$$\tau_{ys} = \tau_{sp} + \tau_{sc} + \tau_{sn}; \quad \tau_{ic} = \tau_{sp} + \tau_{sc} + \tau_{sn} + \tau_{sv}$$

Sustainable development of an enterprise requires that the relative increase in efficiency in successive cycles decreases:

$$\frac{S_1}{S_0} > \frac{S_2}{S_1} > \frac{S_3}{S_2} > \ldots$$

Correlation of the kinetic cycles discussed above (Fig. 2) can be achieved by creating an innovative division within the enterprise's scientific and technical center that coordinates research, design, and feasibility studies. The absence of such a structure leads to operational instability and loss of market position.

Conclusions.

An analysis of the functioning of industrial enterprises with similar levels of production potential and homogeneous product purposes confirms the existence of stable kinetic patterns in the development of innovative potential, which support the implementation of a sustainable development strategy during the transition period. One effective tool for such a strategy is the creation of functional units within the enterprise structure to support intellectual support for innovation.

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UDC 330.341.1:658.5

MODELING OF CLUSTER STRUCTURES OF INTELLECTUAL SUPPORT OF INNOVATIVE ACTIVITIES OF ENTERPRISES

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Abstract. This paper examines current organizational and methodological approaches to establishing cluster structures that provide intellectual support for the innovation activities of industrial and repair

enterprises. It substantiates the importance of integrating research potential, production resources, and management mechanisms to enhance the efficiency of enterprise innovation development within a changing market environment. The study identifies key prerequisites for forming cluster structures, specifically the need to restore collaboration among manufacturing enterprises, research institutions, and higher education establishments, as well as the need to improve the coordination of scientific and technical projects and mitigate the risks associated with implementing innovative solutions.

Particular attention is paid to the functional characteristics of intra-cluster and regional innovation structures. The paper highlights the role of the scientific and technical center as the coordinating core of the intra-cluster, responsible for organizing research and engaging specialized laboratories, testing units, and research-educational institutions to address production challenges. It outlines the potential of regional innovation clusters to pool resources and coordinate participants in scientific and technical programs. A conceptual approach is proposed for quantifying the effectiveness of cluster collaboration using an integral index that accounts for participant coordination levels, the speed of innovation adoption, resource availability, and project implementation risks. The research findings can be applied to further refine innovation management models, organize scientific and technical support for production, and foster partnerships between enterprises and research-educational institutions.

Keywords: innovation cluster, intracluster, infrocluster, scientific and technical center, innovation management.

Problem statement. Performance innovative development depends from abilities enterprises quickly respond to changes market conditions and transform scientific results in production solution. Relaxation traditional connections between industry, scientific institutions and higher education institutions education made it difficult complex intellectual software production. Additional barriers are insufficient flexibility program-specific financing, deficit project management and limited organizational support performers.

Purpose of work: To summarize approaches to construction cluster structures capable of to provide coordination research, production adaptation and implementation innovation at the level enterprise and region.

Basic results. In the source two interconnected levels organizations innovative interactions. Intracluster is forming within enterprises, and its core is the scientific and technical center (STC), which combines coordination functions with their own research. To work are involved factory laboratories, testing, metrological and standardization services, as well as shared departments with scientific institutions and universities. Such configuration contributes formation permanent teams and faster adaptation developments to production conditions.

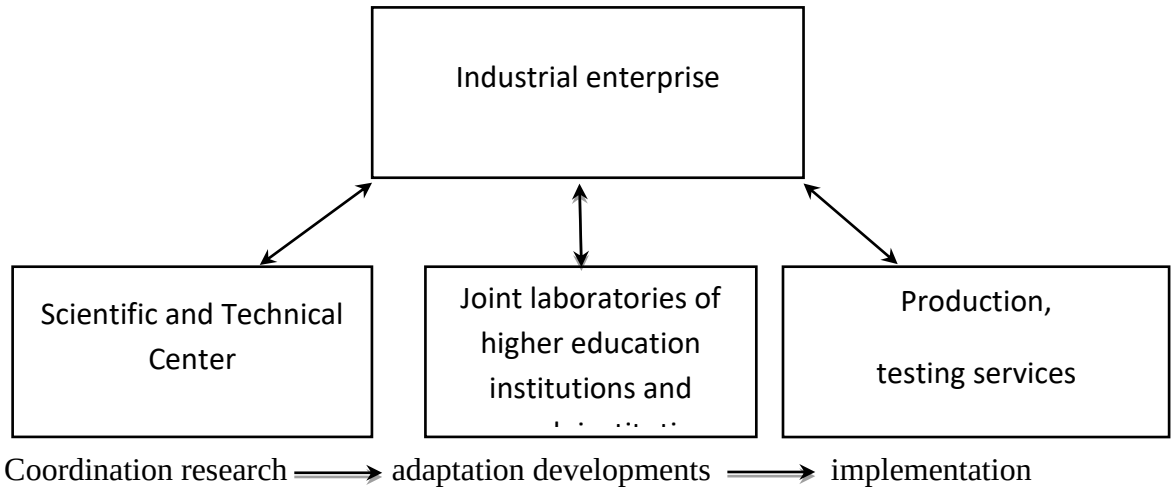


Figure 1 – Generalized scheme of intracluster interactions

Regional infracluster relies on scientific and technical program coordinated by regional organs management and profile scientific and technical structures. Customer companies join through their own STCs or research laboratories that provide connection between regional tasks and production needs. An

important condition effectiveness both models are consistent resources, responsibility and management solutions for all stages innovative project.

Formalization interactions. For a conceptual description performance cluster structures can be generalized index, namely:

$$E = w_1K + w_2A + w_3R - w_4Z, \quad \Sigma w_i = 1, \quad w_i \geq 0$$

where E is the integral efficiency of cluster interaction; K - level of coordination of participants; A - speed of adaptation of development to production; R - resource availability; Z - aggregate realization risk; w_i weighting factors. The formula has conceptual in nature and requires parameterization for practical evaluation.

Conclusions. Integration of STC into the production cycle and development of partnerships with scientific and educational institutions create organizational framework for a stable innovative accompaniment enterprises. Combination intracluster and regional levels gives opportunity to involve wider research potential, coordinate resources and increase adaptability innovative projects. Proposed index maybe serve as the basis for further quantitative modeling after definition indicators and weights.

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