Polish Academy of Sciences University of Engineeering and Economics in Rzeszów Lviv Polytechnic National University

ECONTECHMOD

AN INTERNATIONAL QUARTERLY JOURNAL ON ECONOMICS IN TECHNOLOGY, NEW TECHNOLOGIES AND MODELLING PROCESSES

Vol. 2, No 3

LUBLIN – RZESZÓW 2013

Editors-in-Chief:Eugeniusz KRASOWSKI, Poland
yuriy BOBALO, UkraineAssistant Editor:Andrzej KUSZ, Poland

Associate Editors

ECONOMICS IN TECHNOLOGY: Nestor SHPAK, LVIV; Oleh KUZMIN, LVIV
 NEW TECHNOLOGIES: Aleksandr DASHCHENKO, ODESSA; Andrzej KUSZ, LUBLIN
 MODELLING PROCESSES: VURIY OSENIN, LUGANSK; Andrzej MARCINIAK, LUBLIN
 MECHANICAL ENGINEERING: Gennadiy OBORSKI, ODESSA; Ilia NIKOLENKO, SIMFEROPOL
 MATHEMATICAL STATISTICS: Andrzej KORNACKI, LUBLIN; ROSTISław BUN, LVIV

Editorial Board

Valeriy ADAMCHUK, Kiev, Ukraine Andrzej BALIŃSKI, Kraków, Poland Viktorija BATLUK, Lviv, Ukraine Zbigniew BURSKI, Lublin, Poland Mykoła CHAUSOV, Kiev, Ukraine Valeriy DUBROVIN, Kiev, Ukraine Valeriy DYADYCHEV, Lugansk, Ukraine Sergiey FEDORKIN, Simferopol, Ukraine Jerzy GRUDZIŃSKI, Lublin, Poland Ivan HOLOVACH, Kiev, Ukraine Oleksandr HOŁUBENKO, Lugansk, Ukraine L.P.B.M. JONSSEN, Groningen, Holland Sergiey KOSTUKIEVICH, Mińsk, Bielarus Stepan KOVALYSHYN, Lviv, Ukraine Kazimierz LEIDA. Rzeszów. Poland Ryszard MICHALSKI, Olsztyn, Poland Oleksandr MOROZOV, Simferopol, Ukraina

Leszek MOŚCICKI, Lublin, Poland Andrzej MRUK, Kraków, Poland Witold Niemiec, Rzeszów, Poland Paweł NOSKO, Lugansk, Ukraine Sergiy PASTUSHENKO, Mykolayiv, Ukraine Simion POPESCU, Brasov, Romania Natalia CHARNECKAYA, Lugansk, Ukraine Povilas A. SIRVYDAS, Kaunas, Lithuania Jerzy SOBCZAK, Kraków, Poland Stanisław SOSNOWSKI, Rzeszów, Poland Ludvikas SPOKAS, Kaunas, Lithuania Georgij TAJANOWSKIJ, Mińsk, Bielarus Wojciech TANAŚ, Lublin, Poland Małgorzata TROJANOWSKA, Kraków, Poland Ramazan Ch. YUSUPOV. Chelvabińsk. Russia Danis VIESTURS, Ulbrok, Latvia

ISSN 2084-5715

All the scientific articles received positive evaluations by independent reviewers

Linguistic consultant: Typeset: Cover design: Małgorzata Wojcieszuk Hanna Krasowska-Kołodziej, Katarzyna Mikołajka Hanna Krasowska-Kołodziej

Editorial

© Copyright by Polish Academy of Sciences 2013 © Copyright by University of Engineering and Economics in Rzeszów 2013 © Copyright by Lviv Polytechnic National University 2013

Editorial Office Address

Commission of Motorization and Energetics in Agriculture Wielkopolska Str. 62, 20-725 Lublin, Poland e-mail: eugeniusz.krasowski@up.lublin.pl

Edition 200+16 vol.

Formation of Compensation Mechanism of Regional Enterprises' Human Resources Regeneration in the Labor Potential Development System

I. Alexeev, O. Voloshyn

Lviv Polytechnic National University: e-mail: vop_ippt@ukr.net Received June 21.2013: accepted June 30.2013

Abstract. The article substantiates the formation principles of administration bodies in implementation of compensation mechanism of human resources regeneration. It defines stages of the preparatory period of forming administration bodies of human resources regeneration with the primary units for training and exploitation of human resources, for which was designed the organizational structure of enterprise's personnel departments subdivisions. A model of a compensation mechanism for regeneration of human resources at enterprises was suggested.

Key words: human resources, compensation mechanism of enterprises' human resources regeneration, primary elements for training and exploitation of human resources.

INTRODUCTION

Over the recent decades the domestic economy has sustained great losses in human resources. Without doubt, the most damage was done to various business enterprises that make up the foundation of the national economy in each region of Ukraine. The total of their loss in human resources makes up the national or oblastscale loss in human resources. In this context, it is impossible to draw a line between human resources of individual enterprises and those of the entire country or territory. Loss in human resources might be caused by different reasons and have various effects on economy. On the one hand, loss in human resources is brought about by decline in manufacturing or even entire halt in business activity. The reasons included rupture of economic relations between ex-partners in soviet cooperation, loss of target markets for Ukrainian military industrial sector due to the policy of conversion, loss of resource base (both financial and that of raw

materials), and numerous other factors which have recently embraced the global financial and economic crisis.

PROBLEM STATEMENT

Ukraine's entering the global environment implies aiming at the economic growth of the state, which is impossible without qualified personnel of specialists and workers at enterprises. This requires implementation of a mechanism for regeneration of human resources so as to compensate for the drain of human resources to other regions of Ukraine and abroad.

The issues of training professionals as challenging problems of education have recently drawn much attention in the framework of researching the structural components of human resources at enterprises and their strategic management [1, 2, 4, 7], in the context of personnel training for industry on the basis of higher educational institutions of university type [6], the problem of studying enterprise development [3], examining development tendencies and researching contemporary problems of forming domestic human resources [8, 9], and establishing new educational complex as means of providing comprehensive education [5]. In the context of researching the interrelation and mutual effects of the industry's needs and professional training, it is important to emphasize that the educational system makes up the basis of professional training, in other words, it is the foundation of professional training for industry, for forming and maintaining the human resources potential of enterprises.

RESULTS ACHIEVED

Research has shown that loss of human resources may be compensated by way of planned training of new generations of specialists with necessary professions, specializations and qualifications, as well as by inviting needed specialists from other regions or countries. However, the major direction of regeneration of human resources is training and retraining of specialists, which requires purposive cooperation of enterprises, institutions and organizations that commission educational services with educational institutions.

For the organization and optimization of the above mentioned cooperation process the involvement of national and regional authorities and administrative bodies is indispensible. In the process of controlling the regeneration of human resources, they constitute the center of strategic planning for the region's social and economic development, determine the priorities of development for individual types of economic activity – that is to say they are a kind of a signpost for the development of business activity,– and thus forecast the directions of professional training both for existing enterprises and enterprises that might appear and operate in the region in the future.

The structure of the regenerated human resources is significant both for enterprises, which need services of workers with certain professions, specialties and qualifications, and educational institutions, which are responsible for training these professionals. To settle the given problem, the efforts of enterprises or their associations only are not enough, not to mention those of educational institutions as they are not structural subdivisions of enterprises and don't have enough financial resources for their development. It is necessary to have a regional coordinating body, since regional government bodies have the capacity to take into account mutual interests of different manufacturers and coordinate training and retraining for them in different educational institutions. Such a coordinating role bears all the characteristics and functions of an administration process, i.e. planning, organization, control, coordination and stimulation.

It is suggested that the realization of the above mentioned management functions be performed by the Department of education and science of regional state administration, for which purpose we propose to establish Administration of human resources regeneration for the regional enterprises in its framework. The structure of such Administration can be represented in the following way (Fig. 1):



Fig. 1. Structure of human resources regeneration for the regional enterprises and directions of cooperation of structural subdivisions

To establish regional administration bodies for any type of activity, including regeneration of human resources, it is necessary to conduct preparatory work that will help to find out the aims and tasks of future structural subdivisions. These aims and tasks in their turn determine functions and methods that define the nature of staffing of the given administration bodies. It is also essential to specify the composition and amount of resources for implementing the administrative activity. Thus it is necessary to conduct a preparatory stage that will go before organizing administration bodies for regeneration of human resources. After the preparatory stage and organization of the administration bodies for regeneration of human resources, the process of regeneration itself will get to be implemented, for which purpose the administration bodies will perform planning, coordination and regulation of interaction of the primary sections of human resources training and exploitation.

To form administration bodies for implementing a compensatory mechanism of regeneration of human resources of enterprises, we have suggested carrying out preparatory period events in a couple of stages. The first stage involves determining aims and setting tasks concerning regeneration of human resources and content of professional training. Employers define requirements as to future professionals - employees of the enterprise, which will determine the selection of the professional educational institutions necessary for personnel training. At the second stage, the content and amount of resources needed to provide for regeneration of human resources are determined. The third stage is organizational and selective, this is when organizational aspects of selecting professionals by enterprises are established. At the fourth stage, the activity of state administration bodies is organized, administration subdivisions are formed and interaction of the primary units - employers and providers of regeneration of human resources for enterprises - is coordinated.

On completing the preparatory stage, the time comes for direct interaction of administration bodies for regeneration of human resources with the primary units of human resources training and exploitation. To increase the efficiency of the process, it is recommended to carry it out stage by stage too. Specifically, to balance needs and possibilities in the process of regeneration of human resources at the first stage, it is advisable to plan the composition of educational institutions (service providers) in accordance with the composition and structure of the human resources of enterprises (employers). At the second stage, resource provision should be planned. It determines composition and amount of financial, material and technical resources necessary for regeneration of human resources, as well as it is organized the financing of staff training. At the third stage, after implemented personnel training, specialists are selected by customers according to their

needs. The selection has to be performed due to specific requests of each enterprise and the features of domestic personnel training system must be taken into consideration. In addition the important aspect of selecting process realization is coordination of both sides customer and performer of the process of enterprises human resources reproduction.

Based on the tasks and functions of the enterprise personnel units which have to cooperate with educational institutions in the process of enterprises human resources reproduction, we can offer such composition for them. General name for personnel service in the modern conditions could be like this: control the reproduction of enterprise human resources. Talking about the departments of this service they could be called according to their functions. Thus labour market research department should have performed functions of determining the sources of renovating human resources, in particular: this is necessary to determine educational institutions with which they should conclude the contract of personnel training. In case of personnel training impossibility in the educational institutions known for the department, specialists who can be invited for work for the enterprise from other enterprises of regions, countries should be assigned. The enterprise human resources reproduction planning department should conform concrete conditions of the training of the certain amount of specialists with educational institutions, conclude contracts with them, conclude contracts with future specialists who will be invited for job after graduating or after other employers' contracts expiry. The objective of the enterprise human resourced organization and coordination department is to create background for proper personnel training at educational institutions, to create living conditions and providing specialists who are accepted to work at the enterprise.

Graphically the composition of control units of enterprise human resources reproduction and their performed functions can be presented in this way (Fig. 2).

Summing up the domestic and world experience, we can offer the model of countervailing mechanism of human resources reproduction which may include principles, methods, tools and leverages.

Main principles: endless education, corporate culture, synergy, alternativeness, dynamisms, complexity, awareness. The principle of corporative culture is demonstrated via fast reaction on changes about conjuncture, prices, customers' likes, raw material characteristics, materials etc. The principle of endless education means the presence of continual employees' desire to improve their knowledge, skills by training, increasing their qualification. The principle of complexity connects all the functions of the mechanism, it provides systematic analysis conduction, planning and modeling all kinds of work concerning to the human resources reproduction. Thanks to the principle of synergy counter-



Fig. 2. the composition of control units of enterprise human resources reproduction and their functions *Source: personal elaboration*



Fig. 3. Model of Countervailing mechanism of enterprise human resources reproduction *Source: personal elaboration*

vailing mechanism of human resources acquires dynamic character, this principle gives the ability to establish general regularities of human resources reproduction. The principle of alternativeness gives the opportunity to choose, the one important thing is just to define the choice criteria and to estimate the alternatives taking into considerations incomes, expenses and time interval. The principle of dynamism amplifies mobility and efficiency in making managing decisions and performing all necessary procedures for enterprise human resources reproduction. The principle of awareness confirms the enterprise managers' desire to deal with problem of human resources reproduction [10].

The influence on the activity concerning to human resources reproduction at the enterprise, in the country and in the regions is realized by organizational and legal, economical, social and psychological methods.

Organizational and legal methods anticipate the forming of legal base and bunch of regulations concerning principles of interaction: 1-enterprises being customers of personnel training and retraining, 2educational institutions being service performers of training services, 3-citizens being consumers of training services and being specialists they act like knowledge, skills carriers who are needed by certain enterprises. Except legal measures, this group is supposed to include organizational methods, in particular establishing proper educational institutions, also concerning changes in customer's composition, namely enterprises in the region. Economical methods are supposed to influence human resources reproduction by creating economic interest both customers (enterprises and citizens) and performers (educational institutions) of training services in development of educational and scientific system. Social and psychological methods are intended to form the proper social and psychological climate for the right

orientation firstly of citizens in their choice of socially needed occupations and specialties for the adequate estimation of their abilities concerning training for certain educational levels, obtaining the necessary for economy qualifications.

Model of countervailing mechanism presented on the figure 3.

REFERENCES

- Basko H.M. and Babych V.A. 2007. Struktura komponentiv kadrovoho potencialu pidpryjemstva. Economika i derjava, № 3, 81 – 84.
- Bezsmertna V.V. 2007. Stratehichne upravlinna kadrovym potencialom pidpryjemstva. Economika i upravlenije, №3, 48-53.
- 3. **Kuzmin O.Y. and Alexeev I.V. 2002.** Problemy doslidgenna rozvytku pidpryjemstva. Rehionalna economika, № 1 (23), 75 82.
- Lipych L.H., Levyckiy V.V. and Koshchiy O.V. 2008. Formuvannja stratehiy rozvytku pidpryjemstv na zasadah prohnozuvannja konyuktury rynku. Luck:Veja – 166.
- Matvijenko L. 2004. Novyj osvitniy kompleks yak zasib zabespechennja cilisnoji osvity. Vyshcha osvita Ukrayiny. № 4, 46-49.
- 6. **Moroz A.S. 2005.** Rivni formuvannja kadrovoho potencialu innovaciynoho rozvytku economiky. Economika rozvytku. № 3 (35), 31-33.
- 7. **Obolenska T.Y. 2001.** Marketing osvitnih posluh: vitchyznjanyj I zarubijnyj dosvid. K.: KNEU 208.
- 8. **Rabokon N.P. and Derkach A.S. 2007.** Suchasni problem formuvannja vitchyznjanoho kadrovoho potencialu. K.:NDEI, 4(71), 173-180.
- Krykavskiy E. and Chuhray N. 2007. Transformacija vartosti u rozvytku vidnosyn "pidpryjemstvo-klijent". Lviv – 250.
- Zaharchyn H.M. 2011. Teorija ta metodolohija formuvannja I rozvytku orhanizacijnoji kultury mashynobudivnoho pidpryjemstva. Lviv – 348.

Nonlinear regression model of the formation of the loan portfolios of the banks in Central and Eastern Europe

I. Alieksieiev, O. Belyayeva, M. Yastrubskyy

Lviv Polytechnic National University

Received June 21.2013: accepted August 10.2013

Abstract. The article examines the impact of significant factors and adaptation of the experience of CEE countries to the current conditions of the banking business development in Ukraine in order to strengthen the competitiveness of domestic banks in the conditions of European financial integration. In order to identify the main sources of risks a regression analysis of formation of the loan portfolio volumes of the banks in CEE has been made.

Key words: bank, loan portfolio, external debt, foreign liabilities, deposits, distressed loans.

INTRODUCTION

The global financial crisis has exposed the basic elements of functional vulnerability of the banks in Central and Eastern Europe and significantly increased the risks of their development. In order to identify the main sources of risks and factors influencing the volume of crediting the economic needs of individuals and businesses by the banks, a regression analysis of formation of the loan portfolio volumes of the banks in CEE has been made [5–8].

The study of the dominant factors affecting the formation of behavioral strategies of the banks in the market will make it possible to develop specific recommendations for improving their credit activity with the aim to increase the competitiveness of the entire banking system and avoid crisis phenomena, as well as to model strategies for the development of the banking sector in the conditions of increased integration of national economies into the European financial system.

The necessity for evaluation of the efficiency of banking systems based on loan portfolio volumes is caused by a special urgency to solve the problem of shortage of bank credit resources, which is experienced by all entities of the economy, and trends in the credit, deposit, and shareholder policy of the banks in the precrisis, crisis and post-crisis periods. The basis of the analysis of credit rates in the banking systems in CEE countries is formed by the following indices:

§ volume of deposits in the country as an index used to determine the level of savings and trust of individuals and legal entities in the banking system, which is used for crediting the needs of economic entities of national economies;

§ volume of distressed loans as an index of the riskiness of the credit policy pursued by the banks;

§ volume of the gross external debt (foreign liabilities) as a source of accumulating financial resources by the banks for crediting operations. Typically, this source dominates in the countries with a low level of savings and deposits in the banks, and considerable credit needs of the economy in resources, which encourages the banks to implement the strategies of forming loan funds in foreign financial markets [9–12].

RESULTS AND DISCUSSION

Development and implementation of effective strategies of credit portfolio formation of banks in the present-day conditions of development requires a comprehensive consideration of the impact of significant factors and adaptation of the experience of CEE countries to the current conditions of the banking business development in Ukraine in order to strengthen the competitiveness of domestic banks in the conditions of European financial integration. To assess the impact of the volumes of deposits, gross external debt and distressed loans on the loan portfolios of the banks in CEE, the multiplicative regression model was built (form. 1):

$$Loan_{t} = b_{1} Dep_{t}^{b_{2}} F L_{t-1}^{b_{3}} D L_{t-1}^{b_{4}} e , \qquad (1)$$

where: $Loan_t$ – the current year's loan portfolio, Dep_t – the current year's deposit volume, FL_{t-1} – the gross external debt (foreign liabilities) of the previous year, DL_{t-1} – the amount of distressed loans of the previous year.

After taking the logarithm, the model acquired the following form (form. 2):

$$\ln Loan_{t} = c_{1} + c_{2} \ln Dep_{t} + c_{3} \ln FL_{t-1} + c_{4} \ln DL_{t-1} + e_{1}, \qquad (2)$$

where: $c_1 = \ln b_1$, $c_i = b_i$, i = 2, 3, 4 – regression coefficients, $e_1 = \ln e$ – error of regression.

The data for regression analysis are taken from CEE Banking Sector Reports [5-11]. The regression analysis was made using econometric application package E-views v.4.0.

For Polish banks the model acquired the following form (form.3):

$$Loan_{t} = 0,271 Dep_{t}^{0.547} FL_{t-1}^{0.797} DL_{t-1}^{-0.222} .$$
(3)

The coefficient of determination of the logarithmic linear model is $R^2 = 0,996$, all regression coefficients are statistically significant ($p_i < 0,01$).

The chart of the residuals of the logarithmic linear model is shown in Fig. 1.

The analysis of the model for the evaluation of bank crediting volume provides grounds to believe that the deposits of the current year and external funds loaned the previous year have a significant direct impact on the growth of the loan portfolios of the banks in Poland. The distressed loans of the previous year reduce the amount of credit in the current year.

The regression analysis of bank crediting in Poland has found that the gross external debt has a more significant impact on the loan portfolio formation than the money deposited in the banks (Fig. 2), as evidenced by the higher value of the corresponding regression coefficient (P (2)> C (3)).

For the banks in Slovakia, the model is as follows (form. 4):

$$Loan_{t} = 0,184 Dep_{t}^{0,856} FL_{t-1}^{0,564} DL_{t-1}^{-0,087} .$$
(4)

The coefficient of determination of the logarithmic linear model is $R^2 = 0,991$, all regression coefficients are statistically significant ($p_i < 0,05$). The chart of the residuals of the logarithmic linear model is shown in Fig. 3.

The analysis of the constructed model has found that the deposits of the current year and loan financial resources from foreign markets involved the previous year have a significant direct impact on the growth of the volumes of bank crediting in Slovakia (Fig. 4). Similarly to the situation in Poland, the amounts of distressed loans of the previous year reduce the volume of bank crediting in the current year, but this effect is relatively weaker, as evidenced by the lower value of the corresponding regression coefficient.



Fig. 1. Residuals of the regression model for the logarithms of the loan portfolios of the banks in Poland



Fig. 2. The dynamics of the volumes "deposits - loans - foreign debt -distressed loans" for the banks in Poland, billion euros



Fig. 3. Residuals of the regression model for the logarithms of the loan portfolios of the banks in Slovakia



Fig. 4. The dynamics of the volumes "deposits - loans - foreign debt - distressed loans" for the banks in Slovakia, billion euros



Fig. 5. Residuals of the regression model for the logarithms of the loan portfolio volumes of the banks in Slovenia

The analysis of the evaluation model of bank crediting in Slovenia showed a statistically insignificant value of the regression coefficient in the volume of deposits of the banking system of the country. After removal of this variable, the model acquired the following form (form. 5):

$$Loan_{t} = 0,693FL_{t-1}^{1,103}DL_{t-1}^{-0,0/8}.$$
 (5)

The coefficient of determination of the logarithmic linear model is $R^2 = 0.988$, and, similar to the previous

models, all regression coefficients are statistically significant ($p_i < 0.05$). The chart of residuals of the logarithmic linear model is shown in Fig. 5.

Therefore, the crucial factor for the growth of loan portfolios of the banks in Slovenia in the current year is the increase in the gross external debt in the previous year (Fig. 6). The distressed loans of the previous year slightly reduce the volume of crediting in the current year. A similar situation exists in the Czech banking system. After the removal of the volume of deposits, the model acquired the following form (form. 6):

$$Loan_{t} = 0,620FL_{t-1}^{1,228}DL_{t-1}^{-0,122}.$$
 (6)

The coefficient of determination of the logarithmic linear model is $R^2 = 0,980$, all regression coefficients are statistically significant ($p_i < 0,05$). The chart of the residuals of the logarithmic linear model is shown in Fig. 7.

The growth of bank crediting in the Czech Republic in the current year is due to the increase in the gross external debt in the previous period, while the distressed loans of the previous year insignificantly reduce the amount of crediting in the current period.

During the last two periods, the growth of distressed debt was accompanied by a decrease in the volumes of deposits and loan portfolio of the Czech banks (Fig. 8). However, the long-term stable value of distressed debt in the previous analyzed periods makes it impossible to assess the impact of this factor on the dynamics of the loan portfolio of the banks in the Czech Republic. The increase in the distressed bank loans during the crisis was accompanied by a slight decline in the gross external debt.

The analysis of the regression model for the evaluation of bank crediting in Hungary has made it possible to determine that there is no connection between the gross external debt and distressed loans. After the removal of the above mentioned variables the model is as follows (form. 7):

$$Loan_{t} = 0,079 Dep_{t}^{1.747}.$$
 (7)

The coefficient of the determination of the model is $R^2 = 0.985$, all regression coefficients are statistically significant ($p_i < 0.01$). The chart of the residuals of the logarithmic linear model is shown in Fig. 9.

The dynamics of loan portfolio volumes of the banks in Hungary is directly and closely related only to the dynamics of deposits of the population and business entities in the country.

As shown in Fig. 10, when deposits of legal entities and individuals begin to decline in volume, the volumes of crediting sharply decrease. This is the reaction of the Hungarian banking system to the challenges of the crisis phenomena in the world economic system.



Fig. 6. The dynamics of "deposits - loans - foreign debt - distressed loans" for the banks in Slovenia, billion euros



Fig. 7. Residuals of the regression model for the logarithms of the loan portfolio volumes of the banks in the Czech Republic



Fig. 8. The dynamics of "deposits - loans - foreign debt - distressed loans" for the banks in the Czech Republic, billion euros



Fig. 9. Residuals of the regression model for the logarithms of the loan portfolio volumes of the banks in Hungary



Fig. 10. The dynamics of "deposits - loans - foreign debt - distressed loans" for the banks in Hungary, billion euros

The study of the banking system of Ukraine has found that there is statistically insignificant connection between the crediting volumes of the current year and the amount of the distressed debts of the banks in the previous period. After removal of the specified variable, the model acquired the following form (form. 8) [16, 17]:

$$Loan_{t} = 0,55Dep_{t}^{0,828}FL_{t-1}^{0,428}.$$
 (8)

The coefficient of the determination of the model is $R^2 = 0,986$, all regression coefficients are statistically significant ($p_i < 0,01$). The chart of the residuals of the logarithmic linear model is shown in Fig. 11.

The analysis of the constructed model has found that the deposits in the current year and gross external funds in the previous year have a significant direct impact on the growth of the loan portfolio of Ukrainian banks (Fig. 12).

Ukrainian banks are characterized by a leveling of the risks related to the distressed loans of the previous periods [1, 13].

Comparison of the regression models of the loan portfolios of banks in CEE causes us to recognize four types of strategies of the formation of loan portfolios of banks (Table 1).



Fig.11. Residuals of the regression model for the logarithms of the loan portfolios of the banks in Ukraine



Fig. 12. The dynamics "deposits - loans - foreign debt - distressed debts" for the banks in Ukraine, billion euros

Table 1. Matrix of strategies of the formation of the loan portfolios of banks in CEE

Types of loan strategies of the banks in CEE	Deposits of individuals and businesses	External debts of banks	Distressed debts of banks (risk)
Moderate (risk-conscious) deposit and debt	+	+	+
strategy			
Moderate (risk-conscious) debt strategy	-	+	+
Risk deposit strategy	+	-	-
Risk deposit and debt strategy	+	+	-

The first type of strategies is a moderate (riskconscious) deposit and debt strategy. It is characterized by the formation of the loan volumes by banks both as deposits of individuals and legal entities and debt financing in foreign financial markets, with consideration given to the risks caused by distressed debts of the previous periods. This type of the loan portfolio formation strategy is inherent in the banks in Poland and Slovakia.

The second type of strategies is a moderate (riskconscious) debt strategy. It is characterized by the formation of the loan volumes mainly by external loans. Thus, when planning the bank crediting volumes more consideration is given to the assessment of risks related to the amount of distressed loans of banks in the previous periods. This type of strategy is inherent in the banks in the Czech Republic and Slovenia.

The third type (risk deposit strategy) is inherent in the banks in Hungary. It is characterized by planning the volumes of the loan portfolios by internal funds (deposits of legal entities and individuals). This makes it possible to ignore the impact of the risks caused by the increase of the distressed debts of the banks.

The fourth type of strategies is a risk deposit and debt strategy. It is characterized by using both deposits of the population and external funds of banks. This model does not reveal any impact of distressed loans of the previous periods on planning the volumes of the loan portfolios of banks. This type of loan behavior is inherent in the banking institutions in Ukraine.

CONCLUSIONS

Priorities in the activities of the banks in CEE countries, which form a moderate deposit and debt strategy are currently as follows:

- to resume volumes of crediting for the needs of national economies through internal funds with the aim of reducing the economic system dependence on debt financing;

- to attract temporarily surplus funds of citizens to the programs of economic recovery and growth in the post-crisis period. The restoration of public confidence in the banking system would increase the national source of investment in the economy through the banking institutions, and reduce the amount of non-bank money circulation.

Priorities in the activities of the banks in CEE countries, which form a risk deposit strategy and debt and deposit strategy are currently as follows:

- effective management of distressed debts of the banks arising from the effects of the global financial crisis;

- application of new methodologies to assess the creditworthiness of borrowers with the aim of maintenance of the optimum ratio "yield - risk" when forming the loan portfolios of the banks.

Stable operation of the banking sector is the basic principle of economic development. The global financial crisis has revealed major risks of operation of the banks. In these circumstances, the analysis of the banking risks revealed the most significant factors that affected the efficiency of the loan portfolios of the banks in Central and Eastern Europe. This analysis and experience make it possible to develop the corresponding anti-crisis strategies under conditions of competitive environment and European integration processes.

REFERENCES

 Acharya V. V. 2002. Should banks be diversified? Evidence from individual bank loan portfolios / V. V. Acharya, I. Hasan, A. Saunders. – BIS working paper – 118 – 61.

- Are Credit Booms in Emerging Markets a Concern? / A survey by the staff of the International Monetary Fund // Advancing Structural Reforms World economic outlook: – IMF, April 2004 – 147-166.
- 3. **Boissay F., Calvo-Gonzales and Kozlluk T. 2006.** Is Lending in Central and Eastern Europe developing too fast? Finance and Consumption Workshop Presentation.
- Bonin J. P. Bank performance, efficiency and ownership in transition countries. / Bonin J. P., Hasan I., Wachtel P. // Journal of Banking & Finance. – 2005. – № 29. – 31-53.
- 5. CEE Banking Sector Report / RZB Group. Raiffeisen Centrobank AG, Vienna. 2009. 76.
- 6. CEE Banking Sector Report / RZB Group. Raiffeisen Centrobank AG, Vienna. October, 2005. 80.
- CEE Banking Sector Report / RZB Group. Raiffeisen Centrobank AG, Vienna. – September, 2006. – 80.
- 8. CEE Banking Sector Report / RZB Group. Raiffeisen Centrobank AG, Vienna. October, 2007. 88.
- 9. CEE Banking Sector Report / RZB Group. Raiffeisen Centrobank AG, Vienna. September, 2008. 88.
- 10. CEE Banking Sector Report / RZB Group. Raiffeisen Centrobank AG, Vienna. – September, 2010. – 80.
- 11. CEE Banking Sector Report / RZB Group. Raiffeisen Centrobank AG, Vienna. October, 2011. 84.
- Detragiache E. The Determinants of Banking Crises -Evidence from Developing and Developed Countries. / Detragiache E., Demirgüç-Kunt A. // IMF Working Papers. – 1997. - № 97/106.
- Lensink R. The Short-Term Effects of Foreign Bank Entry on Domestic Bank Behaviour: Does Economic Development Matter? / Lensink R., Hermes N. // Journal of Banking and Finance. – 2004. – № 28. – 553-568.
- Micco A. 2006. Bank Ownership and Lending Behavior. / Micco A., Panizza U. // Central Bank of Chile Working Papers. – № 369.
- 15. The Causes and Nature of the Repid Credit Growth of Bank Credit in the Central, Eastern and South-eastern Countries / [Arcalean C.O., O. Calvo-Gonzalez, C. More, A. van Rixtel. A. Winkler and T. Zumer]. // Rapid Credit Growth in Central and Eastern Europe: Endless Boom or Early Warning? – 2007. – P. 13-47.
- Vasyurenko O., Azarenkova G. and Anna Scannel N., 2004. Econometric Analysis of Banking Financial Results in Ukraine. Journal of Academy of Business and Economics (JABE), Vol. IV. № 1, 202–210.
- Vasyurenko O. and Azarenkova G. 2004. Profitability of the Securities' Portfolio of the Banks of Ukraine and The Structure of Their Regional Distribution (Evaluation Analysis And Methodological Notes). Investment Management and Financial Innovations. Vol. 2, 52–59.

Mathematical model for motion of weighted parts in curled flow

V. Batluk, M. Basov, V. Klymets'

National University «Lviv Polytechnic», Lviv State University of Life Safety v.a.batluk@gmail.com

Received June 21.2013: accepted June 30.2013

Abstract. The article deals with the problem of providing high performance apparatuses for cleaning air from dust in various branches of industry in order to reduce hazardous emissions to the level conforming to sanitaryhygienic norms. The article describes new trends in the development of dust catching apparatuses based on the use of centrifugal-inertial forces, permitting to improve significantly the effectiveness of dust catching.

Key words: dust catching ,air cleaning, pollution, centrifugal, cyclone.

PROBLEM STATEMENT

Ecological problems are well-known issues for those who investigate air surrounding in rooms with welding gases. In this process hazardous substances consist of gases and aerosols where some little fractions permeate to pulmonary tissue and blood. In most cases welding gas has parts of iron oxide, zinc, cadmium, manganese, fluorine, asbestos, nickel, chromium, copper and others. As the result of interaction of those parts eye mucous membranes will be traumatized, some allergic diseases, silicosis, swollen lungs, headaches, chest pains and cancer diseases will occur, kidneys will be injured.

Using of a system air ejector fan will provide a level of maximum allowable concentration in breathing in various industrial processes controlled by industrial safety and ecology legislation.

ANALYSIS OF RECENT DEVELOPMENTS

Electrostatic filters are widely used and spread in different spheres because of high level of the most hazardous parts catching of 1-0.01 micron and undersized. At the same time such disease-producing factors as microbes, viruses, bacterium, morbific fungus and wreckers will die at electrostatic field of filter. Therefore electrostatic filters are different from mechanical filters because of dangerous elements which can be source of pollution in unclean filter maintenance.

Electrostatic filters are used effectively for cleaning air from different parts of dust, oily mist and fine dust of 200-0.01 micron. The efficiency of dust cleaning is 94%.

Air filters with mechanical filters are used to clarify a polluted air from huge parts of different types of dust, oily mist, welding gas in welding galvanized steel, aluminium, stainless steel, galvanizer, dust of soldering and spot welding. Mechanical filters have high level of air cleaning measured by 200 - 0.1 micron.

Tool-making and laboratory measuring show the efficiency of cyclones cleaning is 81-85% in primary dustiness 5,3 g/m³, bag filter – 99%, installation coefficient of efficiency – 99,8% [1,2]. Dry cleaning of dust air in high effective apparatus of modern construction allows providing waste fall in atmosphere up to 20-40 mg/m³.

Nowadays, there is no apparatus to secure regulations of discharge harmful substances providing sanitary-and-hygienic conditions. The most appropriate apparatus can't manage that task. Therefore we aimed at creating high effective apparatus for fine dust catching.

THE MAIN MATERIAL REVIEW

This chapter will describe task arrangement of motion two-phase flow in dust catching of new construction and numerical calculation will be made. Numerical analysis of dynamic processes can be realized if laws of motion processes are described in mathematical formula in differential equation as a rule. Every equation describes specific law of conservation with physical determined variable quantity and balance between various factors influenced on this variable. Dependent variables in these differential equations are specific performances referred to unit of weight. Term of differential equation describes action on unit of volume [3].

Problem statement of air flow motion in equipment consists of:

- Description of general assumption, boundary and initial conditions;

- Mathematical model of air flow motion in equipment considering a turbulence model;

- Mathematical model of solid phase (dust parts) motion in apparatus;

- Choice of a method solving and its realization;

- Method of efficiency determination process flow cleaning of dust parts;

ACCEPTED PROPOSAL, BOUNDARY AND INITIAL CONDITIONS

For a proper description of separation process of little parts of dust in dust catcher of proposed construction assumptions were accepted to approximate the mathematical model to definite conditions of equipment functioning and prevent model complicating.

Developing two-phase flow in elaborated construction of dust catcher for calculation next assumptions were taken:

- Little parts of dust are solid and not interacted;

- A flow has an even field of rate on equipment entering;

- Stokes law is used for resistance movement of particles in a gaseous medium;

- tangential and axial velocities of little parts are similar to velocity of gas flow turnover, accordingly, radial velocities are different as a result of inertial forces.

We need to set initial and boundary conditions for a solution of the problem of air flow motion determined by the shape, design of the dust collector and conditions of work, that is, for each type of cyclone there is a set of initial and boundary conditions.

The initial conditions for this system are the characteristics of air pollution and characteristics of dust:

- normal atmospheric pressure $p_0=101325$ Pa,

- normal air temperature $m_0 = 293$ K,
- air density $\rho_{\theta} = 1,293 \text{ kg/m}^3$,

- middle diameter of small dust particles $d_{50} = (5-30) \cdot 10^{-6}$ m,

- maximal diameter of small dust particles $d_{max} = 50 \cdot 10^{-6}$ m,

- minimal diameter of small dust particles $d_{min} = \cdot 10^{-5}$ m,

- density of small dust particles $r_y = 2000-4000 \text{ kg/m}^3$.

Boundary conditions influence on the problem solution of flow motion and must be performed at each time of motion. Besides they are determined by the nature of air flow on the boundary surface. Boundary conditions are difficult to specify, because they depend on the shape of the dust collector, the characteristics of its operation, as well as the gas density. High-density gas "sticks" to the sides of the dust collector when a rarefied gas slips by boundary surface. However, despite the peculiarities of the process, there are certain laws as boundary conditions when driving in dusty air dust collector: the rate on a fixed solid boundary is zero, the rate of dust air flow at the entrance to the dust collector is stable and equal to 18 m / s [7,8,9].

MODELLING MOTION OF AIR FLOWS IN ALIGNED-INERTIAL DUST COLLECTORS

A motion of air flows in cyclones on the basis of set of equations of viscous substance is considered to be:

$$div v = 0,$$

$$\frac{dv}{dt} = -\frac{1}{p}gradp + v\Delta$$

A flow is dimensional if speeds are parallel to space and hydrodynamic sizes have different values. Choose motion direction axe x. Then:

$$v_y = v_z = 0. \tag{1}$$

Write a set of equations of viscous substance, taking into consideration (1.):

$$\frac{dv_x}{d_x} = 0, \qquad (2)$$

$$\frac{dv_x}{d_t} + u_x \frac{dv_x}{d_x} = -\frac{1}{\delta} \frac{d_p}{d_x} + u \left(\frac{d^2v_x}{dx^2} + \frac{d^2v_x}{dy^2} + \frac{d^2v_x}{dz^2} \right), \quad (3)$$
$$\frac{dp}{dy} = 0, \qquad \frac{dp}{dz} = 0. \quad (4)$$

From (2) it turns out that v_x does not depend on x, from (4) –p is independent of y and z, i.e. :

$$v_{\pm} = v_{\tilde{o}}(y, z, t) , \qquad (5)$$

$$p = p(x,t) (6)$$

Given (5), rewrite equation (3) as follows:

$$\frac{dv_x}{d_t} - u \left(\frac{d^2v_x}{dy^2} + \frac{d^2v_x}{dz^2} \right) = -\frac{1}{\delta} \frac{dp}{d_x} \quad . \tag{7}$$

$$\frac{dp}{dx}$$

Left side (7) does not depend on x, therefore, dx can depend on the time:

$$\frac{dp}{dx} = f(t), \quad p = f(t)x + f_1(t). \tag{8}$$

Thus, pressure in a dimensional motion is linear function x. Functions f(t) i $f_1(t)$ can be found if the pressure p will be given in two intersections:

$$p(x_1,t) = f_1(t)$$
, $p(x_2,t) = f_2(t)$.

Then:

$$\frac{dp}{dx} = \frac{f_2(t) - f_1(t)}{x_2 - x_1} = \frac{\Delta p}{\Delta x} \quad . \tag{9}$$

For a given pressure drop rate is found from equation (7):

$$p\frac{dv_x}{dt} = m\left(\frac{d^2v_x}{dy^2} + \frac{d^2v_x}{dy^2}\right) - \frac{\Delta p}{\Delta x} \quad . \tag{10}$$

Equation (10) is similar with the thermal conductivity equation. Non-homogeneous equation (10) can be reduced to homogeneous with following displacement:

$$v_{\chi} = \mathbf{n}_{\chi} - \frac{1}{p} \int_0^t f(t) dt \; .$$

To solve equation (10) initial and boundary conditions must be given. Dimensional motions can be performed with fluid flow in cylindrical tubes (or beyond). Therefore, the boundary conditions are written on circuits k with cylinder plane x=const:

$$v_x = n_x - \frac{1}{p} \int_0^t f(t) dt$$
 (11)

uk (t) is a speed of circuits points. The initial conditions are following:

1

$$v_x \Big|_{t=t_0} = F(y,z)$$
 . (12)

The task is simplified if the flow is invariable. In this case, the pressure drop is constant and equation (10) reduces to Poisson equation:

$$m\left(\frac{d^2v_x}{dy^2} + \frac{d^2v_x}{dy^2}\right) = \frac{\Delta p}{\Delta x} \quad . \tag{13}$$

Initial conditions disappear and boundary conditions do not depend on time:

$$v_x \Big|_{l_k} = u_k \quad . \tag{14}$$

$$v_x |_{l_k}$$

In general a rate: K may depend on circuits points:

$$v_x \bigg|_{l_k} = v_x(t, M)$$

A free flow of liquid is a special case when:

 $\frac{dp}{dx} = 0$, p=const. Instead (10) we have equation:

$$\frac{dv_x}{dt} - v \left(\frac{d^2v_x}{dy^2} + \frac{d^2v_x}{dz^2} \right).$$

If the motion is set, use Laplace equation to find a rate:

$$\frac{d^2 v_x}{dy^2} + \frac{d^2 v_x}{dz^2} = 0 \quad . \tag{15}$$

Corresponding to boundary conditions (14).

Tasks (15), (14) (uk constant on circuits $l\kappa$) are equal finding flow function j in plane of flow incompressible liquid:

$$\frac{d^2 j}{dy^2} + \frac{d^2 j}{dz^2} = 0, \qquad j \bigg|_{l_k} = u_k \ .$$

Hence, in particular, conformal transformation method can be used to solve the problem (15), (14). It is easy to show that the force f_k , influencing on the circuit l_k in a viscous fluid is described with circulation G corresponding ideal fluid flow. :

$$f_{k} = \oint_{I_{k}} \boldsymbol{t}_{nx} dS = \boldsymbol{m} \oint_{I_{k}} \frac{dv_{x}}{dn} ds = \boldsymbol{m} \oint_{I_{k}} \frac{dj}{dn} dS = \boldsymbol{m} \Gamma$$



Fig. 1. Motion scheme

An air flow motion in the cyclone can be described by a motion flow between two infinitely long circular cylinders with a common axis of the radius R_1 and R_2 , the absence of mass forces (Figure 1.) Use axis x along the axis of the cylinder. Assume that the inner cylinder rotates with angular velocity w_l , external cylinder velocity w_2 . It is convenient to solve the problem introducing cylindrical r, θ, x , coordinates and write in these coordinates the system of equations of viscous fluid. To do this, find expression: div v, dv/dt, grad p, Δv in this coordinate system. Naturally the velocity is directed tangent to the circle r = conct and both with pressure depends on r, that is $v_x = v_r = 0$, $v_0 = v(r)$, p = p(r). A system of equations can be applied to this problem when the motion is set, takes a simple form and can immediately get the solution of the problem in:

$$v_0 = C_1 r + \frac{C_2}{r}, \ p = p_1 + \int_{R_1}^r \frac{v^2(r)}{r} dr$$

Steels C_1 and C_2 are determined from the boundary conditions. But to solve this problem we use other solution.

To find the dependence v=v(r), we write the law of conservation of momentum in a sphere:

$$R_1^2 \le y^2 + z^2 \le r^2, r < R_2$$

(fig. 1). Let M – moment of forces acting on the sphere. As a flow is flat, vector M is recognized on axis x. Get the following equality M=0. It seems that: $M=M_I+M_r$, where: M_I – moment of forces acting on the inner cylinder; M_r – the moment of viscous friction forces that are applied to the cylinder radius r. The magnitude of this vector:

$$M_{r} = \int_{0}^{2p} r(t_{rq} r dq) = r^{2} \int_{0}^{2p} t_{rq} dq,$$

here: $\tau_{r\theta}$ – projection to axis θ (direction v) tension acting on a part with normal r. it depends only on r, so: $M_r = \tau_{r\theta} 2\pi r^2$.

Thus, the law of conservation gives angular equality:

$$t_{rq} 2pr^2 + M_1 = 0. (16)$$

Let angle θ delayed from the axis y. Apparently:

$$t_{rq}\Big|_{q=0}=t_{yz}\Big|_{z=0}.$$

As: $\tau_{r\theta}$ doesn't depend on θ , the latter value is valid for all θ .

$$\boldsymbol{t}_{rq} = \boldsymbol{t}_{yz|z=0} = \boldsymbol{m} \left(\frac{\partial \boldsymbol{v}_{y}}{\partial z} + \frac{\partial \boldsymbol{v}_{z}}{\partial y} \right)_{z=0}.$$
 (17)

We get:

$$v_{y} = -v \sin q = -v \frac{z}{r}, \quad v_{z} = v \cos q = v \frac{y}{r},$$
$$\frac{\partial v_{y}}{\partial z}\Big|_{z=0} = \frac{\partial}{\partial z} \left(-v \frac{z}{r}\right)\Big|_{z=0} = -\frac{v}{r},$$
$$\frac{\partial v_{z}}{\partial y}\Big|_{z=0} = \frac{v}{r} + \left(\frac{d}{dr} \frac{v}{r}\right)\frac{y^{2}}{r}\Big|_{z=0} = \frac{v}{r} + r\left(\frac{d}{dr} \frac{v}{r}\right) \quad (18)$$

Using this equality, from (18) we obtain:

$$t_{rq} = \mathbf{m} r \frac{d}{dr} \left(\frac{v}{r} \right) \tag{19}$$

Substituting (19) in (16), we obtain the equation for finding v:

$$M_1 + 2pr^3 m \frac{d}{dr} \left(\frac{v}{r} \right) = 0.$$
 (20)

The general solution of this equation is expressed by:

$$v = C_1 r + \frac{C_2}{r},$$
 (21)

where:

$$C_2 = \frac{M_1}{4pm}.$$

Steels C_1 and C_2 determined from the boundary conditions:

$$v\Big|_{r=R_1} = W_1 R_{1,} \quad v\Big|_{r=R_2} = W_2 R_2,$$
 (22)

or more precisely:

$$C_1 R_1 + \frac{C_2}{R_1} = w_1 R_1, \quad C_1 R_2 + \frac{C_2}{R_2} = w_2 R_2.$$
 (23)

Solving the system (8), we obtain:

$$\tilde{N}_1 = \frac{W_1 R_1^2 - W_2 R_2^2}{R_1^2 - R_2^2}, \quad C_2 = \frac{R_1^2 R_2^2 (W_2 - W_1)}{R_1^2 - R_2^2}.$$
 (24)

Thus, the velocity distribution between cylinders with a common axis is given by the formula:

$$v = \frac{w_1 R_1^2 - w_2 R_2^2}{R_1^2 - R_2^2} r + \frac{R_1^2 R_2^2 (w_2 - w_1)}{R_1^2 - R_2^2} \frac{1}{r}.$$
 (25)

With formula (25) it is easy to calculate $\tau_{r\theta}$ and M_r :

$$_{rq} = \mathbf{m}r\frac{d}{dr}\left(\frac{v}{r}\right) = -2\mathbf{m}\frac{C_2}{r^2}, \quad M_r = t_{rq} 2\mathbf{p}r^2 = -4\mathbf{p}\mathbf{m}C_2, \quad (26)$$

where: C_2 is (24).

t

Note also that, by measuring the experiment, we can determine viscosity. Partial flow cases:

a) Two cylinders rotate with the same angular velocity:

$$W_1 = W_2 = W,$$

from (1.26) get: v = Wr.

b) fluid fills infinite space outside the cylinder:

$$R_1: R_1 = R, w_1 = w, R_2 = \infty, w_2 = 0$$

In this case:
$$v = R_1^2 \frac{W}{r}$$

c) one of the cylinders is fixed: $W_1 = 0$, $W_2 = W$.

Then:
$$v = \frac{R_2^2}{R_2^2 - R_1^2} wr - \frac{R_1^2 R_2^2}{R_2^2 - R_1^2} \frac{w}{r}.$$

Next we consider the movement of the air flow in the moving coordinate system, which rotates around the axis of the cyclone with an angular velocity equal to the speed of the flow around a vertical axis. Then we will deal with the case where the speed is equal to the outer wall w_z and internal (inertial separator) - w_s [10,11,14].

MODELLING RESULTS

We had constructed three-dimensional finite element model for dust collector (Fig. 1) to prepare calculation in solid modeling program to study the physical meaning processes that occur in our unit and to justify the choice of parameters of experimental studies. The finite element method (FEM) solved the system of Navier-Stokes equations for turbo-valence air flow. For this purpose we built geometric model with geometrical parameters of the apparatus, which have been identified.

1. The diameter of the cylindrical part of the cyclone 0.7 m.

2. The height of the cylindrical part of cyclone 1.5 m.

- 3. The diameter of the exhaust pipe 0.7 m.
- 4. Jalousie separator diameter 0.75 m.
- 5. Height cyclone 3.2 m.

6. Size of cross section inlet 0.40 x0, 70m.

The investigation was conducted for a variety of directions and speeds of jalousie separator. We studied the motion of air flow, distribution of air flow values and static pressure value in the flat section of the apparatus. Figure 2 shows the trajectory of the air flow in the proposed precipitators. The speed of air flow reflected color trajectory. Figure 3 shows the distribution of air velocity in the horizontal section of the dust collector.

Hydraulic resistance of the device without rotation jalousie separator was 651.2 Pa.

Hydraulic resistance of the device was 766.6 Pa in rotating separator towards jalousie movement of air flow in the inlet, with an angular velocity of 1 rad/s.

When rotating separator towards jalousie movement of air flow in the inlet, with an angular velocity of 3 rad/s - hydraulic resistance of the device was 701.52 Pa. When rotating jalousie separator in the direction of air flow in the inlet of the angular velocity of 1 rad/s - hydraulic resistance machine was 1030.2 Pa.

When rotating jalousie separator and direction of air flow with an angular speed of 3 rad/s - hydraulic resistance of the device was 1017.75 Pa.

Figure 8 shows the dependence of the hydraulic resistance of the device on the value of the angular velocity jalousie separator. [20, 21]. Added considered angular velocity jalousie separator in the direction of air flow in the inlet of the machine.



Fig. 2. Model new construction unit

Fig. 3. Characteristics of air flow in the machine with a fixed jalousie separator



 Fig. 4. Characteristics of air flow in the apparatus during rotation jalousie separated ular with an angular velocity of 1 rad / s forward movement of air flow in the inlet

 Path of air flow
 distribution of static pressure

 distribution of static pressure
 distribution of airflow



Fig. 5. Characteristics of air flow in the apparatus during rotation jalousie separator with an angular speed of 3 rad/s forward movement of air flow in the inlet

Path of air flow

distribution of static pressure

distribution of airflow



Fig. 6. Characteristics of air flow in the apparatus during rotation jalousie separator with an angular velocity of 1 rad/s in the direction of air flow

path of air flow

distribution of static pressure

distribution of airflow



Fig. 7. Characteristics of air flow in the apparatus during rotation jalousie separator with an angular speed of 3 rad/s in the direction of air flow

path of air flow

distribution of static pressure

distribution of airflow



Fig. 8. Dependence of hydraulic resistance scrubber from the angular velocity of rotation jalousie separator.

Rotation jalousie separator leads to a symmetrical distribution of air flow in the machine. Between jalousie separator and the outer wall of the device adds a stream, whose main purpose is to counter the radial flow [22, 24, 25]. If we analyze the trajectory of the air flow in the cyclone (Fig. 3-7), we conclude that the rotation jalousie separator in the cyclone are more symmetrical velocity field and a more symmetrical distribution of static pressure in the flat section of the machine. This creates

conditions for increasing the efficiency of the purification process [13, 15, 19, 23].

Taking into account the results of which are presented in Figure 8 shall decide whether to manufacture separator design with jalousie separator that spins forward movement of air flow in the inlet. The optimal value of the angular velocity of rotation will be determined during the experimental trials of the newly formed unit [26, 27].

CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCHES

New constructions of equipment were created on the basis of the simulation design divided into 2 groups of prospective production implementation.

1. Production, using centrifugal, inertial dust collectors.

2. Production of preparation technical documentation for implementation.

Nowadays in the developed and presented in the paper model is developed and produced drawings production pilot plant for cleaning the air of dust in the smelting of metal.

REFERENCE

- Aluev G.M.-A. 1986. Dust extraction and purification technology of industrial gases. - Moscow, Metallurgy. Russia.
- Banit M.I. and Malgin A.D. 1979. Dedusting and gas cleaning in the building materials industry. - Moscow: Stroyizdat, 351. Russia.
- Batluk V.A. 2001. Scientific basis for the creation of highly Dust Equipment / Dis. Of Dr. techn. Science: 05.05.02. - Lviv "Lviv Polytechnic". 370. Ukraine.
- Batluk V. and Paranyak N. 2012. Building a performance factors model for a new design dust collector separator // ECONTECHMOD/Vol1. №3., 3-8 Lublin-Lviv-Cracow.
- Batluk V.A. 2010. Level of air pollution and its impact on the health of the population of Ukraine/V.A. Batluk, N.M. Paranyak, V.G. Substance//Collection of scientific papers "Building, materyalovedenye, Mashinostroenie" № 52, Series "Safety zhyznedeyatelnosty", Dnepropetrovsk,205-210. Ukraine.
- Bretshnayder B. and Kurfyust I. 1989. Protection of the air basin from pollution: technology and control: Per from English. / Ed. AF Tubolkina. - Leningrad: Khimiya, 288. Russia.
- Buczaj M. and Buczaj A. 2012. The use of labview environment for the building of the grain Dust control system in grain mill //ECONTECHMOD/ Vol.1, №1. 21-26. Lublin-Lviv-Cracow.
- Busko E. C, Pazniak S. S., Kostukevich S. B. and Dudkina L. A. 2012. Perspectives of the use of renewable energy sources in enhancement of environmental and energy security of Belarus //ECONTECHMOD / Vol1. №2.,9-13. Lublin-Lviv-Cracow.
- Dubinin A., Hanyk J., Maystruk V. and Ihavryliv R. 2005. Pryamotechiyny cyclone with coaxial insert. Analysis work. // Chemical Industry of Ukraine, № 3., 26 - 2 Ukraine.

- Cittern V.V. and Dorokhov I.N. 1976. Systems analysis of chemical processes. - Moscow: Nauka, 500. Russia.
- 11. **GOST 25199-82** (ST SEV 2145-80). Equipment pyleulav-Lebanon. Terms and definitions. Ukraine.
- GOST 25631-83 (ST SEV 3255-81), GOST 25632-83 (ST SEV 3252-81). Wet dust collectors. Types and basic parameters. Specifications. Ukraine.
- 13. Hervasyev A.M. 1954. Dust collectors. M.: SIOT, 4. Russia.
- Heinrich D. and Herh M. 2001. Ecology: dtv Atlas. -K.: Knowledge; Press, 275. Ukraine.
- 15. Kouzov P.A., Malhin A.D. and Skryabin H.M. 1982. Dusting gas and air in the chemical industry. - L.: Chemistry, 256. Ukraine.
- Kouzov P.A. 1987. Fundamentals of dispersion composition of industrial dusts and powdered materials. -L.: Chemistry,264. Ukraine.
- 17. Kysil Yu.H. and Vasyliv R.M. 2007. Mathematical modeling of dust cleaning processes for vehicles and equipment manufacture // Abstracts of papers VIII International conference "Advanced technique and technologies. Kyiv Sevastopo, 8. Ukraine.
- Ogawa A., Sugiyama K. and Nagasaki K. 1993. Separation mechanism for fine solid particles in the uniflow type of the cyclone dust collector. Paper presented at Filtech Conference, Horsham, West, 627, 640. Ukraine.
- Parshenkov S. 1991. The industrial pollution // Nature. № 5. Ukraine.
- Ratushnyak G.S. and Lyalyuk O.H. 2008. Cleaning gas emissions. Navier-cational aid. - Kiev: Universum-Vinnitsa, 207. Ukraine.
- Rusak O.N., Milokhov V.V., Yakovlyev Yu.A. and Shcheholev V.P. 1989. – M.: Forest industry, 240. Russia.
- 22. **Standard 17.2.4.06-90.** The Nature Conservancy. Atmosphere. Methods for determination of the pressure and temperature of gas and dust flow from stationary sources. **Ukraine**.
- 23. Stockman E.A. 1998. Cleaning the air. Moscow: Publishing DIA, 320. Russia.
- 24. Stupnytska N.V., Proskurina I.V. and Kysil Yu. H. 2007. New methods of cleaning the air of fine dust // Scientific news, special edition materials IV International Scientific and Technical Conference "Ecological and economic problems in the Carpathian Euro-region" EEP KYE. Ivano-Frankivsk, 21-25. Ukraine.
- 25. Swarms G.A. 1993. Treatment facilities. Environmental protection. Moscow: Nedra. Russia.
- Willem van Loo. 2006. Dioxin/Furan formation and release in the Cement Industry // Proc. IV PCB Workshop "Recent Advances in the Environmental Toxicology and Health Effects of PCBs" (Zakopane, Poland 6– 10.09.2006). – Katowice: Uniwersytet Śląski. Poland.

Business vertical integration in Ukraine: motivation, advantages and disadvantages *N. Chukhray*

Lviv Polytechnic National University

Received June 21.2013: accepted August 10.2013

Abstract. The paper deals with the problems of increasing the competitiveness of Ukrainian enterprises and integration process in Ukraine. Correlation between a level of business vertical integration and development of a country is wellproven. Basic problems of the integration strategy of Ukrainian enterprises are identified. The author gives us the examples of successful development of the largest private vertically integrated energy company in Ukraine. One of the main directions of developing of the Ukrainian economy is to cooperate with the strategic partners as an important priority in the formation of vertical integrated structures of national importance

Key words: vertical integration, transition economy, the post-Soviet space, the defence-industrial complex (DIC), strategic partners, vertical integrated structures.

INTRODUCTION

Vertical integration has a significant impact on the effectiveness of enterprise activity and competition at the market. As a process, aimed at establishing an exclusive type of relationship between the manufacturer and its supplier, vertical integration, on the one hand, provides a number of advantages for the enterprise against the competitors, on the other - can have negative consequences for economic competition.

Modern world trends and processes, the character and rapidness of which change the future of the world, determine the economic and political place of different countries, and Ukraine being one of them. Nowadays the world financial crisis triggered acute crisis in Ukraine which has been caused besides external factors by serious internal reasons. These reasons reach far beyond financial problems and concern economic recession in national production, inflation, increase of unemployment, decrease in paying capacity and decline in living standards of the majority of population, bankruptcy of industrial enterprises.

Problems of internal and external markets in conditions of building the innovative economic model, increasing openness of economy as well as issues of connections of globalization processes with internal economic activity of the countries with transition economy are widely discussed in modern economic literature. As A. S. Filipenko points out, globalization of economic development is characterized by increasing interdependence of economies of different countries, greater integrity and unity of the world economy, having at its basis openness of national markets, international divisibility of labour and cooperation [6].

Countries with transition economy in general, and Ukraine in particular, started their movement towards a market economy with a heavy burden of vertical and horizontal dominance. Deep vertical integration of the economy in the post-Soviet space, which is typical for Ukraine, is manifested through internal and external dependency of many industrial enterprises on partners from the former Soviet Union.

Prior to liberalization and privatization processes in countries such as Ukraine, the industrial structure has not experienced significant changes. Thus, Ukraine began market reforms having serious structural problems in the manufacturing sector. In recent years we have seen the tendency of vertical integration development of the Ukrainian economy, especially in exportoriented branches. New vertical unions in industries and motives that induce this process should be considered and studied with special attention.

1. PECULIARITIES OF VERTICAL INTEGRATION IN THE SOVIET UNION AND ITS NEGATIVE IMPACT ON THE ECONOMY OF INDEPENDENT UKRAINE

One of the particular features of the national economy is the deep integration of Ukraine's economy to the post-Soviet economic space (especially to Russia). Industrial- economic cooperation of the post-socialist countries has existed since Soviet times. The collapse of the Soviet Union led to the rupture of a significant relations, which according to the bank's economic development, has led to a 2-fold decline of the industry in general, and 4-fold – of the Engineering [1]. The subjective factors that have a significant impact on the economic relations formation of machinery companies and cause the necessity of its restructuring are:

• relatively high degree of monopolization of engineering production and contiguous areas;

• concentration of engineering production, historically developed in Ukraine, in large industrial enterprises;

• obvious specialization of individual machinebuilding enterprises, which do not always meet the requirements of the market;

• the need to increase the investment attractiveness of engineering production;

• the ratio between state and private property in the machine-building complex;

• existing competition conditions in the domestic and foreign markets of engineering products.

We should note that in the transition to a market economy, the internal and external environment of engineering company is in a constant interrelation, as the market is a source of flow processes formation (resources buying) as well as the ultimate goal of their movement.

Despite the obtaining of Ukraine independence in 1991 and breaking cooperative relations between enterprises, economy integration continues to exist. The economic integration within the post-Soviet countries was supported by the presence of joint production technology, not global competitiveness of many industrial products, an acute shortage of currency, the need to maintain traditional markets and the implementation of a uniform policy on the world market.

The Ukraine drop out from a single economic space with Russia objectively led to the transition to world prices in natural gas trade and other energy resources exported from Russia, which led to a sharp decline in profitability and competitiveness of Ukrainian metallurgical, chemical, engineering and food products [10]. It is estimated that most of the chemical and metallurgical enterprises, agriculture and engineering complexes strongly feel the financial crisis, more than a million people are fired from work. There was a significant part of the discontinuation of high-tech products as a result of the destruction of cooperative ties in aviation, rocket and space, shipbuilding, instrument and other areas of high technology industries. This led to a halt of most promising Ukrainian machine-building enterprises, the half value of the finished product are Russian components, main market of which is in Russia as a result of closure of the relevant segments of the Russian market and breaking cooperative relations with Russian companies.

Particularly dependent on foreign partners and suppliers is the defence-industrial complex (DIC), which products are competitive on the world market. However, structural and organizational shortcomings of the defense-industrial complex is the root cause costly nature of defense industries, high levels of debt, not loading many of businesses and organizations, poor quality of products etc.

Ukraine inherited after the collapse of the Soviet Union nearly a third of industries which produce defense products. The basis of the defense industry in Soviet times were 205 industrial associations and enterprises, 139 research and design organizations. At that time, Ukraine produced 17% of all Soviet Union defense products [16]. The leading industries in DIC were rocket and space equipment, shipbuilding, transport aircraft, engineering machinery, special radio systems. DIC of Ukraine was largely integrated into union structures and became dependent on foreign orders and supply of components and raw materials [14].

Changes in geopolitical conditions after the collapse of the USSR and the development of Ukraine as an independent and sovereign state demanded a radical restructuring of the defence industry. In its basis, as we know, there was the conversion of military production, which was filed as part of the restructuring of the entire economy. At the state level, 22 civilian programs were developed, which included over 550 subprograms concerning organization of development and production of consumer goods.

To finance the conversion programs, which were planned to be performed mainly during 1993-1996, it was supposed to allocate 600 billion rubles (in prices of 1993). Due to execution of conversion programs there were about 2 thousand new manufacturing processes, over 1000 of new designs of civilian products (from the trolley busses to the equipment for the sugar industry) and more than 3 thousand of new types of consumer goods (from mini-tractors to VCRs) [12].

However, in general reorientation of military production to civilian output destination for complying with state targeted programs did not produce the expected positive results. In fact, it was received no more than 20-30% from planned and they were used by many companies to maintain existing production facilities and salaries. Nearly half of the funds from the financing fund conversion were received by the enterprises that had no relation to the defence industry. Due to lack of funding (for example, in 1994 for a program of conversion about half of the planned funds were provided) production capacity of defence companies were used for 5-80% of their design capacity [11].

Reduction of military orders, the braking of closed production cycles and other problems required the restructuring and conversion of the defence industry in Ukraine. But there was not a significant restructuring in the Ukrainian defence industry, as well as positive results were not received. Currently, much of the defence industry enterprises and organizations had the period of auctioning, first state-owned holding companies, financial and industrial groups, international financial and industrial groups, leasing companies, consortiums. However, the results of the production of these structures show that most of them have not yet reached the main goal - to ensure profitable production. Main reasons are related to lack of funds to upgrade or enterprise modernization, working capital, debt elimination to state, the lack of an effective legal framework etc.

About 45% of the total number of defence enterprises changed ownership, including: 17% of aircraft, 25% - defence industries, 58% - shipbuilding, and 79% - electronics industry. However, a substantial increase in the efficiency of these enterprises is not observed, since there are a number of problems that can be grouped into two groups: the problems of external and internal nature. Thus, the location of military orders for some of them is restricted by law and is a deterrent to the development of DIC. Production base of defence enterprises require significant upgrades. Physical depreciation of fixed assets is over 70%. Accordingly, most firms have low profitability. Insufficient financial and economic situation of enterprises has led to the emergence of wage debts to employees.

In the first stage of privatization: the focus was on individual highly profitable enterprises and their subdivisions. Consequently, the preconditions for the separation of common industrial and technological systems into separate structures were created, many of which cannot establish its own production and their own survival in the current economic conditions. It is obvious that the policy of downsizing and disintegration has not justified, because the privatization process has not always been closely associated with the policy of restructuring. Research shows that many companies support the idea of the creation of financial-industrial groups, holding companies and large corporations. In this regard, the privatization process needs further improvement and development of organizational and structural forms of business.

Despite the negative effects, which are typical to the Ukrainian economy at present, there are such branches in Ukraine, the products of which meet international standards. Ukraine is known to be one of the seven leading countries in the world in the branch of nuclear and space investigations, nuclear energy, development of aerospace technologies, production of some medicine, biotechnology, etc. (see Table 3). For example, in the space industry booster "Zenith", which was developed by the SDB "Pivdenne" and was made by the "Pivdenmash" in cooperation with the Russian Federation, is the basis of international projects "Sea Start" and "Global Star". According to experts, today it is one of the best missiles in its class. The great interest of foreign firms is kept to developed in SDB "Pivdenne" rocket "Cyclone", which is designed to launch satellites of middle class [15].

Ukraine has a modern shipbuilding industry, which in the former Soviet Union accounted 30% of total shipbuilding by tonnage and 40% - the number of ships [20]. Its products include various types of ships: from small patrol boats and hydrofoils to large cruisers, aircraft carriers. Industry has broad opportunities for repair and modernization of surface ships and submarines.

Aviation industry is a leader in the development of transport and military transport aircraft. Significant scientific, technical and industrial potential has jet engine, which is capable of producing a wide range of engines for aircraft and helicopters. Engines of Zaporizhske, "Motor Sich" are used on airplanes in almost 60 countries [20]. Enterprises of aviation engine building have ample opportunities of international cooperation, particularly in providing services for capital and maintenance of engines for helicopters of types "Mi" and "Ka".

Tank branch reached the world level. Tanks T-80UD and its modern modification of the T-84, which are produced at plant, named by Malyshev (Ukraine) successfully compete in the global market. Compared to the aircraft and shipbuilding industries armours industry is much less dependent on imports of raw materials, components. It is able to produce many products virtually in closed cycle.

Ukraine is the world leader in the manufacture of navigational instruments, heads for homing missiles "ground-to-air", stations of Radio control, soundmetrical systems of artillery intelligence, complex control systems, radio communication equipment, radio and electronic warfare aircraft and missile systems. Ukraine has kept a well-developed electro-optical industry. In the former Soviet Union it was a leader in the production of universal radar [16].

Although the share of trade Ukrainian defenceindustrial complex (the DIC) with the European countries never exceeded 2.5% in total defence exports, many Ukrainian defence enterprises are now able to actively search for cooperative ties with famous foreign companies. After all, before the emergence of the domestic market, these companies could take over the role of intermediaries in advancing the global markets of certain firms, being, of course, sub-contractors and integrators in rearmament [14]. Finally, access to third country markets with European partners already looks very attractive alternative to one-sided and, as demonstrated by last half century, the adverse orientation solely on Russia.

Table 1.	Classification of	Ukrainian Production	According to the Level of	f Competitive Capacit	y
			0	1 1	~

N⁰	Basic Branches and Their Production	Level of Competitive Capacity	
1.	1. Design and production of space craft, carrier rockets, craft and other	1. World level of competitive capacity according to	
	airborne vehicles.	the functional characteristics.	
	2. Design and production of nuclear station turbines.	2. World level in providing orders for foreign	
	3. Generating heat and electrical energy using thermonuclear reaction.	countries.	
		3. World level.	
2.	1. Production of definite kinds of weapon for armoured units and other	1. European level of competition.	
	forces.		
	2. Production of some kinds of metal-working machines, measuring devices,		
	etc.		
	3. Production of diesel locomotives, ships.		
3.	1. Production of mechanical engineering devices for mining, metallurgical,	1. CIS level.	
	coal and other industries.		
	2. Mechanical engineering, engineering of various devices (suitable for many		
	kinds of production).		
4.	1. Production of main types of consumer products (groceries, footwear,	1. Competitive capacity in the internal market.	
	clothes, building materials, furniture, printing production etc.)		

Source: Strategic Challenges of the XXI century society and economy in Ukraine / Ed. Acad. National Academy of Sciences of Ukraine VM Geytsa, Acad. National Academy of Sciences of Ukraine VP Semynozhenko, Corr. NAS of Ukraine Boris Kvasniuk. Volume 2: Innovation and technological development of economy. - K.: Phoenix, 2007. - 156.

2. ADVANTAGES OF INTERNAL VERTICAL STRUCTURES IN UKRAINE TODAY: SUCCESSFUL EXAMPLES

The results of empirical research of 10 000 of Ukrainian enterprises activity conducted by the Antimonopoly Committee of Ukraine in 1996-1998 showed that the increase in vertical integration at the end of the 90's was caused by severe restrictions of liquidity constraints during the crisis of non-payments [1]. Increasing of vertical linkages helped firms with a relatively low initial vertical integration to overcome the de-organization in the mid 90's. At the same time, firms with a relatively high initial level of vertical integration showed less flexibility in organization to the changing market environment, resulting in lower efficiency.

Vertical integration gained special development in Ukraine through cross-shareholdings. One indicator of this phenomenon is the emergence of new large companies with vertically related business areas. Currently, these companies hold about 25 percent of positions in the ranking of the top 100 with respect to income and exports [2]. These intermediary companies usually sell products of the firms in which they maintain the structure of cross-shareholdings. Widespread of cross-shareholdings in Ukraine is related to a low level of protection of shareholders who have minority shareholdings, underdeveloped financial system, which limits the possibility of complete redemption; opportunity for evasion and tax avoidance, which are provided by this type of business organization.

Among the new vertical associations in Ukraine, successful experience which requires a more thorough study is Donbas Fuel-Energy Company (DFEC). It is the largest private vertically integrated energy company in Ukraine. DFEC enterprises form a production chain from coal mining and enrichment to the generation and supply of electricity. Schematically, the vertically integrated model of corporation "DFEC" development is depicted in Figure 1.

The company was established to improve the efficiency of the energy business, and create transparent asset management system. Today the company fully satisfies the generating assets of domestic coal. Vertical integration of DFEC, along with favourable geographical location of assets allows the company to guarantee the quality and reliability of the entire production chain, and successfully manage the efficiency and control the entire value chain. The advantage of vertical integration business is the ability to reduce the business risk of branch units of the Company.

Transfer to the vertical integration model began in 2005, when on the basis of the association DFEC the Corporation managing company "DFEC" was formed. Over time, a Corporate Centre Ltd. ("DTEK"), which is responsible for the financial and operational results. All enterprises of DFEC the unified management processes were introduced, allowing to establish effective working between all departments of enterprises [20].

As a result of the equipment modernization and relaying protection of Burshtyn TPP, which is included in DFEC, and thanks to the signing of agreements on fail booking of coordinated export with system operators of Continental Europe regional group adjacent grids, the company sells to overseas markets in Europe electricity, namely in Romania, Belarus, Moldova, Slovakia, Poland. DFEC based on government decisions buys electricity on the wholesale market for future exports, at a wholesale market price. In January-September 2012 DFEC doubled electricity exports over the same period last year - to 7.126 million kW / h [16]. Also uninterrupted supply of electricity to Belarus during the period, and an increase in the supply of electricity to the EU, including the beginning of deliveries to Poland (restored in October 2011) provided export growth.





Fig. 2. Cooperation of aircrafts An-148 Source: http://uk.wikipedia.org/wiki/

This rapid growth was made possible by comparatively low price of electricity supplied to the European market. The export of electricity is important primarily for the development of the coal industry, and export growth is provided primarily by power plants that run on coal.

Thus, not only the share increases of the European market for electricity, but also related industries of electricity generation- coal mine is ensured. Export means extra load of thermal generation, which means that the collier will be able to market their products. At the same time, some state-owned coal enterprises stop, and their employees do not get paid because of problems with the sale of coal.

Thus, the private owner and the effective management of the holding enabled to use all the benefits of the implementation in practice of vertical integration model of development in such strategic area as energy.

3. STRATEGIC PARTNERS AS AN IMPORTANT PRIORITY IN THE FORMATION OF VERTICAL INTEGRATED STRUCTURES OF NATIONAL IMPORTANCE

Often, the success in the world market does not only need technical characteristics and service guarantees. And the point is not only in the formal computation and comparison of tactical and technical characteristics of the goods or consumption prices. An important key success factor may be the choice of strategic partner and a good way to cooperate with him for the division of interests in future orders. Such arguments often become a priority in the market of industrial products, especially in knowledge-intensive field such as the aerospace industry.

Let's consider the example of AN-148, a developer and manufacturer of which is the Ukrainian State Enterprise "Antonov". This passenger jet, designed for passenger transport on regional and short-haul flights. State Enterprise "Antonov" (formerly Aviation Scientific-Technical Complex named by Oleg K. Antonov, or ASTC named by O.K. Antonov) - a skilled team, design office complex of laboratories, pilot plant and Test Complex that allow to solve a variety of problems on development and aircraft certification, interact with manufacturers of all types of aircraft "Antonov".

In the implementation of the An-148 in the preparation and production of aircraft companies from 15 countries participate [3]. Serial AN-148's are built in Kiev, at Serial factory "Antonov" and in Russia, Voronezh. Cooperation of aircrafts An-148 includes attracting of many businesses, most of them located in Ukraine and Russia (see Figure 2).

Such deep vertical integration in the production and preparation of the aircraft, which has historically evolved since the Soviet Union at this stage often becomes a barrier of program development. The work on creating its own closed loop production aircraft of this series develops in Ukraine.

Approximate capacity of the world jets market for the period until 2013 - about 500 pieces, CIS - 170 planes. Direct competitors are planes Sukhoi Superjet 100, Embraer 190 and ARJ21-700. At the air show "Max" 2007 SCC "Russia" has signed a contract to supply 6 aircraft, with an option for another 6. In 2009 "AeroSvit" agreed with Oleg Antonov ASTC to buy or lease supplies for three years a 10-AN-148 and its modifications, the An-158 [13, 22, 23].

Ukrainian An-148 aircraft is high-competitive: it has good performance characteristics, favourable price and an adequate level of service and reliability. It can count on a significant portion of the potential market of CIS countries with 750 old aircraft which should be replaced. As we learned in August 17, 2009 Office of the President of the Russian Federation opted for AN-148, refusing to purchase Sukhoi Superjet 100 for top officials of the Russian state [19]. The decision is made on the grounds of safety. December 30, 2009 State enterprise Kyiv Aviation Plant "Aviant" and now "Serial factory" Antonov "(Kyiv) rolled out of the hangar first production model of regional jet aircraft An-148-100V. Implementation and transfer of aircraft belongs to State Enterprise" Leasingtechtrans. "First contest of leasing aircraft won three SE Antonov [23].

Already in July, 10 2012 in the framework of international aerospace salon Farnborough 2012 Russian leasing company Ilyushin Finance Co. (IFC JSC) signed a sales contract for the supply to 2014 in Panama for 15 new generation aircraft AN-148 and AN-158 for a total amount about \$ 420 million [19].

Interestingly, doing marketing efforts in Paris, concerning demonstration of AN-148 - indeed most perspective today Ukrainian air machine - aviation industry representatives realize independently for the Ukrainian producer of competitive aircraft in its present form in Europe market does not exist. Since production depends on Russian partner and independently from it is impossible to enter the international market. So today transactions are signed by Russian mediator - Russian leasing company Ilyushin Finance Co. (IFC JSC).

But Russian managers from AHK "Sukhoy" promote its Superjet 100 to the European market through European partners: at Le Bourget a contract was signed to supply ten regional aircraft to their first customer - Italian airline ItAli worth 283 million dollars. It should be noted that parallel to AHK "Sukhoy" signed an agreement with the Italian Alenia Aeronautica, Alenia under which come with a 25% stake in a joint venture to promote Superjet 100 at the European and American markets. Span is great because the Superjet 100 aircraft does not exist yet, but the first of the ordered party was in Italy at the end of 2009, the final delivery of the same party is scheduled for 2011 Thus, because of Russian-Italian cooperation a Ukrainian plane, is displaced that already exists which at Le Bourget was openly admired by representatives of European companies and American company Boeing.

A similar situation was observed in the late 90s, when the Ukrainian manufacturers could not understand why their competitive lightweight AN-32 transport worker lost tenders in Europe to no better CN-295 of SASA. It turned out that the success stories have understandable components. Show the customer his long-term interests, make him a partner, co-owner and member of the production, and he will choose your plane, despite the fact that it is 30-50% more expensive than in competitors [7]

As we can see, in business there is no hard partnerships priorities at the expense of expanding their market opportunities. In domestic business, as some time ago in the British Empire, there are no permanent allies, but there are permanent interests. Naturally, Ukrainian exporters, who have influence on the economic potential of the country, not only hope, but also have good reason to require from the government to remove obstacles in the way of domestic business, generated by political expediency and personal preferences of this or that political force. Establishing good neighbourly relations with partner countries should be the main goal of summits and bilateral meetings.

CONCLUSIONS

The current system of management is characterized by measures search on enterprises reforms, development and implementation of new models and technologies of modern enterprises management. This is caused by deep structural changes in the economy and the realities of modern Ukrainian economic system. The simplest is to use proven models that have been used in the world and may be relevant for Ukrainian enterprises, usually after adaptability to domestic realities.

In the world in general and in Ukraine there is a trend toward larger businesses due to their vertical integration, often international in character. Any organization is a supplier and consumer. It is integrated into the transformation of raw materials into final, delivered to consumer goods and services. The primary motivation for the organization in implementing the strategy of vertical integration is to strengthen its competitive advantages by weakening the competitive strength of suppliers and consumers. In terms of the model of "national rhomb" M. Porter, vertical integration - a way of strengthening relation "organization - supporting the industries"

However, in Ukraine, a country of transition economy, with weak institutional environment and underdeveloped financial markets, there are peculiarities of integration structures formation and motives of their occurrence. In particular, the phenomenon of Ukraine is other forms of vertical integration, namely vertical integration via cross-shareholdings. Industrial enterprises of some industries are oriented to form a closed cycle of production, as often for the successful implementation of competitive projects there are obstacles as political arguments and dependence on partners from the former Soviet countries, especially from Russia. This applies to former defence enterprises that have successfully completed conversion, activity of which however largely depends on the cooperation ties that were created during the times of the Soviet Union.

Situational analysis of the establishment and effective functioning of the large Ukrainian holding at the energy market proves the acceptability of this approach in the strategic development of Ukrainian enterprises subject on the occasion of effective management and the ability to successfully use all the advantages of vertical integration strategy.

REFERENCES

- 1. Akimova I. and Shcherban A. Stimulating vertical integration in Ukraine // http://www.ier.com.ua/files/ publications/Policy_papers/German_advisory_group
- 2. Akimova I. and Shcherban A. Incentives vertical integration // http://www.amc.gov.ua/amc/control/uk/publish/article
- Badrak V. 2004. Happen roof for avyaproma. Militaryindustrial Courie. - № 18.
- Badrak V. 2007. European Perspectives of Ukrainian Defense / newspaper "Mirror Weekly", June 29. – № 24 (653) 23.
- 5. **Begma V.M. 1998.** Defense-industrial complex of Ukraine and Russia: cooperation, partnership, competition. K. NIURO. 192.
- Filippenko A.S., Rogach O.I., Shnyrkov O.I. and others 2000. World Economy: Textbook. - K. Lybid, Reference list. 93.
- Materials to expert discussion "Innovative way of development of Ukraine: Slogan or Reality?" - Kyiv, Razumkov Centre, 2004, 7.
- 8. **Karnozov B. 2004.** Air Show in England has highlighted new perspectives of domestic firms in the global market avitsionnom. Military-Industrial Courier. № 30.
- Defense with vertical Vzlet. Interview V.Horbulyna // 05.03.2002 / http://www.razumkov.org.ua/ukr/files/ category_journal
- Pashkov M. and Chaly V. 2000. Realities and perspectives of strategic partnership / / Mirror week. № 22 (320).
- Skurskyy P. 2003 Experience, problems, and restructuring the military-industrial complex of Ukraine. -Current Economic Issues. - № 8, p.58.
- 12. Chumak V.M., Begma V.M, Kukyn A.F. and Zaborskyy V.L. 1997.Ukraine and the world arms market. K. NICD.

- 13. Official site of Donbass Fuel-Energy Company (DFEC) // http://www.dtek.com
- 14. Shevtsov V.I. and Bodnarchuk R.V. 2000. Integration into the military-industrial complex of Ukraine: state and development problems. Strategic Panorama. № 3-4,
- 15. Shevchenko V. 2001. Ukrainian-Russian partnership: attempt number five / / Mirror week. № 1 (325).
- 16. Shon E. and Baumann H. 2003. Arms Production SIPRI Yearbook, 400.
- 17. Strategic Challenges of the XXI century society and economy in Ukraine / Ed. Acad. National Academy of Sciences of Ukraine VM Geytsa, Acad. National

Academy of Sciences of Ukraine VP Semynozhenko, Corr. NAS of Ukraine Boris Kvasniuk. Volume 2: Innovation and technological development of economy. -K.: Phoenix, 2007. - 156.

- UNIAN Economics of January 27, 2013 // http:// economics.unian.net/ukr/detail/147805
 AH-148 //
- 19. AH-148 http://uk.wikipedia.org/wiki/%D0%90%D0%BD-148
- 20. http://www.niss.gov.ua
- 21. http://www.niurr.gov.ua/
- 22. http://www.ukrinform.ua/ukr/order/?id=812643 http://pryluky.info/news

Structural contradictions in control system by enterprise as function of associate administrative decisions

N. Kalyuzhna, K. Golovkova

Department of management of international affairs, Volodymyr Dahl East-Ukrainian National University, Lugansk

Received June 21. 2013: accepted June 30. 2013

Abstract. The key role of organizationally-functional structure improvement of management is reasonable in the increase of efficiency of preparation processes, acceptance and realization of administrative decisions on an enterprise. The algorithm of structural exposure contradictions is offered in control system by an enterprise. The morphological matrix of description of structural contradiction as functions of associate administrative decisions is formed. Sources 22.

Key words: control system, administrative decision, algorithm, structural contradiction, morphological matrix.

PROBLEM

Obvious pre-condition of effective administrative decisions acceptance on an enterprise is an exposure of reasons of subzero (or insufficient) quality of management and ground of suggestions in relation to perfection of organizationally-functional structure of management. Corresponding suggestions can foresee reduction of managerial staff, redistribution of functions between managers, clarification of order of their work, fixing of new functional duties, etc. Thus, backlogs for increasing an efficiency of decisions which are accepted, it follows to search, foremost, in providing of rational distribution of management functions between post positions and structural subdivisions of control system.

ANALYSIS OF RESEARCH AND PUBLICATIONS

In works of author [9] reasonably, that, according to the generally accepted algorithm of administrative activity structure [6, 15] concrete maintenance of administrative function opens up through the great number of administrative tasks, that she is folded, and the decision of that is needed for realization of this function. It is possible to assert that a function represents the rich in content side of management only, while administrative task as complex of calculation, conciliatory and organizational administrative works, specifies maintenance of this function, determining actions necessary for her realization. Expediency of distribution exactly of administrative tasks as to the element in the structure of administrative activity, that is subject to regulation, and quality of implementation of that can be appraised, stipulates efficiency of realization corresponding functions of management. of Accordingly, an exposure and removal of structural contradictions that arise up as a result of inefficient distribution of administrative tasks can be examined as foreground job, that must be decided with the aim of perfection of processes of preparation, acceptance and realization of administrative decisions on an enterprises.

THE AIM OF THE ARTICLE

Is development of tool of exposure of structural contradictions in control system by an enterprise in the context of their interpretation as function of administrative decisions.

THE MAIN MATERIAL

The process of exposure of structural contradictions in control system by an enterprise appears expedient to begin the systems of decisions with an analysis, as a central element of that will examine the executive actions of leaders [17]. During a management must be made decision, that determine basic descriptions of future actions of inferiors: aims of actions, objects of action, time of realization of actions, resources necessary for realization of actions et cetera. These decisions are documentarily recorded as plans that become firmly established corresponding chiefs. Orders that are to the inferiors and serve as basis for preparation and realization of executive actions give oneself up after it. Actions change the guided process that is fixed by control system and founding for adjustment earlier made decision state, then management cycle.

Between executive actions objectively there are the copulas of cross-coupling, conditioned by that they lean on general or such, that administrative resources (economic, normatively-legal, methodical, organizational, informative, skilled and other) cross. The said allows set forth the first and basic property of the system of decisions: decisions, that is accepted in organs the managements related to each other and thus, must be accepted not separately, but taking into account the tieup of corresponding executive actions.

Next property of the system of decisions can be named structural inlaid. This property is expressed in that all decisions are accepted by one organizational not element, but up-diffused between many elements that present the multilevel structure of management. The structural inlaid generates additional relations in the system of decisions, for example such, as: relation of seniority (from two decisions older that accepts chief of higher grade); relation of sanctioning (the decisions concerted on bottom levels must be ratified (sanctioned) by a chief). A necessity so to distribute a decision between the elements of control system flows out from here, that, from one side, it did not conflict with the set relations of seniority between these elements, and from other would not violate connections between decisions.

Other property of the system of decisions is her character with the aims of separate decisions that comport not always. Conflict character of the system of decisions results in a volume, that decisions, that she is formed, are divided into three types: managing, conciliatory and coordinating.

Managing decisions (namely speech went higher about them), accepted in relation to directly inferior and determine the area of possible descriptions of their actions. Conciliatory and coordinating decisions formally do not have a direct relation to the executive actions, they are sent to the change(clarification) of possible legitimate values of decisions that manage, with the aim of removal of possible harmful connections and strengthening of useful connections in behalf on providing of most efficiency of all system. A difference between them consists in the following.

Conciliatory decisions are accepted or by the elements of one level of hierarchy (one of that is the initiator of concordance), or elements of different levels at the direction of senior leader. An acceptance of coordinating decisions always is the prerogative of senior leader. In a result, the system of decisions accepts a heterogeneous structure in that managing decision are constrained inter se by means of conciliatory and coordinating decisions. Thus composition of the last is determined by character of connections between the actions of inferiors. In particular, if copulas between some actions are not relevant, then corresponding to these actions managing decisions are unconnected, and in relation to them the acceptance of coordinating(conciliatory) decision is not required. In addition, maintenance of coordinating (conciliatory) decisions to a full degree depends on character of connections between actions. Id est, if between some actions there is conflict connection, for example, as a result of community of the used resource, then maintenance of coordinating (conciliatory) decision will be rational distribution of this resource.

Thus, the system of decisions can be examined as a, hierarchical structure the central element of that are administrative tasks, that the systems of management definitely distributed between organizational elements. Process of exposure of structural contradictions in control system by an enterprise in accordance with the system of decisions, that was folded, can be given as a sequence of the stages (fig.1). Will consider essence of these stages more detailed.

Stage 1. Forming of the system of executive actions is control system by an enterprise. Determination of array of executive actions, as is soil for forming of the system of administrative decisions, can be carried out on the basis of decoupling of strategic aims of enterprise to the level of separate strategic processes, and taking into account distribution of corresponding strategic tasks after functional subdivisions of control system. Coming from that on the level of structural subdivisions is passed only system of strategic aims in herent to concrete functional subdivision, the types of works that is executed in him will assist an achievement at first of aims of this subdivision, and through them and highlevel goals. Exactly from it becomes clear, what payment in realization of strategy belongs to every functional structural subdivision, and systematization of array of executive becomes possible action.

Strategic aims on the level of functional structural subdivisions for determination of totality of executive actions in each of them is base on statement, that realization of strategy of enterprise envisages of him strategic aims on the aim of separate structural subdivisions [3, 277]. Possibly, that in the achievement of strategic aims existing in the system managements are involved an enterprise functional structural subdivisions. Each of them decides a task in accordance with functions, certain in Statutes about functional subdivisions, that provide the achievement of strategic aims of enterprise. To typical functional subdivisions of enterprise, coming from strategic directions of creation of cost [12, 11], it is possible to take: sale/marketing, research-and-development, supplies, productive, economic block (planning, finances, account), external economic subdivision, organizationally-prescriptive block (administration).



Fig. 1. Algorithm of exposure of structural contradictions in control system by an enterprise^{*}

Developed by authors.

Thus, the array of executive actions in control system can be described as

$$\mathbf{D} = \{\mathbf{D}_{ij}\},\tag{1}$$

where: i - is an index of strategic direction, i = 1,..., 4; j - is an index of strategic process, that will be realized within the limits of *i*-th strategic direction, j = 1, ..., 12.

Setting of array of executive actions and their distribution after separate functional subdivisions of control system assists the logical understanding of activity of enterprise, and allows to translate base strategy in the set of concrete executive actions that behave to that or other prospect. Will mark that strategic aims and their further decoupling, that answer every strategic prospect, and, accordingly, certain on their basis set of executive actions, is specific and individual for a concrete enterprise.

Stage 2. Formalized description of the system of executive actions. The second stage envisages development of means of the formalized description of the system of executive actions, as exactly copulas between them determine composition and structure of the system of decisions. The basic requirement to such description consists in unambiguous authentication of actions. In other words, it is necessary to set such descriptions of actions, that would determine all possible actions simply, and simultaneously allowed to find out potential copulas between them.

Will consider that actions are constrained, if the change of descriptions of one action results in the change of descriptions of other action. Accordingly, for the exposure of connections it is necessary between actions, firstly, to set descriptions of actions, set of linguistic variables that describe (identify) every action simply, and, secondly, define terms at that the change of descriptions of one action can cause the change of descriptions of other action.

An executive action can be identified by the cortege of linguistic variables:

$$D_{ij} = \{ O, I, R, Z, T \},$$
 (2)

where: D – is an action; O – is an object of action; I – is a source of action; R – are resources, necessary for implementation actions; Z – is an aim of action; T –is time of implementation of action.

In case if such cortege not enough will appear for adequate description of actions taking into account the specific of the investigated problem situation, he can be complemented by new variables with the aim of providing of the additional working out in detail of descriptions of executive action. It is so, for example, possible to enter additional variables that characterize the method of action, place of realization of action and other.

Stage 3. An exposure of potential connections is between executive actions. On the second stage development of the formalized vehicle of exposure of potential connections comes true between executive actions. It is necessary at the decision of this problem, foremost, to formalize the own concept of connection between actions, and also to set rules that allow to reduce the presence (absence) of potential connection between them. Such rules must be an against the descriptions of executive actions entered on the first stage, operate their values and provide possibility of next classification of educed connections.

Let some actions be described as values of the indicated variables. Then natural terms at that the change of descriptions of one action can cause the change of descriptions of other action are facts of coincidence or crossing (partial matching) of values variable, that determine descriptions of actions. Coming from it, it is possible to set forth next rules that determine the terms of potential connection between actions.

 P_{11} – between the actions D_k and D_l there is a relation of "copulas after the object of action" (r_1), if they have the same object of influence ($O_1 = O_2$), or sent to the different objects that are parts of one object O:

 $\{(O_1 = O_2) \lor [(O_1 \subset O) \land (O_2 \subset O)]\} \rightarrow (D_k) r_1(D_l) . (3)$

 P_{12} – between the actions D_k and D_l there is a relation of "copulas after the source of action" (r_2), if they have a the same source of action ($I_1 = I_2$), or their sources of action are parts of one source I:

$$\{(I_1 = I_2) \lor [(I_1 \subset I) \land (I_2 \subset I)]\} \to (D_k) r_2(D_l).$$
(4)

 P_{13} – between the actions D_k and D_l there is a relation of "copulas after the resource of action" (r_3), if they are executed with the use of the same resource ($R_1 = R_2$), or these resources are parts of shareable resource R:

$$\{(R_1 = R_2) \lor [(R_1 \subset R) \land (R_2 \subset R)]\} \to (D_k) r_3 (D_l).$$
(5)

 P_{14} – between the actions D_k and D_l there is a relation of "copulas after an aim" (r_4), if their aim coincides ($Z_1 = Z_2$), or is directly inferior to the achievement one, more general aim Z:

 $\{(Z_1 = Z_2) \lor [(Z_1 \subset Z) \land (Z_2 \subset Z)]\} \rightarrow (D_k) r_4 (D_l). (6)$

 P_{15} – between the actions D_k and D_l there is a relation of "copulas at times" (r_5), if the moments of their beginning ($T_1^n = T_2^n$) and completion ($T_1^3 = T_2^3$) coincide, or the sentinel intervals ($\Delta T_1, \Delta T_2$) of implementation of actions cross:

$$\{(T_1^n = T_2^n) \lor (T_1^3 = T_2^3) \lor (f_c / T_1 \mathbf{I} \ f_c / T_2 \neq 0)\} \to \\ \to (D_k) \ r_5 \ (D_l) \ . \tag{7}$$

Summarizing, will consider that the actions D_k and D_l are bound by a relation (r), if takes place (P₁₁), or (P₁₂), or (P₁₃), or (P₁₄), or (P₁₅):

$$[P_{11} \lor P_{12} \lor P_{13} \lor P_{14} \lor P_{15}] \to (D_k) r (D_l).$$
(8)

Stage 4. Classification of the set connections. On this stage classification of the educed connections is with working out in detail, that in future soil for determination of structure of the system of decisions.
Classification of connections has for an object to get backgrounds that would allow to set forth the rules of generation of conciliatory (coordinating) decisions and rule of their distribution between organizational elements.

Will consider that achievement of such purpose is possible during classification of connections on next signs: measure of influence of the constrained actions one on other (Π_1); orientation of influence (Π_2); importance of connections (Π_3); character of influence of connections is on the results of actions (Π_4).

Then connection between actions can be described by the cortege Π , the elements of which are linguistic variables { Π_1 , Π_2 , Π_3 , Π_4 , Π_5 }, that acquire next values:

 $\Pi_1 = < relevant > or < unrelevant >,$

 $\Pi_2 = < mutual > or < one-sided >,$

 $\Pi_3 = \langle \text{very important} \rangle$, or $\langle \text{important} \rangle$, or $\langle \text{not }$ very important \rangle , or $\langle \text{not important} \rangle$,

 $\Pi_4 = \langle useful \rangle$ or $\langle harmful \rangle$ or $\langle neutral \rangle$.

Will set forth possible rules that will allow define values of the indicated linguistic variables.

 P_{21} – connection is relevant, if even one of the constrained actions renders substantial influence on the result of other action. Importance of influence is estimated by a quality measure, for example, thus: there is not a result, weak result, middle result, strong result, maximal results. For the quality evaluation of importance the functions of belonging, that determine dependence of measure of achievement of result of one action on other by rule, are set: connection between two actions is relevant, if the change of result of one operating on a quantum results in the change of result of other action not less than what on quantum.

 P_{22} – connection is mutual, if actions have influence on results each other, and one-sided, if one action influences on other results, and reverse influence is not observed, or he is unimportant in this situation.

 P_{23} – importance of connection answers maximal importance of actions. For example, if the action D_k , related to the action D_l , behaves to the important actions, and D_l – to the not important actions, then connection between D_k i D_l is important. Importance of actions is set for concrete terms.

 P_{24} – is connection useful (for the source of actions), if he assists gaining end of his action, connection harmful, if prevent to him to attain the put aim, and neutral, if gaining end of this action does not depend on a tie-up with other action. For example, let the aim of action D_k consist in maximization of efficiency, so in the achievement of maximal result, and without connection with D_l the result D_k is estimated as "middle". Then, if at presence of connection between D_k i D_l a result is estimated as "strong", then connection is considered useful, and if a result is estimated as "weak", then connection confesses harmful.

Stage 5. Forming of structure of the system decisions. Realizable on the previous stage classification

of the educed connections allows for dates the rules of determination of composition of managing, conciliatory and coordinating decisions, and also distribution of these decisions between the organizational elements of control system.

Forming of managing, conciliatory and coordinating decisions will produce according to the system of rules S = $\{ S_1, S_2, ..., S_9 \}$:

 S_1 – a managing decision must answer every action, thus only one,

 S_2 – the acceptance of managing decision on realization of action must be included in the function of chief, that directly inferior performer that carries out this action,

 S_3 – constrained managing decisions must be concerted (made decision in relation to their concordance), if copulas are "not very important" or "not important",

 S_4 – if connection is one-sided, then the initiator of concordance is an organizational element, that accepts managing decision in relation to an action the result of that depends on the action related to him,

 S_5 – if connection is bilateral and harmful only for one organizational element, then he must be the initiator of concordance,

 S_6 – if connection is bilateral, then the initiator of concordance is an element the actions of that have most importance,

 S_7 – constrained managing decisions must be coordinate (a coordinating decision is accepted), if copulas < very important > or < important >,

 S_8 – at presence of general direct chief of acceptance of coordinating decisions it must be included in his function,

 S_9 – in default of general direct chief of acceptance of coordinating decision it must be included in the function of the nearest direct chief.

In relation to the presence of iteration intercommunication between the third and fourth stage of algorithm will notice the following. Naturally, that producing classification of connections is impossible without knowledge of rules of forming of the system of decisions (results of the fourth stage). At the same time, for development of rules of forming system of decisions it is necessary to know both the signs of classification of connections and results of this operation. The reserved circle goes out, an exit from that is iteration implementation of the third and fourth stages.

Stage 6. An exposure of structural contradictions is in control system by an enterprise. The approach to the problem of exposure of structural contradictions will go out from that for certain control system the complete list of administrative decisions that must be accepted is known, to achieve objective her functioning. Will consider that the formal task of management consists in execution operations converting every element of the system of decisions from some initial state in some eventual state. Otherwise speaking, a task consists in implementation of operations in relation top reparation, acceptance and realization of the system of administrative decisions. Accordingly, from the technological point of view the process of preparation, acceptance and realization of any administrative decision can be presented as a sequence of the stages and procedures that have direct and reverse copulas.

Position about a presence in the process of acceptance of decisions of the certain basic stages is major at research of administrative activity. Specialists on a management are offer the different charts of development of decisions that differ in inter se the degree of working out in detail of separate procedures and operations process [1, 2, 5, 13, 14, 16, 18]. According to results researches of authors, that is thoroughly expounded in works [4, 10, 7, 8], it is possible to give the process of preparation, acceptance of administrative decisions as a and realization sequence of the next stages: previous formulation of problem; choice of criterion of estimation of efficiency of decision; a capture of data is for clarification of the put problem; exact formulation of problem; development of possible variants of decision of problem; stow age of mathematical models; comparison of variants on the criterion of efficiency and choice of alternatives; decision-making; taking to the performers and development of measures is on implementation of

decision; control of implementation of decision; evaluation of results and generalization accumulated experience.

Accordingly, in the process of exposure of structural contradictions in control system by an enterprise, it is necessary to set contradictions that arise up on each of the set stages after every decision in the general system. It is possible to set forth next structural contradictions, that can arise up in the process of preparation, acceptance and realization of administrative decisions (table 1).

Generalizations of the got results in relation to the sequence of determination of structural contradictions in control system by an enterprise allow to form the morphological matrix of description of structural contradiction as functions of executive actions (fig. 2). At the construction of this matrix formative descriptions of structural contradiction between executive actions were systematized as corresponding morphological signs, each of that characterizes the certain parameter of structural contradiction. Forming of complete list of possible variants of values of the distinguished morphological signs allows to formalize description of structural contradiction between executive actions, and to carry out the analysis of the got combinations of alternative variants of the distinguished signs with the aim of setting of complete totality of structural contradictions in control system.

Tabl	e 1.	Structural	contradictions,	that	can	arıse	up	ın	the	process	of	preparation,	acceptance	and	realization	of
admi	nistr	ative decisi	ions [*]													

Code	Source of contradiction	Essence of contradiction
A ₁	Incompleteness of the system of decisions	Absence of functions
A ₂	For the acceptance of certain decision one managing element answers more than	Duplication of functions
A ₃	Absence is concordances between decisions, realization of that assumes the use of shareable resource	Inconsistency is after a resource
A_4	Absence of concordance is between decisions that is accepted on the different hierarchical levels of management	Inconsistency is after a structure
A ₅	Absence of relation is co-operations between managing elements, that is responsible for realization decisions	Inconsistency is after functions
A ₆	Absence of concordances between decisions, that present the successive stages of process of preparation, acceptance and realization of decisions	Inconsistency is after an algorithm
A ₇	The sanctioned decision on some reasons can not be well-proven to the performer	Dug up to the management contour on direct connection
A ₈	A managing element sanctioned a decision, and it is well-proven to the performers, but absent control of his implementation	Dug up to the management contour on a feed-back
A ₉	Information that is not used for a decision-making acts to the managing element	Informative surplus
A ₁₀	Information necessary to him for a decision-making does not act to the managing element	Informative insufficiency

^{*} Developed by authors.

		times (P ₁₅)	nnections is on ns (P ₄)	Neutral		XI - is an evaluation of results	A ₁₀ – is infor- mative insuffi- ciency
		Connection at	of influence of co	Harmful	nating decisions	X – is control of implemen- tation of decision	A9 – is infor- mative surplus
	e actions	an aim (P ₁₄)	Character	Useful	Coordir	IX – is taking to the per- formers and development of measures on imple- mentation of decision	¹⁸ - dug up to the manage- nent contour n a feed-back
	tween executive		mections (P ₃)	Not impor- tant		VIII – is a decision- making	dug up to manage- it contour irect con- o
	tural contradiction are bet	urce Con	ortance of cor	very impor- tant		II – is com- parison of variants on he criterion of efficiency nd choice of alternatives	thm conductor data after after on d n n
		fter the reso n (P ₁₃)	Imp	rtant Not	VII is a pa ge of the antical of e altu	A ₆ – is in sistency an algori	
	gns of struc	ection is af of actio	P ₂)	Import	Conciliatory	VI – stowa mather moc	s incon- icy after ctions
	ological sig	Conn	fluence (P	ery impor- tant	0	 making f possible ariants of acision of problem 	A ₅ – i sisten fun
	alues of morpho	ifter the source of n (P ₁₂)	ter the source of (P12)	ne-sided V ₆		- is exact V mulation V problem d	A4 - is incon- sistency after a
	Variants of v	Connection is af action	Connection is after action (ined O		suo	III – is a apture of IV ta for clari- for ication of of lem	A ₃ – is incon- sistency after a resource
		ter the object of (P ₁₁)	ence of the constra one on other (P_1)	Irrelevant	Managing decisi	II – is a choice of da criterion of f efficiency of th decision	A ₂ – is dupli- cation of func- tions
		Connection is at action	Mayor of influ actions (Relevant		I – is previ- ous formula- tion of prob- lem	A_1 – non- functions
Morphologi-	cal signs of contradiction	Source of connection of executive actions	Signs of clas- sification of connections are between actions	Character of connection of executive actions	Type of corre- sponding decision	Stages of preparation, acceptance and realiza- tion of corre- sponding decision	Essence of structural contradiction

Fig. 2. Morphological matrix of description of structural contradictions as executive action function *

39

*Developed by authors.

CONCLUSIONS

Thus, the common task of exposure of structural contradictions in control system by an enterprise is taken to the decision of totality of private tasks within the frame work of six corresponding stages. These tasks are sent to the ground inwardly of non-conflicting organizationally-functional structure of control system, that is confined structural contradictions between executive actions. Forming of such structure will assist the increase of efficiency of processes of preparation, acceptance and realization of administrative decisions on an enterprise and, as a result, development of potential of control system.

REFERENCES

- Vasilenko V. O. 2002. Theory and practice of development of administrative decisions: [tutorial] / V. O. Vasilenko. – K.: CUL. – 420.
- Vinogradskij M. D. 2003. Organization of manage labour : [tutorial] / M. D. Vinogradskij, A. M. Vinogradskaja, O. M. Shkanova. – K.: Kondor. – 414.
- Introduction of the balanced system of indexes / Horvath & Partners ; trans. from german. – 3-th edition. – M.: Alpina Bisness books, 2008. – 478.
- Voronkova A. E. 2008. Administrative decisions in providing of competitiveness of enterprise: organizational aspect : [monograph] / A. E. Voronkova, N. G. Kalyuzhna, V. I. Otenko. – Harkiv.: PH «INJEC». – 512.
- Diyachuk N. V. 1997. Psychotechnics / N. V. Diyachuk. – M.: KSP. – 325.
- Kazarnovskyi A. S. 1981. Perfection of organizational structures of industrial enterprises (Questions of methodology) / A. S. Kazarnovskyi, P. A. Perlov, V. T. Radchenko. – K.: Scientific thinking. – 187.
- 7. Kalyuzhna N. G. 2012. Administrative decision as com_position of interdepend entprocesses / N. G. Kalyuz-

hna, Yu. A. Cherbakova // Announcer of the Khmelnytsk national university. Series: Economic sciences. $- N \ge 2$. T. 3 (186). - 114-116.

- Kalyuzhna N. G. 2012. Administrative decisions: essence, elements, тех-нологіяdevelopments and acceptance / N. G. Kalyuzhna. – In book: Development of potential of enterprise is in the conditions of economy of knowledge: [monograph] / [red. by A. E. Voronkova, Yu. S. Pogorelov]. – Lugansk: "Knowledge". – 302–317.
- Kalyuzhna N. G. 2004. Integration of the existent going near perfection of organizational structure of control system by the industrial enterprise / N. G. Kalyuzhna // Regional prospects. – № 3-5 (40-42). – 331-333.
- Kalyuzhna N. G. 2010. Administrative decision as process : the approach to determination / N. G. Kalyuzhna, K. Yu. Golovkova // Management of development. – № 17 (93). – 44-46.
- Kaplan Robert C. 2003. The Balanced system of indexes. From strategy to the action / Robert C. Kaplan, David P. Norton. – M.: Alpina Business Books. – 320.
- Kaplan Robert C. 2005. Strategic maps. Transformation of non-material assets inmaterial results / Robert C. Kaplan, David P. Norton. – M.: JSC "Olympus-business". – 512.
- Kozeleckij N. N. 1979. Psychological theory of decisions / N. N. Kozeleckij. – M.: Progress. – 228.
- Kolpakov V. M. 2004. Theory and practice of decisions making : [tutorial] / V. M. Kolpakov. – 2-th edition. – K.: MAUP. – 504.
- Lagosha B. A. 1988. Methods and models of perfection of organizational structures / B. A. Lagosha, V. G. Sharkovich, T. G. Degtyareva. – M.: Science. – 188.
- Meskon M. 1995. Bases of management / M. Meskon, M. Albert, H. Hedouri ; trans. from eng. – M.: Business.– 704.
- Theoretical ases of system analysis / [Novoseltchev V. I., Tarasov B. V., Golikov V. K. and others]; edition by V. I. Novoseltchev. – M.: Major, 2006. – 594.
- Yukaeva V. S. 1999. Administrative decisions : [tutorial]
 / V. S. Yukaeva. M.: PH «Dashkov and C^o», 292.

Implementation of corporate social responsibility in the process of strategic management

E. Korenyev

Volodymyr Dahl East Ukrainian National University, Lugansk

Received June 21. 2013: accepted June 30. 2013

Abstract. In the article modern approaches to the definition of the place of corporate social responsibility in the system of strategic management of an enterprise are analyzed. The conclusion about the priority role of the integrated approach to formation of business strategy as a tool of realization of the interests of stakeholders is drawn.

Key words: corporate social responsibility, integrated approach, strategic management, strategy, stakeholders.

ACTUALITY OF THE TOPIC AND PROBLEM STATEMENT

In October 2011 an updated strategy of the European Commission in CSR was adopted. In comparison with the variant of the year 2006 the updated strategy is more mature, which is caused primarily, by the complexity of the process of implementation of CSR in business strategy in Europe. In general, despite the positive statistics, the European Commission notes that: most of the companies in Europe have not still integrated social and ecological issues in their activity; some of the European companies are accused of non-compliance of human rights and labor standards; only 15 of the 27 member countries of European Union have national policies on CSR. This stipulates the actuality of the research of the question concerning integration of CSR in the strategy of a company, a determinative step of which is identifying the existing tendencies and concepts, considering the above mentioned terms in their interrelations and interdependence. Thus, a problematics of CSR was interpreted by a theory of strategic management at all stages of the evolution of this theory: "preanalitical" where a dominant concept is planning, "the formation of a new scientific discipline" - positioning, "developed on

the own basis" – a resource concept, and "formation of a dynamic theory of strategic management' - a concept of dynamic capabilities.

ANALYSIS OF THE RESULTS OF THE PREVIOUS RESEARCH

Thus, in the first concepts of strategic management concerning the school of planning, a question of corporate social responsibility was discussed, this study had an implicit character. Thus, an American researcher I. Ansoff made a point of the importance of studying the problem of interaction between business and society; he connected these problems with the increasing importance of psychological and socio-political changes. These changes till the middle 1980's had to become "the defining aspects of strategic problems, internal and external in relation to the company". [1, 36].

D. Schendel and C. Hoffer, answering the question of what a firm should do, connected this need with an effective interaction between business and society, accessible and positive study and underlined that "a strategy of a company should integrate the company with a broad environment being beyond the control of this firm ... for the realization of the aggregate role which business should play in the everyday life of the society» [2, 12].

E. Freeman proposed to personalize public expectations, resulting in the change of defining the strategy of a firm. From E. Freeman's point of view, this strategy has to do with "values, social problems and also expectations of stakeholders" [3, 88]. In its turn, a corporate strategy, which provides a higher level of analysis, should be focused on identifying the existing opportunities for business development. The concept of

Freeman can be considered as the basis of the modern approach to defining the strategy based on social positioning of a company. Accordingly, the **purpose** of this article is a generalization and systematization of modern views on the process of implementation of CSR in the system of strategic management of an enterprise.

PRESENTATION OF THE BASIC MATERIAL

As E. Freeman himself underlined, if his predecessors connected a strategy of a firm with a research question: what a firm should do, then his interpretation of it he connected with the question: what the firm is [3]. E. Freeman proposed an algorithm of formation of a firm's strategy as the process of planning, based on the sequential analysis of stakeholders, relevant values and social problems.

Using this algorithm as a basis, E. Freeman in 1984 developed a classification of a firm's strategies:

- Strategy, realized in the interests of a narrow group of stakeholders (maximization of the benefit of one interested party or their small group);

- a strategy implemented in the interests of all shareholders (maximization of a benefit of shareholders, maximization of the benefit of "financial stakeholders");

- a utilitarian strategy (maximization of the benefit of all stakeholders, maximization of the average level of welfare of all stakeholders maximization of the benefits of the society)

- a Rawls's strategy (actions directed to improving the level of welfare of the poorest stakeholder);

- a strategy of social harmony (actions directed to supporting or creating a social harmony, actions directed to support of the consent in the society) [3].

A new, extended definition of the strategy of a company, which reveals "how a firm that is committed to its legitimacy and achieving confidence in the future development creates an additional value for its stakeholders was proposed by M. Meznar, J. Chrisman and A. Carroll in the article "Social responsibility and

strategic management: classifications of the strategy of a company" [4] (Figure 1).

According to the authors, the main question is how a firm strategy corresponds to its competence and also expectations of stakeholders. Thus, they related their classification to the more modern concepts of strategic management - positioning and resource, although the key question for these concepts of achieving competitive advantages was not emphasized by them.

In the articles of M. Porter and M. Kramer investments of corporations in social responsibility are considered as a part of their business strategy, aimed at strengthening the competitive positions. A satisfaction of broad social expectations is interpreted also as a source of value for all system of stakeholders, and as an independent source of a value for shareholders. According to M. Porter and M. Kramer, firms should use the basic ideas of a corporate strategy for choosing those types of philanthropic activities that provide a benefit both for the society and the firm, but this interpretation did not have a complete nature, because it covered only the area of philanthropic responsibility, which remained a local area of a business activity of a company.

Foundation of a more complex approach to the analysis of corporate social activities within the framework of the resource concept was laid by the American scientists L. Burke and J. Logsdon in the article "How a corporate social responsibility is paid off." According to these authors, "corporate social responsibility is strategic when it brings significant benefits to the company associated with its business, especially by supporting the basic business activities and thus makes a contribution to the effectiveness of the realization of the company's mission" [5].

Considering that CSR of most companies is not strategic, the authors identified five measurements of the strategic CSR that are the most critical for the creation of an identifiable, measurable economic benefit, which a firm tends to get as a main objective:

		Stakeholders					
			Only	«Economic»	and «social»	Only «social»	
			«economic	Narrow	Broad		
			»				
		Only economic	Classic	-	-	-	
		Economic + social cost's saving	-	defensive (narrow)	defensive (broad)	-	
fits	nbined	Economic + increasing collective benefits	-	offensive (narrow)	offensive (broad)	-	
Bene	Con	Economic + social cost's saving + social cost's saving	-	Adaptive (narrow)	Adaptive (broad)	-	
	Only social		-	-	-	Unprofitable	

Fig. 1. Classification of strategies of a company of M. Meznar, J. Chrisman and A. Carroll [4, p. 333]

- priority: quality of conformance of the mission and objective of a company;

- specificity: the ability of a firm to internationalization of the benefits from corporate social activity;

- proactivity: the extent in which the planned programs warn social tendencies and crisis developments;

- voluntariness: the degree of voluntariness of the made decisions and sophistication of appropriate internal company's standards;

- visibility: recognition of the activity of a firm and its evaluation by internal and external stakeholders.

In 2007, an article of B. Husted and D. Allen, was published, which actualized the positions put out by L. Burke and J. Logsdon. The original model was "more clearly translated into the language of the resource concept", and a strategic CSR has been defined as "an ability of a firm to harmonious formation of the portfolio of their resources and assets (priority); outdistancing competitors in the acquisition of strategically important resources (proactivity), getting reputational benefits by informing consumers about the behavior of a firm (visibility); assigning additionally created value by a firm (specificity) "[6]. Extrapolated measurements of L. Burke and J. Logsdon on traditional CSR, a traditional strategy and a strategic CSR, the authors demonstrated visually that three of the five measurements and the appropriate abilities are irrelevant to the traditional CSR (Table 1).

On the basis of the empirical analysis of a group of Spanish companies, the authors concluded that it is quite enough to focus on the development of only one strategic ability, giving in this case a preference to "visibility" for getting an additional value by a firm and thus removing competitive advantages. Thus, the authors have not only demonstrated the limitation of the traditional CSR, but also underlined the breadth of opportunities of a company in obtaining relevant competitive advantages. However, it is clear that authors meant exactly moral principles (CSR-1) by the traditional CSR, whereas a strategic CSR interpreted in terms of the resource concept corresponds to the expanded system of corporate social activity.

Researches J. Post, L. Preston and S. Sachs, during the implementation of a large-scale project "Rethinking of the Corporation" (years 1995-2000) firstly suggested an idea that a concept of stakeholders completes and integrates the concepts of strategic management: positioning and resource. A linkage of management of a system of stakeholders with generating an organizational wealth understood as the resulting index of the corporation's activity, which includes all its assets, competencies and abilities, arising during the interaction of stakeholders comes forward as an origination point of the proposed argumentation. The authors propose a new definition of a corporation as an organization that "mobilizes resources for productive use in order to create wealth and other benefits for numerous stakeholders" [7].

rategic surement»	Interpretations of CSR and strategy						
Stı «mea!	Traditional CSR	Traditional strategy	Strategic CSR				
Visibility	Irrelevant: CSR as an independent value, though it is profitable in the long term perspective	causes consumer awareness of the product and brand	causes consumer's and other stakeholders' awareness of the product with a value, added by CSR				
Specificity	Irrelevant: CSR as an independent value, though it is profitable in the long term perspective	Manages relationships with customers, suppliers and competitors in the sphere of awarding added value by a firm	Manages relationships with all stakeholders in the sphere of awarding added value by a firm				
Voluntariness	stipulates participation in social activities that go beyond legal requirements and economic interests of a company	stipulates innovations of a company, based on its learning capacity	stipulates a participation in social actions, that go beyond legal requirements				
Priority	Irrelevant: CSR is connected with needs of the society, and not with a mission of a company	stipulates a creation of a value by productive innovations	stipulates a creation of a value by productive innovations, connected with social problems				
Proactivity	stipulates a perspective analysis of changes in social problems	causes advantages of a first mover	Intends a prospective analysis of changes in social problems that cause market opportunities				

Table 1. Comparison of a traditional CSR, a traditional strategy and a strategic CSR [6, p. 598]



Fig 2. Re-thinking a corporation from a point of view of stakeholders' concept [7]

 Table 2. Comparison of concepts of strategic management: industrial, resource, stakeholders' and strategic management of stakeholders [9]

Criterion	Industrial concept	Resource concept	Concept of stakeholders (according to J. Post, L. Preston, S. Sachs)	Strategic management of stakeholders
Unit of analysis	Industry sector	Company	a network of stakeholders of the company	a network of stakeholders of the company
main sources of competitive advantages	 relevant strength of suppliers and consumers confederacy 	tangible fixed assets and intangible fixed assets	relationship assets	 tangible and intangible fixed assets, including relationship assets relevant strength of suppliers and consumers confederacy
Relevant stakeholders	-suppliers -consumers -competitors - regulatory agencies	-workers - investors - partners	industrial, resource, social and political stakeholders	all stakeholders

Stakeholders can be divided into groups corresponding to "resource base", "industrial structure" and also "social and political sphere" (Figure 1.7). Accordingly, stakeholders are able, firstly, to influence the competitive positions of the company in the branch, and secondly, to make a contribution to its unique resources and capabilities, and thirdly, to act as social and political subjects that determine the legitimacy of the company in the society [8]. At the result a model is composed that not only meets two classical concepts of strategic management, but also completes them.

In this case a development and supporting of appropriate relationship assets becomes a key competence of management, the main means of achieving long-term competitive advantages.

The concept of "strategic management of stakeholders', formulated during the 5th annual Colloquium of the European Academy of Business in Society (ABIS) in 2006 became the continuation of the approach of J. Post, L. Preston and S. Sachs. According to the authors of the article, strategic management of stakeholders turns into a full-fledged concept of strategic management. (Table 2).

D. Grayson and A. Hodges developed a model of integration of principles of CSR in a corporate strategy as a basis for generating corporate social opportunities, and namely "commercially profitable business lines that allow to support ecological and social sustainability", and the authors identified innovations in products and services, creating new business models and servicing new markets as the three directions of these possibilities' implementation [10].

The Finnish scientists P. Dobers, and M. Halme, formulated a clearer viewpoint, who proposed a new typology of corporate social activity that includes "philanthropy", "CS-integration" and "CS-innovation." An in-depth analysis of the pragmatic "business argument" in defense of corporate social responsibility strengthened a connection between the concept of CSR and the theory of strategic management. The logic of pragmatic analysis has not only turned researchers to the original broad interpretation of CSR as a multilevel responsibility of a corporation to the society as a whole, represented by a system of stakeholders, but also allowed to interpret CSR as a modern approach to strategic management.

CONCLUSIONS

Thus, a problematics of CSR is reflected in all the main concepts of strategic management. It is necessary to mention that by the terminological variety modern strategic interpretations of CSR, firstly, reflect the same paradigmatic logic "principles - processes - results", and secondly, are linked not to any activity which is of additional discrete nature but to key business processes of a company. An approach, according to which an enterprise's strategy is already not an instrument of profit maximization of shareholders, but a tool for achieving the common good, that is a tool of the implementation of interests of all stakeholders – a priority one in today's economics - makes increasing the level of social orientation of enterprises.

REFERENCES

- 1. **Ansoff H. 1979.** The changing shape of strategic problem //Journal of General Management №4 (4): 42-58.
- 2. **D. Schendel and C. Hoffer.** Little, Brown and Co.: Boston (MA).

- 3. Freeman R. E. 1984. Strategic management: a stakeholder approach. Pitman Publishing: Marchfield (MA).
- 4. **Meznar M., Chrisman J. and Carroll A. B. 1990.** Social responsibility and strategic management: toward an enterprise strategy classification //Academy of Management Best Papers Proceedings. 332-336.
- 5. **Burke L. and Logsdon J. 1996.** How corporate social responsibility pays off // Long Range Planning –№29 (4) 495-502.
- Husted B. and Allen D. 2007. Strategic corporate social responsibility and value creation among large firms // Long Range Planning - №40 – 594-610.
- 7. **Post J. and Preston L., Sachs S.** 2002. Redefining the corporation: stakeholder management and organizational wealth. Stanford University Press: Palo Alto (CA).
- Oleksiv I. and Shpak N. 2012. Method for Selection of Company Stakeholders / I Oleksiv, N. Shpak // ECONTECHMOD. — Vol. I. — No 3. — 66-75.
- 9. **Blagov Yu. E. 2010.** Corporate social responsibility: evolution of the conception / Yu. E. Blagov M.: Higher school of management,– 272.
- 10. **Grayson D. and Hodges A. 2004.** Corporate social opportunity! Seven steps to make corporate social responsibility work for your business. Green-leaf Publishing: Sheffield.

Modelling of investment development of national economy of Ukraine on basis of regression analysis

O. Kuzmin, O. Pyrog

Lviv Polytechnic National University, Educational-Scientific Institute of Economics and Management E-mail: okuzmin@ukr.net, pyrog_ov@i.ua

Received June 21. 2013: accepted June 30. 2013

Abstract. The article considers the results of modeling of investment development of national economy of Ukraine during 2001-2011 on basis of regression analysis. Determine the influence of the investment to economic development of national economy of Ukraine. Sectors of national economy divided to three groups of level of investment impact to economic development.

Key words: modeling, investment development, national economy, Ukraine, postindustrial society, regression analysis.

INTRODUCTION

Postindustrial society is characterized by the priority of investment activity as a factor of exogenous economic development of the national economy. Investment activity can have effect on a cyclical development and be foundation for enhancement of economic activities under condition that investment will be directed to research and production areas.

Investment activity of national economy belongs to the highly researched and disputed topics both in domestic and foreign investment theory and occupies leading position in economic researches of prominent scientists: [4], [5], [11], [12], [20], [21], W. Fisher, W. Sharpe and others. Despite numerous researches issue of modeling of the investment development of national economy of Ukraine in the postindustrial society remain unresolved.

THE AIM OF THE ARTICLE

The aim of the article is the modeling of investment development of the national economy of Ukraine in a postindustrial society by means of regression analysis. The basic method that used into the research is regression analysis.

THE RESULT OF INVESTMENT MODELING OF NATIONAL ECONOMY

Current status of investment activity (by the end of 2011): investment in fixed assets - 15.88% of GDP and foreign direct investments - 2.74% of GDP (Fig. 1).

Our calculations show that investment activity influences level of economic development of Ukraine indirectly, when investment in fixed assets occupy sufficiently big share of GDP (13 - 25%). Regression between investments (Xi) and the development of the national economy of Ukraine (Y) during 2001 - 2011 represented in equation (1) and (2):

$$Y = 0.2985 X_1 + 68.47 , \tag{1}$$

$$(R = 0.9208),$$

 $Y = 0.03X_2 + 115.99,$
(1)

$$(R = 0.2385).$$
 (2)

where: *Y* - the growth rate of the national economy of Ukraine, which display growth or decline of GDP, (%); X_1 - investment activity, which display growth rate of investments in fixed assets, (%), X_2 - growth rate of foreign direct investment, (%), *R* - correlation coefficient, which represent the level and strength of interdependence between dependent and independent variable.

According to equations (1), (2) we can compare multiplicative effect ($M(X_i, Y)$) of investments during 2001 - 2011, such as growth of investments in fixed assets by 1% produce economic growth by 0.2986% ($M(X_I, Y)$ =0.2986%), while growth of foreign direct investments cause only 0.03% growth of the national economy ($M(X_2, Y)$ =0.03%).



Fig. 1. Value of gross capital formation and investments compare to GDP of Ukraine during 2000 – 2011, (%)

These results indicate that both domestic and foreign investments have indirect effect on the development of the national economy and they are not consistent with innovation and investment vectors of development.

We can conclude, that impact of investment is average for the economic development of the country. Since there are different levels of investments in different types of economic activities, by our opinion it's necessary to calculate a regression equation for each type of economic activity (Table 1).

Regression analysis carried out by means of Excel package "Regression" and satisfied fundamental criteria (Fisher's criterion, Student's t-criterion and average relative error) within the given limits.

In these defined univariate regression models average relative error (ε) have the following intervals:

- when ε does not exceed 10% ($\varepsilon \le 10\%$), it indicates high accuracy level of the models and forecasts for the following types economic activities, such as agriculture, hunting and forestry (X_1), industry (X_3) (mining industry (X_{31}) in particular), production and distribution of electricity, gas and water (X_{33})), transport and communication (X_7), public administration (X_{10}), education (X_{11}), healthcare and social assistance (X_{12});

- when ε lies between 10 - 20% (10% < ε < 20%), it indicates average (normally acceptable) accuracy level of the models and forecasts — fishing and fish farming (X_2), processing industry (X_{32}), construction (X_4), trade, repair of motor vehicles, household appliances and good for personal use (X_5), real estate, lease, engineering and services for entrepreneurs (X_9), public and personal services, cultural activities and sports (X_{13});

- when ε more than 20% (e > 20%), it indicates a satisfactory accuracy level of the models and forecasts — hotels and restaurants (X_6), finance (X_8).

To complete this study we deduced the regression equations of impact of each type of economic activity on the economic development of the national economy in a whole - $Iea \rightarrow Yea$ (Table 2).

Regression analysis of «the impact of growth of investment in economic activities on their economic development» during 2001 - 2011 allowed us to classify types of economic activity according to the coefficient of determination (R^2), F - criterion and t - criterion:

- group 1 ($R^2 > 80\%$) – investments in these economic activities are crucial for their economic development during this period;

- group 2 (50% < $R^2 \le 80\%$) – investments in these economic activities have medium impact on their economic development during this period;

- group 3 ($R^2 \le 50\%$) –investments in these economic activities are potentially crucial for their economic development under conditions of postindustrial society.

The first two groups (group 1 and group 2) consisted of economic activities that met the criteria of Fisher and Student, whereas the third group of economic activities, which in analyzed period did not meet the criteria of Fisher and Student, but its trend of investment could have a major impact on economic development in the future in a postindustrial society.

Group 1 - none of the analyzed types of economic activity belongs to this group, i.e. during analyzed period there was no type of economic activity, which has investment as determinative factor of their future development ($R^2 > 80\%$).

Group 2 - economic activities with level of investments which have average impact on economic development of these activities during analyzed period ($40\% < R^2 \le 80\%$): processing industry ($R^2(X_{32}) = 40.1\%$), construction ($R^2(X_4) = 55.4\%$), transport and communication ($R^2(X_7) = 45.9\%$).

_
Ξ
2
ΞÌ.
Ξ
8
ล
ы
·Ξ
lu l
$\tilde{}$
\mathbf{V}_{i}
\leq
₹
>
Ċ,
Ť
En la
Ĕ
đ
5
ve
de
် ပ
٠ă
u
ğ
S
0
÷H
ĥ
1t
б
Se
ti
<u>۲</u>
Ë
ă
<u>1</u> 2.
В
20
ō
မ
f
0
S
y D
5
Ξ.
\bigcirc
Ľ
Ħ
e
Н
ŝt
ve
Ξ.
Ŧ
t C
ក្ត
ğ
В
Ξ.
-
le
ab
Ĕ

Independe nt variable	Coefficient of correlation (R)	Coefficient of determination (R^2)	Fisher's criterion (F - criterion)	Student's criterion (t - criterion)	Regression equation	Meaning of equation	Share of Xi in GVA 2011
X_{NE}	0,9208	0,8479	50.1839	7.0840	$Y_{NE} = 0.2985 X_{NE} + 68.47$	PD / SD Growth of X_{NE} by 1% causes growth of GVA by 0.2985%	100.0
X_l	0.4579	0.2097	2.3882	1.5453	$Y_1 = 0.1474X_1 + 85.65$	PD / AD Growth of X_i by 1% causes growth of GVA by 0.1474%	7.7
X_2	-0.3736	0.1396	1.4608	-1.2086	$Y_2 = -0.0566X_2 + 101.86$	ND / AD Decrease of X_2 by 1% causes growth of GVA by 0.0566%	0.04
X_3	0.5818	0.3385	4.6054	2.1460	$Y_3 = 0.2107X_3 + 78.73$	PD/AAD Growth of X_3 by 1% causes growth of GVA by 0.2107%	36.2
X_{3l}	0.2758	0.0761	0.7413	0.8609	$Y_{31} = 0.0732X_{31} + 94.43$	PD/AD Growth of X_{31} by 1% causes growth of GVA by 0.0732%	10.3
X_{32}	0.6229	0.3880	5.7080	2.3891	$Y_{32} = 0.3262X_{32} + 67.56$	PD/AAD Growth of X_{22} by 1% causes growth of GVA by 0.3262%	17.3
X_{33}	0.2683	0.0720	0.6985	0.8357	$Y_{33} = 0.0397X_{33} + 97.06$	PD/AD Growth of X_{33} by 1% causes growth of GVA by 0.0397%	5.1
X_4	0.7448	0.5548	11.2183	3.3493	$Y_4 = 0.4088X_4 + 50.26$	PD/AAD Growth of X, by 1% causes growth of GVA by 0.4088%	8.5
X_5	0.3201	0.1024	1.0275	1.0136	$Y_5 = 0.1467X_5 + 90,34$	PD/AD Growth of X ₅ by 1% causes growth of GVA by 0.1467%	7.3
X_{δ}	0.0657	0.0043	0.0390	0.1976	$Y_6 = 0.0431X_6 + 107,68$	PD/WD Growth of X ₆ by 1% causes growth of GVA by 0.0431%	2.1
X_7	0.6776	0.4592	7.6431	2.7646	$Y_7 = 0.2109X_7 + 82.72$	PD/AAD Growth of X_7 by 1% causes growth of GVA by 0.2109%	16.5
X_8	0.2208	0.0487	0.4616	0.6794	$Y_8 = 0.1334X_8 + 96.10$	PD/WD Growth of X ₈ by 1% causes growth of GVA by 0.1334%	1.3
X_{g}	0.4751	0.2257	2.6240	1.6199	$Y_9 = 0.1923X_9 + 87.18$	PD/AD Growth of X ₉ by 1% causes growth of GVA by 0.1923%	17.7
$X_{I\theta}$	0.4114	0.1693	1.8344	1.3544	$Y_{10} = 0.0641X_{10} + 93.17$	PD/AD Growth of X_{I0} by 1% causes growth of GVA by 0.0641%	0.8
X_{II}	-0.0756	0.0057	0.0518	-0,2277	$Y_{11} = -0.0117X_{11} + 103.28$	ND/WD Decrease of X_{II} by 1% causes growth of GVA by 0,0117%	1.0
X_{l2}	0.2650	0.0702	0.6801	0.8246	$Y_{12} = 0.0266X_{12} + 99.45$	PD/AD Growth of X_{12} by 1% causes growth of GVA by 0.0266%	1.4
$X_{l_{3}}$	0.3510	0.1232	1.2651	1.1247	$Y_{13} = 0.1269X_{13} + 90.86$	PD/AD Growth of X_{13} by 1% causes growth of GVA by 0.1269%	4.4
<i>Note:</i> $P D - p$ <i>variable</i> $(X_i) a$ <i>correlation</i> coi <i>dependence</i> be	ositive dependence nd depending varia efficient (R): 0 £ R£ tween the indepen	* between an indepen uble (Y), which is dete \$0.25; AD – average dent variable (X _i) an	<i>ident variable</i> (X_i) <i>and a</i> <i>ermined by the sign</i> $(-)$ <i>m</i> <i>dependence between the</i> <i>nd depending variable</i> $($	lepending variable (Y ear correlation coeffi independent variable Y), which is defined), which is determined by the sign cient; WD – weak dependence betw (X_i) and depending variable (Y) , w) by the correlation coefficient (R) :	(+) near correlation coefficient; ND – negative dependence bety een the independent variable (X;) and depending variable (Y), wh inch is defined by the correlation coefficient (R): 0.25 & RE0.5; A $5/5 \in RE0.75$; SD – strong dependence between the independence	tween an independent which is defined by the AAD – above average lent variable (Xi) and
depending var criterion, whic	iable (Y), which is h verified adequacy	defined by the correly of the model (F_{calc} >	lation coefficient (R): 0κ > $F_{tabl}(5.12)$); t - criterio	075£ R£1.0: R ² ; Coe m – Student's criterio	fficient of determination defines the n, which verified the importance of	compliance of the model to constant parameter (\mathbb{R}^{23} 50 %); F factors for the model ($t_{railc} > tF_{labl}(2.2622)$).	7 - criterion - Fisher's

Ξ
ล
<u> </u>
5
<u>o</u>
2
ğ
.Ħ
Ξ
Ð
\geq
Ξ
ō
E
5
õ
ũ.
2
Ħ
ũ.
Ð
ġ.
Ξ
ō
-
ă
ಡ
H
ē
Ξ
ġ.
9
٥.
5
ð
S
Ē.
E
ĕ
ō
2
ž
·5
Ĕ
<u> </u>
8
~
ĕ
Ξ.
5
Ξ.
g
ö
Ē
H
2
ō
S
Ľ.
ō
S
B.
Y
÷.
Ξ.
Ś
Ħ
ē
Ξ
st
é
5
Ξ
G
Ĕ
g
p
H
Ч
e i
ĭ
at

	Impact of type of economic econ	activity on development of the national nomy of Ukraine	Impact of investment in fix economi	ced assets on development of the types of ic activities of Ukraine
Type of economic activity	Coefficient of correlation (<i>R</i>)	Regression equation	Coefficient of correlation (<i>R</i>)	Regression equation
Agriculture, hunting and forestry (X_i)	0.2099	$Y = 0.1688X_1 + 88.04$	0.4579	$Y_1 = 0.1474 X_1 + 85.65$
Fishery and fish farms (X_2)	-0,6394	$Y = -0.4022X_2 + 144.04$	0.3736	$Y_2 = -0.0566X_2 + 101.86$
Industry (X_3)	0.9335	$Y = 1.0951X_3 - 6.98$	0.5818	$Y_3 = 0.2107X_3 + 78.73$
Mining industry $(X_{3,i})$	0.8421	$Y = 1.0780X_{31} - 5.70$	0.2758	$Y_{31} = 0.0732X_{31} + 94.43$
Processing industry (X_{32})	0.9585	$Y = 0.6557X_{32} + 36.50$	0.6229	$Y_{32} = 0.3262 X_{32} + 67.56$
Production and distribution of electricity, gas and water (X_{33})	0.6699	$Y = 1.3669 X_{33} - 30.86$	0.2683	$Y_{33} = 0.0397X_{33} + 97.06$
Construction industry (X_4)	0.8984	$Y = 0.3162X_4 + 74.45$	0.7448	$Y_4 = 0.4088X_4 + 50.26$
Trade, repair of motor vehicles, household appliances and goods for personal use (X_5)	0.8517	$Y = 0.3753X_5 + 64.26$	0.3201	$Y_5 = 0.1467X_5 + 90,34$
Hotels and restaurants (X_{δ})	0.5107	$Y = 0.1730X_6 + 85.62$	0.0657	$Y_6 = 0.0431X_6 + 107,68$
Transport and communication industry (X_7)	0.7888	$Y = 1.1416X_7 - 16.56$	0.6776	$Y_{7} = 0.2109X_{7} + 82.72$
Finance (X_8)	0.8746	$Y = 0.3252X_8 + 68.01$	0.2208	$Y_8 = 0.1334X_8 + 96.10$
Real estate, lease, engineering and services for entrepreneurs (X_0)	0.7776	$Y = 0.5883 X_9 + 38.83$	0.4751	$Y_9 = 0.1923X_9 + 87.18$
Public administration $(X_{I\theta})$	0.0800	$Y = 0.1041X_{10} + 94.87$	0.4114	$Y_{10} = 0.0641X_{10} + 93.17$
Education (X_{II})	0.3122	$Y = 0.6622X_{11} + 38.18$	0.0756	$Y_{11} = -0.0117X_{11} + 103.28$
Healthcare and social assistance (X_{12})	0.1180	$Y = 0.2610X_{12} + 78.52$	0.2650	$Y_{12} = 0.0266X_{12} + 99.45$
Public and personal services, cultural activities and sport $(X_{i,j})$	0.6293	$Y = 0.3907X_{13} + 62.92$	0.3510	$Y_{13} = 0.1269X_{13} + 90.86$

O. KUZMIN, O.PYROG

-

Group 3 - group of economic activities with level of investments which can be potentially crucial for their development, conditions economic under of postindustrial society, include agriculture $(R^2(X_1)=20.9\%)$, trade, repair of motor vehicles, household appliances and goods for personal use $(R^{2}(X_{5})=10.2\%)$, financial activities $(R^{2}(X_{8})=4.9\%)$ and real estate, lease, engineering and services for entrepreneurs $(R^2(X_9)=22.57\%)$. This group includes economic activities of service branch, which confirms the necessity to develop this domain in order to sustain growth of the national economy.

Thus, determining (priority) types of economic activity for the investments and development of national economy are traditional economic activities of Ukraine, i.e. primary and secondary industries of the real economy, such as:

1) industry, where change by 1% cause growth of GVA by 1.095% with highest correlation coefficient – $0.9335 (M(X_3, Y) = 1.095\%, Corr(X_3, Y) = 0.9335)$, include industry the mining _ $M(X_{31}, Y) = 1.0780\%$, $Corr(X_{31}, Y) = 0.8421,$ processing industry $M(X_{32}, Y) = 0.6557\%$, $Corr(X_{32}, Y) = 0.9585$ and production and distribution of electricity, gas and water $M(X_{33}, Y) = 1.3669\%$, $Corr(X_{33}, Y) = 0.6699$;

2) transport and communication -stimulates the growth of GVA by 1.1416% with a coefficient of correlation 0.7888 $(M(X_3, Y) = 1.1416\%)$ $Corr(X_3, Y) = 0.7888).$

The construction industry $(M(X_4, Y)=0.3162\%)$, trade, repair of motor vehicles, household goods and goods for personal use $(M(X_5, Y)=0.3753\%)$ and financial activities ($M(X_8, Y) = 0.3252\%$) stimulate growth of GVA; these are types of economic activities that have strong correlation between development of the branch and national economy $(0.75 < Corr(X_i, Y) < 0.89)$, but they have no significant multiplicative effect on the growth of the national economy.

Education and healthcare are among those economic activities that have the potential for determining influence on the economic development of the national economy: growth in education can cause growth of the national economy GVA $(M(X_{11}, Y)=0.6622\%)$, but strength of correlation of this branch and national economy is below average ($Corr(X_{11}, Y)=0.3122$); healthcare can also stimulate growth of the GVA - $M(X_{12}, Y) = 0.26104\%$, but correlation between healthcare and national economy is also below average $(Corr(X_{12}, Y) = 0.1180)$. So, education and healthcare have potential to become basic branches for sustainable development of national economy in terms of postindustrial society.

According to our calculations only fishing and fish farming has negative multiplicative effect, i.e. growth of the fisheries and fish farm economic activity will cause reduction of growth rate of the national economy by 0.4022% (*M*(*X*₂, *Y*)=-0.4022%).

CONCLUSIONS

Investment activity is not crucial for the economic development of national economy and economic activities of Ukraine, due to chaotic capital movement and lack of stable trends of investment in economic activities of Ukraine.

Industry, where change by 1% of investment stimulates growth of GVA by 0.1061% $(M(X_3, Y_3)=0.2107\%)$ (including processing industry – $M(X_{32}, Y_{32}) = 0.3262\%),$ construction $M(X_4, Y_4) = 0.4088\%$, transport and communication – $M(X_7, Y_7) = 0.2109\%$), is a type of economic activity, which have strong correlation between investment activity and development of the branches $(0.57 < Corr(X_i, Y_i) < 0.75)$, but investment does not have significant effect on their growth. For all other types of economic activity, investment activity does not have defining character and significant impact on their development.

Thus, economic activities that have priority meaning for the growth of national economy are industries, such as processing industry, construction, transportation and communication, development of which can be stimulated by the means of investment activity.

REFERENCES

- Bell D. 1999. Hryaduschee postyndustryalnoe society. 1. Experience socio prediction / lane. s English. - Moscow: Academia, 1999. - 956. Russia.
- 2. Capital Investment on Ukraine for 2007-2011 / State Statistics Committee of Ukraine; ed. M.M. Sobko. - K.: LLC «August Trade», 2012. – 122. Ukraine.
- Drucker P.F. 1993. Post-Capitalist Society. New York 3. City: "Harper Business", 1993. - 232. United State of America.
- 4. Filippenko A.S. 2007. Global forms of economic development: history and modernity. - K.: Knowledge, 2007. - 670. Ukraine.
- 5. Geyets V.M. 2000. Instability and economic growth. -K.: IEF NAS of Ukraine, 2000. - 344. Ukraine.
- Glazev S. 1990. Economic theory of technological 6. development. - Moscow: Nauka, 1990. - 232. Russia.
- 7. Gross regional product for 2011 / State Statistics Committee of Ukraine; ed. I.M. Nikitina. - K.: LLC «August Trade», 2013. – 167. Ukraine.
- Hansen L.P. and Sargent T.J. 1990. Recursive linear 8. models of dynamic economies: Working paper No. 3479. - Cambridge, MA, 1990. - 42. United Kingdom.
- Investment and innovation activities: theory, practice and 9. experience: monography N.P. Denysenko, / L.I. Mikhailov. 2008. - Sumi: SHS "University Book". -1050. Ukraine.
- 10. Kindzersky Y. 2010. Economic development and transformation of the world's industrial policy: lessons for Ukraine // Economics of Ukraine. - 2010. - № 5. - 4-15. Ukraine.
- 11. Kizim M.O. 2011. Investigation of inter-regional disparities of socio-economic development in Ukraine // Problems of Economics. - 2011. - № 2. - 36-39. Ukraine.

- Krupka M.I. 2001. The financial and credit mechanism innovation development of economy of Ukraine. - Lviv: Publishing House of Lviv National University named after I. Franko, 2001. - 608. Ukraine.
- Kuznets S. 1971. Modern economic growth: Findings and reflections [Electronic resource] – Access mode: http://www.nobelprize. org/nobel_prizes/economic-sciences/ laureates/1971/kuznets -lecture.html. – The Official Web Site of the Nobel Prize. United State of America.
- Perez C. 2004. Finance and technical change: a long-term view. – CERF, Judge Institute, Cambridge University, and SPRU, University of Sussex, UK, 2004. – 20. United Kingdom.
- Statistical Yearbook of Ukraine for 2001 / State Statistics Committee of Ukraine; ed. V.A. Golovko. 2002. – K.: Technika. – 509. Ukraine.

- Statistical Yearbook of Ukraine for 2005 / State Statistics Committee of Ukraine; ed. O.H. Osaulenko. 2006. – K.: Publisher "Consultant". – 570. Ukraine.
- Statistical Yearbook of Ukraine for 2011 / ed.
 O.H Osaulenko. K.: LLC «August Trade», 2012. 559. Ukraine.
- Todaro M.P. 1997. Economic development / ed. SM Yakovleva, L. Zenin. 1997. - Moscow: Ekonomicheskie MSU, Unity,.- 671. Russia.
- 19. Ulyanchenko O.V. 2002. Research of operations in economics. Kharkov: Grif. 580. Ukraine.
- 20. Vorotin V.E. and Zhalilo J.A. 2009. Socio-economic development of Ukraine. K.: NISR. 38. Ukraine.
- 21. Zaharyn S. 2007. Investment-innovation corporate sector activity // Biznes-Inform. № 5, Vol.2. 9-11. Ukraine.

The Formation of the System of Evaluation of Enterprise Workers' Competence

I. Oleksiv, G. Mykhailyak

Department of Management and International Entrepreneurship Lviv Polytechnic National University, email: mykhailyakgalya@ukr.net

Received June 21. 2013: accepted June 30. 2013

Abstract. The system and the criteria of evaluation of enterprise workers' competence which will provide the possibility to quantitatively evaluate workers' competence to find appropriate management solutions concerning the influence of its development on the efficiency of enterprise financial activity functioning has been formed and grounded.

Key words: workers' competence, competence evaluation indices, the criteria of competence evaluation, functional aspect of duties accomplishment, creative aspect of duties accomplishment.

STATING THE ISSUE

The development of national industrial enterprises proves the necessity of their goals and activity directions change. Under such circumstances the prior task of national industrial enterprises, which needs solution, is employees' adaptation to the changes of conditions which occur. For a start, attention should be drawn to the system of employees' training; the development and improvement of their competence; the motivation system which influences their completion of positional duties. Such measures need national enterprises to expand the tactics of evaluation workers' competence.

The literary sources analysis [1, 2, 7, 8, 13, 17, 18] allows to claim that workers' competence is better characterized according to separate indices. Taking it into account, the importance should be attached to the formation of the system of evaluation of worker's competence, which will allow reflecting different sides of this economic category level. Apart from this it is worth mentioning that such evaluation will make a basis for the formation of different management solutions concerning training, development and workers promotion in future.

BASIC ISSUE PRESENTATION

There are a number of approaches concerning the evaluation of enterprise workers' competence, presented in the works by modern national and foreign scientists. In this way [6] distinguishes three groups of competence: corporative, professional and behavior-like. The author claims that the evaluation of workers' competence «means definition of importance of the offered within the group, competence which characterizes the degree of importance of every group to effectively complete certain tasks and achieve general goals of the enterprise» [6]. In addition to all this the scientist suggests the model of personnel competence evaluation, which allows completing the drawing of workers' competence and define the zones of certain competence occurrence.

L. Burkova [3] divides the competence into basic, additional and minor ones. Respectively, the author has offered a three level process of competence evaluation, where every level of evaluation needs offering certain points. The data are summed up and compared according to given evaluation criteria.

Algorithm model of personnel's functional duties efficiency been offered by scientists has K. Ushchapovsky and [9]. The model includes the scheme of the functional personnel's duties model under current system of management, rewarding evaluation of personnel's work indices, the evaluation of workers' training cost, the evaluation of diagnosis worth of personnel needs in a way of survey and the implementation of respective methods of motivation, the evaluation of key competence under current system of personnel management evaluation of competence, which

should be supplied in the process of improving the personnel management system.

The analysis and generalization of literary sources [1; 3; 6; 7; 9; 16] showed that the scientists do not possess a unified conception concerning the system of evaluation of industrial enterprise workers' competence. However, having analyzed the given results of national and foreign scientists' investigations of workers' competence, it is worth considering them according to certain components as: knowledge, skills, and worker's personal characteristics. In addition to this it is worth accentuating the very quantitative evaluation of the given parameters, which would allow investigating the influence of certain factors on the meaning of worker's competence development. Apart from this, quantitative evaluation of workers' competence will offer the possibility to investigate the influence of the competence level development on financial indices of industrial enterprises activity. It is also worth mentioning that such evaluation will make a basis for different managerial decision making concerning training, development and workers' promotion.

Applying the results of constituents analysis (knowledge, skills, personal characteristics), which define enterprise workers' competence, considering the entity of the notion «workers' competence», and also the level of their occurrence, the worker's competence should be investigated with the help of two aspects of workers' duties completion: functional and creative. Functional aspect of duties completion means enterprise workers' task completion respectively to the positional instruction. Creative aspect of duties completion means an application of nonstandard, creative worker's thinking; the skills to produce new ideas; the worker's ability to effectively produce new extraordinary ideas; worker's ability to effectively demonstrate one's knowledge, skills in case of nonstandard situations. The indices mentioned above may be presented in the form of workers' competence evaluation matrix (Table 1).

Such approach to indices grouping will allow finding out the efficiency of workers' competence application when completing their positional duties, and also making managerial decisions. The level of notions and facts application and the level of methods and procedures application allow analyzing the worker's knowledge correspondence to the demands defined by the positional instruction. Apart from this, during the period mentioned, analyzing the given indices an enterprise is able to influence the change of notions and facts, methods and procedures level, raising the quality of workers' knowledge in a way of different trainings, seminars, workshops, etc.

The Level of Notions and Facts Application (NI) – reflects the disclosure of the range and meaning of notions and facts; the implementation of logics of interrelation between notions and facts; the problem formulation on the basis of conceptions of certain problematic situations and its possible ways out:

$$N1 = \frac{Nf}{Ngen},$$
 (1)

where: Nf – factual quantity of the notions and facts learnt; Ngen – general quantity of notions a nd facts, which a worker should learn in order to fulfill the tasks respectively to the positional instruction of an enterprise.

The Level of Methods and Procedures Application (MI) – reflects the competence concerning the application of methods and procedures in the context of the data learnt; the worker's ability to reveal the contents of methods and procedures (the characteristics of method or procedure application conditions; logical subsequence of their application):

$$M1 = \frac{Mf}{Mgen},$$
 (2)

where: Mf – factual quantity of methods and procedures learnt; Mgen – general quantity of methods and procedures, which should be learnt by the worker in order to complete the tasks respective to a positional instruction of an enterprise.

The action rewards and the level of ability concerning the methods of tasks completion show the possibility of their proper fulfillment with the help of previously received knowledge and experience.

	Knowledge	Abilities	Skills	Personal Characteristics
Functional Aspect of	The Level of Notions and Facts Application (Nl)	Action Completion Rewards (Ar)	The Level of Adopted	The Responsibility Level (Rl)
Enterprise Workers ⁷ Task Completion	The Level of Methods and Procedures Application (Ml)	The Ability Level of Task Completion and Methods Formation (Tl)	Skills (Sl)	The Level of Emotional Intellect (El)
		The Level of Creative Decision Making (Cl)		The Creative Intellect Level (Ci)
Creative Aspect of Enterprise Workers' Task Completion	-	The Innovations	-	The Initiative's Level (Lin)
		Implementation Level (II)		The Level of Rational Activity (Ra)

 Table 1. Workers' Competence Evaluation Matrix

Action Completion Rewards (Ar) - reflects the quantity of actual action completion of the worker when fulfilling the tasks posed by one's positional instruction:

$$Ar = \frac{Aa}{Agen},$$
 (3)

where: Aa - the quantity of actually completed actions of the worker to fulfill the tasks posed, which are enumerated in one's positional instruction; Agen - the quantity of professional actions necessary for the tasks completion respectively to a positional instruction.

The Level of Ability to Form Methods and Fulfill the Tasks (TI) - reflects the quantity of methods formed for the fulfillment of specific tasks:

$$T1 = \frac{Sm}{Tgen},$$
 (4)

where: Sm - the quantity of methods formed to fulfill specific tasks; Tgen - general quantity of tasks, which does not need to form methods.

One more important constituent part of competence evaluation matrix are skills. As it is known, the process of gaining skills depends on the frequency of certain actions and information use. That is why, in the process of counting of the level of adopted skills primary attention should be paid to their successful formation background [4; 11; 12; 15; 19]. One of the most essential backgrounds is a training purposefulness, which presupposes, first of all, precise understanding of the thing, which is meant to be learnt and concentrated on. The next background is being training aware, which means that a worker has to know and understand a final aim of training, realize the operation structure, which are liable to learning. A rational training process development in the course of time is also essential. To develop a skill one needs to train a lot. That is why the frequency of acts has a crucial part in the process.

Adopted Skill Level (SI) - reflects the ratio of the quantity of adopted skills of a worker necessary to fulfill certain tasks respectively to a positional instruction:

$$Sl = \frac{Sq}{Sgen}$$
, (5)

where: Sq – the quantity of skills a worker has; Sgen – the quantity of skills a worker is to have according to a positional instruction.

Responsibility Level (RI) – demonstrates the range of worker's responsibility to one's duties:

$$R1 = \frac{Ts}{Tgen} , \qquad (6)$$

where: Ts - the quantity of successfully completed tasks; Tgen - general quantity of tasks, which a worker is to fulfill according to a positional instruction.

The responsibility level means a precise process of worker's duties distribution from the very beginning in order to ensure the completion of all the tasks. This index demands precise definition of duties, responsibilities, forms of reporting according to each level of the process, responsible ones for the completion of the tasks. etc.

Emotional Intellect Level (El) - reflects the worker's ability to communicate, realize one's emotions and understand other people's feelings. V. Belkina [14] claims that «the knowledge about emotional intellect is especially applied in the process of business consulting, when we speak about leadership and personnel management».

Nowadays all the tests which define emotional intellect (EQ) are experimental, but there is a possibility to define it without any testing. One need to consider one's character features and behavior in different situations. According to V. Belkina, a person who possesses a high level of EQ can skillfully find a way out of difficult situations, can easily and effectively solve the problems, is kind-hearted and easy-going when communicating, one tries to avoid conflicts, one is confident and independent, can evaluate oneself objectively, etc.

A person who possesses a low level of EQ is often aggressive, conflict, unkind while communicating, is not able to control one's immediate wishes and impulsive reactions, d with one's one is unconfident, unsatisfied with one's life, one does not need any self perfection and does not know what one wants, one can not speak about feelings and does not want to understand other people's feelings. One often feels uncomfortable, sympathetic, has the feeling of guilty/ one is always cold, closed and finds it hard to get on with the staff [14; 20].

Therefore, the development of EQ and in the course of negative emotions allows observing the reason of negative behavior and then evaluate the situation and react to it wisely, in other words to change one's emotional state into a positive one.

The Level of Creative Decision Making (Cl) demonstrates the ability to make creative managerial decisions:

$$N1 = \frac{Dq}{Qgen},$$
 (7)

where: Dq - the quantity of creative decisions made by the worker; Qgen - general quantity of decisions made by the worker.

Modern investigations of creativity point to the fact that «the tendency to being creative is not a phenomenon peculiar to a certain people only» [20]. That means that creativity may be developed owing to time consuming training.

According to E. Fromm [14], «creativity is an ability to impress, find out the solutions in nonstandard situations, the direction to something new and the ability to deeply realize one's own experience. The scientist defined the main features of creative thinking, which are the following: productivity - the wealth of ideas,

associations, variants of problem solutions; flexibility – the ability to immediately change the ways of action, easily shift from one object class to another one; originality – rarity, uniqueness, extraordinary ways of problem solving processpigkichictbas [14]. So, creative managerial decision making demands a certain mental talent.

Therefore, the level of creative managerial decision making allows defining the range of a worker's talent, one's ability to demonstrate one's sensitivity to a certain problem solution, and also is independent when solving unexpected issue, which needs an immediate resolution.

The Level of Implementation of Innovations (II) – allows defining the quality of author's innovations of enterprise workers. In addition to this, the given index characterizes the appropriateness of innovational implementation of the worker to modern achievements of science and technology, which will facilitate to more effective enterprise functioning:

$$I1 = \frac{Q}{Qgen} , \qquad (8)$$

where: Q – the quantity of innovations offered by a worker; Qgen – general quantity of innovations, which are applied in enterprise.

The Level of Creative Intellect (Ci) – reflects the ability of a worker to purposefully act, rationally speculate and interact effectively with an environment applying all the knowledge, skills and personal characteristics one possesses. Apart from this, creative intellect is an activity of human which finds itself in an extraordinary completion of a task.

The level of creative intellect allows defining a gift of each worker in the enterprise, one's ingenuity of problem solving, the ability to creatively evaluate the situation that takes place in a certain period [5; 14; 20].

The Level of Initiative (Lin) - ensures the fulfillment of tasks with the help of one's own ideas:

$$\operatorname{Lin} = \frac{\operatorname{Qi}}{\operatorname{Qi}\operatorname{gen}} , \qquad (9)$$

where: Qi – the quantity of ideas, which were offered by a worker; Qi gen – general quantity of ideas in the enterprise.

According to pedagogical dictionary «initiative is a person's feature, which is characterized by the ability and tendency to act aggressively and independently» [5; 20]. Encyclopedic dictionary covers the notion «initiative» (french «Initiative», from Latin Initium – the beginning) as a beginning, an incentive to the beginning of an affair, the ability to produce new ideas, suggestions and act independently» [5; 20].

S. Rubinshtein [5] defines the notion of initiative as « a large quantity and brightness of new ideas and projects, the rich imagination combined with the intensity of incentives and energy of desires». According to V. Tolochko [16], an initiative is the existence of a tendency to act confidently and extraordinarily for effective task fulfillment.

Therefore, we may conclude that initiative occurs when a certain task and responsibility for its fulfillment arise. That is why any initiative is directed to an expression of action and independence. So, the determination of a certain worker's initiative level is worth being considered as a correlation of a quantity of ideas offered in the enterprise during a certain period.

The Level of Rational Activity (Ra) – allows implementing worker's activity during one's duty fulfillment process:

$$Ra = \frac{Qo}{Qgen},$$
 (10)

where: Qo - the quantity of innovative offers suggested by a worker; Q gen - general quantity of innovative offers suggested in the enterprise.

First of all, an innovative activity should be considered as a conscious activity of a worker's mind, the worker's ability to immediately demonstrate all knowledge and personal characteristics in terms of a certain situation in the enterprise.

The list of competence evaluation indices given in the table 1 is not exhaustive and may be changed (shortened or completed) because of the changes which may take place in a worker's positional instruction, and also when the change of a position or a working place has been made. It should be noted that given competence evaluation indices may be applied not only for theoretical research, but also in practice in order to improve the efficiency of enterprise through the imperfection of worker's competence.

CONCLUSIONS

The given competence evaluation indices may be applied not only for theoretical research, but also in practice in order to improve the efficiency of enterprise through the imperfection of worker's competence and it may solve different problems concerning the development of worker's competence level which will influence the level of enterprise work efficiency. Apart from this, an elaborated matrix will help the authorities receive more precise image of workers' competence state in enterprise, and also elaborate certain measures concerning the improvement and development of worker's competence.

References

- Afanasiev M.V., Gontareva I.V. and Tyshenko O.D. 2010. Training to the forming competencies of Business Economics. – Kharkiv: "INZHEK". Ukraine.
- Balabanova L.V. and Stelmashenko O.V. 2010. Strategic Personnel Management in Enterprise under Market Economy [Text]: monograph; The Ministry of Science and Education of Ukraine, Donetsk nat.Univ. of

Economics and Trade named after Mychayli Tuhan-Baranovsky. Ukraine.

- Burkova L.V. 2010. Indices and Evaluation Criteria of Professional Competence of Future Specialists of Socionomics Professions/ [Electronic resource]. – Access address: http://www.nbuv.gov.ua/e-journals/ ttmuo/2010_3/10burssp.pdf. Ukraine.
- Eicker S., Kochbeck J. and M. Schuler P. 2008. Employee Competencies for Business Process Management. Springer-Verlag Berlin Heidelberg, 251–262. [Electronic resource]. – Access address: http://www. softec.wiwi.unidue.de/uploads/tx_itochairt3/publications/ Employee CompetenciesForBusinessProcessManagement_04.pdf. USA.
- Goydosh N. 2012. The Entity of a Notion «initiative» in Psychological-pedagogical literature [Electronic resource]. – Access address: http://www.nbuv.gov.ua/portal/soc_gum/gvpkhdpi/2012_ 24/78_83.pdf. Ukraine.
- Gruzina I.A. 2011. The Improvement of Evaluation of Personnel's Competence in Enterprise. [Electronic resource]. – Access address. Ukraine.
- 7. **Zvarych I.M. 2012.** Theoretical and methodological basis for the assessment of the pedagogical competence the teachers of USA. Kyiv: Fenics. Ukraine.
- 8. **Khmil F.I. 2006.** The management. Kyiv: Akademvudav. Ukraine.
- Kostyn Yu.D. and Ushchapovsky K.V. 2010. An Evaluation Model of Personnel Work Efficiency at Energy Enterprises / [Electronic resource]. –Access address: http://www.nbuv.gov.ua/portal/soc_gum/ eprom/2010_51/st_51_15.pdf. Ukraine.
- Kuzmin O.Ye., Melnyk O.H., Shpak N.O. and Mukan O.V. 2012. The concept of creation and use of the polycriterial diagnostics systems of enterprise activity. – ECONTECHMOD: An international quarterly journal on

economics in technology, new technologies and modeling processes No4. – Lublin-Cracow. **Poland**.

- Minter, R. L. and Thomas, E. G. 2000. Employee development through coaching, mentoring and counseling: A multidimensional approach. Review of Business, 21(1/2): 43-47. USA.
- 12. Noe R. A. 2002. USA Employee training and development, (2nd ed.). New York: McGraw-Hill Irwin.
- Oleksiv I. and Shpak N. 2012. Method for Selection of Company Stakeholders. – ECONTECHMOD: An international quarterly journal on economics in technology, new technologies and modeling processes №3. – Lublin-Cracow. Poland.
- Paliy A.A. 2010. The Differential Psychology / [Electronic resource]. – Access address: http://pidruchniki.ws/11221213/psihologiya/osnovni_kont septualni_pidhodi_kreativnosti. Ukraine.
- 15. **Pfeffer J. 1981.** Power in Organizations, Marshfield, MA: Pitman. **USA**.
- 16. **Tolochko V.M. 2010.** The management of the employees of the pharmaceutical organizations based on competencies. Kharkiv: Avysta-CLT. Ukraine.
- 17. **Teodorescu Tina. 2006.** COMPETENCE VERSUS COMPETENCY [Electronic resource]. – Access address: http://rescomp.de/resources/competence-vs-competencythe-differencespub.pdf
- Saaty T.L. 1980. The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation, New York: McGraw-Hill International Book Co. USA.
- Sveiby Karl Erik. 2001. Measuring Competence [Electronic resource]. – Access address: http://www.sveiby.com/articles/MeasureCompetence.html
- 20. Venda V.F. 2010. Intellectual Initiative and Child's Intellect Level [Electronic resource]. Access address: http://ua.textreferat.com/referat-13166-1.html. Russia.

Information model of Web-gallery taking into account user's interests

Yu. Ryshkovets, P. Zhezhnych

Information Systems and Networks Department, Lviv Polytechnic National University, e-mail: ryshkovets@gmail.com, pzhe@ridne.net

Received June 21. 2013: accepted June 30. 2013:

Abstract. Web-galleries which take into account user's interests can reorganize the structure of its content according to user's interests and peculiarities of their behaviour. Each Web-gallery encompasses expositions that to some extent reveal defined thematic categories. Each exposition contains exhibits which not always fully reveal its content. Exhibits that poorly reveal the content of exposition distract users and distort their interpretation. This paper describes software architecture of Web-gallery in which user's interests and interaction of components are taken into account.

Key words: Web-gallery, user's interests, linguistic variable, database.

INTRODUCTION

Modern Web-galleries contain large amounts of multimedia data, which are usually presented to users in the form of individual themes of expositions. User formulates a task of obtaining information, information system processes it and returns the result. Most information systems work exactly on this principle, so a user receives both required and redundant information. This situation is a consequence of absence or imperfectness of Web-galleries presentation methods. In order to avoid large redundancy of information or significantly reduce its number it is necessary to adaptively change the structure of Web-gallery content. One of this methods is to create Web-galleries considering features of behaviour and user's interests.

Aim of the article is to analyze the data flow in Web-gallery considering the user's interests and develop architecture of this Web-gallery.

MODELING WEB-GALLERY INFORMATION FLOW CONSIDERING THE USER'S INTERESTS

Standard Web-gallery features include filling, building, displaying and searching. It is characteristic of

such Web-gallery that content is partially or fully structured, gallery themes arise as a result of covering certain events; Web-gallery viewing time is unlimited, it is actually limited by the availability of personal viewing time of the user; gallery filling is manual, with one exhibit at a time; building of the gallery is done by the classical scheme: the name of a new exposition and its themes is given, all the exhibits that somehow belong to a given theme are selected from gallery database and attached to a new exposition; galleries and expositions are displayed in the form of groups of equal objects; search is implemented only by keywords.

Standard Web-gallery features are not targeted at an individual user which is a significant shortcoming because a user has to spend more time finding relevant information.

In the Fig. 1 an architecture of software for Webgallery creation considering user's interests is shown [6].

According to the problems which arise in the process of Web-gallery building considering user's interests consists of the following components:

• *component of gallery filling* allows to increase the volume of gallery content using a single method for adding new exhibits,

• *component of gallery display* uses the principles of displaying galleries, which are based on the phases of user's functional state, the level of performance and interests [8, 12],

• *component of search* locates exhibits by a given keyword or natural language queries, and records all user requests to be used in user's interests analysis [1, 2, 4, 15, 19],

• component of the gallery building uses algorithms of the structural organization and reorganization of

gallery as an additional component of building a gallery including user's interests, which helped implement the mechanism of content adaptation to user's interests taking into account influence factors, confidence and lack of interest rates [7, 12, 13, 20],

• component for determining user's interests uses algorithms for identifying user's interests, influence factors, confidence and lack of interest rates. This component includes a component for processing fuzzy time parameters that handles queries submitted in natural language [10, 13, 14],

• component of gallery content consolidation. This component uses XSLT-structure rules of bring the structure of XML-files of certain museum systems into a single data structure [5, 9, 11, 16, 18].

This approach provides the possibility to use Webgalleries as a valuable Web 2.0 means [3, 6, 17].

The main processes that take place during the organization Web-galleries considering user's interests include (Fig. 2):

• *check the status of the user* – a process by which the system indicates that a user is what he claims to be, based on the information known to both parties,

• *determine user's interests.* By this process user's interests are identified and reidentified by analyzing areas of his interest, visiting information and performed searches,

• *create gallery*. In this process creation of gallery is realized considering user's interests,

• *display gallery*. This process provides gallery display taking into consideration level of efficiency of the user and his interests,

• *consolidate exhibits*. Using this process, you can fill database with new exhibits from external museum systems.

Based on areas of interest, marks of exhibits, expositions, themes and search queries general user's interests are determined. Using these interests, the system creates new or rebuilds the existing galleries adapted to the user's interests. The change of user's interests restarts the process of determining user's interests, creating and displaying galleries, thus improving the content of galleries. In addition, to increase the number of exhibits in gallery database the process of consolidating exhibits from other systems is used [11, 13].





Fig. 1. Architecture of software for Web-gallery creation considering user's interest



Fig. 2. Use-case diagram of Web-galleries considering user's interests

Determining user's interests is the most important task of the software because of the accuracy of determining user's interests influences the accuracy of the system performance – level of interest to the gallery. Determining user's interests is based on areas of interests, evaluation of exhibits, expositions and themes viewed, searches made [10].

The process "Determine user's interests" defines areas of user's interests, analyzes visited galleries, analyzes user's search queries, make a list of user's interests, defines user's interests, fills the database with rules for processing fuzzy temporal characteristics is performed and processes the fuzzy temporal characeristics identified during the analysis of searches queries.

During registration, the user specifies areas of interests using appropriate values of the linguistic variable "Interest". So, each theme defined by the user gets a measure of interest determined using the formula: $A_z \rightarrow I_i \in [0;1], \quad z = \overline{1,9}, i = \overline{1,n}$, where A_z – value of the linguistic variable "Interest"; I_i – measure of belonging.

Then the user interest to themes of Web gallery is defined as the set of tuples:

$$IUT = \{ (T_1 | \boldsymbol{S}_1), (T_2 | \boldsymbol{S}_2), ..., (T_k | \boldsymbol{S}_k) \},\$$

where: T_k - theme, $k = \overline{1, u}$; S_k - user's interest in a theme T_k , $S_k \in [0;1]$.

Addition to areas of interest, using the values of linguistic variable "interest" user evaluates exhibits and expositions.

The software records all moving of the user in the gallery, so that viewed exhibits and expositions and their affiliation to some theme categories can be determined. As a result, the user's interest to exposition exhibits is defined as:

$$IUO(E_{i}) = \{ (O_{i1}|t_{1}), (O_{i2}|t_{2}), ..., (O_{in}|t_{n}) \},\$$

where: O_{in} – exhibit of exposition E_i ; t_n – user's interest of exhibit O_{in} , $t_n \in [0,1]$.

After viewing of exposition the user forms own opinion about it, which is served as user's expositions interests:

$$IUE = \left\{ (E_1 | I_1), (E_2 | I_2), ..., (E_m | I_m) \right\},\$$

where: E_m – exposition; I_m – user's exposition interest E_m , $I_m \in [0;1]$.

After analyzing of the areas of interest, evaluating of viewed exhibits and expositions of gallery general list of the user's interests is formed, on which general user's interests are defined.

The general Web-gallery user's interest in exhibit of exposition is defined as:

$$GIU(O_{j}, E_{i}) = IUO(O_{j}, E_{i}) + \mathbf{m}_{j}\mathbf{l}_{i} \cdot \left(\sum_{k} \mathbf{r}_{ki}\mathbf{s}_{k}\right) - \left|-IUO(O_{j}, E_{i}) \cdot \mathbf{m}_{j}\mathbf{l}_{i} \cdot \left(\sum_{k} \mathbf{r}_{ki}\mathbf{s}_{k}\right)\right|,$$

where: \mathbf{m}_{ij} – measure of exhibition belonging O_j to exposition E_i , $\mathbf{m}_{ij} \in [0;1]$, $i = \overline{1,n}$, $j = \overline{1,m}$; \mathbf{r}_{ki} – measure of exposition belonging E_i to theme T_k , $\mathbf{r}_{ki} \in [0;1]$, $k = \overline{1,u}$.

The values \mathbf{m}_{ij} and \mathbf{r}_{ki} in the process of basic expositions creation is set by expert.

To determine the general user's interest to exposition the following formula is used:

$$SGIU(E_i) = \sum_{j} GIU(O_j, E_i), \ i = \overline{1, n}, \ j = \overline{1, m}$$

General user's interest to certain exhibit Webgallery reflects its quantitative assessment on basis which it is possible not only to determine the levels of user's interests, but also affect their precision. Qualitative evaluation exhibits Web-gallery gives grounds for its modification or restructuring, in order to raising the general user's interests to it and Web-gallery in general [6, 14,].

For qualitative evaluation of existing structural elements of Web-gallery by measuring the degree of trust in them, using the coefficient of the user's confidence (ΔFCU):

$$\Delta FCU = GIU - GNIU, \quad \Delta FCU \in [-1,1],$$

where: GIU – general user's interests Web-gallery; GNIU – general user's disinterests Web-gallery.

In determining of the general Web-gallery user's disinterest linguistic variable "Disinterest" is used.

By using of the user's confidence coefficient permanent monitoring of level of interest each element of Web-gallery is carried out. Depending on the values of this coefficient the system takes certain decisions about the scale reorganization of Web-gallery.

Restructuring of Web-gallery can be made at structural levels of exhibit, exposition and Web-gallery [7]. Therefore, coefficients confidence the user's according to the structural level is defined as follows:

$$\Delta FCU(O_j, E_i) = GIU(O_j, E_i) - GNIU(O_j, E_i),$$

$$\Delta FCU(E_i) = SGIU(E_i) - SGNIU(E_i),$$

$$\Delta FCU(G) = SGIU(G) - SGNIU(G).$$

In the process of adapting of Web-gallery to the user's interests the most important indicator of the level of adaptation is the user's confidence coefficient in the exhibition, because it is based on its values is decided on the future of some exposition – existence unchanged, reorganization or removal.

CONCLUSIONS

In this article the architecture of software for organization Web-galleries considering the user's interests are proposed and information flows of the system are analyzed. Standard Web-gallery is supplemented by user's interests definition component, which includes component of processing of fuzzy temporal parameters that allow to determine the user's interests based on areas of interests, searches and viewing exhibits, expositions and themes; component of building galleries considering the user interests that allow realization of mechanism of content gallery adaptation to the interests of user's with consideration of influence factors, certainty and disinterest factors; component consolidation of content that allowing realization of mechanism for automated consolidating data from XML-documents of different syntactic

structures. Such approach to organization of Webgalleries allows adapting the content relevant to the user's interests and also decreases search time for required information.

REFERENCES

- Dubois D. 1989. Processing fuzzy temporal knowledge // IEEE Transactions on Systems, Man and Cybernetics. — Vol. 19, No 4. – 729-744.
- Jurafsky D. 2009. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition – 2nd edition – New Jersey : Prentice Hall, – 988.
- 3. **Petrovich J. P. 2012.** Modern concept of a model design of an organizational system of enterprise management // Journal "ECONTECHMOD". Vol. 1, No 4. 43-50.
- Ramasubramanian P. and Kanan A. 2009. Intelligent natural language query interface for temporal databases [Electronic resource]. – Mode of access : WWW/URL : http://fccl.ksu.ru/issue6/pvt1.pdf. – Title from the screen.
- Ryshkovets Yu. 2011. Analysis of standard formats xmldocuments when exporting data from popular DBMS // 15th International Forum of Young Scientists "Radio electronics and youth in the XXI century": Publication of the Proceedings Part 7. International Conference "Competitive Reconnaissance and Knowledge Management". – Kharkov: KNURE,. – 147-148.
- Ryshkovets Yu. 2012. Development of software architecture for Web-gallery creation considering the user's interests // Proceedings of the 7th International Scientific and Technical Conference "Computer Sciences and Information Technologies" (CSIT'2012). Lviv : Publisher Lviv Polytechnic, 150-151.
- Ryshkovets Yu. 2010. Development of Web-galleries union algorithm // Computer Science and Engineering. Proceedings of the 4th International Conference of Young Scientists CSE-2010. – Lviv : Publisher Lviv Polytechnic, – 44-45.
- Ryshkovets Yu. 2011. Features of Web-gallery visitor behaviour // Computer Science and Engineering. Proceedings of the 5th International Conference of Young Scientists CSE-2011. – Lviv : Publisher Lviv Polytechnic, – 368-369.
- Ryshkovets Yu. 2010. The analysis of standard tools of exporting data to XML-formats and XML-documents in the popular DBMS // Proceedings of the 5th International Conference on Computer Science and Information Technologies (CSIT'2010). – Lviv : Publishing House Vezha&Co, – 159-160.
- Ryshkovets Yu. 2009. User interests determination during virtual galleries forming // 13rd International Forum of Young Scientists "Radio electronics and youth in the XXI century": Publication of the Proceedings Part 2. – Kharkov : KNURE, – 221.
- Ryshkovets Yu. V. 2011. A data integrating method in museum objects information systems // Information Systems and Networks : Herald of the National University "Lviv Polytechnic". — № 699. – 231-240.
- Ryshkovets Yu. V. 2012. Analysis of web-galleries visiting peculiarities taking into account user behaviour // Journal "Radioelectronics and Informatics". — № 2. – 90-93.

- Ryshkovets Yu. V. 2009. Virtual galleries building by user's interest // Collection of scientific works / NAS of Ukraine, Pukhov Institute for Modelling in Energy Engineering. – K. : Pukhov Institute for Modelling in Energy Engineering, – № 51. – 159-166.
- 14. **Ryshkovets Yu. 2011. V.** Web-gallery user information needs modelling // Journal "Artificial Intelligence". $N_{\rm P}$ 1. 236-242.
- Ryshkovets Yu. V. 2009. Fuzzy temporal parameters processing in natural language queries analysis // Information Systems and Networks : Herald of the National University "Lviv Polytechnic". — № 653. – 188-196.
- Ryshkovets Yu. 2011. XML-technologies usage for Web-galleries data consolidation // System analysis and information technologies: International conference on

science and technology, SAIT 2011. – K. : ESC "IASA" NTUU "KPI", – 490.

- 17. **Shuen A. 2008.** Web 2.0: A Strategy Guide: Business thinking and strategies behind successful Web 2.0 implementations O'Reilly Media, 266.
- XSL Transformations (XSLT) [Electronic resource] / World Wide Web Consortium (W3C). – Mode of access : WWW/URL : http://www.w3.org/TR/xslt. – 23.02.2010 p. – Title from the screen.
- Zadeh L. A. 1978. Fuzzy sets as a basis for a theory of possibility // Fuzzy Sets Syst. — vol. 1. – 3-28.
- Zhezhnych P. I. 2008. Structural and formal models of a virtual museum // Information Systems and Networks : Herald of the National University "Lviv Polytechnic". — № 631. – 107-112.

The role of innovative creative collectives in anticipatory management of enterprises

N. Shpak, O. Goryachka, M. Adamiv

Lviv Polytechnic National University

Educational-Scientific Institute of Economics and Management, E-mail: dida_05@ukr.net

Received June 21. 2013: accepted June 30. 2013

Abstract. In the article the actuality of anticipatory management as an objectively necessary element of the enterprise's management process in today's rapidly changing and uncertain business environment is grounded. The role and functional assignment of innovative creative collectives in the implementation, forming and using the anticipatory management mechanisms at the enterprises are developed. Key words: anticipatory management, innovative creative

Key words: anticipatory management, innovative creative collectives, functions, weak signals, enterprises.

INTRODUCTION

The modern functioning conditions, which are characterized by a high level of dynamism, unpredictability and uncertainty, determine the new requirements for a management as the mechanism of ensuring the sustainable goal-oriented development of enterprises. It concerns a critical growing deficit of time and information resources for a decision-making process that strengthens a threat of the retarded or inadequate response to the changes of enterprises' operation conditions. The forced development of the modern globalized business environment requires from managers of all levels to make decisions in maximally short time period due its intense changes and transformations. In addition, in the current functioning conditions managers and professionals are increasingly faced with not clear, understandable or incomplete by content data that require its accurate analyzing and interpretation. In management science, scholars interpret these informational messages as weak signals of the potential events in the business environment.

The situation described above causes a peculiar management dissonance because the necessary condition to ensure the maximum effectiveness of management activity is the implementation of a completed management technology that is based on the adequate information support and requires the appropriate time costs for its realization. One of the perspective directions to solve this problem is to use the anticipatory management as the actual addition to the enterprise's management system from the position of improving its interaction with the internal and external environment on the basis of increasing the level of enterprise's preparation to any potential changes in the operating conditions. Anticipatory management is aimed at identifying and analyzing the weak signals of possible changes, as well as predicting their future development to different potential events in the business environment. It forms an enough time reserve for preventive decision-making process of exploiting opportunities or eliminating threats in the internal and external environment.

A key problem in the supporting of anticipatory management at the enterprises is to select and engage the high-quality employees with a logical and creative approach to perform the anticipatory tasks. Today at many foreign enterprises there are creative teams which are specialized on the effective implementation and realization of progressive management technologies, instruments, mechanisms, in particular, the anticipatory management mechanism. Everything mentioned above causes a need to characterize the role and functional assignment of innovative creative collectives in the supporting of anticipatory management at the enterprises.

ANALYSIS OF THE LITERATURE ON THE PROBLEM

Although the experience with anticipatory management have not accumulated yet at Ukrainian

enterprises, but abroad this type of management activity is a successful innovation of such leading international companies, as "Toyota", "Nokia", "Mary Kay" and others. At the theoretical level, a significant contribution into the development of anticipatory management concept was made by such Ukrainian and foreign scientists, as [1–15] and others. In their scientific works authors have thoroughly investigated the different aspects of anticipatory management peculiarities and problems at the macro and micro level.

Concerning the staff support of anticipatory management, the authors in their scientific works with one accord emphasize on the importance of strategic thinking in anticipatory management process. As noted by William Ashley and James Morrison, there are no specific persons or structural divisions, which are specialized on performing the anticipatory management tasks at the enterprises, as well as the anticipatory functions are scattered among different specialists within the organizational structure of the enterprise. Given the importance of anticipatory management in current conditions, scientists claim the necessity to create the post of an anticipatory manager or to form special committees of anticipatory orientation [13].

Despite the importance of innovative creative teams for anticipatory management, any literature source is not disclosed the role and tasks of such collectives in the complex support of anticipatory management that concerns to implementation and development its mechanisms at the enterprises.

THE PURPOSE OF THE PAPER

The main purpose of the article is to ground the role and functional assignment of innovative creative collectives in supporting the anticipatory management process at the enterprises.

THE PRESENTATION OF THE MAIN RESEARCH MATERIAL

In today's complicated functioning conditions anticipatory management is an integral part of the enterprise's management process that provides its development in the direction of improving its interaction with the internal and external business environment. The rapid spread of current trends of increasing the uncertainty and unpredictability of operating conditions complicates the problem of timely and adequate response to any change in the business environment. It is caused by the growing deficit of resource support (especially time and information) of management processes at the enterprises, especially the decision making. In response to everything above mentioned anticipatory management provides a mechanism of anticipation the future events in the business environment that is based on the recognition of weak

signals and interpretation of their further development to specific opportunities or threats of enterprise's operating conditions for timely respond to those changes in the business environment.

The key tasks, which are directly related to the performance of a specific anticipatory management assignment, are recognition, analyzing and selection of weak signals, predicting of their future development, as well as identifying all opportunities and threats that may arise from the proper signals for preventive decision making. Despite the qualitative and quantitative character of the implementation the specific anticipatory management assignment, it largely requires the logical and creative approach to perform the anticipatory tasks. Obviously, during anticipatory management process there is a necessity to involve the employees who have strategic vision and creative potential; are able to generate the ideas and suggestions for improving the management process at the enterprise, to identify the most perspective and dangerous functioning areas, form polyvariant scenarios of potential events' the development, make preventive decisions of exploiting the opportunities or eliminating the threats in the business environment.

Unfortunately, today anticipatory management is at the starting stage of its development in the domestic business environment. It indicates a lack of the practical experience in its using by Ukrainian enterprises. That's why it is necessary to have a clear understanding of the role and advantages of this type of management in providing effective enterprise's development that will strengthen the anticipatory management position in its implementation and realization at the domestic enterprises.

Therefore, there is an objective necessity of proper staff support, which is characterized by an innovative creative position for the successful implementation of anticipatory management mechanisms at the enterprises. One of the ways to resolve this problem is to form the innovation creative collectives that will be focused on the implementation and realization of the anticipatory management process at the enterprises. Innovative creative collectives are aimed at finding the new methods, tools, models and mechanisms of improving the efficiency of enterprise's activity. At the enterprises these groups exist in the form of teams of individuals which were united to develop proposals and mechanisms of enterprise's innovative development, as well as to solve the problems of enterprise's operation.

The necessity to involve the innovative creative collectives into realization of anticipatory management at the enterprises is caused by such reasons, as:

1) a lack of practical experience in the implementation and realization of anticipatory management at the domestic enterprises; 2) the unreasonable partiality of managers and employees to the realization of anticipatory management at the enterprises because of unawareness of its role in providing the targeted enterprise's development, avoiding crises, increasing the competitiveness and investment attractiveness in modern functioning conditions;

3) the need to solve unusual and non-standard situations within anticipatory management process by individuals with creative suggestions, ideas and strategic polyvariant vision of the future situation;

4) the lack of experience with using the results of anticipatory management in other functional areas of the enterprise, etc.

In order to justify the appointment of innovative creative collectives in anticipatory management process it has been developed the technology of their functioning in supporting of anticipatory management at the enterprises (Fig. 1). This technology reflects a complex sequence of steps of the implementation, formation and realization the anticipatory management mechanisms at the enterprises.

Having studied the literature on the problem [4; 7; 13; 16-20] it has been distinguished the list of innovative creative collectives' functions which are associated with the implementation, formation and realization the anticipatory management mechanisms at the enterprises (Fig. 2).

1. An information function. Executing this function, innovative creative collectives perform targeted search and selection of relevant information about all areas of business environment, as well as its systematization, sorting, analyzing and priority identification according to the anticipatory management goals.

2. An identification function. Within this function, innovative creative collectives are aimed at identifying the most perspective and dangerous areas of enterprises' functioning, establishment the list of possible objects and goals of anticipatory management, conducting their review, determining the most optimal and adequate to functioning conditions object and goals of anticipatory management.

3. A cognitive function. Implementing this function, innovative creative collectives monitor the business environment to find weak signals of the potential events; recognize the weak signals with the highest priority of future appearance on the base of implementation the intuitive and logical operations; form a consolidated list of weak signals of the potential events according to the object and goals of anticipatory management.

4. A prognostic function. In carrying out this function, innovative creative collectives make the polyvariant trajectories of weak signals' development to the specific potential events in the business environment. In particular, the creative teams develop the characterization of weak signals of the potential events by the significant signs (for example, the source of a weak signal, the presence of weak signals' analogues and the trajectories of their development in the past periods of enterprise functioning, competitors, other enterprises, etc.); form alternative hypotheses of weak signals' development to the strong signals of potential events on the basis of establishing the logical causal relationships between events; review and ground the pre-formed hypotheses of variant weak signals' development to the strong signals of potential events in the business environment; finally make the alternative trajectories of weak signals' development to the strong signals that clearly indicate the future appearance of potential events in the business environment; identify all possible opportunities, threats, states that may occur by the identified signals in the business environment, etc.

5. A directive function. Within this function, innovative creative collectives are focused on identifying the directions and making decisions of exploiting the identified opportunities or eliminating threats in the business environment considering the probability of their occurrence and impact. In particular, the creative teams develop and offer the appropriate responses to the potential changes in the business environment, which are identified by the relevant weak signals, considering the probability of their future occurrence and impact on the enterprise's effectiveness; evaluate those responses by the list of criteria (for example, priority and deadline measures of responses, the level of their effectiveness, coherence with the general objectives of the enterprise, etc.); finally form a set of the most effective responses to identified by weak signals potential events in the business environment.

6. An advisory function. Performing this function, innovative creative collectives develop the proposals of using the results, which are formed within anticipatory management, in other functional areas of enterprise's functioning to ensure its innovative development. For example, creative teams may recommend applying the results of anticipatory management during the developing of strategy and plans of the enterprise's activity, as well as in the decision making in the various functional areas of the enterprise, etc.

7. Generating function. Within this function, innovative creative collectives form the anticipatory scenarios which are based on the generalized and combined information about the different variants of the weak signal's development to specific potential events in the business environment and a list of adequate responses.

8. An advisory function. The implementation of this function is to generate the proposals of the anticipatory management implementation at the enterprises, to ground the importance, benefits and results of the realization of anticipatory management at the enterprises, as well as to bring the developed proposals to the managers of the high level and other employees. An innovative creative collective (ICC) of anticipatory direction is a group of individuals which are united to create ideas, proposals, mechanisms of implementation and realization of anticipatory management within the enterprise's innovative development, as well as to solve the problems of enterprise's functioning

THE TECHNOLOGY OF ICC FUNCTIONING IN SUPPORTING THE ANTICIPATORY MANAGEMENT AT THE ENTERPRISES

1. The implementation of anticipatory management at the enterprises ICC form proposals of anticipatory management implementation at the enterprises; ground the importance, benefits and expected results from the realization of anticipatory management at the enterprises; bring these proposals to the managers of high level and other employees

I

I

I

L

I

1

I

I

I

I

I

I

I

I

L

L

I

L

L

1

L

L

L

2. Forming of the innovative mechanisms of anticipatory management realization at the enterprises

In the conditions of dynamic business environment, which are characterized by the emergence of unexpected and unpredictable events, ICC constantly improve and adapt the typical anticipatory management mechanism, its methods and procedures to the functioning conditions on the basis of formation the innovative ideas to solve the arising problems

3. Performing the specific anticipatory management tasks that require logical and creative approach to their executing

During the anticipatory management process ICC are aimed at performing the different tasks and operations with logical and creative character. In particular, ICC identify the most promising and dangerous areas of business environment, detect the weak signals of the potential changes in operating conditions, form the polyvariant scenarios of their development, make decisions of exploiting opportunities or eliminating threats in the internal and external environment, etc.

4. Defining the directions and areas of using the anticipatory management results

ICC form suggestions and ideas of using the anticipatory management results, as well as identify directions, areas and mechanisms for their application at the enterprise. In particular, ICC may propose to apply the information base, that is concerning to the potential emergence of opportunities and threats in the

business environment, during forming the strategy and plans of the enterprise, as well as in decision making in the various functional areas of the enterprise, etc.



L

I

L

L

I

L

L



Fig. 2. The functions of innovative creative collectives in supporting of anticipatory management at the enterprises

At the enterprises there are such organizational formats of innovative creative collectives, as temporary functioning committee, standing committee, separate division, external agency group [12, p. 25]. Each format of innovative creative collectives may include professionals which are specialized on performance of anticipatory functions within anticipatory management process. Typically, innovative creative collectives with anticipatory orientation, which were organized in the format of standing committees, are aimed at performing the anticipatory tasks and operations.

Anticipatory innovative creative collectives in the format of standing committees are the elements of the enterprise's organizational structure. Although these innovative creative collectives are characterized by their stability, but the structure of team members may be periodically modified under the influence of the changing nature of anticipatory tasks. Typically, the composition of the teams in this format includes the managers of all levels and the employees of prognostic orientation, which are stimulated on the basis of payment of bonuses and allowances. To assist in solving the complex, non-standard tasks managers may invite the external experts on the commercial basis [12, p. 25].

CONCLUSIONS

The modern dynamic business environment, that is characterized by intense and at the same time unpredictable changes and transformations, requires from managers to change its position from traditions to innovations. It means to use progressive management instruments and mechanisms which are specialized on anticipating the potential changes of enterprises' operating conditions. Anticipatory management is aimed at increasing the level of enterprise's preparation to possible changes in the internal and external business environment on the basis of their early identification and consideration in the enterprise's future activity. The specificity of anticipatory management requires the involvement of creative groups, which are characterized by a strategic vision, creativity, innovative approaches to solving the problems of anticipatory management, etc. Anticipatory innovative creative collectives are aimed at forming the ideas and proposals on the implementation, development and realization of anticipatory management mechanisms at the enterprises. To ensure the anticipatory management process at the enterprises innovative creative collectives implement informative, cognitive, identification, prognostic, directive, consultative, generating and advisory functions.

REFERENCES

- Baklan I. V, Poplavska Zh. V. and Tsmots O. I. 2011. Detecting and assessing weak signals within a machinebuilding enterprise // Actual problems of economics. -№ 5(119). - 257-271.
- Bohonikolos N. D. 2005. Models of anticipatory management in factory financial activity: summary of dissertation for the scientific degree of candidate of economic sciences: specialty 08.03.02 – "Economic and mathematical modeling"; Kharkov National Economic University. – Kh.,– 18.
- Guryanova L. S. and Klebanova T. S. 2005. Models of anticipatory management of enterprise's financial security // Thesis of Intern. scient.-pract. conference ["The theory of active systems"], (Moscow, 16-18 November, 2005). – M.: IPU RAN,– 186-188.
- The methods of anticrisis management by the weak signals: [monograph] / [Yu. G. Lysenko, R. A. Rudensky, L. I. Yehorova and oth.]. 2009. – Donetsk: South-West,– 195 – (Ser.: Sustainable Systems in Economics).
- Moroz O. V. and Smetaniuk O. A. 2006. The financial diagnostic in the anticrisis management system of the enterprises: [monograph]. – Vinnitsa: UNIVERSUM – Vinnitsa,– 167.
- Rogovych A. T. 2007. Models of threats' anticipation in financial activity of enterprises [Electronic Source]. – Access regime : http://www.rusnauka.com/7._DN_2007/Economics/ 17600.doc.htm

- Rudensky R. A. 2009. Anticipatory management of complex economic systems: models, methods, tools: [monograph] / [scient. ed. prof. Yu. G. Lysenko]. -Donetsk: South-West, - 257 - (Ser.: Sustainable Systems in Economics).
- Hiltunen Elina. 2008. Good sources of weak signals: a global study of where futurists look for weak signals [Electronic Source] // Journal of future studies. №12 (4). 21-44. Access regime: http://www.jfs.tku.edu.tw/12-4/A03.pdf
- Fonseca Fernando. 2011. The decision making process and weak signal treatment // Future Studies Research Journal. – Jul./Dec. - V. 3, n. 2. – 32-56.
- Kuokkanen Pertti. 2009. Communicative and Anticipatory Decision-Making Supported by Bayesian Networks : a dissertation [Electronic Source]. Finnish National Defence University. Department of Leadership and Military Pedagogy. Helsinki. Publication Series 1 : No 2/2009. 131 Access regime: https://oa.doria.fi/handle/10024/43917.
- Potocan V. 2002. Business systems: sustainable development and anticipatory system [Electronic Source] // Management. – Vol. 7, No. 1. - 67-79. - Access regime: www.efst.hr/management/Vol7No1-2002/5-potocan.doc
- William C. Ashley and James L. Morrison. 1997. Anticipatory Management: Tools for Better Decision Making // The Futurist, September/October № 31(5). 47-50.
- Kuzmin O. Ye. and Goryachka O. O. 2011. Essence and typology of creative collectives on industrial enterprises // Management and entrepreneurship in Ukraine: starting stages and development problems. Journal of National University "Lviv Polytechnic". – Lviv: Publication of Lviv Polytechnic, - № 714. – 22-28.
- Goryachka O. O. 2012. The role of innovative creative collectives in the increase of investment attractiveness of enterprise // The social and economic problems of modern

period of Ukraine. Investment activity in region and tools of increasing its effectiveness: [dig. of scient. works] / NAS of Ukraine. Institute of regional researches (ed. V. S. Kravtsiv). – Lviv, 2012. – N 5 (97). – 240-246.

- Kuzmin O. Ye., Melnyk O. H., Shpak N. O. and Mukan O. V. 2012. The concept of creation and use of the polycriterial diagnostics systems of enterprise activity // ECONTECHMOD. An International quarterly journal on economics of technology and modeling processes. — Vol. 1. No 4. – 23-29.
- Kuzmin O. Ye., Melnyk O. H. and Mukan O. V. 2012. Polycriterial diagnostics of enterprise development // ECONTECHMOD. An International quarterly journal on economics of technology and modeling processes. — Vol. 1. No 3. – 55-65.
- Tsmots O. I. 2010. Features and stages of strategic management of machine-building enterprise with using weak signals // Problems of economics and management. Journal of National University "Lviv Polytechnic". Lviv: Publication of Lviv Polytechnic, № 668. 462-468.
- Business resilience anticipation as the key to sustainable business success [Electronic source] : a seminar / VNO Management Centre 'De Baak' in Noordwijk, the Netherlands, 2-3 June 2004. – Access regime: http://www.eurofound.europa.eu/emcc/content/source/eu0 4021a.htm?p1=ef_publication&p2=null
- Stephen C. Harper and David J. Glew. 2008. Anticipatory management cannot be compromised. (CARPE FUTURUM!) [Electronic source] // Industrial Engineer. - Institute of Industrial Engineers, Inc., August 1 – Access regime: http://www.entrepreneur.com/ tradejournals/article/182930117_2.html
- Gareth R. Jones and Jennifer M. George. 2007. Essentials of contemporary management - [2nd ed.] // Published by McGraw-Hill/Irwin, – 594.

Situation modeling of interaction between enterprises of the region and cross-border industrial clusters

A. Voronkova, K. Zelenkina

Volodymyr Dahl East-Ukrainian National University, Lugansk

Received June 21. 2013: accepted June 30. 2013

Abstract. The article describes the background of development of the cluster forms of interaction between Ukrainian industrial enterprises; models of interaction of large and small businesses are considered, different situations of the "cluster and outsourcer" relationships are identified by weighted index of the interaction potential.

Key words: enterprise, cross-border industrial cluster, situation modeling, region, interaction.

PROBLEM

Ukraine has a favorable geostrategic position in the center of Europe, focusing on its territory important transportation lines, international shipping routes. In the general concept of innovative development, developed by the European Commission in connection with the expansion of the EU priority directions of the state policy in the field of economic development based on innovation and knowledge are determined. Serious attention in it is paid to the creation, primarily at the regional level, of specialized organizations of supporting innovations - technology parks, business incubators, technology centers, cluster associations.

In September 2008 Ministry of Economics of Ukraine developed a Concept of creating clustering in Ukraine. The aim of this Concept is identification of the general principles of creation, functioning and development of clusters, as industrial structures of a new breed, in contrast to associations, corporations, consortia, corporations, the theory and practice of creation of which Ukraine has passed during the planned economy.

The limitation and in some cases lack of possibilities of reconstruction of the production capacity of domestic industrial enterprises make this process in Ukraine more complex. In these circumstances, a strategy for the development of their participation in cross-border industrial clusters may be quite effective.

ANALYSIS OF PREVIOUS RESEARCH

Generally speaking cross-border clusters can be defined as a network of manufacturers, suppliers, consumers and other elements of industrial infrastructure of two or more countries interdependent in creating added value.

Before the advent of the term "cluster" in the economic literature it has been used in other fields of science (chemistry, astronomy, physics, etc.). However, although this term has found its rightful place in the economic literature only in the last decade of the twentieth century, industrial complexes (i. e., classical clusters) took an important place in the research of economists during all the period of the existence of modern economics.

You should consider the development of industrial clusters as a long process that started in the period of a rise of industrial capitalism at the end of the 19th century. In the monograph from the history of the industrial capitalism A. Chandler [1] draws attention to three main factors of growth of modern companies in the leading industrialized countries, the U.S.A., Germany and the UK. These three factors, the benefits from scale, the benefits from the size and savings due to reducing transaction costs have been constantly changing as a result of the development of new technologies, increase of the market, and also changes in government and public institutions of states. The ability to take advantage of these three factors in order to reduce costs has invariably led businessmen to success.

The most important place in the development of a theoretical base of branch clusters is given to "theory of the firm", proposed by R. Coase [2] as well as to the works of Schumpeter [3] about the dynamics of competition, which appeared at the same time that the new interpretation of Marshall's theory about industrial regions proposed by P. Krugman appeared. [4] These and other economists have created the foundation for the new institutional economics by developing a model that explains the reasons for the formation of economic clusters at different levels.

The new explosion of interest of experts in industrial clusters was caused by the publication in 1990 of the work of the professor of Harvard University M. Porter "Competitive advantages of countries" in which he proposed the theory of national competitiveness. [5] In this theory, the leading role is given to clusters.

According to E. Bergman [6], the biggest contribution of Porter to the theory of cluster development is a combination of the theory of international competition and strategic research related to the search of clusters, the economic activity of which arouses interest and willingness to cooperate with companies from other countries. This connection allows you to extend the concept of the classical cluster far beyond the limits of geographically localized industrial complexes.

One of the phenomena that are closely linked to globalization is the transnationalization - the development of large international corporations that carry out their activity all over the world. Until today there is no generally accepted term for the definition of such associations. In the literature, terms such as "integrated corporate structure" [7], "a connected diversified system" [8], "an integrated business group" [9], as well as "metacorporation" [10] are used.

A modern economic theory sets a more complex and integrated value to an industrial cluster. In the works of P. Doeringer, J. Terkle, S. Rosenfield, M. Enright and others clusters are discussed in the context of competition theory, according to which they are transformed into corporate entities of inter-industry orientation, able to accelerate the process of integration of national economies into the world economy significantly. A cluster approach in its new interpretation is based on understanding that the industrial complexes of two or more countries can get an important competitive advantage in conditions of a globalization by creating a cross-border cluster [11]. Innovation processes in the modern world are not related to the activities of individual firms or industrial complexes, but allow the creation of cluster networks with a high level of direct and backward economic and technological links. [12] In other words, innovation activity of industrial complexes is more and more dependent on how they are able to use and adapt the experience of similar complexes, and also create crossborder clusters.

PRESENTATION OF THE BASIC MATERIAL

One of types of cluster interaction is the cooperation between large and small business. Such forms of involvement of small businesses in the operating cycle as the supply of spare parts, maintenance works, if necessary - improvement of the developmental prototype and utilization of production after completion of useful lifetime are referred to this type of cooperation (Table 1).

Clusters take different forms depending on their complexity, but they usually involve companies with a finished product, service companies, suppliers of specialized goods and services, financial institutions, firms with developed sales channels and customers.

Within the cluster, there are vertical (buyer and horizontal (common customers. supplier) technologies, intermediaries) links through which the interaction of different intensity is carried out. Links between enterprises are carried out by passing different flows (information, money, goods, etc.) via the cluster's channels. These links can be determined by analyzing the intensity of the use of different channels within the cluster. Rare use of some channel between companies in a definite time indicates a weak link of enterprises in this flow, and frequent use indicates power of the channel that connects them.

Flows providing normal development of the product creation process within the cluster are: money, labor, information, the flow of finished and semi-finished products, material and intellectual. The evaluation of these flows for a new enterprise (enterprise that wants to join the cluster) is a decisive factor determining the basic direction of organization of interaction with the cluster.

In order to make an analysis of the interaction between a new company and the cluster it is advisable to use the method of evaluation of the interest of a cluster and a new company to determine direction of development strategy based on the strengthening of the existing benefits.

The first step in the procedure is the evaluation of the attractiveness of the cluster for a new company, and then evaluation of the attractiveness of a new company for a cluster from the point of supply and demand for resources available to them. A new company has access to a particular flow in the environment, has some certain resources with a help of which it produces certain kinds of products. A cluster is interested in the resources and products produced by a new company in the process of interaction and a new company has access to other flows of a cluster that are of its interest. The interaction process lies in the exchange of one resource to another, or in the purchase of this product or a substitute.

Before cooperation a new company determines resources, products, which it will send to the cluster, and, in its turn, will have access to the flows of the cluster. You can determine the interest of other enterprises of the cluster in cooperation with the new enterprise through the estimation of the new company's flows, which will be included in the cluster (Table 2).
Type of the subject of cluster- based interaction	Small enterprises	Cluster	Big enterprises	
Field of interaction	Production	Realization	Non-productive cooperation	
	Investment of a big enterprise	A small enterprise realizes production of a big enterprise	maintenance works, improvement of a developmental prototype	
Forms of interaction	Developments of a small enterprise	Using a trade mark of a big enterprise	Utilization after completion of useful lifetime	
	combined participation in production	A big enterprise realizes production of a small enterprise	Mobilization of uncommitted resources	
	Manufacture and release of a developmental prototype for manufacture	Marketing measures	Solution of social and domestic questions	

Table 1. Models of cooperation of big and small enterprises in the process of innovative cluster-based interaction ¹

 Table 2. Being in demand for resources at a new enterprise ²

Flows	Number of products, G	Number of accesses, A	R _{bi}
Money	G ₁	A ₁	R _{b1}
Labour resources	G ₂	A_2	$\mathbf{R_{b2}}$
Information	G ₃	A ₃	R _{b3}
Raw materials and materials	G_4	A_4	R _{b4}
Equipment	G ₅	A ₅	R _{b5}
intellectual assets (knowledge)	G ₆	A ₆	R _{b6}

Table 3. Classification of backgrounds of cooperation between an enterprise and a cluster according to a criterion of weighted index of interaction potential 3

	Direct estimation									Weig	ghted es	timation				
Code of situation	Demand for resource of a cluster, Idbi	Supply of resource by an enterprise, Isbi	Demand for resource of an enterprise, Idci	Supply of resource by a cluster, Isci	Balance	Prospects of interaction	Level of prospects of interaction	Index of prospects of interaction	Type of situation	Demand for resource of a cluster, Idbi	Supply of resource by an enterprise, Isbi	Demand for resource of an enterprise, Idci	Supply of resource by a cluster, Isci	Level of prospects of interaction	Index of prospects of interaction	Type of situation
1111	1	1	1	1	1	2	4	1,00	Α	1	1	1,4	1	2,4	1,0	Α
0111	0	1	1	1	0	1	1	0,25	С	0,4	1	1,4	1	1,8	0,8	В
0110	0	1	1	0	1	1	2	0,50	В	0,4	1	1,4	0	1,4	0,6	С
1110	1	1	1	0	0	1	1	0,25	С	1	1	1,4	0	1,4	0,6	-
1001	1	0	0	1	1	1	2	0,50	В	1	0	0	1	1	0,4	
1011	1	0	1	1	0	1	1	0,25	С	1	0	1,4	1	1	0,4	D
1101	1	1	0	1	0	1	1	0,25	С	1	1	0	1	1	0,4	
0001	0	0	0	1	0	0	0	0,00	D	0,4	0	0	1	0,4	0,2	
0011	0	0	1	1	0	0	0	0,00	D	0,4	0	1,4	1	0,4	0,2	Е
0101	0	1	0	1	0	0	0	0,00	D	0,4	1	0	1	0,4	0,2	
0000	0	0	0	0	1	0	0	0,00	D	0,4	0	0	0	0	0,0	
0010	0	0	1	0	0	0	0	0,00	D	0,4	0	1,4	0	0	0,0	
0100	0	1	0	0	0	0	0	0,00	D	0,4	1	0	0	0	0,0	F
1000	1	0	0	0	0	0	0	0,00	D	1	0	0	0	0	0,0	-
1010	1	0	1	0	0	0	0	0,00	D	1	0	1,4	0	0	0,0	
1100	1	1	0	0	0	0	0	0,00	D	1	1	0	0	0	0,0	

¹ Developed by authors.
 ² Developed by authors.
 ³ Developed by authors.

 G_j – number of products, goods, services, produced by a new enterprise using an i-th resource for the period (i=1,...,6).

 A_i – number of accesses of a new enterprise to i-th flow in the process of products producing for the period (i=1,...6).

 R_{bi} – indicator characterizing a being in demand for i-th resource at a new enterprise while producing products (i=1,...,6):

$$\mathbf{R}_{bi} = \mathbf{G}_{j/} \mathbf{A}_{j}. \tag{1}$$

You can make an estimation of interest of a new enterprise in joining a cluster, focusing on the value of ranks determined in such a way. You can say that there is favorable for the future prospects level of demand of an enterprise for cluster resources and demand of a cluster for resources proving by an enterprise at higher values of the corresponding ranks, which would indicate an interest of a new enterprise in cooperation taking into account the demands of the new enterprise for cluster resources and taking into account offers of these resources by a cluster.

Mathematically, this will be expressed in assigning a value equal to one (in the opposite case - 0) to indexes of demand of an enterprise for cluster resources (I_{dbi}), demand of a cluster for resources proposed by an enterprise (I_{dci}), supply of the appropriate resource by a cluster (Isci) and supply of it by an enterprise (Isbi). As a result a base of a situational model of interaction strategy of the enterprise and the cluster on the basis of combinations of values of the chosen parameters is formed. The first step in the process of formation of such a model is the classification of typical situations. Based on the four obtained values of the variables of parameters and under conditions when one of two values (+/ -, 1/0) can be assigned to each of the variables of parameters, it is more reasonable to use a binary codification (Table 3).

The basis for the classification of situations is the index of the interaction potential, defined as the relative potential of interaction, which in its turn is defined as the sum of the product of indicators of the reciprocal supply and demand for the resources on the part of the enterprise and the cluster:

$$IPi = (I_{dbi}^* I_{sci} + I_{sbi}^* I_{dci}) / Pi_{max;}.$$
 (2)

Depending on the parameters' values that determine it, an index of interaction potential can range from 0 to 1. Based on the values of this indicator four situations can be distinguished to which the appropriate literal notations have been assigned (Table 3, direct estimation). Based on the obtained results the participants can select potential areas for development strategy or adjust existing ones at the moment. The situations of groups A and B can be considered as the most promising from the standpoint of interaction potential.

Obtained in this way typology to a certain extent allows to get a foretaste of the prospects of cooperation

between industrial enterprises and the cluster. However, you should not consider the received typology to be satisfactory due to two reasons. Firstly, situations where the supply and demand of the enterprise and cluster are unbalanced but positive (0001, 0011, 0101) will not be considered as promising at the application of this approach. Obviously, there is a cause and effect link between supply and demand, which creates a potential for the development of the situation in the direction of a formation of cluster interaction. Such a scenario is not required, however, and the presence of a specific interaction potential cannot be denied.

Secondly, at using this approach situations where supply and demand in the system "enterprise-cluster" are well-balanced, will be considered relatively more promising while the total potential of this interaction is relatively lower: for example, situation 1001 will be considered as a more promising, when there is a balance between supply and demand, although it is obvious that the situation 0111, when the supply of cluster resources is faced with lack of interest of the enterprise to it so far, is more promising. Consequently, a need for modification of the index of interaction potential for the purpose of taking into account indicated disadvantages has emerged.

Modification was performed by weighting indicators included in the index. The greater weight is assigned to values I_{dbi} and I_{dci} , reflecting the demand for resources offered by a cluster on the part of the enterprise and demand of a cluster for enterprise's resources accordingly. This operation a) takes into account the leading and decisive role of demand in relation to the supply, b) reflects a relatively big potential forming role of the demand, c) reflects the relatively higher development potential of situations characterized by imbalance of supply and demand, and d) takes into account the leading role of the cluster in the formation of interaction potential:

$$I_{dbi} = \begin{vmatrix} =1 & at \ presence \ of \\ demand \ and \\ =0,4 & at \ its \ diagnosable \\ absence \end{vmatrix},$$

$$I_{dci} = \begin{vmatrix} =1,4 & at \ presence \ of \\ demand \ and \\ =0 & at \ its \ diagnosable \\ absence \end{vmatrix},$$

A classification of situations, received on the basis of the value of weighted index of the interaction potential allows distinguishing a bigger number of possible situations, to each of which a literal notation is assigned.

Groups A (IPi = 1), which reflects the balance of supply and demand on the i-th resource, and B (IPi = 0,8) are the most favorable from the point of view of the development of the cluster interaction. A new company

can quite simply find its place among the enterprises of the cluster and i-th resource brought with it, is in demand in the cluster. The cluster has the i-th resource at its disposal, and the diagnosable absence of a demand for this resource on the part of the new enterprise may indicate an insufficient level of awareness of the synergistic potential of interaction with the cluster on the part of the latter.

Group C (IPi = 0,6) is characterized by a mutual interest of a new company and a cluster with a limited supply of resources on the part of the latter. This situation has a still high, but relatively less potential for development, as occurrence of such situations is typical for the period of the formation of the cluster and inconclusive formedness of the system of relations within it. Under certain conditions, this interaction is beneficial and sufficient.

In situations of group D (IPi = 0,4 supply and demand are close to balanced: there is a demand on the part of an enterprise and supply of the appropriate resource by a cluster. Regardless of the interest of the cluster in the resource proposed by an enterprise a situation is characterized by the presence of the interaction potential. Under real conditions a cluster and an enterprise favorably interacting on the i-th resource most often find themselves in a situation of this group.

Situations of group E (IPi = 0,2) are characterized by a willingness of a cluster to cooperate and a diagnosable lack of interest on the part of the company. A favorable interaction of a cluster and a new enterprise in this case is possible, but a favorable result will depend on the willingness of the participants (in the first place - companies) to make concessions and be adaptive under the conditions of limited supply and demand.

In situations, referred to a group F (IPi = 0) a lost interest of counterparties, is observed, expressed in the absence of flow of a required intensity level of the i-th resource in a cluster or in a new enterprise. Possible to say that there is a mismatch of supply and demand of the i-th resource in the cluster or a new enterprise. A new enterprise or cluster should review their capabilities and requirements, as it is more reasonable in a given situation to look for a new partner on retention of the current condition.

CONCLUSIONS

Thus, in the article it is shown that the participation of industrial enterprises in the cluster interaction is one of the almost mandatory conditions for increasing competitiveness of the region and the country as a whole. Under conditions when economic agents, formerly included in one economic complex are separated by national borders, the only possible form of effective cooperation is the creation of transnational industrial clusters. Within the framework of this article the results of situation modeling of backgrounds of interaction between an enterprise and an industrial cluster based on the chosen criterion of the index value of the interaction potential, which reflects the mutual supply and demand for different types of resources used at creation of the final product on the part of a cluster and an enterprise counterparty are disclosed.

REFERENCES

- Chandler A. 1990. Scale and Scope: The Dynamics of Industrial Capitalism. The Belknap Press of Cambridge, Massachusetts, USA and London, United Kingdom - 10.
- 2. **Coase R.H. 1937.** The nature of the firm. Economica, Vol 4. 386-400.
- 3. Schumpeter J. A. 1934. The Theory of Economic Development, New York. Oxford University
- 4. **Krugman P. 1997.** Good News from Ireland: A Geographical Perspective, in Grey, A.W. (ed.), International -Perspectives on the Irish Economy, Indecon Economic Consultants, Dublin. 38-53.
- Porter M. 1997. Clusters and the New Economics of Competition // Harvard Business Review. — November-December. - 78.
- Bergman E. 1998. Sustamability of Clusters Ten Do's and Don'ts. Vienna University of Economics and Business.
- Vinslav Yu., Dementiev V., Melentiev A. and Yakunin Yu. 1998. Development of integrated corporate structures in Russia // Russian economic journal. – № 11-12. – 28.
- Batchikov S. and Petrov Yu. 1997. Corporate sector in transitional Russian economics //Russian economic journal,— № 8. — 16.
- Avdasheva S. and Dementiev V. 2000. Joint stock and non-property mechanisms of integration in Russian business-groups // Russian economic journal,— № 1. — 14.
- Yakutin Yu. 1998. Corporate structures: variants of typologization and principles of effectiveness analysis // Russian economic journal. — №4.
- 11. Schmitz H. 1992. Industrial districts: Model and reality in Baden- Württemberg, Germany. Geneva, International Institute for Labour Studies, ILO.
- Sokolenko S.I. 2004. Clusters in the global economics. K.: Logos, – 848: 190 il.
- Ways of clusterization of economics for the purpose of competitive recovery of Zaporozhskaia region // International Foundation of market assistance (IFMA), -Kiev: OJSC «Ukrimpeks», 2010.

Regional and national food security: a case of Ukraine and Russia

O. Zhemoyda

National University of Life and Environmental Sciences of Ukraine, e-mail: alzhemoyda@gmail.com

Received June 21. 2013: accepted June 30. 2013

Abstract. We consider three levels of food security – national, regional and global. In our paper we will concentrate on first and second, because the global level depends on national food security of produsing and consuming countries, as well as consist on regional food securities of different parts of the World.

Key words: Food Security, National, Regional, Global, Indexes of Food Security.

INTRODUCTION

The problem of food security isactual for the World economy since early '90s, when the food supply were faced on society together with huge increasing of population in some parts of the world. There are a lot of different approaches and definitions we can found in literature. Here is the most frequently used of them:

• the capacity at all times to provide the world with staple products to support increased food consumption, while controlling price fluctuations;

• the capacity to reach the desired levels of consumption on an annual basis;

• a given capacity to finance import requirements to meet the desired consumption levels;

• assuring every individual at all times of physical and economic access to the food they need;

• access at all times by all people to the food they need for an active and healthy life (World Bank, 1994);

• a country and a people have food security when the food system works in such a way that no-one is afraid of not having sufficient food;

• when every person has, at all times, physical and economic access to meet their basic food needs. A national food security strategy cannot be contemplated without guaranteeing food security at the level of the home; • the capacity to ensure that the food system provides the whole population with nutritionally adequate food supplies over the long term (STAATZ, D'AGOSTINO&SUNDBERG, 1990);

• food security exists when the viability of the household, defined as both a production and a reproduction unit, are not threatened by a food deficit.

Two commonly used definitions of food security come from the UN's Food and Agriculture Organization (FAO) and the United States Department of Agriculture (USDA):

• Food security exists when all people, at all times, have physical, social [1] and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life [2].

• Food security for a household means access by all members at all times to enough food for an active, healthy life.

RESEARCH

Food security includes at a minimum (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability of acceptable foods in socially acceptable ways (with the exception of resorting to emergency food supplies, scavenging, stealing, or other coping strategies – USDA) [3].

All the definitions emphasize four types of development:

• from macro-level to the micro-level concern; from the notion of evaluating national food stocks, the concept has developed to the household level based on the perception of means of access [23] to the food resources created by the population;

• from concern to ensure an adequate level of supply, towards concern to meet the demand. Are the

O. ZHEMOYDA

physical and economic conditions of access adequate? In this stage, there is a shift away from a perception of food as such, towards a consideration of household living standards;

• the breakdown of household consumption reveals the vulnerability of certain sections of the population (women, children, the old) and have driven the search for household level security through the individual's food security;

• from a concern for short-term food security (one year) towards long-term food security (permanent). This development is the consequence of the emergence of the concept of sustainability linked to respect for the environment. [4]

Over these years, most of the definitions have converged towards a number of key words: satisfaction, access, risk, sustainability.

Folloving different authors, the level of risk for a household or a community depends on the modalities of access to food and on available capital. To minimize risks, the people use adaptation or reaction mechanisms at three levels:

• production (diversification, staggering, storage) for the rural population, changing the structure of the diet in case of urban dwellers (buying cheap food items);

• economic activities: increasing revenues by working in the formal, but above all the informal sector, or investing in non-productive assets (jewellery, clothing, livestock, liquid cash), exchanging humanitarian aid products for liquid cash or other assets;

• social relations: borrowing in cash or kind, mutual aid and support, multiple registration of the family with humanitarian aid agencies.

When these adaptation mechanisms are inadequate and threaten the household's food security, various things are done to deal with this unfavourable situation, in three stages:

• minimized risk strategy: informal activities by children, changing feeding patterns (urban gardening, reducing food rations, reducing the number of people that eating at home, consumption of cheap food away from home (Akindès, 1995), seeking support (from the family, relations, the community), selling unproductive assets;

• selling productive capital assets: tools, livestock or land in case of the rural population, and selling reserves, renting or selling house relating to urban dwellers;

• temporary migration of certain family members, followed by the permanent migration of the whole household.

DISCUSSION

The vulnerability of a population in a region suffering from crises depend both on the measures that can be implemented in a given context and on the households capacity to be able to respond to these events. The vulnerability of a population may be estimated by analysing the adaptation and reaction mechanisms and the way of they responding to a difficult situation. When the mechanisms are not effective the household becomes chronically vulnerable.

Sustainability: insecurity is temporary when the household is temporarily incapable of meeting the food requirements of the members of the family. It may be due to unexpected events occurring (insecurity for political reasons) or be seasonal because of logistical difficulties or high prices.

We do propose to measure the natioanl and regional food security level proceeding from two main conditions, mentioned above. For first condition – ready availability – we propose to evaluate the quantity of produced and imported products (market capacity) at the national and regional level. Differenciation for national and regional level gives us an opportynity to estimate the level of diversity and colmplementary for single product market.

Definitely, it is impossible to evaluate the full list of products, FAO make it accordingly to the quantity of grain storage. In our opinion in this research it would be useful to enlarge the number of products due to nutrition preferences for analysed region or country. The list of items is: cereal, potatoes, sunflower seeds, rice, sugar beet, vegitables, meat, cow milk.

It is also important to answer the question about the country-exporter's social responsibility for forming a stable proposition on the national, regional and world industrial markets. There exists a priority to supply the domestic markets with available and quality food products. Balance of interests of different countriessuppliers of resources and benefits is rather important. It is necessary to develop energy renewable resources. It could influence on the industry proposition formation.

We need to estimate the market situation, poverty and habits of consumers to define the ability on acquire foods in socially acceptable ways.

Here we also have to distinguish the availability, accessibility (wich depends on supply) and necessity (wichaffects on demand).

The problem of self-reliant food security strategy was a key for many countries, especially in the last decade. Food strategy was perceived as an ideal way of attaining a high degree of self-sufficiency by adopting an approach guaranteeing consistency, integration and synergy between actions that had hitherto been piecemeal [7].

Food self-sufficiency can be achieved in two ways: through self-reliant development, or development with an opening-up to the international market. The former is a protectionist approach, because it aims at meeting national needs through selective imports and a policy to set prices independently of world markets. The latter is based more on the theory of comparative advantages, and has given rise to the concept of food security. It is founded on three principles:

• each country must seek to establish an agrifood trade balance by encouraging international specialization;

• each country must encourage national food production under sound economic conditions;

• each country must ensure that the disadvantaged sections of the population retain adequate access to food.

The gained results will be of great importance from the side of social value (considering the food security problem that is becoming more crucial for the world community); political importance (considering the existing tendency for transformation of the world political view for joint responsibility in making important decisions and selection of direction for the further development of economical and social relations and meeting the social demand); and economical grounding (solving an important problem of counting the interests of consumers, producers, state, and in our situation also separate regions, and the respective influence on the world stability).

Here is one of examples of social-oriented activity of main food producing countries. Developed by regional economic integration organizations in response to the World Food Summit, with support from FAO, Regional Programs for Food Security promote integration and agricultural development among neighboring countries. Regional programs seek to:

• support food security activities in participating countries;

• promote investment to improve rural infrastructure; and

• harmonize food quality standards and trade regulations to enable local producers and traders to gain access to cross-border and global markets. [8]

The output of the global food crisis found its solution through increased funding, "World Food Program" (World Food Program-WFP). The budget of this humanitarian organization's activity is aimed at combating hunger in the world, formed by voluntary contributions and donations of the world, some businesses and individuals in 2009 was about \$ 6 billion., approximately the cost of Ukrainian grain exports (Table 1).

It is important to note that the cost of food, which in 2009 exported from Ukraine in the framework of this program, which is wheat, peas, corn and peas was \$ 64 million (5.1%) and is more than share of Russia, France and Belgium.

The shifting of self-reliant self-sufficiency strategies towards free market strategies can be put down to three causes [12]:

• loss of financial independence by governments, which was an essential condition for implementing a self-sufficiency policy. Export revenues have fallen back while the prices of foodstuffs and goods and services bought on the international market have soared. This upheaval in the terms of trade has had serious repercussions on governments' financial equilibrium;

• subsidies and demographic growth led to an increase in demand, but the inelasticity in the supply of agricultural products and the failure to control technology have pushed up food and technology imports. This has entrenched another kind of dependency, with repercussions on the national debt;

the difficulty of managing a self-sufficiency policy, which requires a consensus between the conflicting interests of different social groups. "Nothing could be further from the truth than the idyllic image of African societies based on community and mutual support and aid. These are certainly societies based on redistribution and on relationships, but they are run through with a number of oblique strategies, family, ethnic or personal rivalries and clan in-fighting, as well as unspoken opposition between the young and the old" [14].

Table 1. Participating countries in the World Food Programme - WFP, 2009

	Country	'000 U.S. dollars.	share,%
1.	Pakistan	214356	17.15
2.	Ethiopia	88416	7.07
3.	South Africa	65739	5.26
4.	Ukraine	63644	5.05
5.	Indonesia	60234	4.82
6.	Russian Federation	56378	4.51
7.	France	54870	4.39
8.	Belgium	51272	4.10
9.	Turkey	40492	3.24
10.	Italy	34386	2.75
11.	Uganda	33445	2.68
12.	Palestine	30856	2.47
13.	India	29489	2.36
14.	Malaysia	23454	1.88
15.	Canada	22077	1.77
Total o	f 15 countries	869109	69.53

Source: www.fao.org, FAO Statistical Yearbook 2010.

For now the food production is one of the most essential global problems requiring solution not only on the level of a separate country or region, but also on the global level. Combination of such factors as increase of population in some countries or some regions, increase of purchasing power, decrease of land usage for agricultural purposes, decrease of water resources tend to make production of the necessary amount of food products problematic. At the same time number of countries, net-exporters ("large" countries) are rather limited. Therefore value for each of these countries is gradually growing on the world food production market.

At the same time the issues of food security production, provision of enough amount of food products, of the relevant quality and for relevant price are becoming more and more important for every country in the world. Very often, during the period of rapid increase of the world prices, some countries introduce export reduction instruments, namely quotas or export taxes (mainly for grain) with the aim to stabilize the domestic prices.

The primary stage is generalization of the existing data base and selection of the research instruments. The next stage is a consequent analysis of the proposition formation in Ukraine, in Central and Eastern Europe and in the world containing the influence on consumption indexes, prices and availability of Ukrainian food industry. Furthermore, it is necessary to calculate the potential amount of industry production, coordinate the amount with the world demand production prognosis and calculate the amount of the resources necessary for the food industry production. Comparing the potential amount with the existing and potentially available in Ukraine it is possible to analyze the necessity and practicality of selecting the diversification and specialization of Ukraine's agri-industrial production and estimate the relevant economic effects for both producers and consumers.

The following research will need applying different instruments depending on the stage and achievement of a separate task. Modeling is used to determine Ukraine's influence on the regional and world agri-industrial markets. The modeling stipulates analysis of separate countries' markets and specifically the world market; a set of products (both complementary and substitute goods); trade terms or conditions, presence and amount of tax, quotas, export subsidies, application of interventions and either existing or planned level of state support.

As the research is based on the necessity of influence on the supply, the results of this research will be applied for the following stage: determining the level of effective resources usage, the main criterion of which will be non-economic efficiency.

Determination of the advantages of either specialization or diversification of the country's agriindustrial production exclusively relates to considering producers and consumers' interests. The following aspect of the research should use economic estimate of each of the directions of strategy formation and their influence on the social well-being.

The main indexes we use in our research are Indicators of regional specialization and geographical concentration of industry (The indicators used in this paper to analyze regional specialization and concentration of industries are defined in a way that is similar to Aiginger [3]. The dissimilarity index is a modified version of the index proposed in Krugman [21].

Table 2.	The	main	exporting	countries	(by 6	main	crops).	1999-2008
Labie 2.	1110	man	enpoining	countries	(v) = v	man	e rop <i>bj</i> ,	1/// 2000

COUNTRIES			(US\$ '000)		
COUNTRIES	1999-2001	2003-2005	2006	2007	2008
United States of America	10.039.729	11.798.336	13.575.475	21.255.229	29.096.897
France	4.151.339	4.980.965	5.015.145	6.686.403	10.025.642
Canada	2.971.431	2.924.720	3.982.985	5.602.992	8.577.653
Argentina	2.375.862	2.608.085	2.993.295	4.914.761	7.216.026
Thailand	1.758.139	2.365.300	2.659.948	3.597.938	6.350.902
Australia	2.886.061	3.085.593	3.522.895	4.560.333	4.571.315
Germany	1.514.356	1.585.853	1.893.585	2.483.345	3.870.204
Ukraine	472.084	878.392	1.356.697	1.066.807	3.828.273
India	863.587	1.744.283	1.706.547	3.588.086	3.493.220
Russian Federation	169.336	1.078.979	1.595.427	4.178.160	3.455.644
Viet Nam	774.468	1.033.454	1.276.265	1.490.208	2.900.400
Kazakhstan	421.032	513.394	741.313	1.635.086	2.483.075
Brazil	183.527	481.042	608.775	2.044.428	1.933.427
Hungary	291.783	476.049	756.906	1.636.071	1.855.557
Pakistan	579.872	817.279	1.247.384	1.331.729	1.738.998
Belgium	406.758	590.414	627.938	955.970	1.418.398
Italy	516.872	576.990	640.850	783.732	1.235.182
United Kingdom	549.288	649.637	554.552	746.580	1.117.467
World	36.009.771	44.585.839	51.913.148	79.283.905	108.542.060

Source: www.fao.org, FAO Statistical Yearbook 2010.

Tabl	e 3.	The	main	importing	countries	(by 6	i main crop)s),	1999-2008
------	------	-----	------	-----------	-----------	-------	-------------	------	-----------

COLINTRIES			(US\$ '000)		
COUNTRIES	1999-2001	2003-2005	2006	2007	2008
Japan	3.753.506	4.721.895	4.729.272	6.636.852	10.366.315
Mexico	1.642.497	1.929.275	2.442.928	3.106.248	4.563.281
Korea, Republic of	1.509.461	1.973.381	2.073.722	2.854.524	4.370.049
Iran, Islamic Republic of	1.397.523	884.016	785.122	1.069.568	4.054.894
Saudi Arabia	1.077.861	1.523.270	1.978.735	3.266.150	4.040.148
Spain	949.182	1.786.860	2.015.545	3.106.985	3.884.051
Algeria	990.848	1.310.094	1.385.953	1.829.017	3.623.707
Netherlands	873.582	1.278.531	1.588.185	2.780.442	3.584.093
Italy	1.317.013	1.771.605	1.893.495	2.803.324	3.523.666
Egypt	1.268.680	1.290.307	1.550.840	2.541.672	3.509.878
United States of America	994.594	913.042	1.218.715	1.734.667	2.934.005
China	1.627.809	2.661.436	2.150.668	2.229.982	2.831.137
Germany	622.985	928.210	1.102.182	2.039.088	2.754.144
Belgium	818.122	1.100.685	1.199.962	1.957.414	2.701.933
Brazil	1.284.900	1.174.551	1.491.186	2.007.410	2.672.114
Indonesia	1.219.599	1.125.625	1.372.348	1.985.046	2.471.205
Morocco	686.439	728.998	614.152	1.727.639	2.253.767
Turkey	324.383	468.515	167.492	973.273	2.137.842
Malaysia	625.803	732.952	975.821	1.315.944	2.009.613
United Arab Emirates	462.214	434.667	657.931	971.601	2.007.471
Iraq	931.035	749.549	1.090.419	1.147.005	1.915.482
United Kingdom	722.027	842.312	878.946	1.343.258	1.732.320
Colombia	411.536	605.582	868.657	1.192.858	1.654.349
Philippines	628.627	705.927	1.150.867	1.393.966	1.581.808
Yemen	278.825	433.861	587.125	910.127	1.320.004
France	457.365	581.662	560.847	978.804	1.286.437
Tunisia	293.005	353.040	433.234	932.034	1.216.742
Portugal	435.146	571.368	599.487	863.481	1.176.326
Peru	339.752	440.716	523.939	817.275	1.159.319
Venezuela	317.355	364.041	417.870	564.947	1.156.435
Canada	339.287	471.371	451.726	732.708	1.035.639
World	40.467.071	50.482.238	58.660.047	85.187.634	120.091.261

Source: www.fao.org, FAO Statistical Yearbook 2010.

The economic impact of regional integration can largely be classified under two categories: static and dynamic impacts. Two of the impacts are static: one is a trade creation effect, which argues intra-trade expansion due to the removal of trade barriers within the regions (GL index of Intra-Industry) and the other is a trade diversion effect, which argues that imports of efficient production from outside regions would be replaced by imports from inside regions (The dissimilarity indexes of specialization (DSR) and concentration (DCR)).

GL index of Intra-Industry (WOLFMAYAR-SHNITZER, 1998; BRUNHALT, 2001) - The size of intra – industry trade indicates the extent of the economic integration of one country. To this effect, we use in our analysis the Grubel-Lloyd (On theoretical considerations concerning intra-industry trade and the Grubel-Lloyd index, respectively, see [14, 15,26].

The dissimilarity indexes of specialization (DSR) and concentration (DCR) [4, 16, 20–21]. The main indexes we use in our research are Indicators of regional specialization and geographical concentration of

industry (The indicators used in this paper to analyze regional specialization and concentration of industries are defined in a way that is similar to [4].

The overall welfare impact of trade liberalization will be a result of complex interactions that include both effects. Those indexes concern the substitution of goods between internal and external markets. Reductions in the price of imported goods from certain economies - for example, those due to a bilateral FTA - could lower the average price of imported goods from the world market. This would stimulate the aggregated imports of those goods from abroad, substituting domestic products. On the other hand, it concerns the source of generic substitutes among different origins of economies. Removal of the tariff on imports from certain economies would stimulate those imports to substitute those from the other economies. The overall impact on the imports from outside regions would be determined by the relative significance of these two substitution effects. In fact, it is estimated that imports from outside regions would often increase in certain sectors.



Fig. 1. GL Index of intra-industrial trade



Fig. 2. The dissimilarity indexes of specialization (DSR) and concentration (DCR), 2000 - 2004

Regional specialization and geographical concentration of industries are defined in relation to structures (Overviews production of different specialization and geographic measurements for concentration of industries include [5,6]). Our research shows the important role of agriculture in economic development in all contributed countries. For some of them (such as Ukraine, Poland, Slovakia and Moldova) this is one of the most important branches. The manufacturing structure of all region is 'highly specialized', where a small number of industries have a large combined share in the total manufacturing.

Other side of the position of Ukraine at the European market is competition between producers, processors and traders. Increasing competition from the European companies definitely will lead to strong pressure on the Ukrainian agricultural industry. It can stimulate to modernize and improve production technologies. In can caused substantial reductions in employment in agriculture but increase employment in processing. In such case The Ukrainian agricultural industry will then be able to produce much more for lower prices with less input.

Modernizing Ukrainian agriculture also has the positive social impact of improving the quality of work, working conditions and possibilities for selfemployment through entrepreneurial activities in Ukraine's rural areas.

Wage increases and – in the long run – modernization of the agricultural sector will increase the disposable incomes of workers in rural areas and thus have a negative impact on the GINI coefficient (i.e. a positive effect on income equality). Whether the overall FTA impact will lead to converging incomes depends also on the FTA effects in the industrial and service oriented sectors.

An increased variety of food products, possible increases in fruits and vegetables production and better quality of food (because of higher SPS standards) are likely (in the longer run) to affect positively public health. The increase in income is correlating as well with better eating habits and a rise in the consumption of fruits and vegetables. Better health and safety standards are also likely to enhance the public health. Similarly the FTA is expected to include provisions aimed at improving the working conditions of the employees together with better equipment and new technologies. It will take time to adopt the new SPS and safety standards, so these effects would be long term effects. Improvements in the education level of the agriculture workers and producers are also expected with the implementation of new standards. The strength of these social impacts depends, of course, on the courage and decisiveness with which the FTA is implemented.

Labor migration out of the rural areas is a phenomenon that is currently happening. The FTA is likely to have negative effects on labour migration especially in the short run, with possible offsetting effects of rising earnings in the longer run. In the short run, transitional unemployment in agriculture will lead to the unemployed reallocating themselves to other sectors of the economy, i.e. construction or transport. This may also lead to geographical migration from rural areas to the cities. At the same time, many of the unemployed will not have an opportunity to leave their places of residence, which may - in the short run aggravate the poverty problem in rural areas. These trends should be of concern to the government and FTA in developing a strategy and negotiate policy provisions to alleviate poverty and generate employment in rural areas.

Agriculture is an important economic sector for most East-European countries. Such countries as Romania, Hungary, Poland, Slovakia, Moldova, Belarus and Ukraine heavily depend on the level of agricultural production and rural development in the structure of the economy. Some of these countries produce similar types of agri-food products and, therefore, compete in the European and World markets. In addition, most of these countries have a similar structure of agricultural production, and similar educational levels among employees in agriculture, percent of rural population, and government programs implemented in the last ten years. However, nearly every country has unique characteristics concerning agricultural production and place within the world market.

We expect that our results will be conducive to determination of the most efficient production patterns according to regional specifics and specialization. During the last 10 years, the level of specialization in different countries has changed in different directions. The new members of the EU start to differentiate the structure of the economy. On the contrary, Ukraine, Moldova and Belarus change the structure of their economies not so fast and continue to consider agriculture as one of the main sectors. On one hand, this tendency is quite negative relative to the pace of development of the neighbouring countries. On the other hand, the agricultural specialization gives Ukraine the chance to become a big player in some segments of the world market (cereal, corn, rapeseeds, etc.) and use the actual tendencies in the world market for own development of agriculture and rural areas based on business opportunities (as opposed to the supported agriculture in Europe).

Ukraine has its own commodities and market shares at the European and World markets and has very favorable conditions to improve its position. We have also obtained some positive trends in agricultural specialization of Ukraine relatively to its main competitors - neighboring countries (including Post-Soviet countries). Our research also shows that as far as long-term trends in comparative advantage are concerned, Ukraine will have a larger advantage in the production of unprocessed products (wheat, corn, sunflowers, rapeseeds, sunflower oil and rapeseed oil). Regional specialization of the Ukrainian agriculture heavily depends on the level of employment (in some regions more than 30% of capable people employed in agriculture) and on the historical trends (in some regions agriculture is the main industry, but GDP is extremely low). The same tendencies we observe in the other analyzed countries (Romania and Poland), but in Ukraine they are less observable than in other post-Soviet countries (Belarus and especially Moldova). Finally, as Ukraine is a large country with substantial differences in regional conditions, it would be useful to conduct the competitiveness analysis with regard to regions.

FOOD SECURITY INDICATORS

Ukraine has also developed standards physiological needs of the population of Ukraine in key nutrients and energy. Equally important are indicators of food security, quantitative and qualitative description of the state, dynamics and prospects for physical and economic access to food for all social and demographic groups, the level and structure of consumption, quality and food safety, durability and degree of independence of domestic food market, level of development of agriculture and related industries, as well as effective use of agricultural natural resources.

Methods of calculation the key indicators of food security approved by the Cabinet of Ministers of Ukraine. Mentioned resolution provides that the indicators characterizing the state of food security calculated by the following major food groups: bread and bread products, potatoes, vegetables, melons, fruits, berries and grapes, sugar, oil and meat.

Indicator 1.Sufficiency of public stocks in grain.

As of 31.12.2010 the actual availability of food grains in the public intervention fund was 1,105 tons, the amount of average annual domestic consumption of bread in terms of grain, according to statistics, amounted to 6,803 tons. Accordingly, the indicator was sufficient grain supplies 16 percent, despite the fact that the Law of Ukraine "On State Support of Agriculture of Ukraine" stipulates that public intervention fund in 2010 should be kept 20 percent of domestic consumption of grain [10].

Indicator 2. Determine the daily energy value of human diet.

In 2010 the average daily nutritional intake was 2933 kcal Ukrainian, almost 17.3 percent higher than the average rational criterion -2500 kcal., But compared to the year 2009 caloric value for population of Ukraine is still decreased by 0.4 percent. Thus, as in previous years, the bulk of calories consumed with the Ukrainian plant production. Instead, 27.6 percent of daily ration provided by consumption of animal products, and is almost 2 times lower than the established threshold criteria - 55 percent (as reference – in USA the recommended structure of "daily plate" is 45 % of animal production and 55 % - plant production).

In addition, the U.S. experience shows the need for a differential approach to the installation of energy intake. Specialists - nutritionists U.S. in 2010 were made by calculating the number of calories needed to maintain energy balance of different gender - age groups at three different levels of physical activity.

Indicator 3.Sufficiency of the specific product consumption.

The optimal situation is when the actual food consumption throughout the year meets the rational norm, ratio between the actual and reasonable consumption is equal to one.

In 2010 in Ukraine by the majority of main food consumption was found below the actual rational norms. Most lag the actual consumption of rational observed on fruits, berries and grapes - by 47 percent, milk and dairy products - by 46 percent, meat and meat products - by 35 percent, fish and fish products - by 27 percent. Despite lagging the actual consumption of certain food groups from rational norms, last year was marked increase in consumption of vegetables and melons Ukraine - by 6.4 kg of meat and meat by 2.3 kg per capita and consumption eggs and egg products for the first time since independence Ukraine has reached the level of rational norms - 290 pieces per person.

Of particular concern is the preservation of the trends of previous years to a reduction of average consumption of milk and milk products from 212.4 kg in 2009 to 206.4 kg in 2010 at a rational rate of 380 kg per person per year. The reasons for this are long-term crisis

in the domestic livestock industry, especially milk, which has led to shortages of raw milk ratio in the domestic market.

Over the three food groups, namely: "bread and bread products", "potato", "vegetable oil all" actual consumption exceeded rational norm (Table 4). However, such an excess of these groups is evidence of imbalance in food nutrition, which tries to ensure its energy needs through more affordable products.

Table 4. Sufficiency of the specific product consumption, kg per capita / year

Food	Rational norm (calculated MH of Ukraine)	Actual consumption in 2010	Adequacy indicator of consumption	reference: actual consumption in 2009
Bread and bread products	101,0	111,3	1,10	111,7
Meat and meat products	80,0	52,0	0,65	49,7
Milk and milk products	380,0	206,4	0,54	212,4
Fish and fish products	20,0	14,5	0,73	15,1
Eggs (pcs)	290	290	1,00	272
Vegetables and melons	162,0	143,5	0,89	137,1
Fruits, berries and grapes	90,0	48,0	0,53	45,6
Potato	124,0	128,9	1,04	133,0
Sugar	38,0	37,1	0,98	37,9
Vegetative oil	13,0	14,8	1,14	15,4

Source: State Statistic Agensy of Ukraine



Fig. 3. Comparison of wheat prices and average income in Ukraine, 2001-2011 Indicator 4. Food Accessibility.

According to the State Statistics Agency of Ukraine, in 2010, total expenditures of households (average household size in 2010 was 2.59 persons) amounted to UAH 3,072.72^{*} per month, by 11.6 percent increase against the previous year. Of the total household spending on food per month 1639.92 UAH against 1,426.1 in 2009.

Thus, the availability of food last year was 53.4 percent while its 60-percentage ceiling. To describe the level of accessibility of food we can use the Fig. 2. comparison the level of income in households and wheat prices per ton.

Compared to the year 2009 this figure declined by 1.6 percentage points. In the general structure of the cost of food the highest proportion of costs are: meat and meat products - 24 percent (389.76 USD. Of household), vegetables, including potatoes - 15 percent (247.36 USD.), Bread and bread - almost 13 percent (209.9 USD.), milk and milk products - 13 percent (212.79 USD.).

Indicator 5.Differentiation of the cost of food by social groups.

In 2010, 20 percent of households with highest income on average spent on food 1942.82 UAH per month, and 20 percent of households with the lowest incomes - 1503.34 UAH. Factor differentiating the cost of food by social groups was 1.29 against 1.38 in 2009, during the study period was a slight decrease in the differentiation of social groups in terms of food costs. At the same time during the year increased the number of persons in the lowest quintile from 11.4 million to 11.7 million, and in the highest quintile number of people declined (Table 5).

The indicator of the domestic market capacity is calculated as the average annual consumption of certain products and the average population, and is an important element for making up the demand and supply of food and determination of independence for individual products. Compared with the previous year in 2010 was a noticeable increase in capacity of the internal market in four groups of food, "meat and meat products" - by 4.1%, "eggs" - by 6.2%, "vegetables and melons" - by 4.3%, "fruits, berries and grapes" - by 4.9 percent (Table 6).

However, the reduction of average consumption has reduced the capacity of the internal market in five major groups of food, namely, by group, "bread and bread products", "milk and milk products", "fish and fish products", "vegetable oil" and "sugar" The negative trend of the past year is a reduction in the diet Ukrainian those types of food consumption are behind the rational norm (dairy and fish products).

Indicator 7.Food independence for separate product.

Meeting the needs of the population in food, the extent of its purchasing power in 2010 as in previous years, carried out mostly by domestic production. The most vulnerable positions in terms of import dependency positions are "fish and fishery products", "fruits, berries and grapes," "vegetable oil of all kinds," the share of imports from these groups in the total consumption respectively of 71.6, 51.3 and 46,9 percent at a 30-percentage threshold criteria for this indicator (Table 7).

Table 5. Differentiation of the cost of food by social groups groups (average kilo / month / person)

Item	Consumption by quintile the size of	(20%) groups depending on total income	Value of higher and lower quintile
	the first quintile (lower)	the last quintile (higher)	
Bread and bread products	8,40	9,65	1,15
Meat and meat products	3,55	7,10	2,00
Milk and milk products	14,00	25,55	1,83
Fish and fish products	1,30	2,35	1,81
Eggs (pcs)	17,40	22,25	1,28
Vegetables, potato, mashrooms	13,15	17,45	1,33
Fruits, berries and grapes	3,65	8,00	2,19
Sugar	2,45	3,60	1,47
Vegetative oil	1,55	2,00	1,29

Source: State Statistic Agensy of Ukraine

Table 6. Market capacity of individual products, thousand to

Itam	Marke	2010 in% by 2009	
nem	2010	2009	
Bread and Bread products	5105,9	5145,1	99,2
Meat and meat products	2384,0	2290,0	104,1
Milk and milk products	9469,8	9780,1	96,8
Fish and fish products	667,0	696,8	95,7
Eggs(millions pcs)	13279,6	12503,6	106,2
Vegetables and melons	6581,3	6311,8	104,3
Fruits, berries and grapes	2203,2	2100,7	104,9
Potato	5913,8	6125,8	96,5
Sugar	1704,0	1745,0	97,7
Vegetative oil	680,0	711,3	95,6

Item	Imports of products in 2010 in terms of primary product	Market capacity	The percentage of import-dependence
Bread and bread products	131,6	5105,9	2,6
Meat and meat products	378,0	2384,0	15,9
Milk and milk products	273,0	9469,8	2,9
Fish and fish products	477,6	667,0	71,6
Eggs(millions pcs)	311,0	6581,3	4,7
Vegetables and melons	1130,0	2203,2	51,3
Fruits, berries and grapes	30,0	5913,8	0,5
Potato	90,0	1704,0	5,3
Sugar	319,0	680,0	46,9
Vegetative oil	1,0	428,0	0,2
sunflower oil	428,0	450,0	95,1

Table 7. Food independence under a separate product, 2010

Source: State Statistic Agensy of Ukraine

Indicator 6. Market capacity of individual products.

It should be noted that a significant percentage of imports in the group "all vegetable oil" due to import of tropical oils, which are not produced in Ukraine (palm, coconut oil, etc.), but widely used in the production of food domestic food industry. Meanwhile, the local demand for sunflower oil was provided entirely by domestic production.

Last year, the dependence of the domestic market from imports of fish and fishery products increased by 6.3 percentage points, due to a decrease in fishing and extraction of other aquatic resources in inland waters, the volume of which in 2010 compared with the previous reduced by 14.9 percent.

Significant volumes of imports of fruits and berries fall on exotic types of fruits citrus fruits, bananas and more. At the same time is the growth of imports and of the fruits and berries, which are characterized by growing and Ukraine.

The whole research divided in several stages due to the fact that the study of this particular problem contains different aspects of agrarian economy and various agrarian economy instruments influence on the industry proposition in a separate country, region and in the world. The research is also related to the analysis of resources usage and analysis of economical effects depending on the country's diversification or specialization, along with the estimation of influence of a separate market on the external surrounding.

By the FAO statistics during last few years the four main crops (soybean, rapeseeds, sunflower and corn) cover more than 20 per cent of World arable lands (table 8). As we can see from the table 5, six main crops absorb more than 40 per cent of world arable land in use. It meant that exactly the same crops have to occupy at least 50 per cent in diet. And three of them (maize, soybeans and wheat) take over 33 per cent of arable lands. Another part of this problem appears in usage of crops in animal husbandry, means decreasing of food supply.

Also we still remember that any alternative energy sources program influents to market's demand and supply. On the other hand every country has to provide the energy security as well. Here the most important point is to use the all available resources (water, sun, wind, land, etc.) with the maximum effect.

Here is important to explain the results of table for North Africa and Near East – where the percentage of potential arable land in use more than 100 per cent – we do account the number of natural arable lands without usage of specificequipment (drop irrigation, etc.). Also we can see that the most potential ids the South and Central America region, but we have to mettioned that those territories in agricultural usage can cause damage to ecological balance in the region.

Following the data of World Resource Institute the potential arable land exceeds the actual arable land in use more than three times. It means that land resources can be used for development for further global food balance achivment. It is also important to consider the main World food producers and exporters, as far as both group of countries influent for world food balance.

commodity	2006	% in total	2007	% in total	2008	% in total	2009	% in total
Maize	148340,84	10,07	158358,33	10,75	160814,58	10,92	158628,75	10,77
Rapeseed	27441,40	1,86	29887,78	2,03	30659,71	2,08	31120,57	2,11
Soybeans	95308,37	6,47	90155,97	6,12	96480,63	6,55	99501,10	6,76
Sunflower seed	23975,18	1,63	21280,72	1,44	25031,41	1,70	23716,84	1,61
Wheat	211835,82	14,38	216704,93	14,71	222740,35	15,12	225622,45	15,32
Barley	56373,89	3,83	55730,91	3,78	56281,08	3,82	54059,71	3,67
Total	1472853,00	38,24	1472853,00	38,84	1472853,00	40,19	1472853,00	40,24

Table 8. World area harvested, 2006-2009, by items and total, ha

Source: www.fao.org, FAO Statistical Yearbook 2010.

Table 9. Actual and Potential arable land in World

	Total area	Potential arable land	Actual arable land	% of potent. arable land actually in use
Area	'000 km ²	'000 ha	'000 ha	%
Europe	6806,00	384220,00	213791,00	55,64
North America	19295,00	479632,00	233276,00	48,64
South and Central America	20541,00	1028473,00	143352,00	13,94
North Africa and Near East	11545,00	49632,00	71580,00	144,22
North Asia	20759,00	297746,00	175540,00	58,96
Sub-Saharan Africa	24238,00	1109851,00	157608,00	14,20
Asia and Pacific	28682,00	777935,00	477706,00	61,41
World	131866,00	4127489,00	1472853,00	35,68

Source: http://www.wri.org/publication/content/8426

CONCLUSIONS

In modern conditions of social development, financial and food crisis, level of agri-food production doesn't depends on renewable energy. But in nearest future this problem became to influent for food supply. So we have to evaluate the necessity of increasing the number of arable lands and balance the production of crops for food and for energy production. The main resourceshave to be used accordingly to the interest of country and region, but also considering the global stability.

For Ukraine it is extreamly important to run own agricultural policy basing the principles of political trust, macroeconomic stability, sustainable agri-food production, infrastructure and stable trade policy.

In the longer run the present situation will most likely have a positive effect on the level of earnings in the sector. This might keep the agricultural workers from migrating to other regions or sectors. As a result, working conditions of those employed will also improve which is another reason for not migrating. The restructuring of Ukraine's agriculture – that has already been initiated and will be further encouraged– can be seen as a necessary phase in Ukraine's transition and development that involves – often painful – adjustments for industries, regions and/or groups of people. Mitigating measures and development plans have to address these issues to bridge the gap between the short run pains and long run benefits.

There may be no economies that absolutely satisfy the condition of a "small" country assumption in a standard trade model. The terms of trade effects are relatively significant for determining the overall welfare improvements in partial trade liberalization like that from a bilateral FTA.

REFERENCES

 "Chapter 2. Food security: concepts and measurement". http://www.fao.org/docrep/005/y4671e/y4671e06.htm. Retrieved 2011-03-16

- "FAO Practical Guide: Basic Concepts of Food Security" (PDF). http://www.fao.org/docrep/013/al936e/al936e00. pdf. Retrieved November 13, 2011
- "Food Security in the United States: Measuring Household Food Security". USDA. http://www.ers. usda.gov/Briefing/FoodSecurity/measurement.htm. Retrieved 2008-02-23
- 4. Aiginger, K. et al. 1999, 'Specialization and (geographic) concentration of European manufacturing', Enterprise DG Working Paper No 1, Background Paper for the 'The competitiveness of European industry: 1999 Report', Brussels.
- Atkinson, S. J. 1992. Food for the Cities: Urban Nutrition Policy in Developing Countries, Department of Public Health and Policy, London School of Hygiene and Tropical Medicine, n° 5.
- Atkinson, S. J. 1995. Approaches and Actors in Urban Food Security in Developing Countries, Habitat Intel. Vol. 19, n°
 2. University of Manchester, United Kingdom.
- Berman, W.B. and Carter, S. 1993. Structural Adjustment and Trade Liberalization, its Effect on Marketing Institutions and Social Life. Published by Network and Centre for Agricultural M Marketing Training in Eastern and Southern Africa. FAO.
- Brilhart, M. 2001. 'Growing Alike or Growing Apart? Industrial Specialisation in EU Countries', in C. Wyplosz (ed.), The Impact of EMU on Europe and the Developing Countries, Oxford, Oxford University Press, 169-194.
- 9. Devereux, M., Griffith, R. and Simpson, H. 1999. 'The Geographic Distribution of Production Activity in the UK', Institute for Fiscal Studies Working Paper, W99/26.
- 10. http://ec.europa.eu/agriculture/healthcheck/index_en.htm, accessed on October 27, 2008
- 11. http://ec.europa.eu/food/food/intro/white_paper_en.htm
- 12. http://www.amad.org/pages/0,2987,en_35049325_350493 78_1_1_1_1_00.html
- 13. http://www.fas.usda.gov/psdonline/psdHome.aspx
- 14. http://www.wto.org/english/tratop_e/tariffs_e/tariffs_e.htm
- 15. IFPRI, 1995. A 2020 Vision for Food, Agriculture and the Environment, Washington D.C.
- Jonsson, U. and Brun, T. 1978. The Politics of Food and Nutrition Planning in Nutrition Planning. The state of the art, Joy L, Wood C (Eds). IPC Sciences and Technology Press Limit for USAID, London.

- Kawasaki K. 2007. The Impact of Free Trade Agreements in Asia // RIETI Discussion Paper Series 03-E-018, September // http://www.rieti.go.jp/jp/ publications/ dp/03e018.pdf
- Kane, H. 1995. Feeding the World's Cities. Worldwatch Institute, Washington, October 1995.
- 19. **Kracht, U. 1995.** Short and Long Term Food Security. Economies etSociétés, 22 (3-4), 67-75.
- 20. **Krugman, P. 1991.** Geography and Trade, Cambridge: MIT Press.
- Krugman, P. 1991. 'Increasing returns and economic geography', Journal of Political Economy, vol. 99, pp. 484-499.
- Midelfart-Knarvik, K.H., Overman, F.G., Redding, S.J. and Venables, A.J. 2000. 'The Location of European Industry', Economic Papers no. 142 – Report prepared for the Directorate General for Economic and Financial Affairs, European Commission.
- Sen, A. 1981. Poverty and Hunger: Issues and Options for Food Security in Developing Countries. World Bank Policy Study, Washington.
- 24. Staatz, J.M., D'Agostino V.C. and Sundberg, S. 1990. Measuring food security in Africa: conceptual, empirical

and policy issues. American Journal of Agricultural economics, December, 1311-1317.

- 25. **Tickner, V. 1995.** Employment and food crop/food marketing. Food Policy, vol. 20, GAMCO-UK.
- 26. Wolfmayr-Schnitzer, Y. 1999. 'Economic integration, specialization and the location of industries: A survey of the theoretical literature, WIFO Working Paper No. 120, WIFO-Austrian Institute of Economic Research, Vienna.
- 27. World Bank and OECD (2004): Achieving Ukraine's Agricultural Potential: Stimulating Agricultural Growth and Improving Rural Life. OECD and the ESCCD, Europe and Central Asia Region, the World Bank.
- Zhemoyda O. and Pavlenko O. 2008. Place of Ukraine at the European economic integration processes// Konkurencieschopnosť a ekonomickýrast: Európske a národnéperspektívy// Zborníkvedeckýchprác / Slovenská poľnohospodárskauniverzita v Nitre – CD, 375-381 (ISBN 978-80-552-0061-3)
- 29. Zhemoyda O., 2007. Prospects of regional development of agrarian production in Ukraine according to the integration processes// Annals of the Polish Association of Agricultural and Agribusiness Economists, Vol. IX, No 1, 580-584

Table of contents

I. Alexeev. O. Voloshyn, Formation of Compensation Mechanism of Regional Enterprises'	
Human Resources Regeneration in the Labor Potential Development System	3
I. Alieksieiev, O. Belyayeva, M. Yastrubskyy. Nonlinear regression model of the formation of the loan portfolios of the banks in Central and Eastern Europe	9
V. Batluk, M. Basov, V. Klymets'. Mathematical model for motion of weighted parts in curled flow	17
N. Chukhray. Business vertical integration in Ukraine: motivation, advantages and disadvantages	25
N. Kalyuzhna, K. Golovkova. Structural contradictions in control system by enterprise as function of associate administrative decisions	33
E. Korenyev. Implementation of corporate social responsibility in the process of strategic management	41
O. Kuzmin, O. Pyrog. Modeling of investment development of national economy of Ukraine on basis of regression analysis	47
I. Oleksiv, G. Mykhailyak. The Formation of the System of Evaluation of Enterprise Workers' Competence	53
Yu. Ryshkovets, P. Zhezhnych. Information model of Web-gallery taking into account user's interests	59
N. Shpak, O. Goryachka, M. Adamiv. The role of innovative creative collectives in anticipatory management of enterprises	65
A. Voronkova, K. Zelenkina. Situation modeling of interaction between enterprises	71
O. Zhemoyda. Regional and national food security: a case of Ukraine and Russia	77

List of the Reviewers

I. Vytvytska O.D.

- 2. Kniaz S.V.
- 3. Klymash S.V.
- 4. Voronkova A.E.
- 5. Podolchak N.Yu.
- 6. Klymash M.M.
- 7. Lytvin V.V.
- 8. Shpak N.O.
- 9. Kuzmin O.E.

Editors of the "Econtechmod" magazine of the Commission of Motorization and Energetics in Agriculture would like to inform both the authors and readers that an agreement was signed with the Interdisciplinary Centre for Mathematical and Computational Modelling at the Warsaw University referred to as "ICM". Therefore, ICM is the owner and operator of the IT system needed to conduct and support a digital scientific library accessible to users via the Internet called the "ICM Internet Platform", which ensures the safety of development, storage and retrieval of published materials provided to users. ICM is obliged to put all the articles printed in the "Econtechmod" on the ICM Internet Platform. ICM develops metadata, which are then indexed in the "BazTech" database.

Impact factor of the "ECONTECHMOD" quarterly journal according to the Commission of Motorization and Energetics in Agriculture is 0,58 (June 2013).

Volume financially supported by Lublin Scientific Society (LTN)



GUIDELINES FOR AUTHORS (2013)

The journal publishes the original research papers. The papers (min. 8 pages) should not exceed 12 pages including tables and figures. Acceptance of papers for publication is based on two independent reviews commissioned by the Editor.

Authors are asked to transfer to the Publisher the copyright of their articles as well as written permissions for reproduction of figures and tables from unpublished or copyrighted materials.

Articles should be submitted electronically to the Editor and fulfill the following formal requirements:

- Clear and grammatically correct script in English,
- Format of popular Windows text editors (A4 size, 12 points Times New Roman font, single interline, left and right margin of 2,5 cm),
- Every page of the paper including the title page, text, references, tables and figures should be numbered,
- SI units should be used.

Please organize the script in the following order (without subtitles):

Title, Author(s) name (s), Affiliations, Full postal addresses, Corresponding author's e-mail

Abstract (up to 200 words), Keywords (up to 5 words), Introduction, Materials and Methods, Results, Discussion (a combined Results and Discussion section can also be appropriate), Conclusions (numbered), References, Tables, Figures and their captions

Note that the following should be observed:

An informative and concise title; Abstract without any undefined abbreviations or unspecified references; No nomenclature (all explanations placed in the text); References cited by the numbered system (max 5 items in one place); Tables and figures (without frames) placed out of the text (after References) and figures additionally prepared in the graphical file format jpg or cdr.

Make sure that the tables do not exceed the printed area of the page. Number them according to their sequence in the text. References to all the tables must be in the text. Do not use vertical lines to separate columns. Capitalize the word 'table' when used with a number, e.g. (Table1).

Number the figures according to their sequence in the text. Identify them at the bottom of line drawings by their number and the name of the author. Special attention should be paid to the lettering of figures – the size of lettering must be big enough to allow reduction (even 10 times). Begin the description of figures with a capital letter and observe the following order, e.g. Time(s), Moisture (%, vol), (%, m^3m^{-3}) or (%, gg^{-1}), Thermal conductivity (W $m^{-1}K^{-1}$).

Type the captions to all figures on a separate sheet at the end of the manuscript.

Give all the explanations in the figure caption. Drawn text in the figures should be kept to a minimum. Capitalize and abbreviate 'figure' when it is used with a number, e.g. (Fig. 1).

Colour figures will not be printed.

Make sure that the reference list contains about 30 items. It should be numbered serially and arranged alphabetically by the name of the first author and then others, e.g.

7. Kasaja Ó., Ázarevich G. and Bannel A.N. 2009. Econometric Analysis of Banking Financial Results in Poland. Journal of Academy of Business and Economics (JABE), Vol. IV. Nr I, 202–210.

References cited in the text should be given in parentheses and include a number e.g. [7].

Any item in the References list that is not in English, French or German should be marked, e.g. (in Italian), (in Polish).

Leave ample space around equations. Subscripts and superscripts have to be clear. Equations should be numbered serially on the right-hand side in parentheses. Capitalize and abbreviate 'equation' when it is used with a number, e.g. Eq. (1). Spell out when it begins a sentence. Symbols for physical quantities in formulae and in the text must be in italics. Algebraic symbols are printed in upright type.

Acknowledgements will be printed after a written permission is sent (by the regular post, on paper) from persons or heads of institutions mentioned by name.