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METHODOLOGICAL FOUNDATIONS OF ECONOMIC EVALUATION OF TECHNOGENIC LOSSES OF NATIONAL ECONOMY

Abstract. The article considers world's modern approaches of evaluation of technogenic losses from permanent and emergency environmental contamination (emissions, discharges, wastes), and investigates their advantages and disadvantages. The article justifies methods of fuzzy sets theory for complex economic evaluation of technogenic losses of national economy and necessity of these methods under the circumstances of vagueness and lack of information. The article also suggests the heterodox approach to economic evaluation of anticipated technogenic losses of industry branches by analyzing the risks of possible losses by means of fuzzy logic and neural networks.

Key words: economic evaluation, technogenic losses, fuzzy sets theory, national economy, risks of possible losses.

The problem of effective management of the national economy is directly related to the problem of economic evaluation of the losses, harm and damages (in actual and costly forms) that are caused by constant destructive influence of economic activities on the environment and society. In addition, morally outdated production technologies create high degree of system pollution (under normal management conditions) and extremely high degree emergency environmental damage (the onset of an emergency), the decline in the viability of labour resources or destruction of main productive assets. All this leads to an increase in technogenic losses in the national economy. Of particular **topicality** is the problem of constructing a modern approach to the economic evaluation of technogenic losses in the national economy and the formation of the appropriate methodology in the management system of the national economy.

Analysis of recent researches and publications shows that the prominent contribution to the formation of the theory of the national economy function and the theory of economic damage was done by such world's scientists: A. Afanasiev, K. Hoffmann, A. Gusiev, G. Daly, P. Drucker, A. Enders, C. Kuzniets, V. Leontiev, A. Marshall, J. Meadows, G. Motkin, I. Potravny, R. Coase, T. Panayiotou, V. Pareto, F. Perroux, A. Pigou, R. Richter, W. Rostow R. Hawtrey and others. An important contribution to the solution of problems of economic damage evaluation was conducted by leading Ukrainian economists: A. Amosha, A. Balatskiy, B. Burkynsky, J. Vytvytsky, V. Gejets, B. Danylyshyn, S. Doroguntsov, S. Illyashenko, A. Zahorodniy, O. Kraynyk, O. Kuzmin, L. Melnyk, E. Mishenin, J. Petrovych, V. Soloviov, Y. Stadnitskii, V. Tregobchuk, J. Tunytsya, A. Fedoryshcheva, L. Fedulova, S. Kharichkov, V.Shevchuk and others.

However, despite the significant amount of the works on the economy and national economy management, the issues of economic evaluation of technogenic losses caused by economic activity of enterprises and the consequences of technogenic emergencies have been studied insufficiently. Research of opportunities of the fuzzy sets theory methods and means of neural networks for prediction of risks of potential losses due to extreme (emergency) situations in the system of economic management are fragmented.

The research of theoretical and applied methodology basis of loss evaluation leads to the statement of such **objectives of the work**: the formation of the modern approach to the complex

economic evaluation of technogenic losses of the national economy.

Scientists of Lviv Scientific School under the guidance of prof. Kuzmina, O.E in the work [1, p.73-106] view the development of evolutionary economics based on the theory of growth returns by P. David and B. Arthur (theory of positive feedback), where the success of the company depends on the previous development path. At the end of the twentieth century, scientists of Sumy Scientific School under the guidance of prof. Balatskiy O.F laid the foundation for determining the damage caused to the environment in fundamental scientific works [2, 3], where they substantiated the necessity of considering the impact of atmospheric and water on the main indicators of the national economy. It is obvious that the damage inflicted by economic activity in previous time periods affects the national economy in the future. That is why today in the world the search is conducted for new approaches to complex economic evaluation of technogenic losses in the national economy.

The source of technogenic losses is the productive and economic activities of enterprises. This enterprise itself as a system at micro-level is at the same time a subsystem at macro-level, so the development of such complex organizational and productive systems is diverse and varied. Mostly the development of these organizational systems is connected with the development of innovational, productive, supply and marketing activities of a business entity. As proved in the work [4, p. 12–15], a key role in solving classical problems of capacity utilization is played by "methodological approaches of target-oriented planning of their use improvement and bases of forming of economic mechanism of their use." In the past century there were found laws of national economies development, examining the relationship between economic dynamic factors [5, p. 222–225]: 1) the development of STP, 2) existing natural resources, 3) population growth, 4) characteristics of investment (fluctuations in investment, its impulse nature of the investment), 5) a function of consumption and so on. It allowed to form a theory of uneven shocks [6, p. 122–125], where the economic system is characterized by fading fluctuations of income, and its equilibrium is disturbed by external stimulus (the Schumpeter impulse). In his outstanding research work, S. Kuznets [6, p. 124–128] studied the relationship between the release of the final product, capital formation and savings and income distribution among different segments of the population. The author established the existence of a cyclic component in the dynamics of production and prices, determined its time as greater than normal duration of the economic cycle, but less than the period of the Kondratiev's long waves.

In 1995 it was first examined environmental component in predicting of trends in the national economies of states. For example, Grossman and Krueger established the converse domed relationship between the pollution and income per capita. This curve is called the environmental Kuznets curve in honor of his achievements in the study of the laws of economical growth of national economies. Environmental Kuznets curve resembles an inverse parabola between the income growth and the environmental quality. In low-income countries the environmental quality gets worse with increasing incomes of population, while in high-income countries on the contrary – the environmental quality improves according to population income growth [7].

Installation of such relationship between economic growth and deterioration (improvement) of the environment determined, on the one hand, the need to find ways of developing the national economy, including: 1) technological restructuring of production, 2) the elimination of outdated primary means, which threaten accidental pollution of the environment, 3) implementation of eco-innovations of technical and organizational nature, 4) the development of high-tech industrial techno-logies etc. On the other hand, in the collective monograph [8, p. 18–22, 309] the problem of the national economy development is solved by constructing a concept of prognosis and evaluation of the structure of the national economy efficiency by aspects of economic activity.

Therefore, the modern trends of national economy are connected with prognostication of economic phenomena that are of evolutionary nature and cannot always be merely described by traditional instruments. To solve the problem of evaluation of such parameters as stability and risk of the economic systems functioning, the authors of the work [9, p. 6–25] consider that there should be applied modern instruments of systems theory, catastrophe theory, chaos theory and the concept of synergetic interaction of evolutionary systems. There arises a need for new approaches and methods for description of real economic processes

of organizing and self-organizing of economic systems, evaluation of technogenic losses from pollution, influence of harmful factors on economy, nature and population. As emphasized in the work [10], an instrumental basis for solving the specified problems of the practical economic are concepts and models, borrowed from nonlinear thermodynamics, the theory of fractal analysis, self-organizing, regularities of fuzzy logic patterns and properties of neural systems, adapted to existing conditions of heterodox economics.

This property of self-organizing was used at the end of the past century by S. Bir in the work [11, p. 222–225] to construct a model of economic viability of the economic system along with the properties of integrity and coherence of all the elements and availability of feedback in it. Such management system was defined by S. Bir as a system that has the ability to store and maintain an independent existence infinitely. The main property of socio-economic systems, considered by the authors of the work [12], is their resistance to external influences, as well as internal disturbances inherent to any changes of system elements and relations between them.

Let us compare the advantages and disadvantages of the classical approaches and heterodox (unconventional) approaches to economic evaluation of technogenic losses according to their methodological foundations. The damage done to the environment and society by economic activities of enterprises creates aggressive external influences as for the business entities itself, and for the national economy in general. This, in turn, determines disruption of stability of economic systems functioning, reduction of technological safety levels and, consequently, increases risk of emergencies or accidents occurrence. The consequences of such emergency contamination are described in economics as amounts of technogenic losses. Economic evaluation of technogenic losses and their levels allows also to establish levels of the national economy stability.

Let us consider classical approaches to economic evaluation of technogenic losses of the national economy, which can be divided into two classes: the approaches that evaluate the damage to the primary recipients and approaches, that determine damage experienced by the national economy and its branches as a result of aggressive environmental factors activity.

The classic example of sustainability definition on the level of industrial and economic system is a technological approach [13], which deals with external factors of environment and internal factors of main productive assets functioning (resources, equipment, etc.).

At the level of the national economy of Ukraine economic evaluation of destructive influence of economic activity of enterprises on the environment, the economy and the population is based on two main alternative approaches, where the first takes into account the actual (full) evaluation of damage done, and the second – preliminary costs to prevent possible damage. In addition, the methods for estimating technogenic losses from systemic disorders, conned with usual economic activity differ from the methods for estimating technogenic losses from random dangerous technogenic processes (as a result of emergencies or accidents). Among the classical approaches to economic evaluation of technogenic losses of the national economy the most common are approaches of direct and indirect calculation.

The nature of each of these approaches is considered in detail in previous works of the author [14–18], the advantages and disadvantages are presented in Table 1.

Comparison of classical approaches to the economic evaluation of technogenic losses in the national economy

The name of the approach	Advantages	Disadvantages
Direct calculation	1. Determination of actual, factorial and recipient losses. 2. Establishing of root cause relationships between factors of influence and indexes of the national economy and the environment development.	1. Large volumes of output value. 2. Cumbersome calculations. 3. Expert surveys of damage amount.
Indirect calculation	1. Using of multivariate analysis 2. Linking of variables losses (functional and factorial). 3. Calculation of average and specific values of economic losses (losses on damaged or destroyed unit of 1 m^2 area, on 1 km length of connecting line, etc.).	1. The generalized nature. 2. Generating of source of output statistics data on the results of damage evaluation. 3. Limited application.

The international organization UNEP [19] recommends to use two separate types of waste streams for the evaluation of amount of region's solid wastes (in natural and valuable forms) – solid wastes created by economic systems (production, research institutions, treatment plants) and municipal management (catering, building companies, etc.). The advantage of this approach is to determine the amount of solid waste in quantitative measures and their average values that can predict future volumes separately for each industry branch (service). Disadvantages of the approach of solid waste streams are its separation and the need to calculate the ratio of solid waste at the input and output of the manufacturing process.

Economic evaluation of technogenic losses caused to the national economy is concerned with the evaluation of damage from pollution, harmful factors influence on the economy, nature and population. Developing the idea previously outlined in the work [20], in terms of the classical approach there should be used a modern method of evaluating technogenic loss in industry in terms of total streams technogenic waste. The concept of technogenic wastes [20] is defined as air emissions, discharges into water bodies, pollution, liquid and solid industrial waste, business waste and wastes generated by consumption of enterprise, and describes all kinds of lost substances, materials or energy, which are formed as a result of any economic activity and the action of natural forces, and cannot be used fully with their primary purpose in given place and at given time.

Method of evaluation of tecnogenic damages in the national economy in terms of total tecnogenic waste streams of separate industries is built on previous works of the author [20, 23] on the basis of the classification system of economic activities, which is used in Ukraine since 2012 (NACE 2010 DK 009:2010) [24] and meets requirements of International Standard Industrial Classification (ISIC) [25]. The advantage of the method previously proposed by the author in [20, 23] is calculation of the total tecnogenic waste streams of the national economy, which is held in physical and of value terms, and in terms of energy. The disadvantage of the proposed approach is the need for additional expert researches of technologies to calculate the weight coefficient with the coordination of quantities in physical, valuable and energy forms.

It is obvious that to evaluate the appropriate level of technogenic security of economic sectors, of the reliability and efficiency of the national economy, the quality of society life and good environmental features, the classical approaches are insufficient. It is necessary to evaluate the entire amount of both incurred and projected technogenic losses, damages and costs in various industries. Heterodox approach to complex evaluation of technogenic losses in the national economy can be based both on the results of the evaluation of technogenic losses on total anthropogenic waste streams of the specific sectors of the economy, and on the achievements of the theory of fuzzy sets and neural networks for evaluation of the predicted technogenic losses.

Therefore, in order to form heterodox approach to the evaluation of projected technogenic damage in the national economy, first there should be define the basic concepts of the fuzzy sets theory and their economic content.

Environmental management system, as described in [26, p. 389], is usually formed considering in the direct relationship of the environmental risk with the environmental damage, the result of which they are. Simply, the determination of the risk index, that is the occurrence of certain damages, in [26, p. 393] is described by the formula (1):

$$R_i = p_i \times Q_i, \text{ where } i = 1, \quad m,$$

where p_i – probability of the i-th species loss; Q_i – value of possible losses of the i-th species; m – number of species loss.

Thus, the problem of complex evaluation of technogenic losses (both systemic and non-systemic) in the case of violations of environmental, economic or social status of economic systems (national economy, enterprise) can be considered as a probabilistic process. Theory of probability, according to [27, p. 122], is based on the probabilistic measure and is a partial case of fuzzy sets, and fuzzy sets theory uses as fuzzy membership function the distribution of fuzzy set possibility and is a partial case of fuzzy sets theory. Thus, the theory of fuzzy sets provides more opportunities to build methodological foundations of evaluation of technogenic losses.

Fuzzy sets allow considering not only the uncertainties of the statistical, but also of linguistic nature. Fuzzy description is formed by a set of rules,

which for the smallest possible list make the fullest description of the system, with no need of full coordination. Another advantage of the fuzzy description is the ability to process data, received for the short time period (fuzzy numbers) and work with linguistic variables, that is variables whose values are words or expressions of natural or artificial language, thanks to a discovery made by the founder of the fuzzy logic theory Lutfi Zadeh in [28].

Therefore, based on the foregoing, let us suggest for the formation of methodical bases of evaluation of technogenic losses, caused by accidental violations at the objects of the national economy, for application of heterodox approach based on fuzzy logic and fuzzy sets, which allows real (quantitative and qualitative) evaluation of the economic, environmental and social disruptions of the national economy.

In the scientific literature in economics there are known successful attempts of using fuzzy logic to solve similar problems, in particular the authors of the work [9, p. 57–65] used fuzzy logic for solving the problem of accidents risk at the landfill of solid wastes.

To construct an approach to the evaluation of technogenic losses, arising from the operation of the facilities of the national economy, let us use the basic principles and laws of fuzzy sets theory, which are set out in the basic works on this problem [28, p. 17–63, 29, p. 117–191, 30, p. 12–84]. The feature of heterodox approach is the use of fuzzy-logical result, and its main stages we considering the following (Fig. 1).

1. The stage of definition of linguistic values of variables and membership functions, required for formalization, called fuzzyfication of variables.
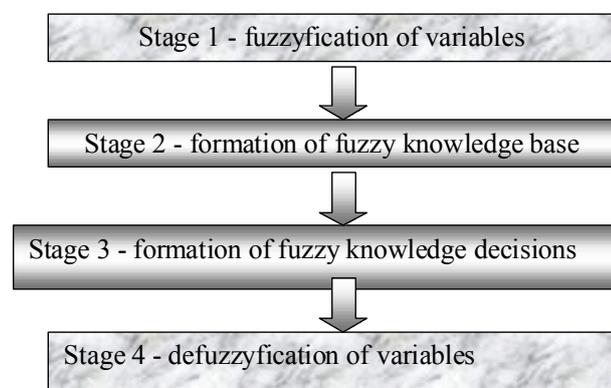

Fig. 1. Main stages of fuzzy-logical result in heterodox approach to the evaluation of technogenic losses in the national economy

2. The stage of formation fuzzy knowledge base, which creates fuzzy conditional rules for conversion fuzzy data into fuzzy action (controlling influences), according to the principle of "if-then".

3. The stage of fuzzy decision-making, where a fuzzy output after the fuzzy control actions according to fuzzy rules from the knowledge base.

4. The stage of transformation of fuzzy data from the output stage of fuzzy decision into precise quantities (quantitative or qualitative) used in the economic environment, called defuzzyfication of variables.

Let us briefly consider each stage of fuzzy-logical conclusion in heterodox approach to the evaluation of technogenic losses.

1. The stage of definition of linguistic values of variables and functions corresponding for their formalization of membership functions requires the selection of elements (and their sets) with the whole problem area. Let the set P – a complete set, covering the entire problem area (the formation of technogenic losses in the national economy). Fuzzy subset F of the set of P factors of technogenic losses is determined by the membership function $\mu^{F}(p)$, where p – an element of the universal set, that is p ∈ P.

The function of reflecting elements of the set P on the set of numbers in the range [0, 1], which characterize the degree of membership of each element $p \in P$ to a fuzzy set F, whereby $F \subset P$. If the full set P covers finite number of sets of elements $p_1, p_2,.....,p_n$, then the fuzzy subset F can be represented as (2):

$$F = \mu^{F}(p_1)/p_1 + \mu^{F}(p_2)/p_2 + ... + \mu^{F}(p_m)/p_m =$$
$$= \sum \mu^{F}(p_i)/p_i . \qquad (2)$$

In our case, the object of study is the factor formation of technogenic losses in the national economy, which are described at the input n variables $x_1, x_2, … x_n$, and at the output – in one variable y (the level of technogenic losses, or technogenic loss ratio) by the formula (3):

$$y = f_y(x_1, x_2, … x_n), \qquad (3)$$

where $x_1,….x_n$ – set of input variables; y – the corresponding value of the output variable.

To solve the problem of economic evaluation of technogenic losses in the national economy it is necessary to develop a method of fuzzy decision making as a result of all the stages of fuzzy-logical conclusion (see Figure 1). For this a specialist in

the delineated area of research (expert analyst) creates a separate set of parameters $X = \{x_i\}$, where $i = 1, \ldots, N$, which is the most important indicator for the evaluation of technogenic losses (otherwise the index of risk of emergency pollution or systemic damage application). In formalized language, that means to a fixed vector of input variables $\vec{X} = \langle \vec{x}_1, \vec{x}_2, \ldots, \vec{x}_n \rangle$, $\vec{x}_i \in P_i$ it should be definitely put in correspondence a solution $\bar{y} \in Y$ (for an object with a discrete output). The expert analyst must choose values according to their significance for the evaluation of technogenic losses; take into account various sources of losses, the impact of different recipients of influence (environment, society, economy) and others. Thus, the set of all indices to assess complex measure of losses may include both qualitative and quantitative criteria and $x_1, x_2, \ldots x_n$.

Fuzzy descriptions of the structure of the method of technogenic losses evaluation from emergencies occur in connection with the expert's uncertainty arising during the various classifications. The expert creates a linguistic variable with its term-set values. In our case, the variable "level of damage" can be described as term-set of values {Very Low, Low, Medium, High, Very High}. For structural description of the linguistic variables, the expert selects the corresponding quantitative feature – for example, a designed in a definite way specified index value risk of danger that takes the value from zero to one. Then the expert chooses the corresponding quantitative trait for a linguistic variable, in our case, it may be an indicator of the value of technogenic losses of certain danger occurrence (harmful effects, pollution, etc.). Among the known functions after the recommendations of Nedosyekina A.O. set out in [31], there are mainly used trapezoidal membership functions. Then the trapezoidal membership function is written in an analytical form (expression or expression system). This is the end of the first phase of fuzzyfication of variables.

2. The stage of formation of fuzzy knowledge base is to construct formal fuzzy conditional rules for converting formed in the first stage fuzzy data into fuzzy actions (controlling influences) according to the principle of "if-then". Forming a set of rules, in fact, is created by an expert system based on fuzzy knowledge, where the adoption of fuzzy-logical conclusion will be made. In this case,

there will be made the conclusion about the level of losses, arising as a result of the functioning of the national economy on the basis of all the necessary initial information received in the course of research. At this stage, the formation of fuzzy knowledge is being held. The process of fuzzy-logical conclusion is important itself. In the simpler cases, this can be a table with a set of decision rules, and in more complex cases – fuzzy-integral convolution. It is important, that the mathematical framework, which lays in the mechanism of the conclusion, identifies features of all the other stages of expert system. Notable examples of expert shells, as a mechanism of fuzzy-logical conclusion, as described in [32] is used a sequence (in terms of hierarchy of knowledge base) of fuzzy-integral convolution after Sugeno. Each fuzzy integral is a mechanism of elementary comparison. It receives input from one side – expertise knowledge (a standard) as a distribution point for a given fuzzy set, on the other hand – the current expert review as a distribution of membership function in this set. This feature of the use of Sugeno fuzzy integral defines the benefits of expert shell, suggested in [32].

3. The stage of fuzzy decision-making, in our case, is done with the help of a table of decision rules for the system of fuzzy knowledge from the knowledge base.

4. The stage of transformation of fuzzy data from the output stage of fuzzy decision into precise quantities (quantitative or qualitative) used in the economic environment, is done in the opposite direction to the stage fuzzyfication for linguistic variable of the damage level Y.

Accordingly, in order to develop appropriate methodological basis of an assessment of technogenic losses in the national economy there were conducted the following studies:

1. Study of the advantages and disadvantages known in the world classical approaches to the evaluation of technogenic losses from environmental pollution (emissions, discharges, wastes). Particular attention is paid to the research of capabilities of the approach recommended by the International Organization of the United Nations Environment Program (UNEP), for evaluation of the streams of solid wastes, which are determined by the production technology in each industry and national economy.

2. Suggestion of modern approaches to economic evaluation of possible (in terms of total

technogenic wastes streams) and projected (in terms of the risk of non-systemic (emergency) situations occurrence) technogenic losses to the national economy sectors. Herewith, the notion of technogenic wastes is considered as a complex, which includes air emissions, discharges into water bodies, pollution, liquid and solid industrial wastes, business wastes and wastes consumption of products of enterprises, etc. The stages of each of the proposed approaches, their advantages and disadvantages were characterized.

3. Substantiation of expediency of methodological foundations forming of economic evaluation of technogenic losses in the national economy by means of fuzzy sets theory and neural networks.

4. There was described the heterodox approach to predicting of damage caused by accident (emergency) situations.

5. Building of the fuzzy-logical conclusion for damage levels evaluation of the functioning of the national economy.

The suggested methodological principles can be used for different sectors of the national economy in future studies for building of the evaluation methodology of technogenic losses.

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ASSESSMENT OF THE INVESTMENT FACTOR IMPACT ON THE ECONOMIC DEVELOPMENT OF NATIONAL ECONOMY OF UKRAINE

Abstract. Article presents the results of the research of impact of investment factor on economic development of Ukraine and types of economic activities for the period 2000-2011 are presented; and determines types of economic activities, that are priority for investments in order to ensure the development of the national economy in framework of the post-industrial society.

Key words: economic development, national economy, the investment factor, evaluation, capital investments, efficiency, correlation and regression analysis, Ukraine.

Statement of the problem. In a post-industrial society the development of the national economy can be achieved only by stable economic development of the country and its economic activities where both domestic and foreign investments have the decisive influence on it.

According to theoretical studies and experience of developed countries, economic development is interconnected with investment activity that determines the trajectory of development. World average ratio of gross domestic savings to GDP in the last decade of 20th century stood at 23–24 %: in developed countries this figure is by 1–2 % lower, and in emerging countries this ratio is much higher and remains at 29 %. The high rate of gross savings (over 30 %) and high economic growth allowed Japan, and then another four Asian countries – South Korea, Singapore, Taiwan and Hong Kong to join developed countries. Thus, the volume and efficiency of investment are the key to economic development of country and competitiveness improvement of economic activities in modern post-industrial society. Accordingly, study of development of Ukraine's economy and economic activities under the influence of investment become very important topic.

Analysis of recent research and publications. One of the pressing modern issues is investing of national economy that being researched and disputed both in domestic and foreign investment theory and occupies a leading position in economic studies and reflected in the scientific papers of I. Alekseev, I. Blanc, M. Krupka [1], D. Lukyanenko [2, 3], U. Makogon, A. Persada, A. Poruchnik [3], O. Rogach, J. Stiglitz, A. Filippenko, W. Fisher, W. Sharpe and others. Despite numerous research in investment, issue of assessment of impact of the investment factor on the economic development of the national economy of Ukraine in a postindustrial society remain unresolved. The importance of research on both macro- and meso-level is supported by an observation that macro level (the entire national economy of Ukraine) shows aggregated trends in the country, while the meso-level (different types of economic activity) reveals features of the regional industry, determines differences from macro-level trends across the country and detects asymmetries in the economic development of Ukraine.

The purpose of the research: to establish current trends of economic development of Ukraine and economic activities under the influence of the investment factor in the conditions of post-industrial society.

The methodical basis of the study are the methods of analysis and synthesis, statistical analysis and correlation-regression analysis. Data

used in the research is official statistical data of Ukraine and economic activities for the period 2001–2011 [4–9].

The main material of the study. During 2001–2011 investments in national economy does not exceed 25 % of GDP and characterized by uneven annual growth (Table 1).

In the 2001–2011 period capital investments (*Ic*) in economic activities increased in 7.31 times, with the highest growth in public and personal services, cultural activities and sport (in 15.31 times) and trade, repair of motor vehicles, household appliances and goods for personal use

(in 13.44 times), the lowest – in the fishery and fish farming (in 1.85 times).

During the studied period dynamics of Ukraine's *Ic* index mostly remains positive but unstable. However, the growth rate of *Ic* by types of economic activity of Ukraine indicate that the growth dynamics is typical for the most economic sectors of the country. At the same time, the limits of the growth from year to year are constantly changing, i.e. are not constant and varies greatly. The trajectory of growth rates of capital investments by the types of economic activities of Ukraine creates wide flow that changes its direction with uneven density, due to differentiation of growth rates of industries (Table 2)

Table 1

**Growth rate of capital investments by types of economic activity
of Ukraine in 2001–2011, % to previous year**

Type of economic activity	Period										Comparison of, 2011 to 2001 (times)
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Ukraine	114.1	137.2	148.4	123.0	134.5	150.5	123.7	65.1	112.7	139.2	7.31
Agriculture, hunting and forestry	119.4	110.9	157.9	148.4	145.7	130.2	177.4	55.5	129.0	150.2	11.24
Fishery and fish farms	170.0	114.7	97.4	71.1	203.7	65.5	169.4	36.1	300.0	56.1	1.85
Industry	110.7	130.5	142.9	124.3	127.9	143.6	119.1	75.3	101.6	147.4	6.32
Mining industry	90.2	118.4	140.3	127.8	106.0	141.3	138.1	83.0	112.2	157.6	5.81
Processing industry	119.0	138.3	142.9	134.4	134.4	148.8	109.3	72.1	96.9	120.7	5.83
Production and distribution of electricity, gas and water	122.6	123.9	146.2	87.3	134.7	121.0	147.4	77.4	103.5	234.2	8.75
Construction industry	164.4	137.2	186.9	105.4	127.8	144.6	136.9	42.7	93.3	172.0	7.70
Trade, repair of motor vehicles, household appliances and goods for personal use	157.1	162.3	162.5	143.1	153.1	152.5	138.9	57.1	84.0	145.9	13.44
Hotels and restaurants	95.1	151.8	158.6	140.4	98.3	176.3	123.3	80.4	118.7	159.7	10.46
Transport and communication industry	94.0	146.1	146.8	112.5	120.4	156.0	102.7	75.4	118.4	135.4	5.28
Finance	168.1	109.7	127.4	157.8	121.5	174.6	111.3	72.5	85.1	110.2	5.95
Real estate, lease, engineering and services for entrepreneurs	122.1	139.1	145.6	136.4	156.7	164.1	123.9	52.6	144.8	113.2	9.26
Public administration	136.9	176.4	146.0	68.6	132.9	149.1	115.7	49.1	144.8	143.5	5.66
Education	142.8	112.2	146.2	91.3	133.8	141.8	140.6	63.9	126.2	132.7	6.11
Healthcare and social assistance	121.7	182.5	139.8	88.1	141.5	137.2	140.2	54.7	142.5	125.3	7.28
Public and personal services, cultural activities and sport	111.2	161.2	158.9	93.4	156.3	142.3	133.5	88.7	110.5	197.6	15.31

Note: compiled and calculated by the authors according to [4–9].

Table 2

**Characteristics of capital investment growth by types
of economic activity of Ukraine in 2001–2011**

Indicator	Period									
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Highest growth rate, %	70.0	82.5	86.9	57.8	103.7	76.3	77.4	-11.3	200.0	134.2
Lowest growth rate, %	-9.8	9.7	-2.6	-31.4	-1.7	-34.5	2.7	-63.9	-16.0	-43.9
Width of the flow, percentage point	79.8	72.84	89.41	89.15	105.36	110.81	74.75	52.64	216.04	178.0
Average growth rate, %	27.8	38.4	46.6	14.4	37.2	43.1	33.0	-35.2	25.7	43.9
Spread between the highest and average growth rate, percentage point	42.2	44.0	40.2	43.4	66.5	33.2	44.4	23.9	174.3	90.3
Spread between the lowest and average growth rate, percentage point	37.6	28.8	49.2	45.8	38.8	77.6	30.3	28.7	41.8	87.8

Note: compiled and calculated by the authors according to [4 – 9]

There is a noticeable fluctuation of the width of the flow of the growth rate of economic activity of Ukraine: from 52.64 percentage points in 2009 to 216.04 percentage points in 2010. If we compare the width of the flow in 2011 with 2001, we can argue that in this period the flow expanded in width in 2.2 times, which may be an indicator of sectoral imbalances of investment in national economy of Ukraine. The average growth rate of gross regional product for 2001–2011 is also not uniform and varies each year, such as from 14.4 % in 2005 to 43.9 % in 2011 and (-35.2) % in 2009.

During the studied period the efficiency of the investments in economic activities of Ukraine achieved through constant growing quantity of industries that have increasing growth rate of capital investment. Even in 2003 and 2008 the growth of capital investment was observed for all economic activities in Ukraine. The negative impact of the global financial crisis and domestic economic crisis fully manifested in 2009 when all economic activities of the country had declining rates of capital investment. However, in 2010 almost all economic activities of Ukraine, except processing industry, construction, trade, repair of motor vehicles , household goods and personal items and financial activities resumed growth in investment, while in 2011 – only fishing and fish farming had growth.

The obvious leader in economic activities in terms of growth of capital investments is trade, repair of motor vehicles, household goods and personal use. Also, the four top places in terms of growth during 2001–2011 often are occupied by finance, real estate, lease and business activities and public and personal service activities in the field of culture and sport. The list of economic activities with the lowest growth or decline in capital investment includes mining, transport and communication, public administration and construction.

We created variation-dynamic table that allows to determine the pace of capital investment, which were typical for the most of types of economic activities in Ukraine during the studied period. It was found that the majority of economic activities was characterized by growth rates that are more than 120.0 % for the entire the studied period. In other ranges the economic activities were distributed evenly, but these growth rates are typical for a minority of cases.

Grouping of economic activities of Ukraine according to the share of capital investment into the three groups allowed us to receive the following results:

– the First Group always consists of three types of economic activity – processing industry, transport and communication, real estate, lease and business activities with a capital investment share of 56.4 – 58.7 %, while in 2001 – 2002, 2008 and 2011 this group had one more type of economic activity – mining industry and accordingly the share of the group was 61.8 – 71.6 %;

– the Second Group includes nine types of economic activity of Ukraine with a capital investments share of 27.5 % in 2001 and 42.1 % in 2011, which increased by 14.6 percentage points during period;

– the Third Group consists of three economic activities of Ukraine: fishery and fish farming, public administration and education with a capital investment share of 1.58 – 1.82 %.

Detailed analysis of sectoral structure of capital investment for the period 2001–2011 reveals significant changes: by reducing investment in industry by 5.67 percentage points and by 6.35 percentage points in transport and communication there was increase of investment in such economic activities as real estate, lease, engineering and services for entrepreneurs by 3.73 percentage points, trade by 3.3 percentage points and agriculture by 2.67 percentage points. V. Dergacheva [11, p. 24] argues, that the consequences of this vector of economic development will be loss of quality of labor force (due to the loss of industrial intelligence) and critical depletion of fixed assets. Also these factors block the prospects for the competitiveness of the national economy in free market mode of economic and monetary relations.

Sectoral asymmetry of investments in national economy of Ukraine has following distribution: two-thirds of investments (61.8 %) are concentrated in three types of economic activity (processing industry, transport and communication, and real estate, lease and services for entrepreneurs), while the remaining twelve economic activities of the country attracting only one-third of capital investment. The macro- and meso-level features of investment in the national economy of Ukraine are shown in the table 3.

Impact of investment on economic development of the national economy of Ukraine and economic activities was established by using correlation-regression analysis. Formulated univariate regression models have average relative error (ε) with the following values:

– less than 10%, indicating a high level of accuracy and model predictions for such economic activities as agriculture, hunting and forestry ($X1$), industry ($X3$) (including mining ($X31$), production and distribution electricity, gas and water ($X33$)), transport and communication $(X7)$, public administration ($X10$) , education ($X11$), health care and social assistance ($X12$);

– within 10–20 % , indicating an average (normally acceptable) accuracy models and forecasts for the following economic activities: fishery and fish farming ($X2$), processing industry ($X32$), construction ($X4$), trade, repair of motor vehicles, household appliances and goods of personal use ($X5$), real estate, lease and services for entrepreneurs ($X9$), public and personal services, cultural activities and sports ($X13$);

Table 3

Features of the investment of the national economy of Ukraine in 2001 – 2011

Macro-level features	Meso-level features
– capital investments in Ukraine increased in 6.42 times, while the maximum growth (in 13.46 times) took place in Autonomous Republic of Crimea and the minimal growth (in 2.86 times) – in Sumy region;	– capital investments by the types of economic activity of Ukraine increased in 7.31 times, where maximum growth of Ic was noticed in public and personal service activities, cultural activities and sport (in 15.31 times) and trade, repair of motor vehicles, household appliances and goods of personal use (in 13.44 times), and the minimal growth – in fishery and fish farming (in 1.85 times);
– range of variation in the growth rate of capital investment was significant: from 48.6 % in 2009 (Lugansk region) to 249.0 % in 2004 (Cherkasy region). Even at the end of the studied period growth of the capital investments by regions of Ukraine cannot be characterized as steady and homogenous.	– range of variation of the growth rate of capital investments was significant by the types of economic activity from 36.1 % in 2009 (fishery and fish farming) to 234.2 % in 2011 (production and distribution of electricity, gas and water). Even at the end of the studied period growth of capital investments by the types of economic activity cannot be characterized as steady and homogenous.
Common investment trends	
– growth rates of capital investment over 120% are typical for the most regions and economic activities of Ukraine;	
– high growth of capital investments do not provide a significant accumulation of investments in regions and in types of economic activities of the country.	

Note: compiled by the authors according to the results of own studies.

– More than 20 %, indicating a satisfactory level of accuracy models and forecasts – hotels and restaurants (*X6*), finance (*X8*).

Therefore crucial for the development of the national economy are traditional economic activities for Ukraine that belong to low- tech and primary industries:

1) industry – 1 % of growth stimulates growth of gross value added at 1.0956 % with the highest correlation coefficient of 0.9335, due to mining (1% stimulates the 1.0780 % of GVA growth with a coefficient of correlation of 0.8421), processing industry (1 % stimulates 0.6557 % of GVA growth with a coefficient of correlation of 0.9585) and the production and distribution of electricity, gas and water (1 % stimulates 1.3669 % of GVA growth with a coefficient of correlation of 0.6699);

2) transport and communication – 1 % stimulates 1.1416 % of GVA growth with a coefficient of correlation of 0.7888.

The types of economic activities that have a close interconnection between the economic sector development and development of national economy (correlation coefficients within 0.75 – 0.89), but have no significant effect on the growth of the national economy are construction (1 % stimulates 0.3162 % of GVA growth), trade, repair of motor vehicles, household appliances and goods for personal use (1% stimulates 0.3753 % of GVA growth) and financial activities (1 % stimulates 0.3252 % of GVA growth).

Education and health care are economic activities, which have the potential to have decisive influence on the economic development of the national economy due to the fact that 1 % increase in education can stimulate 0.6622 % of GVA growth of the national economy, but the relationship between the education and the national economy is below average (correlation coefficient – 0.3122), 1 % increase in health care can encourage 0.2610 % of the growth of GVA of the national economy, but the relationship between the health care and the national economy is also below average (correlation coefficient – 0.1180).

According to the results of the evaluation, only fishery and fish farming has average negative correlation with the development of the national economy, which means with decline of economic activity in fishery and fish farming by 1 % stimulates 0.4022 % of growth of the national economy.

Economic activities that have a strong correlation between investment activity and sector development (correlation coefficients within 0.57 – 0.74), but investments do not have significant effect (indirect impact) on sector growth are industry (1 % of investment stimulates 0.1061 % of growth of GVA of sector), namely processing industry (1 % of investment stimulates 0.3262 % of growth of GVA of sector), construction (1 % of investment stimulates 0.4088 % of growth of GVA of sector) and transport and communication (1 % of investment stimulates 0.2109 % of growth of GVA of sector). For all other types of economic activity investment activity is not the defining factor and does not impact on their development.

Conclusions. During the study of the impact of the investment factor on the development of the national economy of Ukraine and economic activities were obtained the following results:

– investment activity is not crucial for the economic development of the national economy and the economic activities of Ukraine, due to lack of stable investment trends and chaotic capital investments into economic activity of Ukraine, in the same time investments in the national economy of Ukraine and economic activities unevenly grow annually with rate of more than 120.0 % ;

– high investment growth rates do not provide a significant accumulation of investment in economic activities of Ukraine;

– industry (mainly processing industry), construction, transport and communication are types of economic activities, that are priority for the economic development of the national economy and development of which indirectly influenced by investment activity;

– under the terms of the post-industrial society in economic activities of Ukraine education and health have potential opportunity to become the basic economic activities for the stable development of the national economy.

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CONCEPTUAL BASIS OF MANAGEMENT ACTIVITIES DIAGNOSTICS IN THE SYSTEM OF PROCESS-STRUCTURED MANAGEMENT

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Abstract. The role and place of diagnostics in management systems of enterprises and peculiarities of management activities diagnostics are considered. The essence and characteristics of process-structured management as the most effective integrated approach to management in current operation conditions are described. The conceptual basis of management activities diagnostics in the system of process-structured management is worked out, it foreseeing distinguishing and specifying principles, types, objects, subjects, methods, methodologies, indicators of management activities diagnostics. The sequence of management activities diagnostics and all its essential constituent elements are characterized.

Key words: diagnostics, management activities, process-structured management, types of diagnostics, methods of diagnostics, diagnostic indicators and criteria.

Problem statement. Diagnostics is an integral constituent of management system of any enterprise as it creates information base for management decision-making at all levels, enables identification of problems and perspectives of operation, prevents emergence and development of adverse events at the enterprise etc. The recent crisis in the world financial and economic system, permanent stagnation processes in the world largest economies, increasing competition at the world market have shifted priorities in management systems of the leading enterprises to human factor as the key organization resource allowing to keep and strengthen the enterprises positions in the market. According to K. Rise [1, p. 24], in the 21st century everything depends on human potential, creativity and innovations. Thus, what can be observed is the change of management paradigm, its reorientation from technological and organizational maintenance of the enterprise activities to the human potential. These new trends are most vividly reflected in modern process-structured approach to management [2–4] that maximally combines the advantages of system, situational, functional, process, dynamic, adaptive, anticipative approaches. The process-structured management is based on providing purposeful influence of the organization's managing system on its managed system with the account of operating factors and operating conditions on the basis of organic combination of all structural elements within the limits of successive implementation of logically grounded stages with explicit prioritization of the human factor. With the account of the above said, it may be concluded that diagnostics of management activities in the system of process-structured management becomes extremely important and leads to the need to justify the conceptual basis of its conducting.

Analysis of recent research and publications. Initially the term "diagnostics" appeared in medicine reflecting the process of identifying, distinguishing characteristic features of diseases, and later it became widely used in the fields of

technology, chemistry, economics, and management. The existing publications show a great diversity of opinions of both scholars and applied scientists on the essence, content, types, characteristics, principles and technology of conducting diagnostics of various activities, though none of them sufficiently identifies the position of diagnostics in the system of process-structured management or specific features of diagnostics of management activities.

Both theoretical and practical studies state the fact of existing close interrelation between diagnostic systems and enterprise performance. William Schemann and John Lingle are of the opinion that there is a directly proportional relationship between the level of diagnostic systems development and profitability of the enterprise, the fact having been justified by the comparative performance analysis of 58 enterprises with well-developed diagnostic systems and 64 enterprises using no justified diagnostics (Table 1) [5, p. 10].

Table 1

Results of analyzing the effect of developed diagnostic systems on enterprise performance [5, p. 10]

Parameters of comparison	Enterprises with diagnostic systems	Enterprises without diagnostic systems
Being the leader in the field during the last three years	74 %	44 %
Being one of three leaders in the field by financial performance	83 %	52 %
Investments pay off in less than three years	80 %	45 %
Successful cultural and/or organizational changes	97 %	55 %

As it can be seen from Table 1, the enterprises with developed diagnostic systems are characterized by much higher level of efficiency and effectiveness, the fact allowing them to take leading positions in the market.

As to the position of diagnostics in the enterprise management system, T.O. Zahorna emphasizes that diagnostics is the function that, by way of providing information, connects researchers with all the elements of operating environment [6, p. 10]. At the same time the author notes that diagnostics can be looked at as a set of methods for both qualitative and quantitative analysis, methods of forecasting and evaluating efficiency of using enterprise resources for achieving the goals of business development with the account of external limitations within the strategic economic zone [6, p. 14]. At this, the aim of diagnostics is identified as revealing the state of the object under investigation, and the objective of diagnostics is stated as defining management procedures and decisions [6, p. 22]. Thus, in the above presented statements, diagnostics is viewed simultaneously as the function, method and procedure of management decision making, and this is the evidence of the absence of sufficient justification in understanding the essence of diagnostics in the context of management.

In the collective monograph "Diagnostics of Enterprise: Theory and Practice" it is noted that the management instrument capable of providing feedback in management is the diagnostics of enterprise operation. It is for this reason that we observe the increasing role of diagnostics, the major objective of diagnostics being identification of strengths and weaknesses of enterprise operation, search and involvement of resources into its productive and economic activities [7, p. 9]. At the same time, in this scientific publication, diagnostics is characterized as a type of management activities aimed at identifying and studying features, evaluating the internal state of enterprise management and detecting problems preventing the enterprise's effective performance and management system development as well as at finding the ways to solve these problems [7, p. 43]. According to this approach, diagnostics is simultaneously considered as a management instrument and as a type of management activities, i.e. both as a method and as a function of management, this being impossible because management methods are the result of implementing management functions. It is worth noting, that within the frames of management diagnostics the authors consider only the specific features of evaluating corporate management and management of enterprise's culture.

O.O. Hetman and V.M. Shapoval use the notion of "management diagnostics" without providing any interpretation of the term, without determining the place of management diagnostics in the system of management functions, without identifying objects and peculiarities of such diagnostics [8, p. 140–141]. It is worth noting that in the context of management diagnostics the authors consider only the enterprise's anti-crisis management diagnostics.

L.A. Kostyrko states that at present there exist four concepts of diagnostics, they being analytic, informational, anti-crisis and advisory. Within the first concept diagnostics is considered to be an analytical function being realized while studying the state and behavior of the management object. According to the second concept, diagnostics is associated with identifying problem situations and bottlenecks in the enterprise's management system with the aim of taking decisions. The anti-crisis concept is connected with detecting crisis aspects in the operation of the enterprise. The advisory concept equates diagnostics with the corresponding economy-oriented information systems that provide information support of management decision-making [9, p. 12–18]. Thus, diagnostics is treated as an analytical function, an information system, an element of anti-crisis support.

More profound understanding of the role of diagnostics in the enterprise's management system is provided in the work of H.O. Shvydanenko, A.I. Dmytrenko, O.I. Oleksiuk [10, p. 286–312] which, in particular, provides specifics of justifying and taking strategic and operative management decisions on the basis of diagnostics, describes principles of diagnostics of information and management field of the company.

Analysis of the publications on the problem [4–10] allows to come to certain conclusions, they being as follows: definition of the role and place of diagnostics in the enterprise's management system is controversial as diagnostics is treated simultaneously as a management instrument, a management function, a management method, a system of information support etc.; there is no certainty as to the stage of management process at which diagnostics should be conducted; understanding of the purpose of diagnostics in the enterprise's management system is complicated as the result of equating diagnostics with monitoring, economic analysis, information support system; actually the existing publications do not consider the specifics or conceptual basis of management activities diagnostics in the enterprise's management system.

Research objective. With the account of the results of analyzing the existing publications, the research objective is defined as development of conceptual basis of management activities diagnostics in the enterprise's system of process-structured management.

Research materials. The research done allows to state that process-structured management is based on simultaneous combination of system, situational, functional, process, dynamic, adaptive and anticipative approaches to management by forming a certain integrated, poly-vector, logical and consequential model of management activities at the enterprise. Thus, process-structured management ensures, within the interaction of managing and managed subsystems of the organization's management system, fulfillment of the following successive stages of the management process:

– carrying on specific management functions through general ones (planning, organizing, motivating, controlling, regulating);

– creating management methods as the potential way of influence of the managing system of an organization on its managed system;

– transforming management methods into management decisions;

– ensuring the influence of the managing system of the enterprise on its managed system on the basis of management mechanisms.

All the above presented stages of management process are directly related to carrying out management activities by the managing system, at this there are options of involving representatives of the system being managed to the process of management.

Conceptual principles of management activities diagnostics in the system of process-structured management embrace a system of views on the peculiarities the course, characteristics, methodical and criteria instruments of such diagnostics.

Diagnostics of management activities envisages evaluation and identification of the state, course, effectiveness and efficiency of management activities at the enterprise. Thus, the objects of management activities diagnostics in the process-structured management system are:

– managers of different management levels as performers of management activities;

– state and course of implementing the stages of the management process;

– effectiveness and efficiency of the management activities.

Diagnostics of management activities should be conducted with the account of certain initial statements, principles, they being as follows:

1. The principle of purposefulness. It means that the determined purposes of diagnostics in the field of management activities further determine its character and peculiarities of the applied methods, methodologies, indicators, criteria etc.

2. The principle of object-orientation. Depending on the determined object of diagnostics, its scope, complexity, dynamics, measurability it is necessary to choose the appropriate type and parameters of diagnostics.

3. The principle of objectivity. It ensures conducting diagnostics on the basis of accurate, realistic information with the use of scientifically-grounded instruments, without involving any subjective factors.

4. Principle of economic feasibility. Economic results and positive effects of the diagnostics conducted must exceed the costs of its realization.

5. The principle of dynamics. As management activities are very dynamic and their characteristics depend on both the internal and external factors, changes in parameters should be accounted while carrying out their diagnostics.

6. Principle of effectiveness. It means that the results of diagnostics should become the basis for taking management decisions, introducing corrections into the management activities etc.

On the basis of the above principles, the subjects of the management activities diagnostics (managers, owners, potential investors, competitors, counterparties) specify purposes of evaluation and determine the type of diagnostics.

Evaluation of management activities can be done with various types of diagnostics. The research performed allows systematizing of the types of management activities diagnostics according to a set of essential and independent features (Fig. 1).
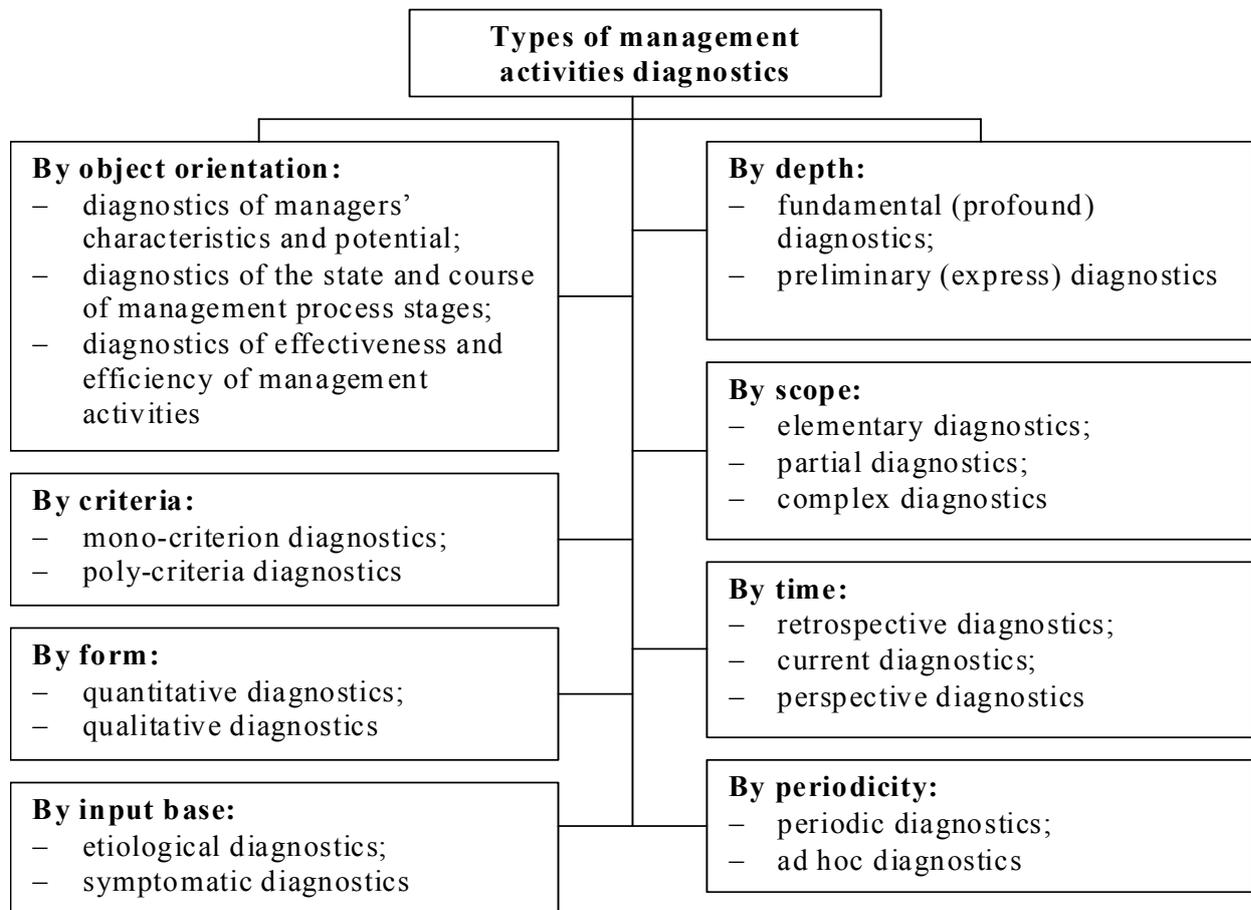

Fig. 1. Systematization of the types of management activities diagnostics

By its object orientation, diagnostics is divided into types on the basis of its above presented selected objects. By the criteria base, there should be distinguished mono-criterion diagnostics (providing evaluation of certain fragments of management activities by a single criterion) and poly-criteria diagnostics (carrying on diagnostics of management activities by a system of well-grounded criteria) [11, p. 20; 12]. By the depth of application, diagnostics is divided into fundamental (implying deep, comprehensive study of the management activities parameters) and express diagnostics (foreseeing formation of the preliminary idea about characteristics of management activities on the basis of the limited information support). By the scope, it is worth distinguishing elementary diagnostics (is directed towards evaluating a particular indicator, fragment, operation), partial diagnostics (implies evaluation of the components of process-structured management: functions, methods, management decisions), complex diagnostics (provides identification of parameters of the whole system of process-structured management). By the time, it is necessary to consider retrospective diagnostics (in the past periods), current diagnostics (in the present period) and perspective diagnostics (in the future periods). Diagnostics of management activities may be accomplished periodically on the basis of certain justified time periods and ad hoc (when it is necessary due to the emergence of non-standard situations: conflicts, disagreements, thefts etc.). Due to specifics of management activities, both qualitative (expert) and quantitative (based on indicators) diagnostics can be applied. The input base also affects characteristics of diagnostics and this allows to single out etiological diagnostics (from causes to effects) and symptomatic diagnostics (from effects to causes).

The goals of and types of diagnostics chosen by the subjects of diagnostics determine the selection of the most effective evaluation and identification methods in this field. On the basis of the publications analysis we suggest classifying diagnostic methods by the following features [11–13]:

– by the form of evaluation: quantitative methods (imply the use of mathematical, statistical procedures), qualitative methods (are based on experience, knowledge, intuition, competences of the subjects of diagnostics etc);

– by the form of reflection: facts-related (time-taking, stocktaking, expertise, experiment), calculation and analytical (feasibility calculations, analytical estimation, arithmetic verification, economic and mathematical simulation etc.), document-related (logical checking, counter-checking of documents, checking the correct reflection of all the operations in documentation, data consolidation schemes etc.);

– by reasoning (abstraction, idealization, axiomatics, induction, deduction, generalization, synthesis), empirical (experiment, expertise, calculations, measurements, tests);

– by the number of criteria: mono-criterion (are grounded on studying the object by one criterion), poly-criteria (imply studying the object by a system of criteria);

– by the character of relations being studied: linear (simplex method, method of transportation problem); non-linear (dispersion analysis, dynamic and statistic analysis, correlation-regression simulation, matrix method);

– by the level of research: analysis (dynamic(trend), comparative, structural (vertical), index, coefficient, factor), synthesis (direct, element-theoretical, structural-genetic);

– by the degree of formalization: non-formalized (methods of expert estimates, scenarios, psychological, morphological, comparative, tabular, graphical); formalized (statistical, accounting, economic and mathematical) etc.

Management activities diagnostics can be performed by simultaneously using several of the above presented methods which, after being aggregated, form diagnostics methodology, i.e. a particular algorithm, a list of actions in the sphere of estimation and identification of management activities parameters. Diagnostic techniques contain diagnostic indicators and criteria of their optimality.

It is necessary to draw attention to the fact that diagnostic indicators are a grounded limited list of indicators (up to 25) that allow to most representatively and completely evaluate parameters of management activities in accordance with the established goals and objects. Diagnostic indicators are directly connected with the characteristics of the objects being estimated, they

being managers, stages of management process as well as efficiency of management activities.

To diagnose management activities of managers at different levels of management it is possible to use such a universal list of quantitative and qualitative indicators: age, work experience, intellect level, profession-oriented competences, communication skills, coefficient of successful problem solutions, creativity and innovation, internality, flexibility, stress resistance, honesty, integrity, ability to finish the started, success orientation, partner reliability etc.

While performing diagnostics of the state and course of the management process stages there are used particular indicators representing just the area under study. Thus, while diagnosing fulfillment of particular management functions through general ones, it is necessary to separately consider the course of every major function (planning, organizing, motivating, controlling and regulating). While identifying characteristics of planning in a particular area (production, finances, logistics, innovations etc.) it is necessary to estimate periodicity, accuracy, completeness, rhythm, planning horizon, risks, coordination of plans with other functional areas, level of plans attainability and fulfillment. Organizing as a management function is directed towards designing management organizational structures, distribution of functional responsibilities, rights and duties among employees. Thus, diagnostics of organizing enterprise operation is directed towards estimating the quality and effectiveness of created organizational management structures by determining the coefficient of responsibilities scope according to a particular management function, coefficient of management works duplication, coefficient of management works concentration, coefficient of management functions centralization, adherence to management span, indicators of managerial load per manager etc. While diagnosing the state of motivation of different categories of employees (managers, specialists, officials, basic and support personnel) the key diagnostic indicators are as follows: basic and additional wages, average level of wages for a particular category of employees, special rewards for particularly valued employees, level of satisfaction of workers of different categories with material incentives, coefficient of correlation between the average level of wages at the enterprise and that in the field, coefficient of differentiating managers' and employees' wages etc. Diagnostics of controlling characteristics in an organization foresees estimation of the level of centralization, integrity, periodicity, accuracy, representation of controlling procedures. Estimation of the state and course of regulating at the first stage of management process is based on determining efficiency, targeting, effectiveness, adequacy of the means being regulated.

Diagnostics of the state and course of the second stage of management, that of creating management methods, is based on estimating quantitative and qualitative characteristics of the created management tools. At this, it is reasonable to use such diagnostic indicators: level of documental, instructional, technological, organizational and administrative support of management activities.

The third stage of management process implies decision making on alternative basis. Thus, at this stage there arises the necessity in estimating the efficiency of management decisions on the basis of such indicators as the level of economic feasibility, riskiness, efficiency, optimality, efficiency, thrift, achievability of management decisions.

At the next stage of the management process according to process-structured approach there takes place bringing decisions to their executors. So, at this stage the following is being diagnosed: speed of bringing decisions to their executors, speed of implementing management decisions, effectiveness and timeliness of implementing decisions, level of deviations etc.

While diagnosing effectiveness and efficiency of management activities one should be guided by the functional indicators associated with the corresponding functional areas of managers. For example, effectiveness of management activity of a deputy director of finances and economic affairs may be estimated by such indicators as profitability, liquidity, financial independence, solvency, business activity of the enterprise. The effectiveness of management activities of a deputy director of production may be diagnosed using such indicators as rhythm of production, production capacities, shortage of production, implementation of the plan of production program etc.

When performing complex diagnostics of process-structured management it is necessary to emphasize estimation of management efficiency as a social and economic phenomenon. Management efficiency is a complex multi-aspect concept that is characterized by a system of indicators reflecting all areas of enterprise's activities (production, marketing, finances, staff, innovations etc.). Management efficiency can be divided conventionally into economic, organizational and social [13, p. 356–357].

Economic efficiency of management reflects economic results that characterize organization's performance with a particular management system. On one hand, economic efficiency is characterized by indicators that reflect design and performance of management systems. Among such indicators are: computerization of the managers' workplaces, instructional and regulatory material development, general scope of management, technical equipment of managers etc. On the other hand, management systems efficiency is characterized by indicators that reflect results of production and business activities. Such indicators are: the value of profits, cost, total output, sales volume, profitability of products, capital ratio, level of liquidity, level of risks, coefficient of autonomy, financial stability, maneuvering, turnover etc.

Organizational efficiency of management characterizes the quality of organizational design, its system of management, management decisions taking, management system response to stresses, conflicts, organizational changes etc. Organizational efficiency is characterized by indicators that reflect the quality of organizational design and its system of management, namely: level of centralization of management functions, correlation of the number of managing employees between different levels of management, proportion of managers in the total number of administrative personnel, coefficient of linkage of management structure, speed of management decisions taking etc.

Social efficiency of management reflects the effect of management on the processes of forming professional features of employees, including managers, forming corporate spirit, appropriate psychological climate among employees, atmosphere of safety and involvement into accomp-lishing organizational goals, perspectives of developing social institutions etc. Social efficiency of management can be also diagnosed from two perspectives. On one hand, it can be estimated by the indicators that reflect social and cultural sphere of organization's operation, these indicators being: discipline at work, personnel stability, social and productive situation at the enterprise, working conditions etc. On the other hand, social efficiency of management can be estimated by indicators reflecting its effect on achieving productive and economic results and satisfying market demands. These indicators are: labor productivity, return on wages, level of consumers' satisfaction, development of social infrastructure etc.

Generalization of indicators for diagnosing management activities in the system of process-structured management is presented in Fig. 2.

So, for diagnosing management activities in the system of process-structured management there arises a necessity to build a pyramid of diagnostic indicators that would allow to identify the state, course and efficiency of such activities. The values of calculated indicators should be compared with optimal criteria that essentially depend on the kind of activities, specifics of technological processes, the scope of activities etc.

Conclusions and perspectives for further research. Management activities are a specific type of activities directed towards taking management decisions and affecting the enterprise's managed subsystem. Process-structured approach to management creates prerequisites for the most effective course of management activities under current conditions. At this, there arises the necessity of diagnosing management activities for the purpose of identifying and estimating their state, course and efficiency that will form information base for improving enterprise's management system and its operation in general. The performed research and the analysis of the publications allowed to develop conceptual basis for diagnosing management activities in the system of process-structured management which formed theoretical and methodological as well as methodical and practical bases for performing diagnostic procedures in this field.
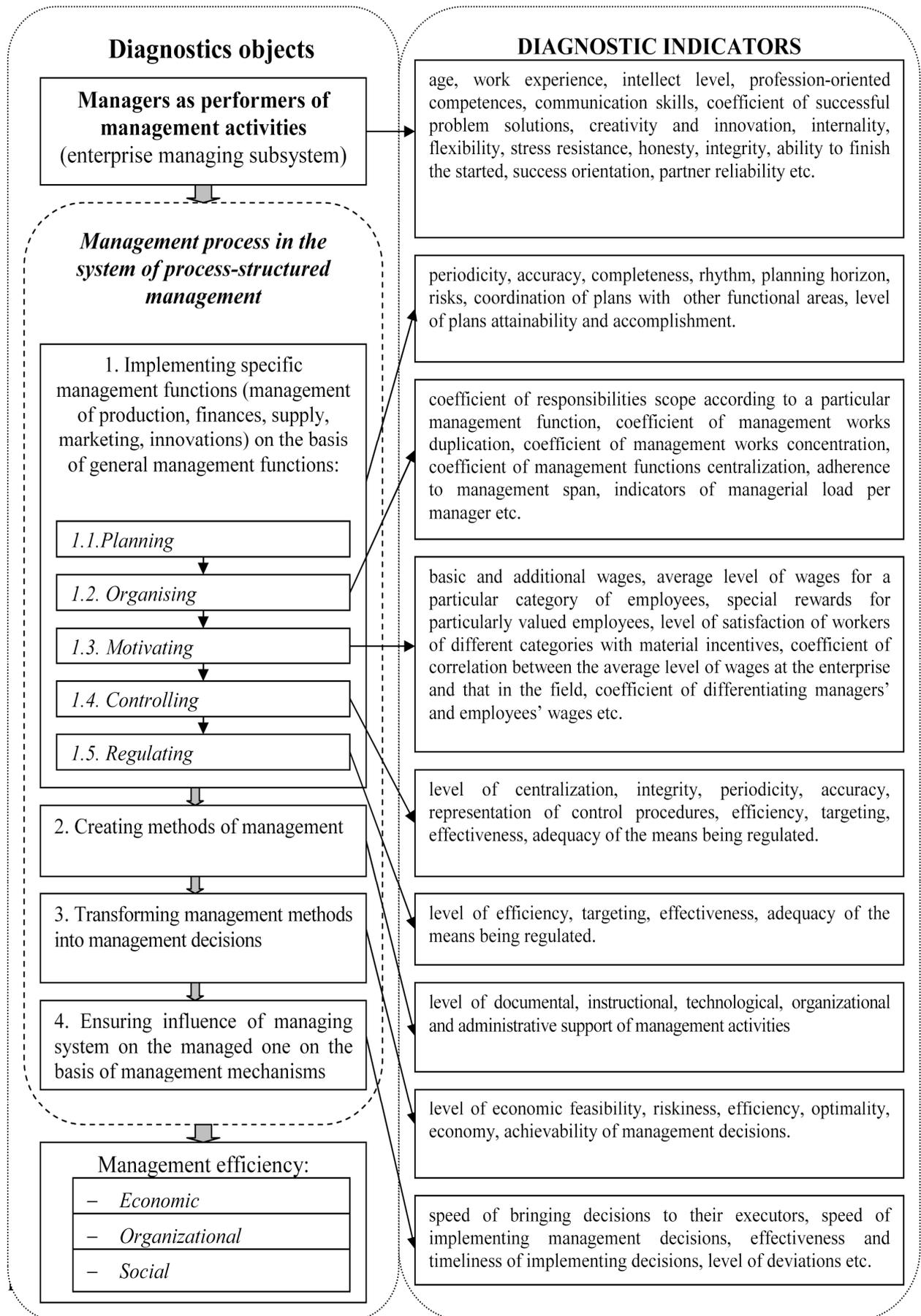
Diagnostics objects

Managers as performers of management activities
(enterprise managing subsystem)

Management process in the system of process-structured management

1. Implementing specific management functions (management of production, finances, supply, marketing, innovations) on the basis of general management functions:

1.1.Planning

1.2. Organising

1.3. Motivating

1.4. Controlling

1.5. Regulating

2. Creating methods of management

3. Transforming management methods into management decisions

4. Ensuring influence of managing system on the managed one on the basis of management mechanisms

Management efficiency:
- Economic
- Organizational
- Social

DIAGNOSTIC INDICATORS

age, work experience, intellect level, profession-oriented competences, communication skills, coefficient of successful problem solutions, creativity and innovation, internality, flexibility, stress resistance, honesty, integrity, ability to finish the started, success orientation, partner reliability etc.

periodicity, accuracy, completeness, rhythm, planning horizon, risks, coordination of plans with other functional areas, level of plans attainability and accomplishment.

coefficient of responsibilities scope according to a particular management function, coefficient of management works duplication, coefficient of management works concentration, coefficient of management functions centralization, adherence to management span, indicators of managerial load per manager etc.

basic and additional wages, average level of wages for a particular category of employees, special rewards for particularly valued employees, level of satisfaction of workers of different categories with material incentives, coefficient of correlation between the average level of wages at the enterprise and that in the field, coefficient of differentiating managers' and employees' wages etc.

level of centralization, integrity, periodicity, accuracy, representation of control procedures, efficiency, targeting, effectiveness, adequacy of the means being regulated.

level of efficiency, targeting, effectiveness, adequacy of the means being regulated.

level of documental, instructional, technological, organizational and administrative support of management activities

level of economic feasibility, riskiness, efficiency, optimality, economy, achievability of management decisions.

speed of bringing decisions to their executors, speed of implementing management decisions, effectiveness and timeliness of implementing decisions, level of deviations etc.

Fig. 2. Indicators of management activities diagnostics in the system of process-structured management

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KEY DRIVERS OF CORPORATE SOCIAL RESPONSIBILITY IN ASIA

Abstract. Few years ago the concept of corporate social responsibility was not a household term in most organizations in Asia. Times are changing and now corporate social responsibility has appeared in most countries of the region. The aim of this article is to identify the main CSR drivers in Asia.

Key words: corporate social, main CSR drivers in Asia.

Introduction. Business opinion polls as well as corporate behaviour both show increased levels of understanding of the link between responsible business and good business. In addition to attracting good customers and employees, acting responsibly towards workers and others in society can help build value for firms and their shareholders.

Although much of CSR in Asia is still limited to philanthropy, the recognition of the significant effect the activities of the private sector have—on employees, customers, communities, the environment, competitors, business partners, investors, shareholders, governments and others is growing, and companies focus on more and more diverse methods that enable them to realize their vision of social responsible companies. In many parts of the world CSR actions have their own, unique forms and dynamics, and different aspects drive companies apply such policies and actions. This article deals with the key drivers of CSR in Asia.

Definition of CSR. On a wide range of issues corporations are encouraged to behave socially responsibly (Welford and Frost, 2006; Engle, 2006). At the very beginning one must stress that CSR is an evolving concept that currently does not have a universally accepted definition, in both the corporate and the academic. CSR is understood as the way firms integrate social, environmental and economic concerns into their values, culture, decision making, strategy and operations in a transparent and accountable manner

and thereby establish better practices within the firm, create wealth and improve society.

There have been many attempts to establish a better understanding of CSR and to develop a common, robust definition. One of the best known attempts Carroll's (1999) literature review of CSR definitions in academic literature, dating the first formal definition to Bowen (1953). Moir (2001) followed this methodological approach, but expanded the analysis to include definitions used by business. Others as well have presented reviews of available definitions, e.g. Joyner and Payne (2002) and Carter and Jennings (2004). These reviews are necessary in order to provide an overview of the historical development of concepts such as CSR. Table 1 presents more popular CSR definitions.

One must be aware that 'some…researchers…distort the definition of corporate social responsibility or performance so much that the concept becomes morally vacuous, conceptually meaningless, and utterly unrecognizable'(Orlitzky 2005); or that CSR may be regarded as 'the panacea which will solve the global poverty gap, social exclusion and environmental degradation' (Van Marrewijk 2003).

It is worth stressing that corporate social responsibility (CSR) is also known by a number of other names, such as corporate responsibility, corporate accountability, corporate ethics, corporate citizenship or stewardship, responsible entrepreneurship, etc.

A link between PR and CSR. The formal practice of "public relations" dates to the early 20th century. In the relatively brief period leading up to today, public relations has been defined in many different ways, the definition often evolving alongside public relations' changing roles and technological advances. The earliest definitions emphasized press agentry and publicity, while more modern definitions incorporate the concepts of "engagement" and "relationship building."

Popular CSR definitions

Definition source	Definition
Commission of the European Communities, 2001	A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis
World Business Council for Sustainable Development, 1999	The commitment of business to contribute to sustainable economic development, working with employees, their families, the local community and society at large to improve their quality of life
World Business Council for Sustainable Development, 2000	Corporate social responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as the local community and society at large
Commission of the European Communities, 2001	Corporate social responsibilty is essentially a concept whereby companies decide voluntarily to contribute to a better society and a cleaner environment
Business for Social Responsibility, 2000	Business decision making linked to ethical values, compliance with legal requirements and respect for people, communities and the environment
Business for Social Responsibility, 2000	Operating a business in a manner that meets or exceeds the ethical, legal, commercial and public expectations that society Has of business. Social responsibility is a guiding principle for every decision made and in every area od a business
IBLF, 2003	Open and transparent business practices based on ethical values and respect for employees, communities and the environment, which will contribute to sustainable business success
Khoury et al., 1999	Corporate social responsibility is the overall relationship of the corporation with all of its stakeholders. These include customers, employees communities, owners/invstors, goverment, suppliers and competitors. Element of social responsibilty include investment in community outreach, employee relations, creation and maintenance of employment, environmental stewardship and financial performance
Business for Social Responsibility, 2003b	Corporate social responsibilty is achieving commercial success in ways that honour ethical values and respect people, communities and natural environment
Commission of the European Communities, 2003	CSR is the concept that an enteprise is accountable for its impast on all revelant stakeholders. It is the continuing commitment by business to beheve fairly and responsibly and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and socjety at large
CSRwire, 2003	CSR is defined as the integration of business operations and values, whereby the interests of all stakeholders including investors, customers, employees and the environment are reflected in the company policies and actions
Hopkins, 1998	Corporate social responsibilty is concerned with treating the stakeholders of the firm ethically or in a socially responsible manner. Stakeholders exist both within a firm and outsider. Consequently, behaving socially responsibly will increase the human development of stakeholders both within and outsider the corporation
Ethics in Action Awards, 2003	CSR is a term describing a company obligations to be accountable to all od its stakeholders in all its operations and activities. Socially responsible companies

Source: Own study.

Public relations has developed very rapidly in recent years, partly because management of various commercial and non-commercial organizations have discovered a need for public relations activities. There has also been a considerable increase in the means by which public relations messages can be conveyed.

The term public relations is understood in this study as a corporate function that manages relationships with strategic constituencies (Hutton, 1999). The term public relations is used as an umbrella term to describe the organizational function that adjusts business to society and society to business is consonant with the emerging behavioral paradigm in public relations theory and practice. The corporate public relations function is central to the implementation of corporate social responsibility.

Asia. Asia's time has come. For centuries, this vast, complex and diverse continent has been forced to play catch up with the Western world. However, the emergence of China and India as fast-growing economies is the biggest shift in geopolitical power since the US replaced Europe's imperial powers as the world's dominant trading block. While India and China are Asia's driving force, the continent also boasts some of the most technologically advanced territories on the planet. Long time ago, Japan graduated to the economic and innovation elite. But now it has been joined by, Taiwan, South Korea, Hong Kong and Singapore. At the same time Indonesia, Malaysia, Thailand, the Philippines and Vietnam are all experiencing economic growth and advances in infrastructure.

Asia is a dynamic place and home to some of the richest as well as the poorest people in the world. The nature of its rapidly growing economies results in huge opportunities for businesses but also great challenges.

Both in geographical size and in population Asia is the largest continent. It is probably the most complex region as well. Asian countries such as China and India have emerged as significant markets for multinational corporations. This process of international trade in Asia continues to expand The creation of these new markets will continue to demand an increase in the level of public relations activity in the continent. (Sriramesh, PR Encyclopedia, 2005).

Globalization has opened up the economies of a dozen or so Asian countries, resulting in a significant inflow of multinational corporations into the region. A concomitant result has been the entry of leading multinational public relations agencies into Asia, resulting in an infusion of Western perspectives of public relations practice. Some observers have rightly commented that this development has led to an increase in the level of professionalism among public relations practitioners in the continent. Nevertheless, it is also important to recognize that there has been no corresponding flow of information out of Asia that could help in the development of effective strategies for conducting public relations globally. It is reasonable to believe that a continent as rich as Asia, with its long heritage, has something useful to offer the public relations industry and pedagogy[1].

CSR in Asia. Across Asia, CSR initiatives and CSR issues vary hugely. In China there have been much interest from the government side. A number of guidelines and initiatives around CSR were developed. In Hong Kong, NGOs have demanded improved CSR initiatives from large companies. In Malaysia there have been significant leadership on CSR issues from stock exchanges. In Vietnam, one can see leadership from the Chamber of Commerce working in partnership with the United Nations Development Programme. Singapore presents a tripartite approach including business, government and trade unions. In Japan many companies have been leaders on environmental initiatives. A great deal of voluntary initiatives are apparent when one considers CSR in India. Bangladesh has introduced tax exemptions for companies engaging in CSR programmes. In Sri Lanka there has been an emphasis on CSR in small enterprises and CSR initiatives were linked to peace in the country.

Key Drivers of CSR in Asia – research method and findings. The research method used in this paper is a qualitative analysis of discussion forums concerning international aspects of CSR, especially in Asian region as well as company and industry reports. Research was conducted from the beginning of November until the end of December 2012. The author has analyzed 23 internet sites and reports. Among others the following sources have been used: Grant Thornton International Business Report, The Lloyd's Register Group Report, CSR IN ASIA, THE REAL PICTURE, Asean Foundation, CFO innovation Asia, CSR Asia Center at AIT, CSRwire.com, International Centre for Corporate Social Responsibility, Amsterdam Conference on the Human Dimensions of Global Environmental Change. Table 2 presents grouped research results:

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[1] http://www.icpr.ir/The%204th%20International%20Conference%20on%20Public%20Relations.pdf

<div align="right">*Table 2*</div>

Key drivers of CSR in Asia

Institutional drivers	In Asia there are increasing number of government actions to guide or legislate CSR activities. Many experts in this filed believe that eventually some Asian governments will be likely to adopt similar European frameworks to regulate mandatory reporting and disclosure.
Business	Another important driver for CSR in Asia are businesses. Businesses are focused on how moving towards more ethical business practices can help them control costs.
Quasi-public bodies	In Hong Kong, Malaysia, China, and more recently Singapore as well as Thailand, stock exchanges are playing an important role in raising the visibility of businesses and encouraging reporting on sustainability.
Employment	Recruitment/retention remains a key driver indicates the importance to businesses of attracting the right staff and keeping them satisfied. The big challenge faced by many companies operating in Asia is finding and hiring highly professional people, particularly in middle management level. Finding good professional -level talents is a constant pressure. The war for talent is consistent across all industries".
Transparency and accountability	Still in many Asian countries, families have controlling interests in large listed companies. It is questioned whether in such circumstances companies are run in the interests of all stakeholders. For that reason, transparency is an essential step to CSR. It opens companies' conduct to public scrutiny and indicates that a company values the opinions of its stakeholders.
Social media	There is no doubt that social media is now playing an important role in driving CSR in Asia. Only in China there are more than 80 million bloggers from a large and constantly growing community of internet users engaged in online discussion about contemporary issues.
Supply chain concerns	Asia is seen as the workshop of the world. With increasing consumer pressures for more responsible products, there is perhaps even more attention being placed on Asia's complex supply chains. Attention is focusued not only on labour and human rights abuses, but also on the environment and product traceability.
Environment	Environmental issues are considered to be one of the least important drivers of corporate social responsibility not only in this region but also globally.

Source: Own study.

Summary. The future will probably see Asian stakeholders becoming more sophisticated and expecting more from business. They will use social media to discuss the activities of large companies and brands will have to be increasingly aware of the new emerging issues. A new Asian consumer class is both more educated and more aware and will expect value from their purchases reflected not only in how much they can get for their money.

A new wave of Asian multinationals is also set to upset the existing international economic order. Many of those new companies are recognising that CSR practices are part of their license to operate on the competitive international playing field. It shouldn't be assumed that the emerging brands cannot be every bit as good at CSR as their Western counterparts, if they need to be. Companies operating and investing in Asia, have to be aware of the Asian issues that can affect their business. Replicating Western forms of CSR and introducing them into Asia may end with limited success. That is why CSR will have to be tailor-made to the needs of the region and the aspirations of stakeholders. CSR must be aligned with Asian challenges if they are to provide opportunities for business.

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THEORETICAL AND PRACTICAL APPROACHES TO IDENTIFICATION OF STAKEHOLDER INTERESTS OF THE COMPANY

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Abstract. In the article the approaches to stakeholder interests identification are proposed. The developed approaches are directed at identification of types of stakeholder interests and their localization in the company value chain.

Key words: stakeholders, stakeholder interests, company value chain.

An introduction, indicating article scientific problem. The recent research in business and economy says that building company management system just on the principles of maximizing shareholder value is not an effective approach to achieve sustainability of the company and the society. That is why incorporation of wide variety of stakeholder interests into company management system can solve the problems of company stability. Thus the current article is directed towards the identification of stakeholder interests.

An analysis of recent research and publication. Although a great variety of theories developed in the previous century, such as SWOT analysis, it is not clear whether the interests of stakeholders from the external environment should be considered. The other problem is how the goals of important stakeholders could be implemented into corporate strategy. The necessity to solve these problems resulted in introduction of new managerial theories. In those theories it is proposed to review the enterprise activity from different perspectives (customers, creditors, investors, consulting agencies etc.) and/or aspects of enterprise development (innovative aspect, aspect of labor resources etc.) [6]. Such ideas are supported by the research of the following scholars: in [11] is stated that strategy is the set of pragmatic compromises between stakeholders while in [8] it is claimed that failure to act in accordance with stakeholder requirements leads to possible problems in strategy implementation. Managerial commitment to stakeholder interests will drive strategic decision making, which in turn will affect firm financial performance [3; 9]. The ability to balance stakeholder influence leads to higher level of consistency in corporate activity and achievement of corporate goals. The described approach to forming corporate strategy could be called multilateral. The actuality of such approach lies in balancing of a significant number of economic factors and corporate strategy [6]. The corporate management based on multilateral approach permits to adapt measures of corporate activity to the requirements of different stakeholders. The most accented the need in reviewing of corporate activity both from external and internal points is proposed in stakeholder approach worked out by E. Freeman [5].

The theory that considers points of views of stakeholders and transforms them into strategy is the "balanced scorecard theory" developed by R. Kaplan and D. Norton [6]. However as S. Walker and J. Marr [12] claim in that theory "Kaplan and Norton, except employees and customers … appear to have overlooked the important category of tracking other stakeholder groups… The strong companies of the future will develop key business indicators for each stakeholder group". In the same time the important issue of Kaplan and Norton's balanced scorecard theory is consideration of some aspects of corporate development that influence corporate activity significantly in addition to the stakeholders.

The stakeholder theory consists of three parts: narrative, descriptive and instrumental [5; 7]. Descriptive theory lies in describing company

behavior towards stakeholders and stakeholders towards company. In the normative theory ethical issues connected with company relations with its stakeholders are being solved. Instrumental theory purports to research the influence of stakeholders on the outcomes while making corporate strategy. Some aspects of instrumental theory are the main issues of the current research.

Objectives of the article. The objective of the article is develop approaches for identification interests of influential stakeholder.

Presentations of the main research and explanation of scientific results. According to [5, 46] stakeholders are a group of socio-economic actors who can promote or oppose to achievement of goals or activities of the company. The other definition that is relevant to the current research is the following: a stakeholder is an individual or group that has a stake or can influence the organization performance [2]. The following socio-economic actors can be company stakeholders: managers, owners, customers, state authorities, employees, investors, non-governmental organizations etc. can be company. The reconciliation of stakeholder interests will lead to better access to resources and as the result to the increase in company effectiveness. The important aspect of "company-stakeholder" interaction is identification of interests of such socio-economic actors.

Thus the development of methods for identification of stakeholder interests will contribute to the improvement of company performance. The scientific literature in stakeholder analysis contains various approaches to identification of stakeholder interests [1; 10] and to the research of interests of such socio-economic actors in company activity. The authors that researched the problems of identification of important stakeholder interests are the following E. Freeman [5], A. Carrol [4], A. Keay [7]. It should be also stated that the research of mentioned authors are not systematic in relation to stakeholder interest identification and need to be complimented by additional theoretical and practical developments.

The socio-economic interests in company activity can be various. Thus for this research only stakeholders that can foster or oppose realization of company goals were considered. Thus only the

desire of socio-economic actor to get something from the organization can not be considered as its legitimate claim. For the company important are only the interests of influential stakeholders.

The literature review [4; 5; 7] permitted to define two basic directions of identification of stakeholder interests. They are: analysis of company obligations to its stakeholders and analysis of place of interests in company activity.

The first direction is related to analysis of what the company owes to its stakeholders while the second – permits to locate stakeholder interests in company activity.

The presence of company obligations to its stakeholders usually means that the company owes something to its stakeholders. In the same time stakeholder expects the company to fulfil its obligations.

According to the Pyramid of Corporate Social Responsibility [4, 44] the company has four types of responsibilities to its stakeholders which are the following: economical, juridical, ethical and philanthropical.

It should be underlined that the approach which is based on "strategic necessity" and pragmatical compromise [5, 44] anticipates understanding of the fact that the company responsibility to its stakeholders is based on the specific obligations. Thus instead of using term "responsibility" which is used in the Pyramid of Corporate Social Responsibility we will use the term "obligation".

It should be also noted that the Pyramid of Corporate Social Responsibility was developed for the countries of Western world where the standards of interaction of the company with its socio-economic actors are different from Ukrainian society. In particular, in Ukraine the economy is in the process of accumulation of the capital by buy owner who started their business recently. Thus ethical and philantropical responsibilities usually does not exist. In addition we are conducting research from the positions of "strategic necessity" for consideration of stakeholder interests. Thus to identify stakeholder interests more pragmatical approach should be applied.

Considering the letter it is proposed to replace ethical and philantropical responsibilities for the "necessity to comply with norms and standards which are accepted in the society or among specific socio-economic actors" for identification of stakeholder interests.

Thus the research of practical activity of Ukrainian enterprises permits to make a conclusion that at the moment there are three types of obligations of the company to its stakeholders. They are: economical, juridical and the necessity to comply with norms and standards accepted in the society or among some particular socio-economic actors (Tabl. 1).

The economic obligations arise from formal and informal contracts of the enterprise and its stakeholders about exchange of financial recourses for goods and services. For example, as the result of the job accomplished by employee he or she expects to receive salary agreed beforehand or the consumer pays the price for the goods supplied by the company.

Such obligations give birth to the appearance of stakeholder interests in company activity. It should be underlined that both formal and informal contracts established between the company and its stakeholders forms mutual obligations and interests in each other activity.

There are two types of juridical obligations. They are: contract and legislative. Contract obligations arise from juridical interaction between company and its influential stakeholders while the second type of obligations are established by the government. The emergence of juridical obligations of the company to some socio-economic actors often leads to transforming the latter into stakeholders. For example establishing the contract between the enterprise and the supplier leads to forming possibilities for mutual influence to guarantee accomplishment of contract conditions by contra agents.

It should be underlined that the third type of obligations arise from norms and standards accepted in the society or among some socio-economic actors. If some stakeholders are important for the company it will try to follow norms and standards accepted among such socio-economic actors. The latter norms and standards will transform into stakeholder interests in company activity. More over such norms and standards usually have non-juridical character which means that they are not implemented into the legislation but are generally accepted among group of stakeholders or in the society. The norms and standards usually have social, ecological or ethical character.

Table 1

Interests of stakeholders by types of obligations of the company to such socio-economic actors*

Stakeholders	Types of obligations of the company to stakeholders					
	Economical	Juridical		The obligations to comply with norms and standards accepted among stakeholders		
		Contract	Legislative	Social	Ethical	Ecological
Owners and Managers	Profit					
Consumers						
Employees	Salary				Ethical standards in relations between management and employees	
Suppliers		Supplying in time				
Intermediates		Supplying in time				
State authorities and society			Paying taxes by the company	Participation of the enterprise in realization of social projects		
Potential investors						
Potential creditors						
Non-government organizations						Company activity according to ecological standards that are not approved by jurisdiction

* Note: developed basing on [4].

The social interests means that stakeholders expect from the companies actions directed towards realization of social projects. For the company such actions may improve its image in the society and may lead to better attitude of government authorities.

Ethical stakeholder interests mean that the company while interacting with socio-economic actors should comply with some specific ethical norms.

Ecological stakeholder interests mean that stakeholders expect from the company to follow ecological standards in its activity. For example, some non-governmental organizations expect that companies will not break both the rules incorporated in the legislation and the common sense of ecologically responsible activity.

The other important aspect of stakeholder interests research is identification of their appearance in company activity. It should be underlined that stakeholder interests can appear either in the entire enterprise or in some aspects of its activity.

If stakeholder interests relate only to some aspect of company activity it is sensible to split the latter on stages of company value chain.

Such approach will permit to concretize the place of stakeholder interest emergence in company activity. For better visualization and practical application of developed approach to stakeholder interest identification we propose to use matrix analysis (Fig. 1).

The matrix presented on fig. 1 includes both types of interests of stakeholders in company activity and the location stakeholder interest emmergance in company activity.

The matrix of stakeholder interests in company activity could be filled in basing on knowledge of experts about company interaction with its stakeholders, negotiations with stakeholders and analysis of the information concerning socio-economic actors activity both inside and outside the company.

Stakeholders	Types of obligations of the company to stakeholders	Stakeholder interests in entire company activity	Interests of stakeholders relatively to stages of value chain		
			Supply	Manufacturing	Sales
Owners and Managers	Economical				
	Juridical				
	Norms and standards				
Consumers	Economical				
	Juridical				
	Norms and standards				
Employees	Economical				
	Juridical				
	Norms and standards				
State authorities and society	Economical				
	Juridical				
	Norms and standards				
Suppliers	Economical				
	Juridical				
	Norms and standards				
Intermediates	Economical				
	Juridical				
	Norms and standards				

Fig. 1. Matrix of stakeholder interests in company activity

*Note: developed by the author.

Conclusions. Theoretical and practical approaches to stakeholder interest identification presented in the article can be used for reasonable selection of stakeholder interests. The further research in the field could be directed towards implementation of stakeholder interests into company management system.

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SIMULATION OF THE DISTRIBUTION OF FIXATION OF IMPACT OF THREATS FROM INTERNAL AND EXTERNAL ENVIRONMENTS ON ECONOMIC PROTECTABILITY OF ENTERPRISE

Abstract. The conceptual approach to simulation of the distribution of fixation of impact of threats from internal and external environments on the current state of economic protectability of enterprise, that allows monitoring its integrity and further dynamics with maximum precision with the participation of optimally proposed number of parameters-indicators in terms of inputted components of integrated economic protection of business entity, is formed in the work.

Key words: economic protectability, enterprise, impact of threats, internal and external environment, simulation, parameters-indicators.

Formulation of the problem. Unfavorable conditions of management, prevailing in the post-crisis period at some domestic industrial enterprises, continue to focus the attention on the search and implementation at them of diagnostic methods of assessment and control of protective functions in order to make on these business entities the effective decisions concerning stabilization of financial and economic situation. The problem of necessity of implementation of in-depth simulation of the distribution of fixation of impact of threats from internal and external environments on the state of economic protectability of enterprise with the participation of optimum quantity of inputted parameters-indicators that will allow us differentially in a short time to more carefully treat the qualitative management of complex impact of all threats on the integrity of the protection and to overcome the downward trend of state of economic protectability of industrial enterprise, by timely neutralizing the destabilizing action of some threats simultaneously improving in general its economic stability is connected with this.

Analysis of recent researches and publications. Domestic and foreign experience shows that the problem of protection arises before every enterprise of any form of ownership, especially if it aspires to continue to function with acceptable financial and economic results in the crisis or post-crisis period, when the level of market uncertainty is maximum due to the imposition and prolongation for indefinite period of the greatest number of different identified risks that comprehensively burden the whole entrepreneurial activities.

Complex system of economic protection of enterprise in this situation is always based on the minimization of external and internal threats that affect the financial and economic stability of business entity [1, p. 26], that remains under any conditions the main indicator of its activities.

In scientific publications of I.O. Blank, T.H.Vasyltsiv, N.V. Vashchenko, L.I. Donets, O.A. Zayichkovskyi, T.M. Ivanyuta, M.I. Kamlyk, V.I. Kyrylenko, M.B. Tumar [2; 3; 4; 5; 6; 7; 8] and of many other scientists the economic protection of enterprise was considered comprehensively first of all with the help of the mechanism of management of its financial and economic activities and evaluation of the results namely through results of optimization of cash flows, investment activity and efficiency of investments, financial risks, management of financial innovations, management of financial stability of enterprise, through financial profitability and formation of financial resources etcetera. Most of them connected the main task of reforming of business entities with the necessity of activization and escalating of their potential simultaneously overcoming just randomness of internal state and external activities, increase of the predictability of their functioning through the mechanism of ensuring of a potential protection [4, p. 12]. It means that a significant number of scientists did not give the preference to economic protectability of enterprise not separating it from their understanding of economic security in the

spectrum, firstly, of narrowed number of its components for strict economic protection: innovative, financial and credit and investment, and secondly did not take into account the element of simulation of the distribution of fixation of impact of threats from internal and external environments on its current state that allows simulating control over itsfurther dynamics in the complex system of protection accurately with the participation of beforehand proposed optimum number of parameters-indicators in terms of inputted components of economic protectability of business entity.

Analysis of scientific sources showed that in the countries with developed market economy and with stable political and economic systems the decline of the level of economic protectability and full bankruptcy of enterprises only by 1/3 are caused by external factors and by 2/3 – by the internal [9, p. 8]. The distribution of these factors in the countries with a deficit of state budget, Ukraine belongs to, can be significantly distorted and be vice versa – 60 % and 40 %, respectively, since country and production structures that belong to enterprises of most strategic sectors of economy, maintain numerous financial and economic relations with external environment in order to solve financial problems at the expense of foreign investments, purchase of import raw material, spare parts, that is equally typical for any branch of industry for example for both the production of machinery products and light industry products.

However, none of the researchers have yet considered the possibility of simulation of the selection of parameters-indicators that would fix the above mentioned ratio of the impact of threats from internal (40 %) and external (60 %) environments on economic protectability of domestic industrial enterprises, maintaining the integrity of the formed system of economic protection of industrial and economic structure. Especially it is important for those business entities that can not differentially single out all threats that prevent the preservation of an acceptable level of their economic protectability.

Objectives of the work. Purpose of the work is to propose a conceptual approach concerning the distribution of fixation of impact of threats from internal and external environments (in a specified ratio) on the current state of economic protectability of enterprise comprehensively optimizing the appropriate number of selected parameters-

indicators in terms of inputted components of integrated economic protection of business entity.

Presentation of the main material of the research. To achieve economic efficiency of functioning of the system of economic protection of separately taken business entity there is needed not only rational applied method of diagnostics of the level of its economic protectability, but also the preceding to it an effective apparatus of simulation of distribution of fixation of impact of threats from internal and external environments on state of economic protectability of enterprise that allows us with the participation of a number of parameters-indicators that fix the quality of the flow of innovative, financial and credit and investment spheres of the activities of business entity with maximum precision to control further dynamics of its economic protectability in order to prevent its downward trend. It was found that in order to get out of crisis state of a number of enterprises and to increase the level of their economic protectability first of all the technical reconstruction is necessary, the result of which is the increase of the qualitative state of production base and achievement of such their level of technique and technology that would give the domestic industrial and economic structures an opportunity to resist the external environment producing products of high quality and ensuring its competitiveness in global markets [10]. However it should be taken into account the fact that it is complicated to quickly technically reconstruct such enterprises and to maximize their income from the sale of finished products, especially because of totality of negative uncontrolled factors of external environment. Although it is possible to manage them.

In general the factors that form the appropriate level of economic protectability of enterprise are the indicators of assessment of simultaneous impact and counteracting of the threats from both internal and external environments. According to [11, p. 14], these factors are various and in each branch of industry they have their own specifics, but there are distinguished the general factors that affect the level of economic protectability of enterprise regardless of the forms of ownership and branch of production. These are primarily the factors of production: location of enterprise, natural resources, availability of their use, manufacturing infrastructure with education and qualification level of staff; stable demand for products; reliability of suppliers; external competi-

tiveness concerning products that is exported and must meet international standards and normative parameters of quality; state economic regulation of activities of enterprise; sufficient protection of trade secret and competence of administration of manufacturing structure.

In its turn, if to single out all destabilizing factors they being potential threats to any industrial enterprise are systematic and non-systematic. They arise in the space of internal and external environments and also directly influence the objectivity of the state of economic protectability of business entity (Fig. 1). Since modern enterprise is the main element of general dynamic economic system having the property either to develop or to completely collapse under market conditions that maximally expands the range of diagnosed level of its protectability both in general and according to separate spheres of entrepreneurial activities the problem of simulation of the distribution of fixation of impact of threats from internal and external environments on the current state of economic protectability of enterprise that gives an opportunity with the participation of optimally suggested quantity of parameters-indicators to adequately monitor and when ever possible to consistently neutralize negative consequences of interrelation of components of the environments with the current effective system of ensuring of economic protectability of business entity can not be left without attention.
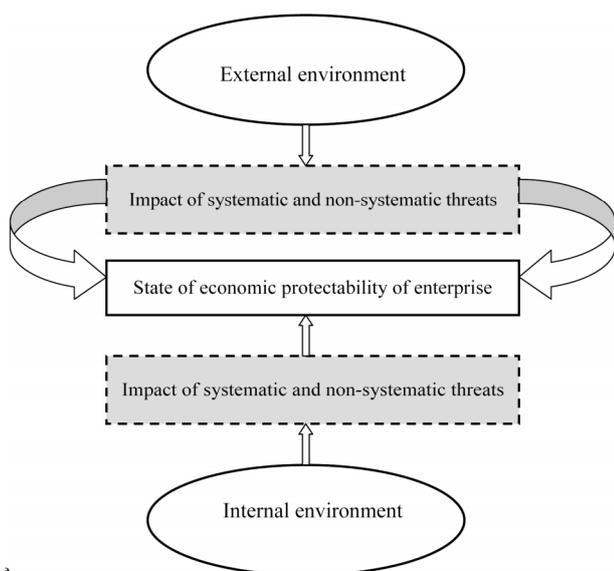

*Fig. 1. Generalized impact of systematic
and non-systematic threats
on economic protectability of enterprise*

Note: made by the author

The current consequences of the global financial crisis of the previous years continue to impact the domestic industrial enterprises. In this regard it is worth revising at them not only the state of efficiency of functioning but also the systems of their economic protection. Each manufacturing enterprise can independently form and afterwards correct the individual activities of the control service over the state of its economic protectability. Since every business structure is an open system that has constant and close interrelation with internal and with external environment, it is necessary to periodically assess the impact of threats that arise in the space of these environments on integrated its economic protectability, but it can be done only provided that the relevant information on financial and economic activities of enterprise is open to users.

It is not excluded that this information can be distorted and incomplete that will negatively affect the integrity of objectivity of economic protection. In this situation it is necessary to select a range of financial and economic parameters-indicators so that they would absolutely fix the impact of all even of the minor threats, by the deviations from their normative meanings however keeping previously mentioned specific weight of fixation of destabilizing factors from internal (40 %) and external (60 %) environments.

As for internal environment, it is easier to diagnose its influence and in the future to monitor and direct it at the collective effective management of trend of fluctuation of the level of economic protectability since it directly depends on the dynamics of the internal state of solvency, creditworthiness, competitiveness of enterprise. However a number of properties of enterprise automatically depend on the size of influence of threats from external environment. Since it is impossible now, for example to find products of automotive industry in which all parts and nodes would be made by one or only by few producers. For example, in MG 350(Morris Garages) there are used components of nearly 500 suppliers that makes the control over all external factors not maximally precise [12]. Also the state of economic protectability of automotive industry and machine industry in general all over the world, and particularly in Ukraine can be destabilized by the present "stable stagnation" in the market of sale of finished products that affects primarily such economic indicator as sales proceeds.

For example, in Europe only for October 2012 the number of registered new cars dropped by 4.8 compared to similar period of the year 2011. In addition, for January-October 2012 the decline was 7.3 %, particularly including Ukraine. This trend of decline in number of sales of products of motor industry covered such countries as France – by 7.8 %, Italy – by 12.4 %, Spain – by 21.7 %. However the Great Britain was not affected by it: there was recorded an increase by 12.1 % [12]. Although the dynamics of production of trucks and buses at some domestic machine-building enterprises is not decreasing.

Therefore only by such an effective financial and economic indicator as revenue from the sale of finished products it is difficult to investigate the general state of economic protectability of the industry or individual enterprise. Some trends of the production of trucks and buses at domestic enterprises and dynamics of sale in the market of Ukraine of minibuses and some types of commercial automobiles for January – September 2011–2012 are given in tabl. 1 and tabl. 2.

Table 1

Dynamics of the production of trucks and buses at machine-building enterprises of Ukraine for January – September 2011–2012, pc.

Enterprise	2011	2012	2011	2012
	Trucks		Buses	
PJSC "Zaporizhzhya automobile building plant" (ZAZ)	927	861	131	562
CJSC "AvtoKrAZ"	736	730	–	–
Subsidiary of "AZ "Bohdan" PJSC "Cherkassy bus"	415	689	61	318
CJSC "Boryspilautoplant" (BAZ)	192	100	791	821
PJSC "Cherkassy bus"	15	71	630	441
LLC "Kremenchukcar assembly plant" (KrASZ)	200	100	–	–
PJSC "Chasovoyarskbuses"	–	–	411	187
PrJSC "Chernihivautoplant" (ChAZ)	–	–	373	167
Khersoncar assemblyplant"Anto-Rus"	–	–	83	1
Plant of municipal transport (LAZ)	–	–	92	Information is unavailable
Total	2485	2551	2572	2497

Note: made according to data of Information-analytical group AUTO-Consulting [12].

Table 2

Dynamics of sales in the market of Ukraine of microbuses and commercial automobiles for January – September 2011–2012, pc.

Brand	2011	2012
Sale of microbuses		
GAZ	299	277
Ruta	420	196
Hyundai	162	176
Volkswagen	304	269
UAZ	80	99
Ford	**7**	14
Toyota	18	12
Chevrolet	1	11
Other brands	88	127
Total	1379	1181
Sale of commercial automobiles		
Fiat	1423	1817
GAZ	1994	1607
Volkswagen	1247	1318
Ford	519	984
ZAZ	508	469
Renault	714	1085
Peugeot	535	787
UAZ	307	252
Bohdan	148	141
Mercedes-Benz	81	164
FAW	37	83
Izh	114	79
Citroen	655	480
Other brands	932	167
Total	9214	9433

Note: made according to sample data of Information-analytical group AUTO-Consulting [12].

Apparently the dynamics of production and sale in Ukraine of some types of minibuses and commercial automobiles are ambiguous. In particular, production of trucks for investigated period 2011-2012 grew by 2.66 %, and the total production of microbuses has a downward trend by 2.92 %. Yet the sales of trucks for the specified period decreased by 13.05 %, similarly to the sale of microbuses, where the decline is 14.36 %. Although the sale of commercial automobiles has not experienced decline yet: their total sales in 2012 compared to the same period of January – September 2011 increased by 2.38 %. That is, according to this data it is impossible to clearly investigate how various threats from internal and external environments affect the state of the economic protectability of the leading domestic enterprises.

Leading positions in the production of passenger cars in Ukraine as of 01.12.2012 are taken by such companies: corporation "Ukravto" (Zaporizhzhya city), subsidiary of "AZ "Bohdan" PJSC "Cherkassy bus" (Cherkassy city), PrJSC "Eurocar" (Solomonovo city), LLC "Kremenchuh car assembly plant" (Kremenchuh city).

By rational choice and optimal structuring of parameters-indicators in the system of diagnostics of economic protectability of enterprise there can be achieved the accurate simulation of the distribution of fixation of impact of threats from internal and external environments on the current state of economic protectability of enterprise parallelly using the method of control of deviations of structural parameters-indicators from the well-defined range of their normative values.

Therefore let us offer structuring of parameters-indicators according to innovative, financial and credit and investment components of

economic protectability of enterprise so that the peculiarity of offered analytical toolkit would lie in the fact that all estimated parameters would be chosen so as to fix strictly relevant specific weight of the consequences of threats that came from internal (40 %) and external environments (60%) with the help of introduced their optimal number [13]. The distribution of parameters-indicators is as follows: innovative protectability – 6:3 (9 parameters-indicators); financial and credit protectability – 9:6 (15 parameters-indicators), investment protectability – 3:17 (20 parameters-indicators) (see table. 3), that will objectively promote target evaluation of the full range of the threats that periodically come to the space of enterprise with advantage, as was shown by studies, in 20% of threats from external environment, the impact of which can be quantitatively diagnosed through the changes of levels of components of economic protectability.

Table 3

The distribution of advantages of fixation of the impact of threats from internal and external environments according to inputted parameters-indicators within the components of the economic protectability of industrial enterprise

№	Parameter-indicator	Advantage of fixation of impact of threats from internal ($\downarrow I$) or external ($\downarrow E$) environments
1	2	3
Innovative protectability		
1	$k_{i_{off}}$ – coefficient of innovative offer	$\downarrow I$
2	P_{sip}^{P} – parameter of profitability of sold innovative products by net profit	$\downarrow I$
3	e_u^i – value of useful efficiency from introduction of innovations	$\downarrow I$
4	$k_{\sum C}^{IP}$ – coverage ratio of the total costs of innovation project	$\downarrow I$
5	R – total risk of innovation project	$\downarrow I$
6	l_{ia} – level of inventive activities	$\downarrow E$
7	l_{ia}^{fc} – level of financing and crediting of innovative activities	$\downarrow E$
8	I_{ia}^{e} – integral parameter of efficiency of innovative activity	$\downarrow I$
9	P_{ipr} – indicator of profitability of innovation project owing to investments	$\downarrow E$
Financial and credit protectability		
1	k_{gl} – coefficient of general liquidity (coverage ratio current)	$\downarrow I$
2	k_{ql} – coefficient of quick liquidity	$\downarrow I$
3	k_{al} – coefficient of absolute liquidity (immediate solvency)	$\downarrow I$
4	$k_{R/P}^{sh}$ – coefficient of ratio of short-term accounts receivable and short-term accounts payable	$\downarrow E$
5	k_a – coefficient of autonomy (financial independence)	$\downarrow I$

1	2	3
6	k_{fs} – coefficient of financial stability	$\downarrow E$
7	k_{moc} – coefficient of maneuvering of own capital	$\downarrow I$
8	k_{fin} – coefficient of financing	$\downarrow E$
9	k_{fd} – coefficient of financial dependence	$\downarrow E$
10	k_{eof} – coefficient of ensuring of current assets at the expense by own funds	$\downarrow I$
11	k_{dc}^{c} – coefficient of concentration of debt capital	$\downarrow E$
12	k_{rbof} – coefficient of ratio of borrowed and own funds	$\downarrow E$
13	P_{oc} – profitability of own capital	$\downarrow I$
14	P_{a} – profitability of total assets by net profit	$\downarrow I$
15	P_{P_s} – profitability of sold products by net profit	$\downarrow I$
Investment protectability		
1	k_{in}^{pr} – integrated coefficient of probability of preservation of investment attractiveness of enterprise	$\downarrow I$
2	k_{fi}^{R} – coverage ratio of risk from financial and investment activities of enterprise	$\downarrow` E$
3	$k_{\sum_i}^{fe}(t)$ – coefficient of ratio of financial expenses to total amount of investments received by enterprise for the reporting period	$\downarrow E$
4	$k_{P_s}^{C}$ – coefficient of ratio of obtained credits to the amount of sold products at enterprise	$\downarrow E$
5	k_{s}^{BPA} – coefficient of suitability of state of basic production assets, that do not need immediate additional investments for updating	$\downarrow I$
6	k_{inv} – coefficient of investing	$\downarrow E$
7	k_{ESF}^{fd} – coefficient of financial dependence on external sources of financing	$\downarrow E$
8	k_{s-p}^{li} – coefficient of special-purpose designation of long-term investments with the participation of investments	$\downarrow E$
9	k_{a} – coefficient of autonomy (financial independence) (without control of consideration of ensuring of following expenses and payments at enterprise (because of removal of restrictions on credit risk) and income of future periods with recommended expansion of the upper range of normative values)	$\downarrow I$
10	k_{fl} – coefficient of financial leverage	$\downarrow E$
11	$I_{pr}(I_{if}^{1})$ – profitability index (income per unit of invested funds)	$\downarrow E$
12	$R_{r}^{C_{inv}}$ – rate of return on capital investments	$\downarrow E$
13	R_{ar} – accounting rate of return	$\downarrow E$
14	k_{fi}^{e} – coefficient of effectiveness of financial and investment activities	$\downarrow E$
15	k_{RCF} – coefficient of reinvestment of cash flows	$\downarrow E$
16	k_{P}^{CFIA} – coefficient of profitability of the cash flow by investment activities	$\downarrow E$
17	$k_{\Delta FI}$ – coefficient of relative rate of change of current financial investments	$\downarrow E$
18	$k_{\Delta a}^{\Delta FI}$ – relative rate of change of the coefficient of absolute liquidity with the participation of current financial investments	$\downarrow E$
19	k_{FI}^{w} – specific weight of current financial investments of enterprise in the total amount of investments at the reporting date	$\downarrow E$
20	$k_{P_s}^{FI}$ – coefficient of relation of financial investments to volume of sold products for the reporting period	$\downarrow E$

Note: made by the author

In other words according to table 3 the total number of parameters-indicators by components of economic protectability that fix the impact of threats from internal environment – 18 and from external environment – 26. This corresponds to specific weight of the consequences of threats that may come from internal (40 %) and external environment (60 %), as noted earlier, with an error not larger than 1 % due to the fact that the coefficient of autonomy (financial independence) (k_a) is used both within financial and credit and investment protectability, although with different upper range of its normative value. In the consequence of the fact that for objective assessment of investment protectability it is possible not to control the future expenses and payments at enterprise thanks to the removal of restrictions on credit risk and incomes of future periods, extending in such a way the upper range of normative value of this parameter-indicator.

Conclusions and perspectives of future researches. Thus, the economic protectability – is an economic category that characterizes the degree of absence of the consequences of threats and overcoming of the impact of destabilizing factors of internal and external environment on economic activities, that is inherent to all structural functioning elements of economic system that are involved in financial and economic and manufacturing activities, where correspondingly the greatest impact on it manifests itself through the change of the quality of main structural properties of enterprise.

It was found that economic protectability of enterprise, being dynamic in time, additionally requires a weighed conceptual approach concerning introduced simulation offixation of impact of threats (by pre-specified specific weight) from the internal and external environments on its current state that is based on optimally inputted number of parameters-indicators in the terms of the recommended components of an integrated economic protection of business entity. This allows us with a maximum precision to control its further dynamics on the basis of accurate information about the range of normative values of proposed parameters-indicators. Perspectives of the further researches in this direction is the specification of some methods of diagnostics of state of economic protectability of industrial enterprise that is the specification of the system of evaluation measures aimed at determination of magnitude of deviation of the fixed current functional protection of enterprise from the allowed general level of economic protectability.

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THE OUTSOURCING OPERATION RISK MANAGEMENT
BY THE CORPORATE CUSTOMER

Abstract. The article deals with the peculiarities of outsourcing risk management when making decisions about its usage in production and commercial operations of the enterprise. The main factors of risk development have been systemized, as well as the estimation procedure of the level of their impact on the enterprise has been developed, based on the determination of the expected amount of losses.

Key words: outsourcing, outsourcing risks, factors of outsourcing risk development, the expected outsourcing risk level, threshold outsourcing risk level.

Problem statement. The adaptation to the conditions of modern business environment calls for reduction of expenses and optimization of the production organizational framework. Consequently, enterprises use new management tools of production and commercial operations (including outsourcing) with increasing frequency. The international practices show that outsourcing is one of effective ways of doing business, in view of all the advantages that a corporate customer receives with its usage. However, outsourcing operations are also associated with certain risks, of both internal and external origin, as related to the enterprise. Thus, risk management in the process of cooperation between the enterprise and the outsourcing company is one of the important tasks to ensure high operating results of contractors.

Analysis of research studies has shown that the problem of quantitative assessment of risk exposure in the course of cooperation between outsourcer and customer today remains unsolved. In the analyzed literary sources the majority of authors, in particular O.V. Manoylenko, I.V. Popovychenko, N.Y. Omarova, I.I. Zavodovska, A.H. Zahorodniy, pay principal attention to the definition of the most important types of outsourcing risks. [3, p. 44; 4, p. 90; 6, p. 11; 8, p. 181; 9, p. 179]. Some scholars, such as O.P. Lohvinova, M.V. Kotok, K.O. Spiridonova, investigated factors of risk formation in outsourcing operations in order to develop measures to neutralize their effect [5; 7, p. 119; 10, p.160]. Thus, literary sources reveal the theoretical aspects of the outsourcing risk analysis. However, not enough attention is paid to the evaluation of their impact on the results of corporate customers' production and commercial operations.

The aim of the article is to determine the risk assessment peculiarities of outsourcing operations and risk management; to develop the expected outsourcing risk level in the economic activity of corporate customers.

Results and discussion. Risk management is one of the most important tasks in the organization of cooperation between the customer and the executor of outsourcing operations. Therefore, outsourcing requires making effective managerial decisions regarding evaluation, analysis and control of risk-related situations that may arise in the economic activity of the enterprise.

Risk formation in the course of cooperation between the outsourcer and the customer is due to the influence of certain factors of both internal and external origin as related to the corporate customer. Classification of these factors is presented on Fig. 1.

The description of composition and effect peculiarities of the main factors of risk formation in the course of cooperation between the outsourcer and the customer is represented in table 1.
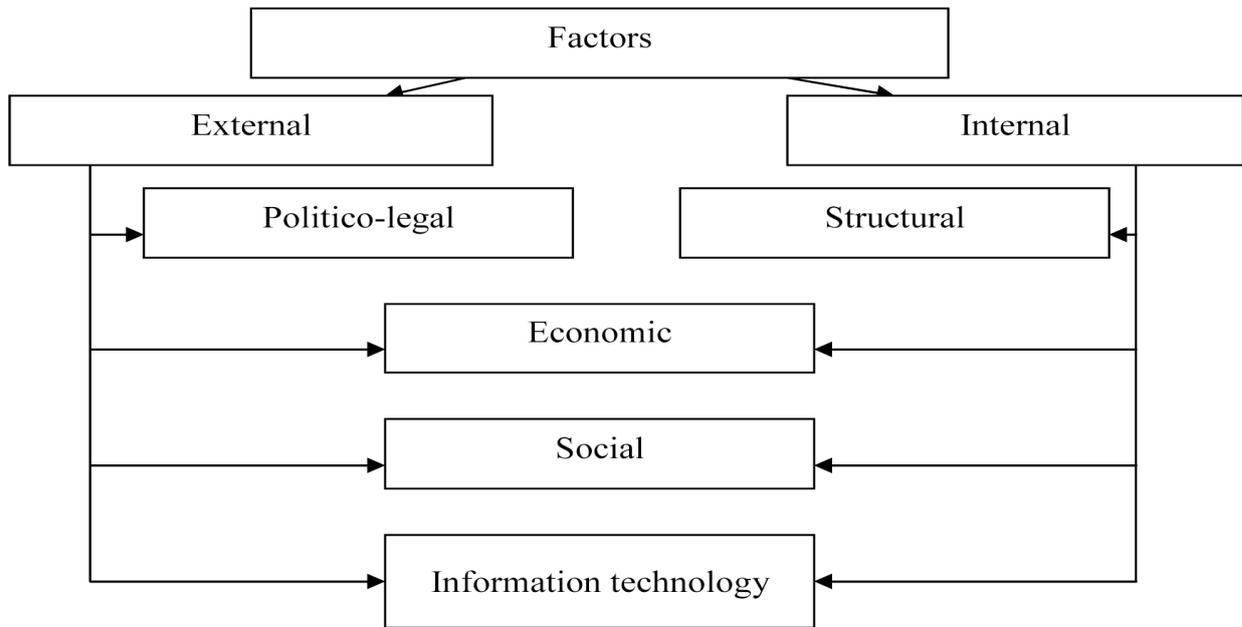
Fig. 1. Factors classification of risk formation that arise in the course of cooperation between corporate customer and outsourcer

* – authors' own elaboration

Table 1

Factors of risk formation that arise in the course of cooperation between corporate customer and outsourcer*

Factors	Description
Politico-legal	Risks driven by the changes in political situation in the country of the customer or the executor (if international outsourcing is used), quality level of normative legal regulations within outsourcing activity.
Economic	Risks that depend on the outsourcing market development, quality of outsourcer selection, validity level of the outsourcing deal conclusion, and quality of execution control as to the performance of outsourcing operations.
Social	Risks inherent in the emergence or increase of social tension level in the group due to the changes of the employees' tasks or due to staff reduction.
Information technology	The risks of technology or information resources misuse by the customer or the executor of outsourcing operations. These risks are driven by the low information awareness level of the enterprise about potential adverse effects of outsourcing activity.
Continuation of table 1	
Structural	Risks inherent in reorganization of the corporate customer when the execution of business processes becomes the responsibility of the outsourcer.

*- authors' own elaboration

Within the outsourcing risks originating under the influence of external in regard to the enterprise factors one can also specify two distinct groups: risks due to improper performance of their function by outsourcers, and risks due to the fault of the highest legislative and administrative state bodies. The detrimental effect of the first group of risks may be considerably lowered by means of appropriate preparation and conclusion of the outsourcing deal. At the same time, an enterprise cannot control the risks related to the second group. Thus, it has to adapt its activity to the peculiarities of their influence in time. Corporate customer has the biggest influence on the risks that arise within his corporate organization, if relevant methods and tools are used. Taking this into account, the corporate customer of the outsourcing services has to form an effective system of cooperation risk management.

Risk management of outsourcing operations is the process of their identification, evaluation, monitoring and control, as well as development and implementation of measures aimed to decrease the detrimental effect of these risks on the corporate customer's performance results.

Risk management of outsourcing operations should be conducted by the corporate customer in two stages: the first stage is preventative management; the second stage is current management (see Table 2).

In order to manage outsourcing risks that arise in the economic activity of the enterprise one should:

•   create an effective system for identification and determination of risks;

•   ensure proper significance assessment of risk influence on the corporate customer activity;

•   develop compensatory mechanisms to prevent or reduce the level of risk exposure of the enterprise.

To properly form the outsourcing operation risk management system the first things one should understand are the main objectives and concerns which the owners and managers of the enterprise put forward when they make a decision about outsourcing. They are usually divided into short-term (cost reduction and growth of profits) and long-term (increase in the economic potential of the enterprise, growth of competitive ability, improvement in the quality of production, etc.) [2, p. 84].

Despite the fact that in the analyzed literary sources authors pay attention mainly to the definition of risks inherent in outsourcing operations, and not to the assessment of their influence on the results of the production and commercial operations of the enterprise, risk management process should be based on the analysis of uncertainty level of future outcomes as well as on the amount of expected losses. This assessment can be done using appropriate methods, particularly analogue, expert, calculation and analytical, economical and statistical methods, etc. [1, p. 121].

Deciding to use outsourcing operations one should also define the following: risks that the enterprise may assume; risks, the effects of which should be limited or diversified; risks to be avoided. For this purpose it is reasonable to form management strategy for the risks arising from outsourcing activity. Major questions in the course of such a strategy formation are determination of threshold risk level an enterprise can assume, taking into account its own supply of proper manufacturing, labor and financial resources and ability to neutralize detrimental effects of risk-related situations, associated with outsourcing. An enterprise should stop cooperation with outsourcer if risk level of outsourcing deal exceeds the enterprise capability to compensate the expected losses caused by risk-related situation by means of internal resources. Consequently, threshold risk level of outsourcing operations is the highest possible risk an enterprise may agree to assume in the course of cooperation with outsourcer, taking into consideration current economic strength of the outsourcer and peculiarities of objectives and development in the market. The decision to transfer the execution of business process to the third party can be made if the following relation is executed:

$$\textit{Expected risk level (R)} < \\ < \textit{Threshold risk level (Thr)} \qquad (1)$$

Table 2

Description of two stages in risk management of outsourcing operations conducted by the corporate customer*

Stages in risk management of outsourcing operations	Peculiarities of management stages
Preventative management	It is carried out before starting cooperation between corporate customer and outsourcing company. It focuses on exclusion of potential adverse effects on the enterprise activity and determination of measures as to the reduction of intensity of their impact.
Current management	It is carried out in the course of outsourcing cooperation. It focuses on analysis of possible deviations of actual risk level and the expected risk level, and on the implementation of measures concerning the reduction of detrimental effects of risks on the production and commercial operations of the enterprise.

* – authors' own elaboration

Expected risk inherent in cooperation of corporate customer and outsourcer is an integral figure that depends on the impact intensity of the associated with this process risk system and probability of risk-related situations. The intensity of risk exposure is characterized by the amount of damage and loss inflicted to the production and commercial operations of the corporate customer. This figure should be determined separately for each type of risk that may arise in the course of outsourcing operations. The amount of loss inflicted by certain risk-related situation may differ depending on the type and form of outsourcing, as well as on enterprise capability to compensate the expected losses by means of internal resources. Level of risk effects may be assessed by means of quantitative calculation and expert methods. The level of financial and economic expenses can be determined on the basis of quantitative calculation in case of some risk exposure. The larger is the volume of estimated expenditures the more risk-related the cooperation with the outsourcer is. Expert methods may be used to assess the risk effects on the qualitative characteristics of the enterprise activity.

Taking all of this into account, the expected risk level of outsourcing for the corporate customer (R) can be defined by the following formula:

$$R = \sum_{i=1}^{n} Pi * C{\textit{в}}i , \qquad (2)$$

where Pi – "i" risk probability in the corporate customer activity when using outsourcing, $C{\textit{в}}i$ – level of losses that an enterprise may assume if "i" risk arises, thous. UAH.

Assessing the effects of risk inherent in outsourcing operations on production and commercial operations of the corporate customer, one should systemize them by the amount of expected losses (see Table 3).

Table 3

**Risk level of outsourcing
for the corporate customer ***

Alignment amount of expected losses of outsourcing risk and threshold risk level	Risk level of outsourcing
R< Thr	Acceptable risk
R = Thr	Critical risk
R> Thr	Catastrophic risk

* – authors' own elaboration

If the expected amount of losses of the corporate customer using outsourcing doesn't exceed the highest possible level, then it is reasonable to perform such an operation.

Assessing risk exposure of outsourcing, an enterprise may find out that the expected level is higher than the threshold risk level or equal to it. In this case corporate customer should make managerial decisions in accordance with the matrix represented in the Table 4.

Table 4

Matrix of making managerial decisions of the corporate customer *

Expectance of risk / The area of expected losses	Close to zero	Low	Medium	High	Close to unity
At the level of profit	Acceptance of risk			Acceptance of risk and the development of appropriate compensation	
At the level of income	Acceptance of risk		Risk allocation and the development of appropriate compensation		Avoidance of risk
At the level of equity	Risk allocation and the development of appropriate compensation	Avoidance of risk			

* – *authors' own elaboration*

On the basis of this matrix it is possible to identify major risk factors and work out appropriate steps to reduce their detrimental effects on the enterprise. Development of the decision-making matrix for the outsourcing risk management should take onto account the expected amount of losses that the corporate customer may bear in case of any risk-bearing situation, particularly expenses on the profit level, income level and on the level of equity capital.

After risk management strategy has been practically implemented by the corporate customer of outsourcing, it is reasonable to assess real consequences of risk effects on the results of the production and commercial operations, define possibilities and ways to improve the system of compensatory measures formation, aimed to reduce the loss amount and the expected risk level of outsourcing operations.

Conclusion. Risk management of outsourcing operations requires from corporate customers to implement certain decisions associated with identification, assessment and control of risks related to such activity. Planning and implementation of the decision to use outsourcing in economic activity of corporate customer should be based on the determination of threshold risk level an enterprise can assume and its comparison with the expected risk level inherent in the cooperation between customer and outsourcer. Depending on the expected loss amount in case of risk-related situations corporate customer may carry on business and make managerial decisions in accordance with the developed matrix. Peculiarities of risk management in outsourcing are different for each specific case, depending on the type and implementation form, as well as on the resource supply of the enterprise.

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CAPITAL AS A GENERIC CONCEPT OF ECONOMICS AND ACCOUNTING: THE CONTENT OF CATEGORY, THE PROBLEMS OF FORMALIZATION AND MANAGEMENT

Abstract. The content and essence of capital of modern economic agents, its role in their operating performance are considered. The problems of capital quantification and management in post-industrial economy are developed.

Key words: post-industrial economy, management, economic agents.

Introduction. Post-industrial socio-economic environment and its pervasive informatization and intellectualization, the emergence of new financial instruments have dramatically changed the view on the capital of modern economic systems. Information and intellectual component of the resource potential is significant in the total capital of any modern economic entity. Intangible economic resources, which represent the capital of today's economic systems, dynamically acquire significance, creating more productive power of capital.

Scientific cognition of capital is inseparable from the evolution of the socio-economic environment, technical, scientific and technological progress advancement, and, therefore, all and all new facts of reality are defined in economic research in this domain area. An indisputable fact is that at the present stage of scientific rationale the capital requires substantial and adequate to modern conditions research, because in real financial and economic processes it is the main factor in the theory of the reproduction process in general, and in theory of crisis recovery in particular. That is why capital is the most important category, which requires increasing attention of modern economic science [1, p. 3].

Analysis of recent research and publications confirms the ambiguity disclosure of economic content of this category in different concepts and paradigms in terms of multilevel economic systems view of capital. Thus the basic problems are the lack of satisfactory formal evaluation system of individual components (primarily intangible) and total expression of modern economic agents' capital. The system of accounting and financial reporting is objectively the only one able to represent the information on economic agents' available capital in formalized way. That's why leading Ukrainian scientist A.A. Chukhno notes that since the components of intellectual capital are involved in the production, determine the value of the company, they must be reflected in accounting documents [2, p. 50].

Based on this view, the Russian scientist K.Y. Tsyhankov substantiates "optimization of accounting methodology and conception of accounting as a unified data system about the condition and movement of capital" [3, p. 5]. Although well-known scientist B. Lew notes that the current methodology of "modern accounting mishandle "internally generated intangible assets, which are the engines of modern economic growth" [4, p. 8]. A. Poltorak and P.Lerner hold the position that intellectual capital, intellectual assets and intellectual property are incorporated that is they are the part of each other: intellectual assets are intellectual capital that is recorded, stored, capitalized and available for studying [5, pp. 18–19].

Overall analysis of researches and publications in this domain area enables to state the general problem, which consists in the fact that "the dynamics of reproduction processes requires the development of new approaches to the process of capital management of the enterprise that should be based on a new philosophy, discovering new content of already known categories, one of which is capital" [1, p. 3].

The main material. Dominance in the economy of information and intellectual resources and adequate to this situation paradigms of "building in" intellectual capital in total (market) value of economic agents capital as well as requirement of consideration of such synthetic substance as economic categories in management concepts (Value Based Management, Knowledge Management etc.) have actualized thematic study on developing methodologies of measurement (formalization) intellectual capital in the aggregate. The question at issue of capital value representation, estimation and management is that "capital of the organization may change also because of non-economic reasons ... Likewise market elements may affect the amount of capital that changes assets value" [3, p. 25].

The accounting system is a supporting element in the management system, it is designed to arrange incoming and outgoing information for the needs of management. The need to ensure effective management on the basis of recordkeeping tools determines the interconnection between management systems and accounting. B.Rayan notes that accountants and financiers are still rely on the old management theories that form the basis of their professional expertise. Many accountants in understanding management are at the level of XIX century, not the end of XX [6, p. 12].

The canonical principle of economy is the thesis that "you can manage only what is measured and estimated". In this context, we can cite the position of the leading theorists of modern management P. Drucker, who states that not so many factors are so important for the organization's activities as evaluation – especially value measurement of intangible economic resources of modern market economy agents. This kind of economic resources (information and intellectual assets) constitute a significant share of an entity's capital of post-industrial type.

Probable valuation of intangible assets, and therefore objective formalization of the total enterprise capital is important for the key strategic directions of economic entity functioning in the modern economy – the market value of public company, the cost of production (amortization of information and intellectual capital's component) and consequently, pricing and profits, investment attractiveness and market position in the industry and so on. In addition, "the issues of accounting reflection of changes in owners' equity, including for the purpose of settlements with corporate rights holders

in case of their withdrawal from the company and its liquidation require detailed study" [7, p. 2].

Complexity of objective monetary expression of the total capital of modern economic agents is related with the problems of its intellectual component value measurement. Intellectual capital, its valuation is not formed by adding together the separate parts of it, but it is specified (determined) on the basis of the interaction of all its component parts, while taking into account the synergistic effect arising from their implementation into practice of the firm.

Management of capital formation is one of the most important parts of financial management system. It gets more and more profound theoretical basis and effective forms of implementation. By intensity of managerial decisions making and the impact on the outcomes of economic activity capital management of is one of the important systems to provide effective operation of business. The value of the intellectual component, but at the same time and the total capital of the enterprise is determined by the specific development strategy, drive of such capital for future benefits that determines its value.

Two approaches to the notion of capital are discussed in scientific and research literature – financial and economic. Financial definition of capital is associated with financial activity, based on the essence of formation, distribution and use of enterprise resources. It is related to the balance sheet of the enterprise. In turn, from the position of balance sheet two key concepts of capital are identified. One of them is the concept of financial nature of capital, the base of which are the financial resources or the sources of their formation (dominant liabilities). This idea belongs to H. Sviney. Another concept is grounded on subject-material nature of capital, which is based on the tangible and intangible assets (dominant assets). This idea belongs to I. Paton.

The economic definition of capital is associated with one of the possible stages of existence that is with the production stage when capital is considered as a complex of production means. The intellectual component of the total capital and general meaning of the notion "capital" of the modern enterprise is inseparable from the "new economy." This component (information and intellectual) to the utmost identifies key factors of successful (effective) performance of the enterprise of post-industrial development. Obtaining due to these component parts

of capital (goodwill, productive energy of trade mark, human capital, know-how, etc.) various technological and organizational advantages in competitive markets is the key to the effective functioning of the economic entity in contemporary information and intellectual (post-industrial) economy. Therefore "modern economics focuses on identifying the role of intellectual capital in ensuring the effective performance of the economic systems, their intensive development and increase of qualitative level of production" [8, p. 267].

The theory of assessing the value of total economic resources and enterprise's capital is associated with the formulation of a new knowledge of economic dimension, scientific and methodological area of which, according to D. Wyllie "is between the principles of economic theory and methodology of accounting". We support the position that the development of cost of capital valuation theory should be based on the updating of international standardization of financial reporting and the review of the main postulates of economic theory. In the literature the statements of Paul Samuelson are often quotes, in which "... the enterprise's balance sheet is based on the valuation of assets that is one of the main questions of the theory of capital and interest".

In the modern market economy, characterized by a number of uncertainties, extremely acute problem is the determination of objective entity's cost of capital for management of its attraction, allocation, use and capitalization of assets. Besides being the measure, that characterizes the market value of an entity's capital in the current period, the cost of equity due to the dynamism is provided with characteristics of investment resource, object of sale and purchase, property and accumulated values, production factor and object of management, risk bearer and other properties.

Currently the capital of economic unit is usually considered as all kinds of property and intellectual values, which ensure, above all, the ability to functioning, profit earning or market value growth. Besides investment function of capital, it important characteristic is the influence of factors, primarily through the function of assets' capitalization, which acts as a basis for determination the level of its efficiency and the market value of company' capital justification.

The study of theories of value and capital, their evolution and adequacy to the current structure of resources that represent the capital of the company, is carried out through the analysis of their methodological principles, the basic theoretical concepts, international and domestic experience in the practical demonstration by economic agents their value. Capital management of the company and its cost characteristics are based on volume theoretical basis of economic theories related to the formation of information and analytical support of management goals on the status and dynamics of the cumulative potential of the company.

Classical theories of value and capital act as methodological framework of the development of scientific approaches to value relations in the modern economy, as well as value measurement of company' economic parameters. These theories have been quite broad, on different aspects analyzed in domestic and foreign literature. The study of these theories evolution and the analysis of their conceptual foundations compliance are made from the perspective of defined principles of modern measuring economic entity potential and substance of real structure of economic resources.

In the current economic environment, the issues of determination "fair" or "real" cost of capital, represented by the available in it aggregate economic resources, that is identical to value assessment of economic unit, acquire particular importance. Cost verification of company capital is based on the use of two types of valuation tools – the system of economic evaluations and the market mechanism of stock price-fixing. Economic valuation of capital in practical economic terms plays a starting and supporting role to market evaluations, and therefore, in its essence coincides with the market pricing mechanism: "Welfare of the Firm Theory provides integrated business models formation, where any management decision is considered in the context of its impact on the market value of the firm" [9, p. 263].

Generally accepted representation of the economic entity capitalized performance and value of its potential is complicated not only by the presence of the problematic aspects of methodological and methodical character, but also due to the needs of selecting the value component of entered into use notion of "Synergy Capital", which hasn't concretely defined content and essential substance, becoming a "loaded terminology".

Latent form of decrease in equity value or factors that are putting pressure on its price characteristics are risky management that balances

on the verge of dynamic accumulation of problem assets – the formation in companies "bad", "distressed", "toxic" assets (accumulation of not written off in time prepaid expenses), directing capital to excessive expenses on the "acquisition" of goodwill or representation costs (the market factors of increase in capital value), which in many cases do not have parity evidence and so on. Despite the fact, the information about these economic actions is regarded as causing increase in market valuation of the company (stock prices).

The weakening of equity capital due to excessive prepaid expenses can be revealed through the activities of the company Porshe, which has spent one billion Euros developing model Panamera (costs of research, production, advertising, exhibition stands, etc.). The money spent on the one hand had been allocated to prepaid expenses, but at the same time, this has had positive impact on the reputation (market value) of the company. These prepaid expenses that have questionable possibility of their write-off to the mass production, cause high probability of transformation into non-productive (toxic) assets of the company. Neglecting of canonical approaches to the needs for creating anticipated reserve sources to cover "onerous contracts" plays the same functional role (reduction of equity value).

Conclusions and suggestions for further research. The evolution of theoretical and methodological foundations of theories of value and capital allows to make a conclusion that their development comes interdependently with the change in the structure of economic resources of the enterprise as dominant factors for its functioning, representing the capital in value. Principles of the theories of value and capital are consistent with the changes in the organizational structure of the modern companies and the principles of market economy. Modern theories of value and capital are based on several concepts, the main problem of which remains the objectivity of the assessment of intangible resources and vast capital of company.

Generalization of conceptual, methodological and organizational applied principles of existing systems of value measuring in the system value-based management enables to conclude about the lack of reasonable evidence of their results. The

main problem of objectivity of the methodology of modern models of economic assessment of company's value characteristics appears in attracting a large number of speculative assumptions expressed by nonformalized parameters and indicators that cause inadequate results of the theories and their practical reality. Instability of the capital markets and economic fluctuations in the economy have formulated additional requirements as to the process of value measuring of company and business, as well as to a fundamental rethinking of methodological foundations of existing models , systems and methods of value measuring.

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FLEXIBILITY AS THE SOURCE
OF SUPPLY CHAIN COMPETITIVE ADVANTAGE

Abstract. The article describes the competition reorientation for markets among individual business entities on competition between supply chains. The supply chains as open dynamic economic systems are considered. The evolution stages of key sources of competitive advantages formation and their meaning are revealed in the article. The areticle also includes the description of the main sources of supply chains competitiveness in contemporary market conditions. The influence of the time factor on the adaptability of production systems and supply chains flexibility is proved.

Key words: flexibility, supply chains.

The problem formulation. High market dynamics and growing demands as well as the customers needs, progressive globalization and increasingly strong pressure by market rivals forces the modern enterprises to unite forces in the competition, namely through the mutual coordination and common business processes within the supply chain. At present the traditional rivalry between the individual companies is replaced by rivalry between the whole supply chains – usually complex structures which operate globally. The implementation of the supply chain management concept and processes coordination of the management of the chain individual members provides great opportunities for specialization, reducing costs, improving the aqctivity effectiveness as well as the speed and flexibility of response on the needs of the last customers than it would have been possible in a single enterprise acttivity [5].

The problem of the rational formulation and effective providing of their functioning is increasing concerning its topicality with the gradual shift of the sources of competitive advantages with the level of individual enterprises to the level of supply chain. In practice, indeed, not all the supply chains operate successfully and gain competitive advantage at the market. As a result of complication of economic, technological, competitive environment, it is becoming more and more difficult for enterprises in the supply chain to create value for consumers higher than the competitors may do, and thus remain in the profit. The main sources of competitive supply chains according to different scholars include not only the expenditure efficiency, but also their effectiveness, flexibility, adaptability, speed of customer service etc.

The paper analyses namely flexibility as a source of sustainable competitive advantages of supply chains which is actualized by modern market demand concerning improving of elasticity of "hard" supply chains.

Analysis of the existing research. An important contribution to the development of the theory and practice of competitive strategies creation, analysis of enterprises competitiveness sources was made by foreign scientists such as I. Ansoff, H. Assel, M. Porter K. Prahalad, A. Thompson, G. Hamel, and other famous scientists. Problems of enterprises competitiveness providing are covered in the works of our scientific schools, including:

- representatives of the Kharkiv Scientific School focuse their research primarily on theoretical and methodological foundations of the competitiveness of enterprises (Yu. Ivanov, M. Kyzym, O. Tishchenko, etc.);

- Lviv scientific school is focused largely on the study of innovation and logistics in enhancing the competitiveness of enterprises (O. Kuzmin, J. Petrovych, Ye. Krykavskyi, Zh. Poplavska etc.);

- other Ukrainian scientists emphasize on the specific formation of competitive advantages and competitive strategies, and determination of their impact on the competitiveness of enterprises in certain industry markets (I. Kuznetsova, I. Altukhova, N. Kubrak etc.).

It is impossible to omit works of Donetsk (L. Balabanova, I. Tuleev) and Kyiv schools representatives (N. Butenko, A. Dligach, V. Herasymchuk etc.).

The essence of the concept of organization flexibility in the theoretical and practical aspects was studied, first of all by modern foreign scholars who studied in particular:

- conceptual basis of flexibility, its nature and types (D. Hervin, A. Seti, S. Seti);
- the impact of flexibility on organization productivity (S.Bahremi, L. Coste, M. Malhotra)
- The role of flexibility in an instable environment (D. Aakeer, D. Upton, D. Galbraith).

Ukrainian scientists, including W. Anishchenko, S. Komarynets, I. Otenko, J. Petrovych, Zh. Poplavska, T. Sadovska, and others made a series of works on production flexibility and productivity of production lines and logistics management specialists (Ye. Krykavskyi, M. Vasylevskyi, M. Hryhorak, M. Oklander, M. Poston) develop methodological approaches to the management of movement of material flow in the supply chain and management of value chain (O. Hirna, O. Shandrivska, N. Kosar, N.Chornopyska, R. Syvak).

However, some problems of the formation of enterprises modern competitive strategies in an increasingly unstable economic environment is still studied insufficiently, in particular there is lack of research of the competitive strategies formation in terms of the supply chain competitiveness. The necessity to solve these issues determines the relevance and definition of objectives of this research, including:

- to justify the emphasis shift of competition in the market from individual enterprises to competition between the whole supply chains;
- to develop the evolution of key sources of economic systems competitive advantage formation;
- to reveal the nature and subordination of such concepts as "adaptability" and "flexibility" of organization, to highlight its essence taking supply chain as an example.

1. From the concentration on a single entrepreneurship entity to open dynamic economic systems. Economic science considers a separate enterprise as a complex production, economic and social system, because it is making efforts to meet the needs of society (environmental system), and consists of interrelated parts (industries, shops, stations, functional units, etc.) activities of which affect on the final product. Enterprise as an economic system interacts with the external environment from which the system receives factors of production, necessary for operating activity (inputs) and which implements and performs activity results (outputs) – products, works and services.

According to leading economists, the basis for the operation of a modern enterprise should be a concept of enterprise as a kind of system integrator – an integrated economic entity, which combines in time and space different socio-economic processes and receives the effect through the use of systematic multiplicative effects. In an instable environment in order to achieve and maintain a sustainable competitive advantage, the enterprises must have properties that are typical for complex open purposeful systems: to perform certain processes within the life cycle of production, to respond to a changing external environment and ensure its own development (property of self-organization); to have typical for complex systems combination of the properties of integrity and separation, which, in some way, affect its functioning and development.

Growing competition at product markets encourages companies to integrate their efforts, tools, ability to obtain competitive potential, particularly in the form of supply chain. Foreign scientists reveal the essence of the concept of "supply chain" as "... network of related organizations in their work with organizations that are ahead of her, and organizations that act after them, and the realization of different processes and actions which create value for the final customer in the form of products or services "[15, p. 37]. According to the model changes of rivalry competition between single enterprises to competition between whole production chains there is a need of forming competitive strategy taking into account the characteristics of the different enterprises competitive advantages of industrial chains, managing supply and demand, relationships between suppliers and customers, establishing and maintaining long-term partnerships.

Supply chain is described as a complex open economic system in which there is movement of material flow, information flow and financial means to create and transfer value to the final consumer. In this way the supply chain connects the benefits manufacturing sector with the sector of its consumption (Fig. 1).
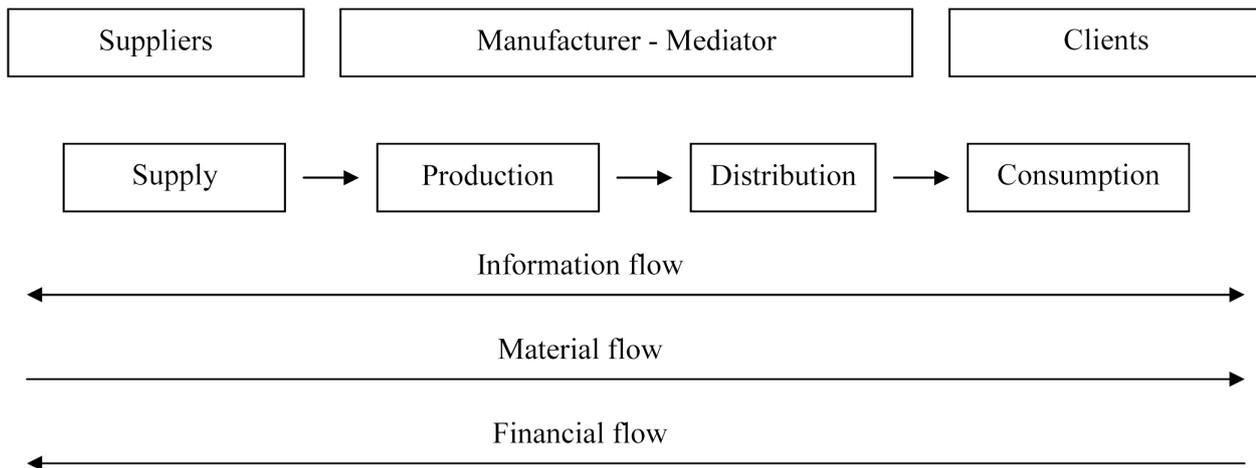
Suppliers	Manufacturer - Mediator	Clients

Supply	→	Production	→	Distribution	→	Consumption

Information flow ← →

Material flow →

Financial flow ←

Fig. 1. Schematic representation of the supply chain

Source: [13, p. 42]

Supply chain can be compared with played and experienced team, all members of which coordinate their actions in order to participate in competitions. The ultimate aim of supply chain management may be defined as recognition, identification of expectations performance in the sphere of service quality for all clients with regard to actions in favor of permanent costs lowering to a level that corresponds to optimize profit in whole chain [Vaselevskyi]. Achieving this goal thus creates conditions for obtaining competitive advantages, mainly by technical integration of systems which support the management of the information, goods, and money flows movement. In turn, institutional and infrastructural interaction of supply chain participants requires the integration of operational processes, maximal increasing of supply chain capacity by supporting difference of companies potential – its members and the maximization of value providing for customers to increase their loyalty.

Coexistence of chain activates and intensifies the need for finding reserves and hidden potential, especially in the area of cost savings and avoidance of waste, acceleration of order fulfillment, increasing flexibility of respond to changes of different nature in order to increase competitiveness.

2. Evolution of key sources of competitive advantages. Every economic system at the market tends to take an advantageous position in relation to competitors. Its competitive strategy is focused on how to achieve sustainable and profitable position, allowing the system to withstand the

pressure of the forces which determine the competition at the relevant market.

A variety of scientific papers on directions of competitive advantages creation, evidences about the objective complexity of the subject. Analysis of the global practice development of achievement commercial success by companies during the late nineteenth century and the beginning of the XXI century allows to single out several stages in the evolution of the key sources of competitive advantages formation. Each of these phases is characterized by specific demands of consumers concerning goods (services) of firms and thus firms focusing on specific aspects of strategic nature to better meet these requirements. Evolution of the value proposition at the market is schematically shown in Fig. 2, and the characteristics of each stage are presented in Table. 1.

Stage I. Up till the early twentieth century welfare of individual companies and entire countries largely depended on the possession of the production key factors. Material and technical basis for the production process in industry is the main funds. The main production funds determine the nature of industrial area material and technical basis at different stages of its development. During this period, the possession of land, raw materials, factories was considered as an attribute of prosperity. The development of countries was largely due to the presence of raw materials and energy. For example, the famous German Ruhr, rich in coal, helped to develop the iron- and -steel industry, which became the basis for engineering [6].
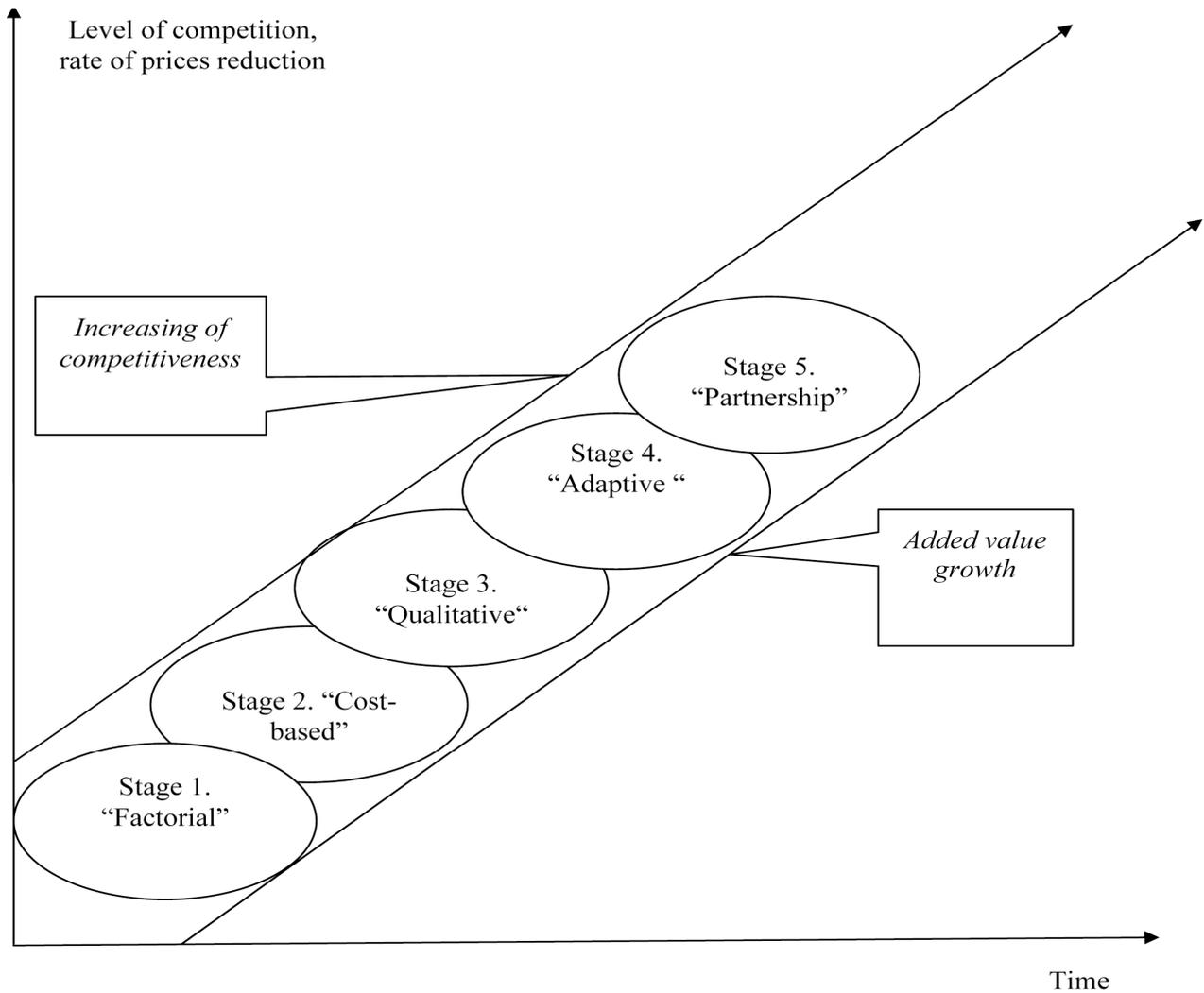
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Fig. 2. Evolution of evaluative supply at the market

Source: author's elaboration

Table 1

Evolution of the key sources of competitive advantages formation

№	Stage title	Approximate time bounds	Market demands	Key source of the competitive advantages
1.	"Factorial"	Till the beginning of the XX century	Goods at reasonable prices	Factors of production availability
2.	"Cost-based"	Beginning of the XX cent. – 50-ies	Minimum prices	Unflinching costs reduction
3.	"Qualitative"	60-ies-70-ies	Superior quality characteristics	Continuous quality improvement
4.	"Adaptive"*	70-ies-80-ies	Commodity modifications adapted to the changing requirements of consumers	Adaptability of production systems
5.	" Partnership "*	80-ies-90-ies	Suply chains competing	Partnership in supply chains
6.	"Innovative"	90-ies – beginning of the XXI cent.	Originality, uniqueness of products	Innovations
7.	"Elastic"*	Beginning of the XXI cent.	Quick response to dynamic market changes	Flexibility of supply chains

Note*: steps are proposed by the author.
Source: added by the author based on [6].

Stage II. In the second phase (beginning of the twentieth century. – 50s of the twentieth century.) there is a task for industrial enterprises to lower costs and increase personnel labour productivity. The development of large corporations opened the possibility of using the benefits of standardized mass production to meet needs of mass undifferentiated markets at that time. Competitiveness of enterprises was achieved through the use of economies of the scale effect and experience, measures concerning reduction of the cost and selling goods at competitive prices.

Stage III. Subsequently, in 60s – 70s of the twentieth century close attention in business begins to be paid to ensuring the quality of products and services, and later – the quality of processes and systems. Systematic, comprehensive quality management principles, which are called "total quality management" (English – Total Quality Management, TQM) begin to develop. Internal and general quality management system in firms started to being formed gradually. Normative base for such systems creation became an international standard ISO 9001, the latest version of which was published in 2008 by the international organization of national standards bodies ISO.

Stage IV. Typical feature of the fourth stage (70–80 years of the twentieth century.) in the development of key sources of competitive advantages formation, in our opinion, is focusing of enterprise entities on adaptability of its production systems. With the saturation of commodity markets and increased competition on it, diversifying of consumer tastes and priorities – the prerequisite for the competitiveness of organizations is the ability to create and offer commodity modifications to the market, according to changing requirements of consumers.

The concept of adaptation in the scientific literature is used in different disciplines and areas of human activity. It comes from the Latin term "adaptatio", which means the adaptation. In biology, adaptation involves adaptation of the organism to external conditions during evolution. The notion "adaptation" has long gone beyond biology and currently belongs to the general concepts, is widely used not only in natural, but also in the social sciences. Philosophers consider adaptation as "a manifestation of the unity of the internal (body) and external (environment), with its inherent contradictory moments" [14]. Just as in philosophy, from an economic point of view, the adaptation is seen as a process of balance establishment of internal and external environment [12, p. 86].

Particularly topical in this period became the tasks of creating flexible manufacturing systems, with help to perform integration [1]:

- Equipment and all variety of manufactured parts in processing;
- Material flows (parts, products, fixtures, equipment, basic s auxiliary materials, etc.);
- The processes of designing and manufacturing of products from concept to turn-off (merger of main, support and service processes of production);
- Service;
- Management through computer systems, data, application software packages, automatic control systems, etc.;
- Information flows to developing constructive management solutions;
- Staff through mastery of related professions.

Differentiation of consumers needs in the market required diversification of commodity supply while maintaining a competitive price level. The use of universal (non-automatic) equipment increased complexity of production, and therefore its price, which negatively affected the competitiveness of products and its perception by the market. In such a situation there was a need to create equipment to satisfy the following requirements: – universality, easy setup (functional invariance); – Automation; – Automatic changeover with team of management computer center (computers); – high accuracy and reliability; – automatic setup of tool in the course of operations. Based on the specified equipment in this period of time the flexible production modules (FPM) were established at many enterprises, integrated and flexible complexes and line (PC), flexible integrated station, shops, production plants, etc.

Stage V. We decided to define and name the fifth stage of competitive advantages formation in business (the 80-90s of the twentieth century.) as the "partnership", as it was during the active interaction of business entities with counterparties of environmental (external) environment, the operation of which involved individuals, physical assets and entities that are out now: suppliers, buyers of products, intermediaries and other market counterparties and sometimes even competitors. Transformation processes, taking place in the

global economy require a radical restructuring of the entrepreneurship concept – from focusing on the own internal efficiency of the manufacturer to understanding the factors which determine the effectiveness of the partners activity. In this regard, the concept of relationships with partners and affiliate marketing is gradually becoming a new paradigm of management.

Stage VI. Namely at this stage of the evolution of competitive advantages (90-years of the twentieth century. – beginning of the XXI century), the strategic emphasis is made on innovations, because the development of a modern economy is becoming more dependent on the efficient generation, purchase, distribution and use of innovations. Implementation of knowledge through innovation and use of information is becoming a major factor in international competitiveness and thus creation of wealth and living standards improvement. Knowledge, innovation and its control – just as once the ownership of land, raw materials, factories – became the prosperity attributes. Consumers increasingly demand the products to differ from counterparts, reflecting originality and individual tastes of buyers. Innovations include a variety of areas of organizations activity. Some researchers among multiple competitive strategies distinguish basic strategy of "innovation" implementation.

Phase VII. The first decade of the new millennium marked by increased levels of unpredictability and complexity of the external business environment. Therefore, the first place in the competition comes to the ability of companies and entire supply chains quickly, often even in the mode "on-line" to respond to dynamic market changes. A key source of competitive advantages is the flexibility of the supply chain as a response to the increasing dynamics, complexity and unpredictability of the environment.

According to experts, the process of arising and perception of ideology by managers of each of the next new areas of competitiveness providing during the twentieth century – beginning of the XXI century has not only gradually-evolutionary as abrupt nature [6]. As shown in Fig. 1, after the opportunities exhaustion of market supply improvement and increase of its competitiveness at the market, there is need of new sources of competitive advantages emergence. To the extent

that, as a leading and successful companies achieved first significant success in the competition by obtaining and using a new type of competitive advantage, most followers also changed their strategy, wanting to imitate the leaders achievements. Due to this process of diffusion the new business models quickly gained distribution, and defined sphere of competitive advantages became the object of meticulous attention of the broad scientific public. On the other hand, it should be noted that new areas of competitiveness providing did not denye existing, but rather complemented, deepened and developed it. For example, innovative model updating of economic systems has not withdrawn from the agenda, but rather aggravated the problem of costs minimizing and improving quality.

3. The influence of the time factor: from the adaptability of production systems to flexibility of supply chains. Given the high dynamic environment economic systems have developed their ability to adapt to change. The results of the study of works of foreign and domestic scholars and empirical practical experience of the author, helped to highlight two features of economic systems in the context of their ability to adjust, namely adaptability and flexibility. The literature on the subject of investigations definitive generally accepted definitions of these concepts do not exist. In the field of management in most cases, the concept of "flexibility" and "adaptability" is considered as synonyms and learn "... from the standpoint of behaviors of the system and the external environment, organizational capacity for innovation and experimentation, willingness to change, collaborative learning and self-renewal, permanent ..." [8, 89]. Ukrainian researchers Z.V. Poplavskaya and S. Komarynets organization's ability to adapt is called "organizational flexibility" and Polish scientist Vasilevsky in the context of the supply chain uses the term "elasticity". The existence of different approaches to use this conceptual-categorical apparatus requires deeper its scientific justification.

In theory, management changes distinguish different types of changes in the environment of the organization. Firstly, changes in the external environment can be divided by the criterion of "time" into two types: planning (strategic) and situational (dynamic) changes, or changes that arise

unexpectedly. Secondly, according to the suscep-tibility to peredbachuvannya, changes in the external environment can be divided into those that can be predicted, and those that are difficult to predict. Thus, changes can be planned in advance, while others are nothing more than a reaction to the unexpected and unanticipated events. So, there are two kinds of organizational changes in response to changes in the external environment – planning (strategic) and situational (dynamic).

Plans (strategic) changes – are those who previously developed and implemented with the intended purpose, specific goals, in a manner and within the prescribed time. When it comes to projected future changes, then adjust the way the economic system is to adapt its strategic plans. Planned changes – a deep medium-and long-term changes, which include vision and mission of the organization, as well as those aspects of its corporate life as development, quality, innovation and value in relation to staff, customers' needs and applied technologies. Strategic changes are made in the context of changes in the external competitive, economic, social and political environment and internal organizational resources, capabilities, culture, structure and systems.

Thus, the method of adjustment planned economic system to changes in the environment we consider the process of adaptation. After creating an economic system, its operation and success is only possible in accordance with the organizational structure, organizational culture, business models of the environment. Just as in nature, the market survive and become successful only those economies that produce the best shape of his operation. Their development, transition economies to higher levels of management due to the need to adapt. Thus, market evolution and adaptation – are processes that are inseparable from each other. Term adapting various scientists consider in different ways, which can be generally represented in three ways:

• as a property of the system to adapt to changes in functioning, likely in the future – adaptability;

• how the process of adaptation of the adaptive system to future changes, in fact, adapt;

• as a forecasting method based on the processing of incoming information and is suitable for forming long-term plans to achieve a specific optimization criterion – adaptive algorithms.

In our opinion, the successful adaptation of the economic system involves its ability to obtain the information and make realistic predictions for the future to advance the future of their behavior and structure to the optimal data market conditions. Thus, the main feature of such characteristics of the economic system as adaptability is its focus on the future because of the ability to highlight problems early, in time to decide to eliminate them, identify new trends change. The nature of the economic system is mostly evolutionary. Adaptation of the supply chain involves adapting its configuration and business models to expected market move-ments, often taking into account the time factor. Examples of strategies aimed at the formation time of competitive advantages are: increasing the speed of participants in the supply chain to respond to changing consumer demand, accelerate the process of developing new products, reducing production cycle, shortening the supply of goods or services, etc..

It is important to involve irreversible changes in the macro, such as areas of scientific and technological development, demographic trends, social and political changes, etc., as well as to predict the probable business chances in order to adapt its strategy and management decisions to these changes. The fulfillment of this goal requires, in particular [4, p. 61]:

• providing participants circuit current data regarding demand, sales forecasts, production schedules and orders, as well as other information related to the physical movement of goods;

• joint planning and implementation of sourcing chain defined function of its individual parts;

• coordination of the principles of separation of risk and the possible benefits that result from joint logistics activities;

• establish a central coordinator of the movement, ie links, which is the main initiator of the action, and monitors their implementation, in particular to avoid duplication and uncoordinated actions in the transportation and warehousing;

• refusal to practice shifting costs hold stocks at suppliers or customers in the optimization of resources along the entire supply chain.

In practice increasingly dynamism and complexity of the environment is manifested through situational changes that require rapid response to events in the process of implemen-tation. Every economic system is subject to a large

number of situational changes that should adequately react. It is this ability to determine the flexibility of the system. The principal differences between the adaptability and flexibility of economic systems and management author systematized in Table. 2. On the flexibility of supply chain management as an open economic system is affected, including transparent and clearly defined operating procedures, serviceability of all elements of the chain, high operating efficiency, and above optimization angle client, market requirements and the nature of the whole chain [4].

Flexibility in an economic sense is versatile concept that different scientists examined from different perspectives and interests. Agree with the definition given in [8, p. 89] that "flexibility – the ability to react and change in response to environmental variability by creating new opportunities without undue expense, loss of time and productivity", adding that it is responding to situational (dynamic) changes.

For competitive supply chain, the modern supply chains develop in three directions: first, cost savings and avoidance of waste ("slimming" supply chain), and secondly, increase readiness for adaptation (adaptive supply chain), and thirdly, the growth ability to respond (flexibility supply chain). Schematically, this is shown in Fig. 3. In practice, the supply chain can improve their ability to respond quickly to changes in the environment in different ways.

Firstly, supply chain flexibility should ensure its resistance to force majeure. You must provide the ability to change the participants in the supply chain if force majeure, for example, have in reserve suppliers and consider the design principles in favor of supply, to develop emergency plans and systems and preventive measures after the crisis on risk management. This requires training of highly qualified personnel in the field of risk management for dealing with crisis situations (accidents, strikes, wars or terrorist attacks, natural disasters, epidemics and diseases). As an example, the earthquake in Japan in the spring of 2011 led to the suspension of many plants not only in Japan but also a number of American and European car manufacturers, digital cameras and other products due to disruptions in the supply of components. Obviously, the widely publicized supply "just-in-time" ("exactly on time") that minimize inventories in this situation worked not in favor of either producers or resellers.

Secondly, it is important to improve the ability to respond flexibly to market demand fluctuations. This software flexibility is achieved through: the establishment of insurance reserves of inexpensive materials and components, for which demand is stochastic, but which are essential to ensure continuity of operation of the supply chain, the presence of flexibility in each link of the supply chain, as well as through collaboration with suppliers and customers in the design and redesigning processes, components, finished products in order to enable the development schemes "postponing differentiation in time personalization of goods".

Situational changes occur regardless of desire or reluctance of management, they are not planned, but they can and must be considered in determining the future of the organization. It should be pointed out that a significant number of situational, unplanned change is neevolyutsiynyy nature and occur because the organization must respond to new situations and challenges surrounding. For example, competition may force the company – producer of sharply lower prices, strike – raise wages, etc. These changes are a way of quickly adapting to the economic system conditions prevailing, ie reactive. This occurs when management organizations are not planned but often unaware of their need at the time of occurrence, but still carries them to respond to any events and trends that may be threatening or vice versa – to open unexpected opportunities.

Since situational changes are usually the rash, the possibility of inefficient decision-making on them increases. Planned changes almost always take precedence over situational as provide time for preparation. The real art of management should be considered as a way out of unplanned situations with positive results and lowest cost through proper management of their occurrence.

While some environmental changes affecting the operation of the economic system, on the other it may itself affect or even cause them. Matrix of possible economic system to adapt to external changes is shown in Fig. 4.

The principal differences between the adaptability and flexibility of supply chains

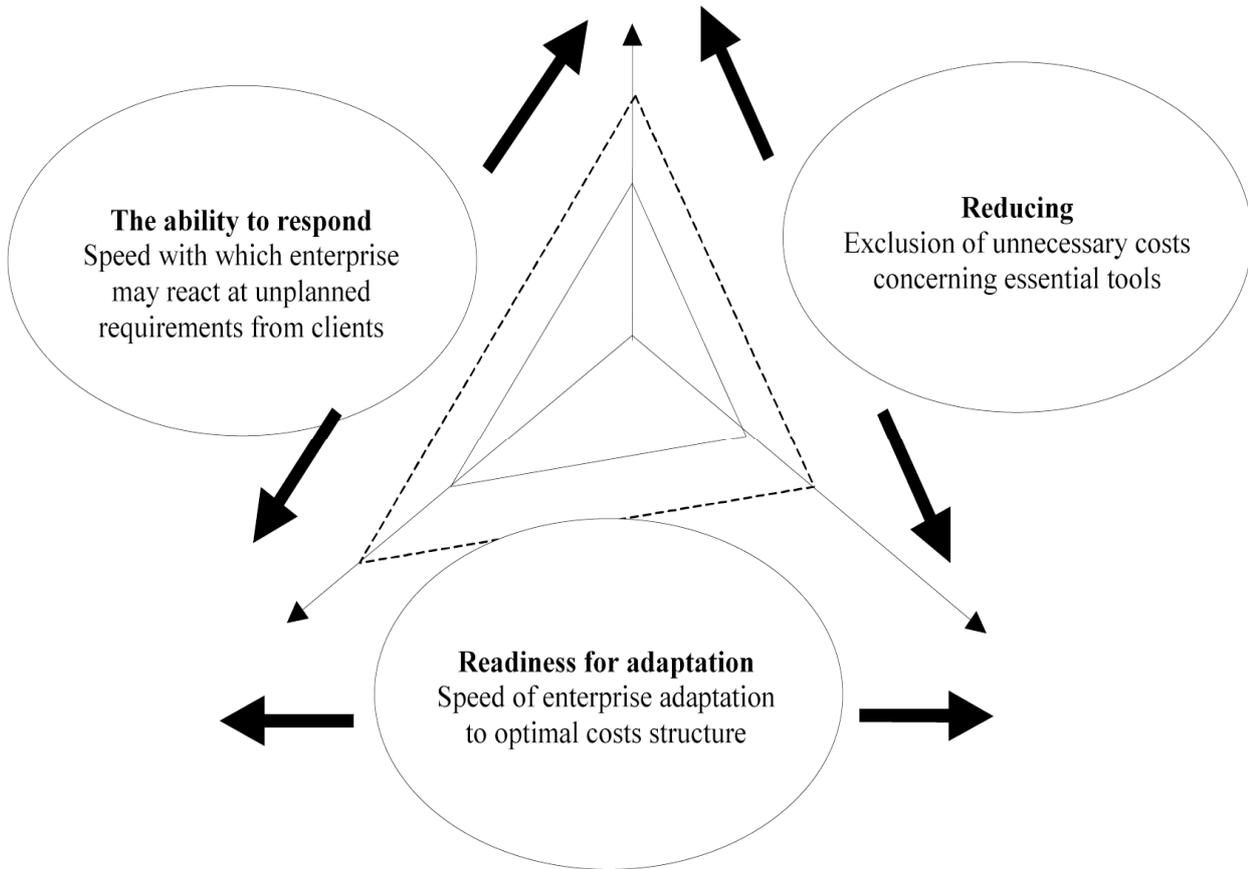| Sources of competitiveness	Priority in management	Horizon of management	The dominant stage of management	The tasks for development	The nature of development
Adaptability of economic system	The ability to predict	Planned period	Strategic planning	Adapting to change in the future	Mainly evolutionary
Flexibility of economic system	Speed of response and the availability of reserves	The actual period	Operational regulation	Quick response to the today's demands	Mainly the jump-like

Source*: author's elaboration

The ability to respond
Speed with which enterprise may react at unplanned requirements from clients

Reducing
Exclusion of unnecessary costs concerning essential tools

Readiness for adaptation
Speed of enterprise adaptation to optimal costs structure

Fig. 3. Components of competitiveness of supply chains

Source: [20]

The ability of the economic system	Changes	
	Predicted	*Unpredictable*
Inability to affect changes	**Passive adaptation**	**Fast flexible response**
Ability to affect changes	**Proactive adaptation**	**Proactive response**

Fig. 4

Source: author's elaboration

Given the ability of the economic system affect the environment changes, its adaptation should be considered in two aspects: passive on the external conditions to which the system can not influence, active when the system itself influences the changes in the environment or even generates them. However, some scholars hold only passive concept adaptation, suggesting that modification of the environment is not included in the concept of adaptability [12].

Several authors stress the importance not only to adapt to rapidly changing conditions, but the ability to create new opportunities in the changes to achieve competitive advantage. Thus, it is not just about preventive and reactive measures in response to the changing environment, but also the formation of a strategic imperative, which enables the supply chain to overcome uncertainty, which can take different forms.

Conclusions. 1. The competition, which is influenced by sharpening competition both from direct competitors, and by producers of goods-substitutes, intensifying struggle in the market for the end user. This causes the need for model transformations rivalry between individual enterprises towards competition between whole supply chain.

2. The rapid increase in competition in the domestic and foreign markets, higher demands of consumers leads to the fact that in the coming decades could hope for prosperity is not a single enterprise, and a chain of entities are integrated into complex open economic systems. One of these forms of interaction contracting market is the supply chain, which, due to increased competition between them, must have a sustainable competitive advantage, particularly in reducing costs, improving product quality, flexibility and speed of supply, innovation and more.

3. Given the complexity neprohonozovanist and market dynamics among the main sources of competitive supply chains figures prominently their flexibility and adaptability. Flexibility – the ability of the economic system to respond quickly to situational changes in the environment that are difficult to predict, but which require urgent attention. Quick response supply chain appears as a reaction to the unexpected and unanticipated events. In turn, adaptability – the ability of the economic system to adapt to projected changes in the environment. Adaptation of the supply chain is done by routine response to expected changes.

4. Effective supply chain management helps ensure the reliability and flexibility of supply due to the elasticity of flow processes, ability to adapt to rapidly changing market conditions. However, remember that the decision on the level of flexibility of supply requires compromise agreement "time-cost" and synchronization of existing logistic processes all members of the supply chain in accordance with the dynamic changes that will be the subject of further research of the author.

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BASKET PAYMENT COMBINED WITH MARKOWITZ PORTFOLIO APPLIED TO COMMODITY TRADE

Abstract. The article presents a method for expressing the value of commodities on world markets (petroleum products) as a function of a basket of currencies or a basket of precious metals (Gold and Silver) and compares their performance with a Markowitz portfolio of the underlying. The method of basket payments can be used as a tool for diminishing the riskiness of forward transactions on commodities markets. By establishing a model of payment based on the baskets, we propose to liberate the payment rules from disadvantages inherent in the use of official currencies. After minimizing the price variability of individual commodities by using instrumental (basket) prices, we propose to construct Markowitz portfolios of the commodities to reach further reduction of the forward transactions riskiness. Results of applying of the idea to selected petroleum products are shown.

Key words: basket payments, Markovitz portfolio, commodity trade.

1. Introduction – currency baskets and financial stability. The idea of basket payment has been promoted for a decade as a way to stabilize world markets against fluctuations in official currencies' (mainly USD) exchange rates and resultant variations in commodities prices (e.g. see [8]). The main issue is to establish an instrumental currency as a weighted average of leading currencies. Mundell [10] proposed the idea of optimal currency areas as a means to facilitate economic exchanges. There are two options available to a government when it comes to a decision to stabilize its currency: it can link the currency to another currency or to a basket of currencies. The objective of pegging to a currency basket is usually to stabilize the exchange rate between the pegging country and its major trading partners in ways to minimize economic shocks resulting from exchange rate fluctuations [7]. An alternative to basket pegging is pegging to SDR (Special Drawing Rights). However, as Branson and Katseli [3] report, SDRs represent a generic currency basket and are not adapted to the needs of any particular country. In Asia, the crisis of 1997 has shown that a dollar-peg exchange regime was not the optimal mechanism for managing exchange rates [11] as there appeared differences between actual and desirable rates of exchange.

Commodities, such as metals or petroleum products, are priced on open markets in terms of a base currency. Effectively, most commodities are priced and transacted in spot, futures or options contracts in terms of the dollar. The price of an asset does not, however, have to be denominated in a particular currency but can be expressed as a weighted average of a defined number of selected assets. Such basket payments may be less risky due to mutual compensation of variability of particular basket components prices.

In our earlier papers [4-6], we proposed to apply a model of basket payments to metal commodities, by constructing a dedicated (instrumental) currency, minimizing the forward transaction risk. In addition to official currencies, precious metals (i.e. Gold and Silver) can be included into such a basket. This article extends this idea with the Markowitz portfolio theory [9] to select the least risky set of commodities composing the individual basket currency. The goal is to model the behaviour of commodity prices by a suitably chosen portfolio of

currencies and commodities and illustrate the usability of basket instruments for either hedging or investment purposes.

In this paper analysis focuses on modeling the values of selected petroleum products: TXPropan; USGulfROil; HeatOil; LCrude1; NYGasF; WTI and Brent. In the first step, the value of each of these products is expressed by a basket mix of global currencies (Euro, British Pound, SDRs, Yen, Ruble, Polish Zloty, Indian Rupees, Brazilian Real, the Australian dollar and the US dollar) as well as precious metals (Silver and Gold). Second, the performance of every basket identified in the first step is compared to an optimal basket of selected currencies based on the Markowitz efficient frontier.

2. Basket payments and portfolios – theoretical background

2.1 Basket optimisation. Let us consider a trade contract made at time *n*, concerning a commodity *k*, to be delivered at time *n+p*. One can take the agreement (**Rule I**) the contract amount due may be paid at time *n* or *n+p* with a package of quota $V_k = \{V_{kc}, c=1, ..., C\}$ in different currencies

$$V_{kcn} = P_{kn}\beta_c R_{cn};$$
$$\sum_{c=1}^{C}\beta_c = 1; \quad \sum_{c=1}^{C}\frac{V_{kcn}}{R_{cn}} \equiv P_{kn}, \quad (1)$$

where β_c means the fraction of the original price to be paid in c-th currency, agreed at time *n* or before. The quota V_k are fixed at the time *n* according to eq.(1), so that $V_{kcn+p} = V_{kcn}$.

The transaction risk [12] could be expressed as the change $\Delta_I P_{kp}$ of the commodity price recalculated to US dollars at the time *n+p*:

$$\Delta_I P_{kp} = P_{kn+p} - \sum_{c=1}^{C}\frac{V_{kcn}}{R_{cn+p}} =$$
$$= P_{kn+p} - \sum_{c=1}^{C}\beta_c \frac{R_{cn}}{R_{cn+p}}P_{kn}. \quad (2)$$

One can take also another rule (**Rule II**): at the time *n* we define only a currency basket $W_n = \{W_{cn}: c=1, ..., C\}$ where $W_{cn} = b_c R_{cn}$ is the quota of *c*-th currency to be paid for 1 USD, either at time *n* or *n+p*. The transaction risk may be expressed as the difference $\Delta_{II} P_{kp}$ of the commodity

price paid at *n* and *n+p*, recalculated to US dollars at the time *n+p*:

$$\Delta_{II} P_{kp} = (P_{kn+p} - P_{kn})\sum_{c=1}^{C}\beta_c \frac{R_{cn}}{R_{cn+p}} \quad (3)$$

Nevertheless, the risk measures (2) and (3) may be misleading, as they do not take into account changeable position (appreciation/depreciation) of the USD itself. Moreover the risk assessment involves the ratio of two random variables R_{cn}/R_{cn+p} that makes it more uncertain. Hence, to eliminate the above drawbacks, in the paper [6] we propose to use for the trade risk assessment an instrumental price Π_{kn}, based on the currency basket composed of the currencies *c*=1, …, *C*, recalculated to USD with constant exchange ratios R_{cref}:

$$\Pi_{kn} = P_{kn}\sum_{c=1}^{C}b_c \frac{R_{cn}}{R_{cref}}; \quad \sum_{c=1}^{C}b_c = 1, \quad (4)$$

where $\{b_c: c=1, …, C\}$ are the factors (the basket coefficients) partitioning the transaction risk onto the currencies *c*.

The contract can be made according to the rules I or II with $\beta_c = b_c$, but its risk may be evaluated as the instrumental price change:

$$\Delta_I \Pi_{kp} = \sum_{c=1}^{C}\left(\frac{b_c}{R_{cref}}(P_{kn+p}R_{cn+p} - P_{kn}R_{cn})\right) \quad (5)$$

or weighted change of the original price (like in eq.(3):

$$\Delta_{II} \Pi_{kp} = (P_{kn+p} - P_{kn})\sum_{c=1}^{C}\frac{b_c}{R_{cref}}R_{cn}( ). \quad (6)$$

The above measures express better the contract risk than eqs (2,3), particularly when the quota V_{kcn} to be paid at time *n* had been acquired in a longer time interval (not bought at time *n*), which is rather typical case. Hence, the most suitable reference exchange rate R_{cref} seems to be the mean value R_{cNL} in a presumed time interval containing *N* historical samples of R_{ci} and ending at *L*-th sample (*i=L̄N*+1, …, *L*), with *L* taken arbitrarily (NL interval)

$$R_{cref} = R_{cNL} \overset{def}{=} \frac{1}{N}\sum_{i=1}^{N}R_{mL-i+1}. \quad (7)$$

The currency basket coefficients b_c may be adjusted in such a way, to minimize the overall trade risk, expressed by the variance of $\Delta_I \Pi_{kp}$ or $\Delta_{II} \Pi_{kp}$ in NL interval, averaged over the set of the commodities to be sale/buy with the same basket. To this aim the linear quadratic optimization tools may be applied, minimizing one of the above performance measures:

$$J_{I\,NL} = \frac{1}{K}\sum_{k=1}^{K}\left(\frac{1}{N}\sum_{i=0}^{N-1}\left(\sum_{c=1}^{C}\left(\frac{b_c}{R_{cNL}}(P_{kL-i+p}R_{cL-i+p} - P_{kL-i}R_{cL-i})\right)\right)^2 - \right.$$

$$\left. - \left(\sum_{c=1}^{C}\left(\frac{b_c}{R_{cNL}}\frac{1}{N}\sum_{i=0}^{N-1}(P_{kL-i+p}R_{cL-i+p} - P_{kL-i}R_{cL-i})\right)\right)^2 \right) \tag{8}$$

$$J_{II\,NL} = \frac{1}{K}\sum_{k=1}^{K}\left(\frac{1}{N}\sum_{i=0}^{N-1}\left(\sum_{c=1}^{C}\left(\frac{b_c}{R_{cNL}}R_{cL-i}(P_{kL-i+p} - P_{kL-i})\right)\right)^2 - \left(\sum_{c=1}^{C}\left(\frac{b_c}{R_{cNL}}\frac{1}{N}\sum_{i=0}^{N-1}R_{cL-i}(P_{kL-i+p} - P_{kL-i})\right)\right)^2 \right) \tag{9}$$

If the delivery delay p is differentiated or varying, the adequate averaged measure of the trade risk is simply the standard deviation (variance) of Π_{ki} in the NL interval. Thus, the third alternative performance index may calculated as follows:

$$J_{\Pi\,NL} = \frac{1}{K}\sum_{k=1}^{K}\left(\frac{1}{N}\sum_{i=0}^{N-1}\left(\sum_{c=1}^{C}\frac{b_c}{R_{cNL}}P_{kL-i}R_{cL-i}\right)^2 - \right.$$

$$\left. - \left(\sum_{c=1}^{C}\left(\frac{b_c}{R_{cNL}}\frac{1}{N}\sum_{i=0}^{N-1}P_{kL-i}R_{cL-i}\right)\right)^2 \right) \tag{10}$$

The following constraints must be satisfied:

$$b_c \geq 0 \quad \text{for } c=1, \ldots, C, \quad \text{and} \quad \sum_{c=1}^{C}b_c = 1 \tag{11}$$

2.2 Markovitz portfolio and its application to the basket payments. Using instrumental currencies Π_k (calculated for the individual baskets b_{ck}), one may consider the construction of a portfolio of the given commodities to be bought/sold in such a way to minimize the overall transaction risk.

The optimal portfolio idea [9] is to construct a portfolio composed of a set of commodities $k=1$, ..., K, and find an optimal set of portfolio weights a_k for each of them. The portfolio coefficients should be adjusted in such a way to satisfy a compromise between two criteria: maximize the expected transaction return and minimize a risk measure of the transaction. The optimization is based on series of historical data from a presumed time interval containing N samples, recorded at the same time instants for all the commodities. These are expressed as the series of return rates w_{kn} for $n=n_0, \ldots, N+ n_0-1$. In the Markowitz portfolio the

risk is measured by the variance of the portfolio return, assuming that the statistics of the historical returns are representative of future transactions. Referring to the basket payments, the returns w_{kn} have to be calculated for the instrumental prices Π. Let W_{kn0} denote the averaged value of k-th commodity returns in the window starting with n_0 sample, $C_{km\,m0}$ – the covariance coefficient of the k-th and m-th returns in this window. For transactions concerning the prices p samples ahead, the above quantities are calculated in the following way:

$$w_{kn} \overset{def}{=} 1 - \frac{\Pi_{kn-p}}{\Pi_{kn}}, \qquad W_{kn0} \overset{def}{=} \frac{1}{N}\sum_{n=n0}^{N+n0-1} w_{kn}, \tag{12}$$

$$C_{km\,n0} \overset{def}{=} \frac{1}{N}\sum_{n=n0}^{N+n0-1} w_{kn}w_{mn} - W_{kn0}W_{mn0}.$$

The Markowitz portfolio optimization task may be expressed in the following form:

find the portfolio coefficients a_k, $k=1, \ldots, K$, minimizing the performance index:

$$J_M = -(1-\lambda)\sum_{k=1}^{K} a_k W_{kn0} + \lambda \sum_{k=1}^{K}\sum_{m=1}^{K} a_k a_m C_{kmn0} \tag{13}$$

subject to the constrains:

$$\sum_{k=1}^{K} a_k = 1, \qquad a_k \geq 0 \quad \text{for} \quad k = 1,\ldots,K, \tag{14}$$

where $\lambda \in \langle 0, 1\rangle$ denotes the aversion to risk coefficient taken arbitrarily.

It should be noticed that the above formulation involves the price return ratios w_{kn}, while the baskets currency Π is optimized for the price increments $\Delta\Pi$ defined in eq.(5) or eq.(6). Thus the portfolio optimization is not consistent with the basket currency application. Nevertheless, the basket optimizing the increments $\Delta_I\Pi$ (see eq.5)

may be used in our approach, as it produces consistent price time series, for which the return ratios w_{kn} may calculated (hence it is more appropriate than the basket related to $\Delta_{II}\Pi$ – see eq.6).

2.3 Method and results of calculations. The method proposed in the paper is applied to the pricing of basket contracts on six petroleum products: TXPropane; USGulfROil; HeatOil; LCrude1; NYGasF and WTI Brent. All data were recorded in the time interval from 01.01.1998 to 26.11.2010 from various Internet sources [12] Data sources. Table 1 presents the data used in the study. One year forward transactions are considered and optimized with the discussed method: first by constructing the optimal currency basket related to the instrumental price increments defined in eq.(5), then by optimizing the commodity portfolio by following the steps described in eqs.(12-14). The proposed basket elements are the world's principal currencies (Euro, British Pound, SDRs, Yen, Rouble, Polish Zloty, Indian Rupees, Brazilian Real, the Australian dollar and the US dollar) as well as Gold and Silver. For each petroleum commodity an individual currency basket is constructed using these elements. The performance of the basket and Markowitz portfolio method is then contrasted to the Markowitz portfolio computed with market prices of the commodities by comparing the risk of transacting in the basket against transacting in the US dollar, first at the time interval of four years used in the optimization tasks, then in the one year validation interval.

The examined petroleum products and currencies making the baskets are described in Table 1.

Time series of the examined raw material prices and exchange rates are presented in Fig. 1, 2.

As shown, all studied series are non-stationary and highly varying in the last three years (during the crisis of 2008–2010). It made one year forward transactions very risky

Numerical treatment of the data with software tools used in our research faces two technical problems: the first one is incoherency of the data registration period, the second one comes from deficiency of data (for example weekends, holidays). Weekends are synchronous interruptions and that's the reason why we can ignore them and regard as continuous period. Asynchronous deficiencies (holidays or global incidents such as terrorist attack on WTC or U.S. intervention in Iraq) cause mainly interruptions which lasts couple days or more and effects the work of stock exchange. Such deficiencies were removed through linear interpolation.

The calculations were performed with our own program working on the MATLAB software platform, employing MATLAB *fmincon*() function as the solver of the optimization tasks (8-11) and (12–14). The coefficient λ has been taken in such an interval to produce non-dominated compromise solutions (Pareto curves – see Figure 3), and finally its mean value in this interval has been accepted as the best compromise solution.

Table 1

List of raw commodities and exchange rates used in calculations

| Commodity Prices	
TXPropan	Mont Belvieu, TX Propane Spot Price FOB (Cents/Gallon)
USGulfROil	U.S. Gulf Coast Kerosene-Type Jet Fuel Spot Price FOB (Cents per Gallon)
HeatOil	New York Harbor No. 2 Heating Oil Spot Price FOB (Cents per Gallon);
NYGasF	NY Harbor Conventional Gasoline Regular Spot Price FOB (Cents per Gallon)
WTI	Cushing, OK WTI Spot Price FOB (Dollars per Barrel)
Brent	Europe Brent Spot Price FOB (Dollars per Barrel)
Silver	London Bullion Market Association, held each working day at 12.00 PM in the City of London, Dollars per Troy Ounce
Gold	London Bullion Market Association, Gold prices Day 3:00 PM, USD per Troy Ounce
Exchange rates	
AUD/USD, BRL/USD, GBP/USD, EUR/USD, INR/USD, JPY/USD, PLN/USD, RUB/USD, SDR/USD	
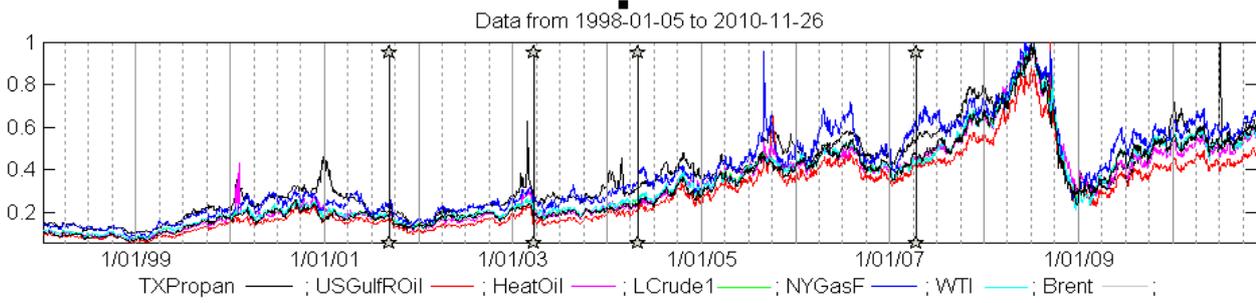
Fig. 1. The time series of the considered commodities (in USD). The values in each series are proportional to their maximal value. Vertical dotted lines – three months and 1-year (bold) intervals
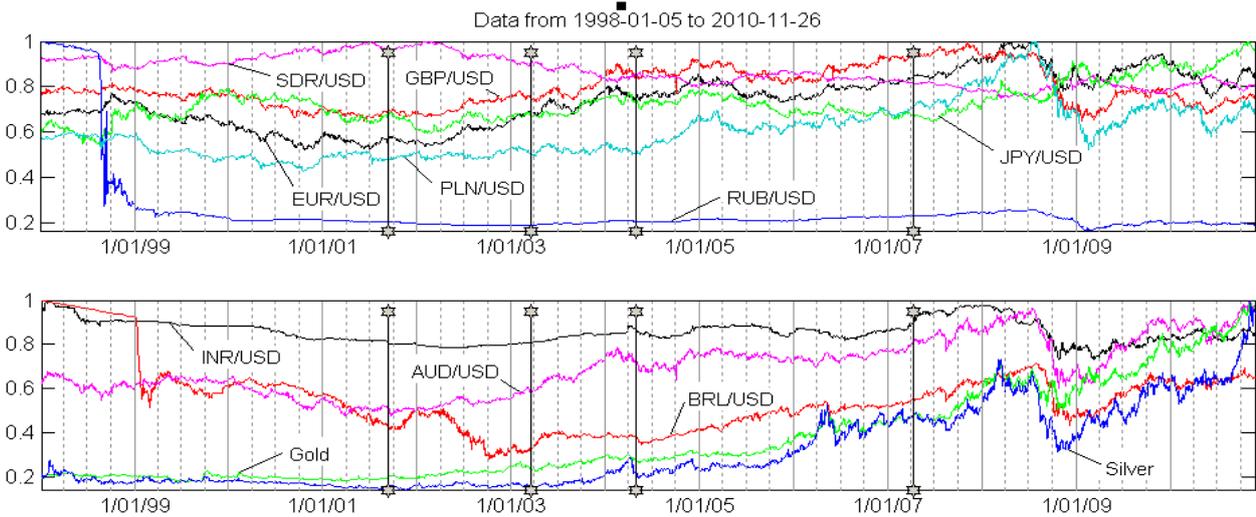

Fig. 2. Time series of exchange rates of currencies used in calculations. The values in each series are proportional to their maximal value. Vertical dotted lines – three months and 1-year (bold) intervals

The currency basket has been optimized in four-years intervals (1044 samples). The interval length corresponds to cyclic properties of World economy [5]. Significant contribution of four-year cycles to financial time series is often suggested in literature (see [1, 2]). In our earlier papers [4,5] we have shown that eight-year cycles in leading Stock Market indices are also present, but that four-year oscillations are of significance too. Thus the interval covering four years data seems to be a good compromise between filtering (averaging) and flexibility properties of the numerical analysis.

In the same time interval we have calculated two Markovitz portfolios: first based on the optimised basket currency, and second for the original prices. Then the both portfolios (with constant basket and portfolio coefficients) were applied in one year validation interval (in fact it covers two years, as the one year ahead transactions are examined during one year). The procedure has been repeated for consecutive years, since 2003 to 2010, in the intervals shifted ahead by one year. Typical Pareto curves found for the both portfolios are shown in Figure 3.

The expected (average) portfolio return ratio of the basket portfolio W_B and the standard deviation σ_{wB} of the returns, related to the same quantities, W_P and σ_{wP}, reached with the portfolio based on original prices were used as efficiency measures of the basket-Markowitz portfolio in the optimization intervals (W_{Bopt}/W_{Popt}, $\sigma_{wBopt}/\sigma_{wPopt}$) and in the validation intervals (W_{Bval}/W_{Pval}, $\sigma_{wBval}/\sigma_{wPval}$).

Two basket types were employed: currencies and currencies plus Gold and Silver.

The results of calculations are summarized in Tables 2 and 3. They show that the basket portfolio is usually much more effective than that based on the original prices ($\sigma_{wB}/\sigma_{wP}<1$), although in some intervals it is worse, both in the optimization and validation intervals ($\sigma_{wB}/\sigma_{wP}>1$). Notice that the basket portfolio was strongly advantageous during the last two years, mainly in the validation intervals. It is also noteworthy that the basket excluding Gold and Silver produces significantly better results.
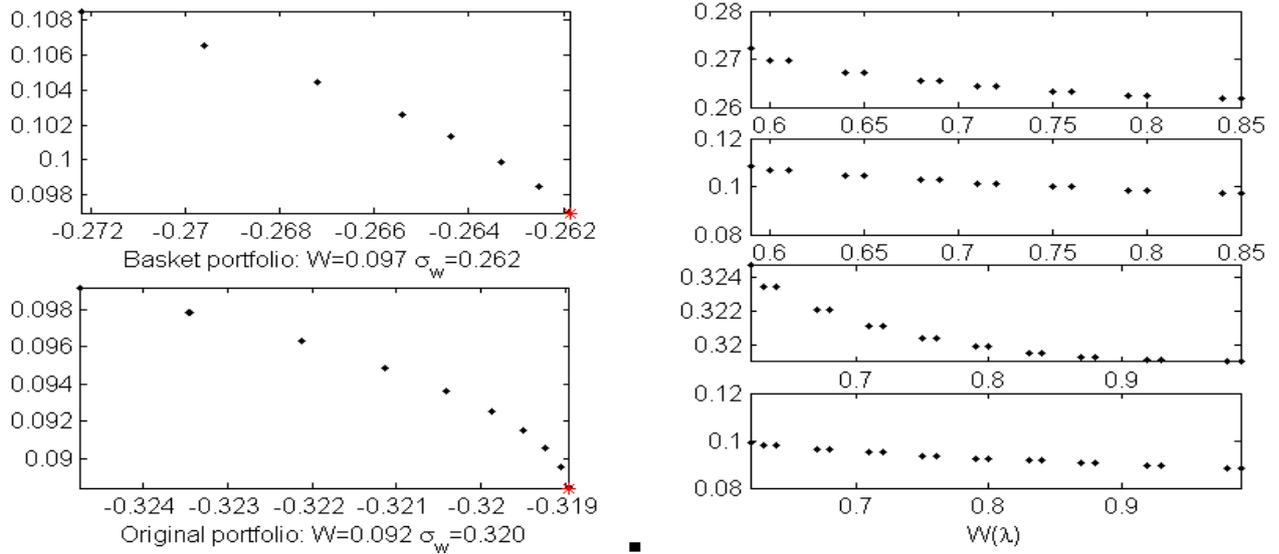
Fig. 3. Pareto curves $W(\sigma_w)$, and dependencies $W(\lambda)$ and $\sigma_w(\lambda)$ in the interval 1998-2001

Table 2

**Efficiency assessment of the currency basket containing gold and silver, combined
with Markovith portfolio optimisation, used for one year forward transaction
on six petroleum products: TXPropan, USGulfROil, HeatOil, LCrude1, NYGasF,
WTI and Brent (see Table 1 for explanations)**

End of validation interval	30.12.03	30.12.04	30.12.05	30.12.06	30.12.07	30.12.08	30.12.09	26.11.10
W_{Bopt}/W_{Popt} %	109.02	107.03	-52.47	38.71	31.14	45.87	16.90	68.32
W_{Bval}/W_{Pval} %	76.33	95.89	-114.76	-54.55	204.86	74.84	57.81	93.32
$\sigma_{wBopt}/\sigma_{wPopt}$ %	82.53	89.53	87.51	106.46	137.33	118.17	88.16	54.36
$\sigma_{wBval}/\sigma_{wPval}$ %	122.88	97.01	141.65	136.31	56.42	61.02	83.10	44.83

Table 3

**Efficiency assessment of the currency basket excluding gold and silver, combined
with Markovith portfolio optimisation, used for one year forward transaction
on six petroleum products**

End of validation interval	30.12.03	30.12.04	30.12.05	30.12.06	30.12.07	30.12.08	30.12.09	26.11.10
W_{Bopt}/W_{Popt} %	104.83	116.07	-27.40	75.04	65.46	48.19	50.94	52.69
W_{Bval}/W_{Pval} %	77.00	105.78	84.59	-7.96	167.26	65.30	88.48	100.18
$\sigma_{wBopt}/\sigma_{wPopt}$ %	81.87	86.34	94.36	91.62	122.90	116.88	74.83	54.56
$\sigma_{wBval}/\sigma_{wPval}$ %	122.19	100.08	133.07	94.82	62.39	56.87	52.04	42.05

Conclusions. The article proposes a new method for expressing the value of petroleum commodities as a function of a basket of currencies and precious metals. It then compares the performance of these basket portfolios to an optimal Markowitz portfolio. Results show that variance of basket portfolios computed with the proposed method is proportionally lower (by about 46 %) to that of unstructured baskets (lines 3 and 4 in Tables 2 and 3). Portfolio performance in the out-of-sample validation period is superior for the optimized basket portfolios which proves the usefulness of the method. Although

portfolio and basket optimizations are not consistent, the proposed method yields significantly positive results. Markowitz portfolio theory is used to verify that the performance of the commodity baskets is significantly superior to alternatives. An added advantage of the method featured in the article is its relative ease of computation.

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