

UDC 658:334.716

O. V. Panukhnyk, Dr. Sc. (Econ.), Prof.,
N. Yu. Marynenko, Dr. Sc. (Econ.), Assoc. Prof.,
I. Yu. Kramar, Cand. Sc. (Econ.)

Ternopil Ivan Puluj National Technical University, Ternopil,
Ukraine, e-mail: panukhnyk@gmail.com; n_marynenko@
ukr.net; ira_kramar@yahoo.com

SYNTHESIS OF EFFECTIVE COMPONENTS OF THE MECHANISM OF MANAGING ADAPTIVE DEVELOPMENT OF PRODUCTION AND ECONOMIC ORGANIZATIONS

О. В. Панухник, д-р екон. наук, проф.,
Н. Ю. Мариненко, д-р екон. наук, доц.,
І. Ю. Крамар, канд. екон. наук

Тернопільський національний технічний університет імені
Івана Пулюя, м. Тернопіль, Україна, e-mail: panukhnyk@
gmail.com; n_marynenko@ukr.net; ira_kramar@yahoo.com

СИНТЕЗ ДІЄВИХ КОМПОНЕНТІВ МЕХАНІЗМУ УПРАВЛІННЯ АДАПТИВНИМ РОЗВИТКОМ ВИРОБНИЧО-ГОСПОДАРСЬКИХ СТРУКТУР

Purpose. The purpose of the paper is to develop effective components of adaptive development management mechanism for the industrial enterprises within production and economic organizations (PEO).

Methodology. The key findings of the research were obtained due to the analysis of scientific literature concerning the issues of enterprise development management, including the adaptive one. The basic concepts of situational, systematic, synergistic and hierarchical approaches to the enterprise development assessment were used.

Findings. The conceptual foundations of adaptive development management of industrial enterprises within PEO are determined. A scheme of an industrial enterprise's adaptive development management processes on the basis of passive and active adaptation is introduced. Co-adaptation of enterprises is considered in as enterprises' mutual adaptation to each other during the combined development which is aimed at mutual benefit and strengthening of cross-functional relationships utility within the PEO and, consequently, at ensuring its viability under the influence of the external environment.

Originality. An adaptive development management mechanism for industrial enterprises within the PEO is proposed on the basis of the situational approach to the regulation of adaptive capacity (at appropriate diagnostic support of management and control of the PEO's non-adaptive business activity).

Practical value. The suggested approach to adaptive development management of industrial enterprises within the PEO can be used by managers while prioritizing the strategic directions of their development to achieve the established goals. It will allow implementing the current management, adhering to the chosen measures policy, correcting it, focusing on the enterprise's functional areas development, implementing an anti-crisis management, carrying out the production diversification.

Keywords: *production and economic organization, pre-adaptation, co-adaptation, mechanism of management*

Introduction. The current state of Ukrainian industry is a consequence of a number of external and internal factors, inconsistent implementation of economic policy reforms by the government and the lack of structural reforms. For the industrial enterprises being a part of large industrial complexes the typical shortcomings are as follows: inefficient management system, especially the lack of adequate tools allowing evaluating the efficiency of enterprises in comparison with the external environment, identifying their potential and developing effective solutions regarding the level of all the areas of the company development. Therefore, the need to form a system of the enterprise's adaptation to external changes is of great importance nowadays.

Analysis of the recent research and publications. Among foreign scientists who have made a significant contribution to the development of the issues concerning the enterprise development and management or

some of its aspects, the following scientists should be mentioned: R. Ackoff, I. Ansoff, S. Beer, P. Doyle, P. Drucker, K. Kearns, H. Koontz, P. Kotler, E. Mansfield, H. Mintzberg, D. Norton, C. O'Donnell, M. Porter, F. Taylor, J. Stiglitz, etc.

The scientific papers of Ukrainian scientists who have researched domestic industrial enterprise development under adaptation or some particular aspect of this issue belong to I. Alieksiev, O. Amosha, M. Afanasiev, B. Andrushkiv, Yu. Bazhal, Ye. Balatskyi, I. Blank, M. Chumachenko, V. Heiets, T. Hryenko, A. Hrynirov, I. Hroznyi, O. Kuzmin, M. Lepa, R. Lepa, T. Mostenska, M. Olshanska, Yo. Petrovych, O. Pushkar, O. Raievnieva, O. Trydid, A. Voronkova, M. Voinarenko, etc.

Among the modern Ukrainian researchers issues in adaptation are being studied by M. Budnik, S. Halushko, M. Kyzym, T. Klebanova, S. Kudlaienko, T. Landina, V. Petrenko, L. Salomatina, V. Stasiuk, Yu. Stepanova, H. Tarasiuk, V. Tymokhin, A. Turylo, V. Yachmeniova, O. Zborovska, etc.

Unsolved aspects of the problem. Under current circumstances, a priority task for economic entities is not the improvement of their development and obtaining a long-term competitive advantages, but actions being addressed to the solving of today's problems. Therefore, the development of effective scientific and methodological approaches to the development management of industrial enterprises within the PEO under adaptation to challenging external environment is urgent nowadays.

Besides that, existing approaches to industrial enterprises' development management do not take into account internal features of interaction between enterprises within the PEO and the nature of their relationships. These features have determined the need to develop new approaches by providing accurate functioning of the internal structure of enterprises and organizational changes aimed at adapting the industrial enterprise to external environment effects. The lack of theoretical and practical findings in this field, the impossibility of majority of them to be practically applied resulted in the focus on this research.

Objectives of the article. The purpose of the paper is to develop an approach to synthesis of effective components of the adaptive development management mechanism of industrial enterprises within PEO.

Presentation of the main research. The development of the approach to synthesis of effective components of industrial enterprises' adaptive development management mechanism requires the identification of factors determining the adaptive development process and, therefore, the level of adaptability. The main task of management should be the development of the company's internal potential which will make it possible to obtain a competitive advantage over the long-term period. Under the adaptive factor it is proposed to understand the components of the organization's internal environment which determine the capacity of an enterprise as a socio-economic system for adaptive development and which restricts or enhances the possibilities of such development. It is obvious, that external environment factors in this context should not be considered as their change results in the enterprise's adaptive development.

The application of such notion as "aim" (goal) is particularly useful when analyzing complex systems as it reflects the characteristic behavior of the entire system regardless of the state of each of its individual components and the perturbations affecting it. The degree (level) of the system's goal achievement is to be used as the main criterion of functioning effectiveness of the system.

The management system of an enterprise's adaptive development is a balanced body which tightly interacts with its environment. Due to the fact that the system's functioning conditions change constantly, the maintenance of its viability can be achieved only through the development adaptation to the changes sometimes provoked by the system itself.

The two types of factors affecting the enterprise's adaptive development management system are as follows: external and internal ones. The external factors include uncontrolled parameters of the external envi-

ronment. The sharp, unpredictable change of these factors features perturbation and usually prevents achieving the goal, deflecting the trajectory of the system behavior. These factors do not depend on the internal features of the system, they are difficult to forecast and it is impossible to use them for controlling the behavior of the system.

The internal properties of the adaptive development management system of the enterprise, including adaptability, consist of:

- the possibility of choosing the right way of the enterprise development;
- the possibility of confronting the perturbations;
- the degree of individual subsystems functioning coherence;
- other properties that allow the system to move in the most effective way to achieve the goal, maximally approaching the perfectly possible adaptive development of the enterprise under given conditions.

Ashby W.R. formulated the law of requisite variety stating that "variety absorbs variety" defining the minimum number of states necessary for a controller to control a system of a given number of states. The number of states of the system's control mechanism must be greater than or equal to the number of states in it being controlled for this system to be stable.

According to W. R. Ashby, in order to reduce the uncertainty of the environment effects, the company should have a variety of powerful management tools – the so called "strength margin", which means the variety of possible reactions of the system managing the adaptive development to certain events. This creates a situation in which, in order to increase the security of the enterprise's goals achievement, it becomes necessary to refuse from some of them for improving the enterprises adaptive capacity.

An important task is to determine the acceptable level of possible reactions diversity, which, on the one hand, will make it possible for the company to ensure the stability and security of achieving the long-term goals and, on the other hand, these results should be economically efficient.

The task of managing the enterprise adaptive development is a preliminary determination of the maximum possible level of development in the planned period, which is determined on the basis of considering possible perturbing factors, comparison of the costs associated with the localization of their effects, and costs to strengthen the adaptive capacity that could prevent these effects.

The adaptive development management system of industrial enterprises within PEO should possess the ability to not only respond to the planned event, but also to be able to adjust its capacity to preventively respond to unexpected, usually unfamiliar, events in its environment.

While discussing the PEO's adaptive development management processes, three main interconnected contours are to be distinguished – preventive, active and passive adaptation (the last two terms have been introduced by R. Akcoff).

The preventive adaptation contour consists of adaptive capacity regulation and planned decisions adjustment blocks. This contour is an integral part of that of the active adaptation and is based on the analytical data of the enterprise's implementation of development strategic or tactical plan. The preventive adaptation is aimed, first of all, at increasing enterprise's development capacity under positive financial results of performance and conditions of the external environment. Otherwise, it is necessary to adjust the goals in accordance with the accepted criteria for the level of development of the enterprise within the PEO.

The passive adaptation contour contains the memory block, block of the system state and the external environment identification, anticipation and the enterprise development plan synthesis blocks. Information about the determinants of the external environment is fed into the first two blocks and is the basis for planning the enterprise's development under the impact of anticipation effect.

Active adaptation is aimed at changing the external environment to ensure more efficient functioning of the enterprise, while passive one aims at changing the enterprise's behavior for adapting to changing external environment [1, 2].

Within research studies on strategic interaction of the enterprise with its external environment it is considered to be more appropriate for the active adaptation to be based not only on the ability to forecast the future, but also on the ability of consciously managing the process of its creation through strategic influence groups [3].

Active adaptation of industrial enterprise is a mechanism for implementing adaptive features inherent in the system, with the possibility of adjusting the planned decision. Passive adaptation contour includes memory unit that stores the accumulated experience of the system for prior periods (the external environment effects and internal conditions and signals in the system of the enterprise adaptive development management). This unit provides self-education of the system, which, in turn, results in more effective adaptation.

The passive adaptation ensures an account of possible changes in the industrial enterprises' adaptive development system functioning while developing its plan by realizing the anticipation effect.

Thus, the plan consists of components of the adaptive capacity of the development management system (maneuvering corridors, flexibility, manageability, etc.) and components of the industrial enterprises development capacity (production and technological, financial, organizational, personnel), which results in the most effective ways to implement the reaction to possible perturbations. The basis of the industrial enterprise's passive adaptation is the accumulation of information on the plans being implemented in previous periods, ensuring the self-learning of the system.

Block of the system and the external environment state identification determines the current conditions (internal and external ones), in which the system operates. In the anticipation block the dynamics of changes

in external and internal parameters and the tendencies of their development are determined on the basis of which the system development plan with adaptive properties is formed taking into consideration the modeling methods and tools of anticipatory management [4].

Thus, the process of passive adaptation of industrial enterprises should result in obtaining such a plan, which includes adaptive capacity for responding to the whole range of changes in both external and internal conditions of their functioning. The process of the plan implementation is monitored by the block of process analysis. In case of actual deviations of indicators from the planned ones the plan regulation may become necessary by re-allocating the capacity of industrial enterprises embedded by passive adaptation. If such regulations are not enough, and the scope of maneuvering (adaptive capacity) embedded by passive adaptation, cannot restore normal operation of the system, it is necessary to review the criteria for the system functioning, to adjust or develop a new plan (i. e. the use of preventive adaptation methods in the context of the active adaptation contour).

The processes for managing the adaptive development of an industrial enterprise in the active, preventive and passive adaptation contours are presented in Table.

So, the active adaptation ensures constant control over the plan implementation and its corresponding adjustments in case of changes in conditions of the system functioning and in the parameters of the external and internal environments.

Based on the forecasted values of future states of the enterprise's external and internal environment, the synthesis of the development plan, which has adaptive properties, occurs in the passive adaptation contour. Each element of the proposed mechanism is the object of managerial decisions (Fig. 1).

Co-adaptation of enterprises within the PEO is one of the main elements of the proposed mechanism of the

Table
Processes for managing the enterprise's adaptive development

Adaptation type	Components of adaptation type
Active adaptation	Analysis of the plan implementation
Preventive adaptation	Regulation and coordination
	Adjustment of the planned decision
Passive adaptation	Records block
	Block of the internal and external environment analysis
	Anticipation block
	Forecasting of the internal and external environment parameters
	Determination of mechanism to counteract the perturbations
	Synthesis of the enterprise development plan with adaptive properties
	Distribution of the plan by the planning periods

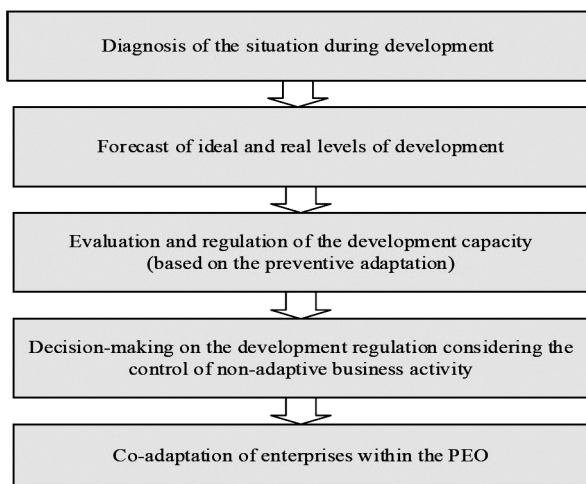


Fig. 1. Effective components of the mechanism of the industrial enterprises' adaptive development management

adaptive development management. It includes the processes that occur during mutual adaptation of enterprises within the PEO to new functioning conditions.

Co-adaptation of enterprises should be considered through the reciprocal adaptation of enterprises to each other during the development which is aimed at mutual benefit and reinforcement of cross-functional relationships between enterprises within the PEO and, consequently, to ensure its viability under the impact of the dynamic external environment.

The effectiveness of the offered approach to synthesis of effective components of the industrial enterprises' adaptive development management mechanism under current market conditions is evaluated on the basis of a machine-building holding "Corum Group" (at "Corum Druzhkovsky Machine-Building Plant"), which is a part of one of the largest financial and industrial groups in Ukraine "System Capital Management" [5]. Its main activities are focused on the engineering, manufacturing and servicing of mining equipment.

The financial analysis of the investigated company before and after the introduction of adaptive measures to the effects of the external environment is to be carried out. "Corum Druzhkovsky Machine-Building Plant" financial ratios in 2013–2015 are shown in Fig. 2.

Analyzing the data shown in Fig. 2, it should be noted that the values of the most important indicators, even during the crisis in 2014, were greater than 1, indicating that the company has sufficient funds at its disposal to meet the current and long-term liabilities.

The fact that at the end of 2015 the equity exceeds the borrowed capital testifies the enterprise's adequate level of financial stability and its ability to implement the production modernization program and the introduction of pre-adaptive, co-adaptive and adaptive measures without attracting external sources of funding and additional contributions by investors.

The dynamics of the income statement indicators in 2013–2015 was determined on the basis of the researched enterprise's financial results analysis (Fig. 3).

The carried out analysis of the "Corum Druzhkovsky Machine-Building Plant" over the period of 2013–2015 makes it possible to conclude that the crisis in 2014 has turned into the recovery in 2015 and the enterprise managed to reach its performance indicators at the level of 2013. The timely response of the "Corum Druzhkovsky Machine-Building Plant" managers to the external environment changes by implementing the mechanism of the industrial enterprises' adaptive development management based on the synthesis of its effective components made it possible for the company to increase its revenue by 51.814 thousand UAH in 2015 compared with the crisis year of 2014. Change of the adaptive development vector at integrating existing mechanical engineering products of the manufacturer into the business of consumers ensured a positive dynamics of the researched enterprise development.

The enterprise's successful adaptation to the variability of the external environment conditions took place due to the completion of reform program developed in September 2014. The conceptual principles of the pre-

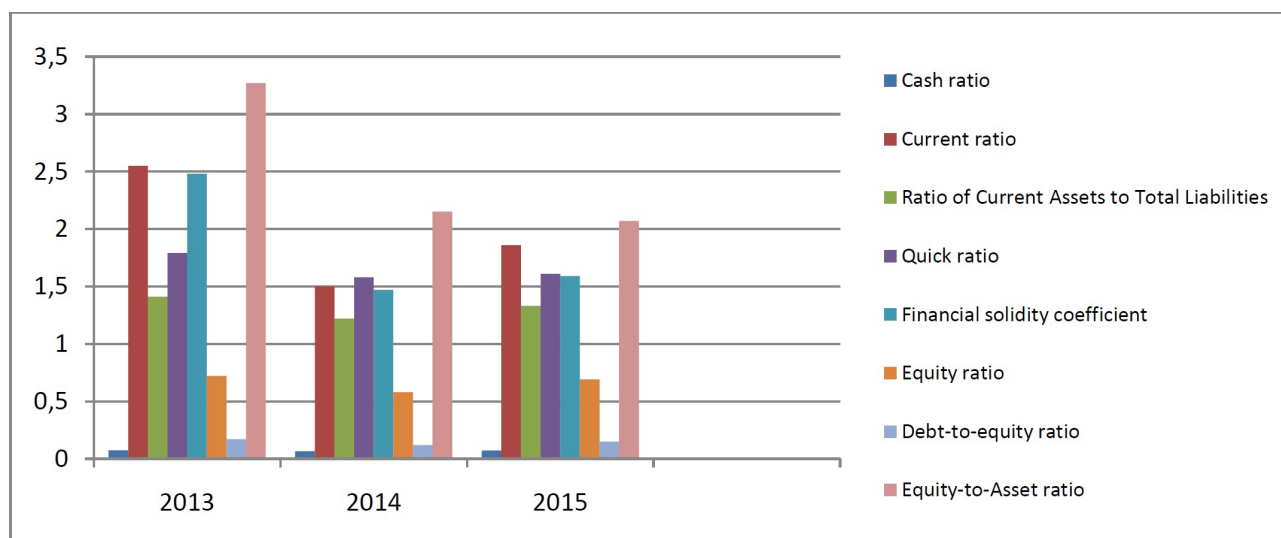


Fig. 2. "Corum Druzhkovsky Machine-Building Plant" financial ratios in 2013–2015

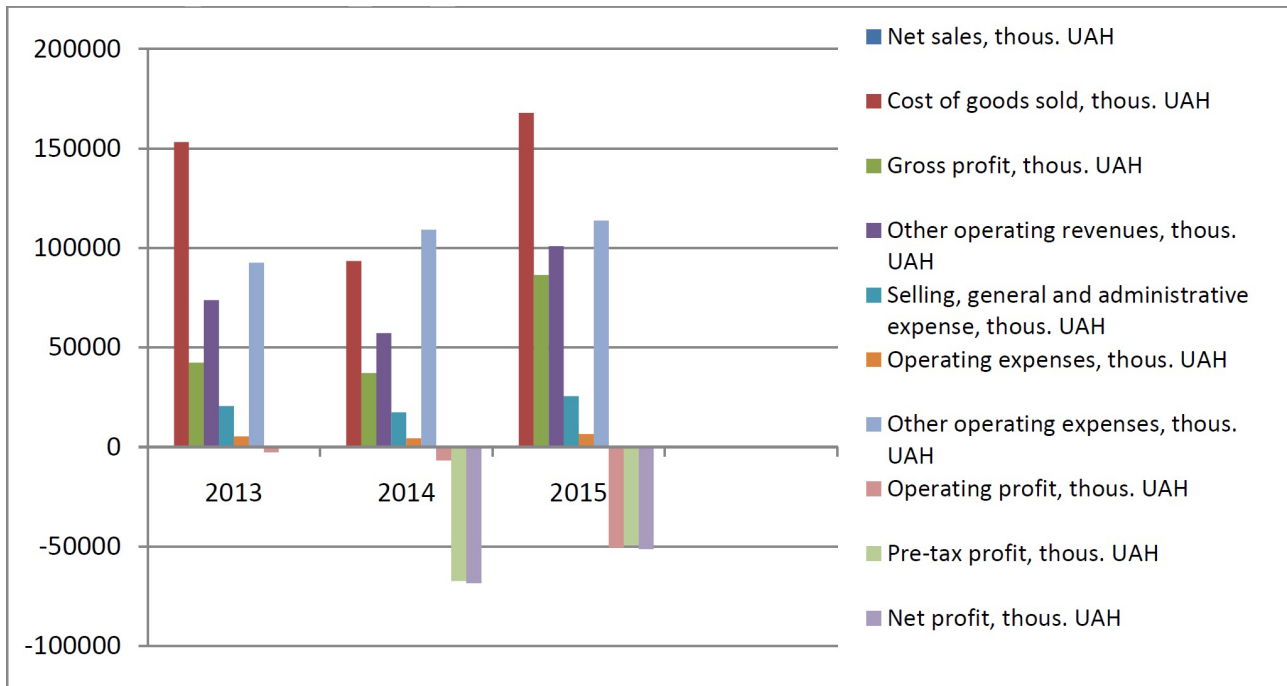


Fig. 3. Analysis of the “Corum Druzhkovsky Machine-Building Plant” income statement indicators in 2013–2015

ventive adaptation have become the basis for this program.

The main measure undertaken within the program was the modification of the production process that has been dominant in terms of sales, and its provision with high-performance production equipment. In addition, considerable attention has been paid to cooperation with clients at the stage of technical task development, which made it possible to use unified units and components, to create equipment with specific technical characteristics.

In 2015, the efforts of the “Corum Druzhkovsky Machine-Building Plant” engineers were aimed at improving the construction of the main representatives of the product range being offered in the market of heavy mining equipment by increasing the productivity of a roadheader KPD, operational features of a drill-loading machine BPR and a shearer loader UKD400.

The main competitive advantages of the investigated enterprise are the increased reliability of the equipment operation in specific mining-geological conditions on the basis of its constructive improvement and modification of the main technological processes. Synthesis of the enterprise’s adaptation mechanism of effective components on the basis of the concept developed by the top management and its program implementation ensured the growth of sales revenue and gross profit.

Conclusions and recommendations for further research. Thus, the proposed approach to synthesis of effective components of the adaptive development management mechanism of the industrial enterprise within PEO on the basis of the preventive adaptation of the enterprise capacity to the highest possible level of its development allows improving the quality of managerial decisions, estimating the whole range of possible areas of activities and assessing the level of development in

each of them. This makes it possible to objectively prioritize the strategic components under development in accordance with the established goals and to specify strategic directions of the adaptive development (e.g., implementation of current management, adherence to the chosen measures policy, implementation of the chosen corrections policy, focusing on the enterprise’s functional areas, implementation of an anti-crisis management, carrying out of the production diversification).

References.

1. Ponomarenko, V.S., Yastremska, O.M. and Lytskovskiy, V.M., 2008. *The formation and functioning of the corporate management mechanism at industrial enterprises: monograph*. Kharkiv: Kharkiv National Economic University.
2. Ponomarenko, V.S., Kyzym, N.A. and Klebanova, T.S., 2009. *Modern problems of socio-economic system modelling: monograph*. Kharkov National Economic University, Kharkov, INZHEK.
3. Shemaieva, L.H., 2009. *Ensuring economic security through the strategic interaction management with the subjects of the external environment: monograph*. National Security and Defense Council of Ukraine, National Institute of International Security Problems, Kyiv.
4. Lysenko, Yu. H., Timokhin, V.N. and Rudenskiy, R.A., 2013. Methodology of viable economic systems strategic development management In: *Managing strategic development of viable economic systems: models, mechanisms and tools: monograph* [2 vol.], Donetsk, Vol. 1.
5. History of the “Corum Group” [online] Available at: <<http://www.corum.com/ua/company/history/> [Accessed 04 June 2016].

Мера. Розроблення дієвих компонентів механізму управління адаптивним розвитком промисло-

вих підприємств у складі виробничо-господарських структур (ВГС).

Методика. Основні результати дослідження були отримані на основі аналізу наукової літератури щодо проблематики управління розвитком підприємств, у тому числі адаптивним. Використані основні положення ситуаційного, системного, синергетичного та ієрархічного підходів до оцінки розвитку підприємств.

Результати. Встановлені концептуальні основи управління адаптивним розвитком промислових підприємств у складі ВГС. Представлена схема процесів управління адаптивним розвитком підприємства на основі пасивної та активної адаптації. Розглянута коадаптація підприємств як взаємне (поєднане) пристосування підприємств один до одного під час сполученого розвитку, що спрямована на взаємну вигоду й посилення міжфункціональних корисних зв'язків у складі ВГС і, як наслідок, забезпечення її життєздатності під впливом динамічного зовнішнього середовища.

Наукова новизна. Запропоновано механізм управління адаптивним розвитком промислового підприємства на основі ситуаційного підходу до регулювання адаптивного потенціалу (при відповідному діагностичному забезпеченні управління та контролю неадаптивної активності підприємств ВГС).

Практична значимість. Запропонований підхід до управління адаптивним розвитком промислового підприємства у складі ВГС може бути використаний менеджерами при обранні пріоритетних шляхів реалізації стратегії їхнього розвитку з метою досягнення поставлених цілей. Дозволить здійснювати поточне регулювання, дотримуватися обраної політики заходів, здійснювати її корегування, робити акцент на розвитку функціональних сфер підприємства, здійснювати заходи щодо антикризового регулювання, проводити диверсифікацію виробництва.

Ключові слова: *виробничо-господарська структура, преадаптація, коадаптація, механізм управління*

Цель. Разработка действенных компонентов механизма управления адаптивным развитием промышленных предприятий в составе производственно-хозяйственных структур (ПХС).

Методика. Основные результаты исследования были получены на основе анализа научной литературы по проблематике управления развитием предприятий, в том числе адаптивным. Используются основные положения ситуационного, системного, синергетического и иерархического подходов к оценке развития предприятий.

Результаты. Разработаны концептуальные основы управления адаптивным развитием промышленных предприятий в составе ПХС. Представлена схема процессов управления адаптивным развитием предприятия на основе пассивной и активной адаптации. Рассмотрена коадаптация предприятий как взаимное (сочетанное) приспособление предприятий друг к другу во время сопряженного развития, которая направлена на взаимную выгоду и усиление межфункциональных полезных связей в составе ПХС и, как следствие, обеспечение ее жизнеспособности под воздействием внешней среды.

Научная новизна. Предложен механизм управления адаптивным развитием промышленного предприятия на основе ситуационного подхода к регулированию адаптивного потенциала (при соответствующем диагностическом обеспечении управления и контроля неадаптивной активности предприятий ПХС).

Практическая значимость. Предложенный подход к управлению адаптивным развитием промышленного предприятия в составе ПХС может быть использован менеджерами при выборе приоритетных путей реализации стратегии их развития для достижения поставленных целей. Позволит осуществлять текущее регулирование, придерживаться выбранной политики мероприятий, осуществлять ее корректировку, делать акцент на развитии функциональных сфер предприятия, осуществлять меры по антикризисному регулированию, проводить диверсификацию производства.

Ключевые слова: *производственно-хозяйственная структура, преадаптация, коадаптация, механизм управления*

Рекомендовано до публікації докт. екон. наук Б. М. Андрушківим. Дата надходження рукопису 05.07.16.