproduction is based on Open Innovation principles even if this term is not pronounced (see, for example, IT platforms *InnoCentive* [http://www.inno centive.com], *IdeaConnection* [http://www.idea connection.com/], *Innoget* [http://www.innoget. com/], *NineSigma* [http://www.ninesigma.com/].

Summarizing the above, we can say that there are close links between the Open Innovation and ICT phenomena since just ICT provide a new level of openness in exchange of ideas, in tools for R&D and management and in business models. An additional argument that proves this conclusion could be found while comparing those times when mentioned phenomena appeared and became popular. Henry Chesbrough published the study «Open Innovation: The New Imperative for Creating and Profiting from Technology» in 2003 and we could see a rapid growth of Internet users and the development of new ICT products and instruments at the same time.

The above mentioned ICT phenomena created a new type of physical space for business that got the name coworking [13]. The openness in coworking is presented at the level of working space and to get profit from it the owners of coworking should follow OI principles in their business models and processes. At first the focus group of coworking were freelancers specialized in programming, but at the moment coworking have become serious competitors for traditional incubators and other forms of the innovation infrastructure aimed to emerging business in general. It means that ICT spread their direct influence on programming and other business areas [14].

Conclusion. The study has demonstrated interconnected links between 3 subjects:
− ICT as a technological base for modern business;
− Open Innovation as a paradigm to create effective business models for a science-intensive business;
− and coworking as a type of infrastructure for emerging business.

In the current business environment these links will developed and could be the subject for our further studies. One of the first researches in this area was done within the framework of the project SE631 «Open Innovation Services for Emerging Business − OpenINNO». It was implemented in 2012−2014 within the program of *«South-East Finland − Russia European Neighbourhood and Partnership Instrument ENPI»*. The results of the project are available on the project website [15].

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SMALL ENTERPRISES IN THE CONTRACT PROCUREMENT SYSTEM OF THE ULYANOVSK REGION

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МАЛОЕ ПРЕДПРИНИМАТЕЛЬСТВО В КОНТРАКТНОЙ СИСТЕМЕ УЛЬЯНОВСКОЙ ОБЛАСТИ

The law says that 10—20 % of municupal procurement orders must be placed with small enterprises as a way to provide them with state support This paper presents an analysis of the participation rate of small enterprises in this procurement process. The analysis covers the municipal entities of the Ulyanovsk region and is based on the statistics for 2011—2012. Mathematical economic models were developed to estimate regularities and the existing differentiation of basic indicators that characterize the contract procurement system. The paper therefore discusses some proposals regarding the development of the new contract procurement system.

MUNICIPAL PROCUREMENT; MATHEMATICAL ECONOMIC MODELS; SMALL ENTERPRISES; MUNICIPAL ENTITIES; CONTRACT PROCUREMENT SYSTEM.

Законодательно установлена обязательность размещения части муниципальных заказов в размере 10—20 % среди субъектов малого бизнеса. На основе статистических данных за 2011 и 2012 гг. по муниципальным образованиям Ульяновской области приведен анализ уровня участия малых предприятий в соответствующих закупках. Для оценки закономерностей и сложившейся дифференциации основных показателей, характеризующих контрактную систему, разработаны экономико-математические модели. Рассмотрены предложения по развитию новой контрактной системы.

МУНИЦИПАЛЬНЫЕ ЗАКУПКИ; ЭКОНОМИКО-МАТЕМАТИЧЕСКИЕ МОДЕЛИ; МАЛЫЙ БИЗНЕС; МУНИЦИПАЛЬНЫЕ ОБРАЗОВАНИЯ; КОНТРАКТНАЯ СИСТЕМА.

Entrepreneurhsip development requires a substantial effort from authorities. One of the ways to provide systematic support to enterprises at the federal, regional and municipal levels is to secure their participation in the contact procurement system.

The experience gained in Russia and economically developed foreign countries today shows how important it is to set up a municipal procurement system as an effective tool of macroeconomic regulation and support of entrepreneurial activity. Municipal bodies or institutions act as customers: they represent the municipality and have the authority to make budgetary commitments. The municipal procurement order is to ensure a certain volume of high-quality procurement, the orderly and prudent manner of expending budgetary funds, the effectiveness of integrating different forms of enterprises and organizations to implement contracts, the openness and transparency of procurement, the enhancement of competitiveness, the reduction of corruption. The basic principles according to which small enterprises could participate in the municipal procurement process can be found in the Federal Law of 21 July, 2005, no. 94-FZ «On placing orders to supply goods, perform work or provide services for state and municipal needs» [1], which was in effect till 2014. The Ministry of Economic Development of the Russian Federation has repeatedly emphasized the need to expand the role of small busness in the federal and municipal procurement system. [2].

The regulatory framework that classifies a business enterprise as a small one was described in detail in the Federal Law of 24 July, 2007, no. 209-FZ «On developing small and medium scale entrepreneurship in the Russian Federation» [3]. The main criterion is the number of employees: it should not to exceed one hundred people for a small enterprise. According to Item 1 of Article

3 of the aforementioned Law, self-employed entrepreneurs, that is, individuals who are engaged in entrepreneurial activity, are to be regarded as small enterprises as well. Henceforth, the article also refers to small enterprises as small business entities or SBEs for short. The theoretical and applied aspects of federal and municipal purchases, especially the legal and organizational ones, are considered in the literature [4, 5, 6, 7, 8, 9, 10]. However, we can state that the assessment of the role that small business entities play in the implementation of contracts ensuring the needs of municipalities has been researched insufficiently.

In view of the above, the need for the relevant research has become quite obvious. The results of it are discussed in the present article.

The aim of this research was to develop methods and to analyze regularities characterizing the reached level of SBE participation in the municipal procurement process. At that, the following objectives have been achieved: the methodological approach and the research algorithm of the study have been substantiated, mathematical economic models have been developed that describe such indicators as the number and the cost of contracts per one SBE functioning in each municipality, the relative share of the number and the cost of contracts against the total number and the total cost of the contracts awarded following the results of tenders (lots) and requests for quotations, the proportion of successful tenders against the total number of SBE tenders and the average cost of one contract concluded by a SBE for municipal needs. The obtained models have been analyzed and the regularities that characterize the resulting values of these ndicators have been determined.

The research is based on reviewing the activities of small enterprises engaged in municipal procurement practices with municipal entities of the Ulyanovsk region.

The employment of such an approach results from a considerable differentiation in the values of the indicators throughout our country. The state procurement system has been implemented more vigorously in recent years in full compliance with the decisions of the President and the Government. But the process has moved in fits and starts. The level of SBE participation in the municipal procurement system is determined by a lot of objective and subjective factors. All this has brought about significant differentiation of indicators reflecting volumes of products, work and services commissioned by a municipal entity. A variety of mathematical economic models have been created (all the formulas and tables presented further in this article have been developed by the authors) in order to characterize the current state of differentiation in the level of SBE participation in the implementation of contracts. Normal density functions were used as the models. According to the earlier research, these functions describe the consistencies in the operations of enterprises in various regions of the country well enough [11]. The main advantage of such functions is that they allow for gaining unbiased estimators that determine both the average operating rate of enterprises and the intervals of the changes in the parameterstypical of SBEs in most regions of the country.

The authors' algorithm for analyzing the regularities in the achieved level of SBE participation in the municipal procurement contracts includes the following steps:

− establishing the database that describes the number and the cost of contracts that each municipality concluded with small enterprises for municipal needs;

− determining the ratio of the number and the cost of contracts that a municipality concluded with small enterprises for municipal needs against the total number and the cost of all the contracts it awarded;

− determining the number and the cost of contracts that a small enterprise concluded for municipal needs in each municipality;

− determining the average cost of a contract that small enterprises concluded for municipal purposes in each municipality;

− determining the share of successful tenders of a small enterprise against the total number of tenders submitted by small enterprises;

− constructing normal density functions by all the considered parameters;

− assessing the quality of the constructed functions in accordance with the accepted criteria;

− analyzing the models and determining the regularities that are descriptive of SBE participation in municipal contracts;

− preparing proposals for the development of the state procurement system.

When constructing the models, data on the contracts awarded to a small enterprise for municipal needs served as baseline information. Statictics on Municipality 21 of the Ulyanovsk region were considered. We used the data for each of the municipalities for two years (2011 and 2012). The rationale for this approach can be explained as follows: at the beginning of the 21st century the simultaneous consideration of both temporal and spatial data received widespread acceptance. Later spatial data became known as panel data. Methods of panel data analysis are presented in the works of such scientists as B. Baltagi, C. Baum, M. Nerlove, C. Hsiao [12−15]. Since panel data combine information about spatial characteristics of the objects being examined and the dynamics of their changes over some time, the developed models offer greater flexibility and content richness.

It has become apparent that a methodology based on the use of panel data has a number of significant advantages over constructing similar models covering one particular period (year):
− the whole modeling process involves a greater deal of observations;
− the effectivenesss of assessment is enhanced;
− deficiencies typical of both spatial and temporal models are excluded.

When developing the models, we made use of the data for 2011 and 2012 borrowed from the site of the Territorial Department of the Federal State Statistics Service of the Ulyanovsk region [16].

Tab. 1 shows a portion of the initial data (on the 6 municipalities of the region) describing the contracts concluded with SBEs for municipal needs.

The research was based on statistical analysis methods and mathematical economic modeling. To solve the problems and to process the information the computer programs Statistica and Microsoft Excel were applied. The functions were verified according to the Pearson criterion [17], the Kolmogorov-Smirnov criterion and the Shapiro-Wilk criterion [18].

The research process involved developing six normal density functions that reflected the regularities of SBE participation in the procurement system for municipal needs in different regions of the country in 2011−2012. The corresponding functions are given below.

The first function shows the distribution of the ratio of contracts awarded to small enterprises against the total number of contracts awarded subsequent to the results of tenders (lots) and requests for quotation (x_1, %)

$$y_1(x_1) = \frac{24}{0.98 \cdot \sqrt{2\pi}} \cdot e^{\frac{-(x_1 - 1.82)^2}{2 \cdot 0.96}}. \quad (1)$$

The second function shows the distribution of the ratio of the cost of contracts awarded to small enterprises against the total cost of contracts awarded subsequent to the results of tenders (lots) and requests for quotation (x_2, %)

$$y_2(x_2) = \frac{73.33}{2.30 \cdot \sqrt{2\pi}} \cdot e^{\frac{-(x_2 - 3.67)^2}{2 \cdot 5.29}}. \quad (2)$$

Table 1

Portion of the initial data on the contracts concluded with SBEs for municipal needs in 2012

Municipality	Number of contracts with SBEs, units.	Cost of contracts with SBEs, RUB millions	Number of tenders submitted by SBEs, units
Bazarnosyzgansky municipal district	28	3019	60
Baryshsky municipal district	21	1892	61
Veshkaymsky municipal district	38	3319	75
Inzensky municipal district	12	2243	33
Karsunsky municipal district	89	7757	207
Kuzovatovsky municipal district	23	2671	51
...	...	...	

The third function describes the distribution of the share of successful tenders submitted by a SBE against the total number of SBE tenders (x_3, %).

$$y_3(x_3) = \frac{285.71}{8.88 \cdot \sqrt{2\pi}} \cdot e^{\frac{-(x_3 - 44.42)^2}{2 \cdot 78.85}}. \quad (3)$$

The fourth function describes the distribution of the number of contracts awarded to small enterprises per SBE located in the respective municipality (x_4).

$$y_4(x_4) = \frac{1}{0.05 \cdot \sqrt{2\pi}} \cdot e^{\frac{-(x_4 - 0.09)^2}{2 \cdot 0.0025}}. \quad (4)$$

The fifth function describes the distribution of the average cost of one contract for municipal needs among small enetrprises (x_5, RUB thousand)

$$y_5(x_5) = \frac{1900}{61.75 \cdot \sqrt{2\pi}} \cdot e^{\frac{-(x_5 - 132.89)^2}{2 \cdot 3.81 \cdot 10^3}}. \quad (5)$$

The sixth function shows the distribution of the contract costs awarded to small enterprises per SBE (x_6, RUB thousand)

$$y_6(x_6) = \frac{100}{3.91 \cdot \sqrt{2\pi}} \cdot e^{\frac{-(x_6 - 8.87)^2}{2 \cdot 15.29}}. \quad (6)$$

The developed models allow for estimating the regions' average for the considered indicators and the variation ranges of these values that are typical of the majority of Russia's regions.

Logical and statistical analysis demonstrated that all the developed models approximate the initial data well on the whole range of their changes. Tab. 2 presents the calculated values of the basic statistics for the three quality criteria. The comparison of these calculated values showed that the statistics by the Pearson criterion is less than the tabular value [17]. Similarly, the calculated values by the Kolmogorov-Smirnov criterion is less than the tabular value. Statistics by the Shapiro-Wilk criterion is close to 1 [18]. Thus, the models considered by all the criteria are of high quality and can be used to describe the regularities under study.

Table 2

Calculated values of statistics by the quality criteria

Number of the function	Calculated value by the quality criterion		
	Kolmogorov−Smirnov	Pearson	Shapiro−Wilk
(1)	0.06	0.77	0.97
(2)	0.08	1.04	0.96
(3)	0.07	0.43	0.94
(4)	0.09	0.64	0.93
(5)	0.08	2.08	0.95
(6)	0.04	0.72	0.98

Since all the developed mathematical economic models approximate the initial data well and are of high quality in regard to accepted criteria, we can conclude that using the normal distribution density functions for the description of regularities and the analysis of all the parameters considered in this article is expediential.

The developed models (1)−(6) help to establish regular patterns that reflect the level of SBE participation in the municipal procurement process in the regions.

A peculiar feature of normal density functions [19] is that they allow for determining the average values and variation ranges of the considered indicators for the majority (68 %) of the regions, while they do not require complex calculations. These intervals are calculated on the basis of the average quadratic deviations of the indicators. In this case, the interval boundaries for the mean are calculated by adding or subtracting the said deviation.

Tab. 3 shows the average values and variation intervals of the number and cost of contracts per 1000 small enterprises, the ratio of the number and cost of contracts against the total number and total cost of contracts awarded subsequent to the results of tenders (lots) and requests for quotation, and the average cost of one contract signed by municipalities with small enterprises as of 2012. The obtained values are based on the developed models (1)−(6).

Tab. 3 shows that an average of 9 % of all small enterprises participate in the state procurement system for municipal needs, i. e., the level of SBE participation in these purchases

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Table 3

Characteristics of the contracts concluded with SBEs for municipal needs in 2011 and 2012

Indicator	Average values	Variation intervals
Number of contracts per 1 SBE, units	0.09	0.04−0.13
Ratio of contracts with SBEs against the total number of contracts, %	1.82	0.84−2.80
Contract cost per 1 SBE, RUB thousand	8.87	4.96−12.78
Ratio of the cost of contracts with SBEs against the total contract costs, %	3.67	1.31−5.97
Average cost of one contract concluded with a SBE, RUB thousand	132.89	65.14−200.64
Share of successful SBE tenders against the total number of the tenders submitted by SBEs	44.42	35.54−53.00

is significant. In most municipalities, the indicator varies from 4 % to 13 %, which implies a high level of its differentiation. However, in the total number of contracts, the ratio of contracts awarded to SBEs is quite impressive. Almost 18 % of them are implemented by small enterprises. The differentiation of this indicator for municipalities is relatively small and does not exceed one third of the indicator value.

The amount of municipal procurement in municipalities is quite insignificant. For most regions, this indicator lies within the range from RUB 5 to 13 thousand per year.

The ratio of SBE contracts against the total number of contracts is small and amounts to 1.8 %. It must be noted that this indicator was not specified in Federal Law No. 94-FZ [1]. The law featured the ratio interval of SBE contracts of 10 % to 15 %.

The ratio of SBE contracts against the total cost of contracts is considerably (3 times) higher than the ratio of all the contracts. This points to a large difference between the cost of SBE contracts and the contracts with other (mainly municipal) enterprises and organizations. It is important to state that the proportion of SBE contracts in the total annual procurement volume is substantially less than the minimum value of 10 % established under legislation in 2011−2012.

The average cost of an awarded contract is RUB 133 thousand. It is significant that the volume of production (services) per one SBE employee in the same year amounted to an average of RUB 2 million per year, which is more than ten times more than even the upper

limit of the variation interval for the average contract cost. This means that most enterprises performed these contracts not on the on-going basis and just for a limited period of time.

It is of particular interest to analyze the share of successful SBE tenders against the total number of tenders submitted by small enterprises. The value of the indicator is almost 45 %. And its differentiation among municipalities is relatively small. This may be due to two reasons: a high quality of submitted tenders or their small number.

In recent years, the established system of municipal procurement has been adapting to peculiarities in the operation of small enterprises. Thus, in 2012, an average of 34 contracts for one municipality was performed by SBEs.

Further development of the federal procurement system is related to the Federal Law of April 5, 2013, No. 44-FZ «On the contract system in the procurement of goods, works and services for state and municipal needs» [20] that came into force on January 1, 2014. It stipulates that purchases from small enterprises should not be less than 15 % of the total municipal procurement.

When tenders and auctions are held, restrictions allowing only SBEs to participate can be established. In addition, there can be mandatory requirements to the supplier of goods and services regarding the involvement of subcontractors or co-contractors from among SBEs in the implementation of a contract.

The starting price of a contract is set at RUB 20 million which is almost twice as much as the current average annual volume of production

and services per small enterprise. Thus, economic prerequisites will be created to make the share of small enterprises participating in municipal procurement quite significant.

Also, informing SBEs of impending tenders in advance should encrourage SBEs to play an active part in the procurement process. Procurement planning of purchases is to inculde 2 stages. The first stage is to plan procurement for the next 3 years, the second stage involves preparing a corresponding schedule for each coming year.

There is a provision for customers that they are to generate reports on the volume of procurement from small enterprises and to lay them out in the unified information system until April 1 of the year following the accounting year. Such reports should contain information on the awarded contracts and on the failed attempts to find suppliers.

It is essential that the functions of customers should be executed professionally, qualified specialists with theoretical knowledge and skills in the procurement area may be brought in.

Yet, there is a number of limitations in the examined federal law which may interfere with the planned transition of the procurement system to a new level, as far as small enterprises are concerned. They apply to financial guarantees for tender security at tenders and auctions and to the execution of contracts. The cost of SBE contracts is expected to increase substantially in the nearest future. And the amount of tender security will grow too. At the same time, for example, participation in online procurement auction is possible only after depositing monetary funds. A similar situation arises with contract performance security. There are two forms of security: depositing monetary funds and a bank guarantee. The amount of contract security is quite substantial for a small enterprise because it ranges from 5 % to 30 % of the initial contract price.

The new contract procurement system has some flaws and it does not refect the following aspects that are important for small enterprises:

− it is not statutorily prescribed that advance payments should be included in contracts, which complicates producing goods and rendering services. SBEs do not usually have any significant working capital and credit resources are very expensive;

− the standard wording in most contracts requires payment only after a customer receives funds from respective budgets. This approach often causes late payments for fulfilled municipal orders;

− the current law does allow several SBEs to jointly bid for one and the same lot. Yet, such a concession would seem reasonable, especially for those SBEs that form clusters, which have become quite common in Russia;

− it stands to reason that the requirements to the documents being submitted should be simplified. Small enterprises rarely employ highly qualified specialists in the area of municipal procurement and, thus, they experience difficulties in preparing and submitting their tenders and in finalizing and signing contracts if they have won. It, therefore, appears practical to authorize a simplified registration procedure when only small enterprises are allowed to participate in the bidding process.

The problems mentioned above can have a particularly strong influence on SBEs located on the territory of small municipal entities. As it happens, the analysis shows that in these cases SBEs are usually small-sized as well.

Further development of the contract procurement system aimed at encouraging small enterprises to take part in the bidding process involving the procurement of goods, services or works for municipal needs will improve the effectiveness of municipal contracts, will enhance bidding competition and thereby will minimize costs.

Overall, the following conclusions can be drawn from the present research:

− the possibility of employing normal density functions as mathematical economic models to characterize the level of SBE participation in municipal procurement has been demonstrated;

− the algorithm has been proposed and the models have been developed that describe the number and the cost of contracts per one small enterprise, the ratio of the number and the cost of contracts against the total number and the total cost of contracts awarded subsequent to the results of tenders (lots) and requests for quotation, the share of successful SBE tenders and the average cost of one contract;

− all the designed density functions approximate initial data well and are of high quality in regard to accepted criteria;

− the average values for the regions and the variation intervals for the considered indicators that are typical of the majority (68 %) of the municipalities have been defined;

− the existance of differentiation among all the considered indicators in different municipalities has been proven;

− the indicators characterizing SBE contracts for goods and works have been analyzed;

− it has been demeonstratedt that the level of SBE participation in municipal procurement in the Ulyanovsk region is considerably lower than the statutory level;

− the main strengths and weaknesses of the new contract procurement system introduced in 2014 have been described;

− proposals and recommendations to encourage small enterprises to participate in the municipal procurement process have been formulated.

The obtained results are of certain theoretical and practical importance. More specifically, they facilitate the motivation for proposals on the development of state support of small enterprises. The designed models and the resulting regularities can be used to solve a wide range of problems related to monitoring SBE participation in procurement for municipal needs, development planning and forecasting the future of this aspect of municipal administration.

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УСЛОВИЯ ПУБЛИКАЦИИ СТАТЕЙ

в журнале «Научно-технические ведомости Санкт-Петербургского государственного политехнического университета. Экономические науки»

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