

UDC 332.1

NEOCLUSTERIZATION ON THE INDUSTRY 4.0 PLATFORM AS A DRIVER OF STABILIZATION OF THE ECONOMY OF THE REPUBLIC OF BELARUS: THEORETICAL AND PRACTICAL ASPECTS**НЕОКЛАСТЕРИЗАЦИЯ НА ПЛАТФОРМЕ ИНДУСТРИИ 4.0 КАК ДРАЙВЕР СТАБИЛИЗАЦИИ ЭКОНОМИКИ РЕСПУБЛИКИ БЕЛАРУСЬ: ТЕОРЕТИЧЕСКИЕ И ПРАКТИЧЕСКИЕ АСПЕКТЫ***Yashava G.A.* , Kondrateva V.D.**Vitebsk State Technological University, Belarus**e-mail: gala-ya@list.ru***Яшева Г.А.* , Кондратьева В.Д.**Витебский государственный технологический университет, Республика Беларусь*

Keywords: cooperation, stakeholder, blockchain technologies, digital economy, cluster, smart cooperation, smart industry.

Ключевые слова: сотрудничество, стейкхолдер, блокчейн-технологии, цифровая экономика, кластер, smart-кооперация, smart-индустрия.

Abstract. The article discusses the theoretical and methodological foundations of network cooperation in clusters, including: forms of cooperation and their advantages for stakeholders; the composition of cluster-type network structures; the concept of "cluster", "network cooperation"; types of network connections. The analysis of the degree of development of network cooperation in Belarus was carried out on the basis of a survey of 421 business entities, which revealed the following problems: lack of information about potential partners; low level of trust between entrepreneurs; lack of infrastructure and services for organizing cooperation and business cooperation.

Taking into account the digitalization of the Belarusian economy, the directions of enhancing network cooperation in clusters have been developed, including: subcontracting service, blockchain technologies, smart contract, the use of which will contribute to improving the efficiency of both cluster entities and the economy as a whole.

Аннотация. В статье рассмотрены теоретико-методологические основы сетевого сотрудничества в кластерах, включая: формы сотрудничества и их преимущество для стейкхолдеров, состав сетевых структур кластерного типа, понятие «кластер», «сетевое сотрудничество», виды сетевых связей. Проведен анализ степени развития сетевого сотрудничества в Беларуси на основе анкетирования 421 субъекта хозяйствования, который позволил выявить проблемы: отсутствие информации о потенциальных партнерах, низкий уровень доверия между предпринимателями, отсутствие инфраструктуры и услуг по организации сотрудничества и кооперации бизнеса.

SECTION 2. SOCIAL AND ECONOMIC PROBLEMS OF EDUCATION AND SCIENCE DEVELOPMENT IN THE 21st CENTURY

С учетом цифровизации экономики Беларуси, разработаны направления активизации сетевого сотрудничества в кластерах, включая: сервис субконтрактации, блокчейн-технологии, смарт-контракт, применение которых будет способствовать повышению эффективности как субъектов кластера, так и экономики в целом.

In the Republic of Belarus, cluster policy is becoming an important tool for stimulating the innovative development of the economy. At the same time, clustering processes are not active enough in comparison with foreign countries. Clusters of foreign countries employ about a third of the total number of employees, and labor productivity is 40 % higher [1]. Currently, only 8 active clusters, 6 emerging and 18 cluster initiatives have been created in the Republic of Belarus [3].

Innovation is a crucial factor in productivity growth and value creation. The importance of innovation is especially increasing in the era of the Fourth Industrial Revolution (Industry 4.0). The cluster concept is influenced by the external environment – namely, the development of ICT, the Internet, the concept of "Society 5.0", informatization of production, etc. [2].

The aim of the work is to develop the theoretical foundations of neoclusters and develop practical directions for their creation in order to innovatively develop the economy of the Republic of Belarus.



Figure 1 – Map of clusters of the Republic of Belarus

Source: [3].

A new concept is proposed, which is a neocluster. It is based on the transformation of a cluster into a neocluster. We believe that the neocluster is a network structure of entities localized in the region, interconnected in the value chain, interacting with each other on the basis of ICT and/or basing their business processes on elements of

Industry 4.0. The paper proposes a neocluster structure, which, unlike the cluster structure, contains elements of Industry 4.0.

The same processes as in clusters are observed in neoclusters, in particular active cooperation of participants, exchange of advanced developments, iterative modernization, integration of production processes, optimization of operational activities, diversification of work with suppliers. Similarly, specialized cluster enterprises cooperate and compete with each other in the value chain, outsourcing certain functions if necessary [4, 5].

In the context of Industry 4.0, the ability to flexibly integrate into existing enterprise networks provides great advantages. The high level of communication technologies allows us to quickly exchange information and set a strict sequence of operations in the production chain. The density of cooperative networks is growing, creating prerequisites for the formation of cyber-physical systems [3].

In order to develop the cluster theory, the following neocluster features are formulated: strategic orientation to innovation; use of cyber-physical systems; use of artificial intelligence technology; accelerated integration of computing resources into industrial processes; blurring the boundaries between physical, digital and biological technologies within the neocluster manufacturing industry; robotization and informatization of production; active use of cloud technologies; use of ERP, CRM software for automating customer interaction strategies; BPM for managing the business processes of the system.

Following are the advantages of neoclusters compared to conventional clusters: higher competitiveness compared to clusters; lower transaction costs compared to clusters; the use of simulation modeling and the creation of digital twins.

The analysis of the external environment, conducted on the basis of a review of various studies, revealed the following prerequisites that influence the formation of neoclusters: the development of ICT and the digitalization of society; the development of network forms of relationships between subjects. Network forms include: clusters, technology platforms, strategic alliances; the "democratization" of knowledge through the Internet.

The following directions of development of neocluster structures are proposed.

Digitalization of communications between cluster entities:

- Creation of: databases on cluster entities within the framework of the regional statistical office; business platforms (technological, procurement, digital, etc.); development of the architecture of "live laboratories" for the "smart cooperation" of stakeholders in the production of innovative products;

- Creation of Internet portals: Internet platforms for training, networking and cooperation; creation of a virtual Subcontracting Center; virtual business incubators; social business network "Cluster";

Digitalization of training of cluster participants:

- creation of Knowledge Centers in the form of virtual organizations based on industry research and/or educational organizations of the cluster;

– opening of a business school of distance learning for cluster entities at the entrepreneurs support center;

Digitalization of production in the subjects of the cluster:

– development of the smart industry based on the principles of "smart cooperation";

– introduction of artificial intelligence technology;

– introduction of blockchain technologies; cloud technologies.

Implementation of: ERP, CRM software for automating strategies of interaction with customers; BPM (business process management) for managing the business processes of the system.

Thus, neoclusters are clusters of the future. Combining all the components of Industry 4.0 will make neocluster as automated and competitive as possible, and, consequently, a leader in the global market. The use of digital information and communication technologies in the organization and operation of clusters, i.e. neoclusterization, will contribute to the sustainable development and increase the competitiveness of the Belarusian economy.

References

1. Слонимская, М. А. Предпринимательство Витебской области: проблемы и перспективы развития / М. А. Слонимская, Г. А. Яшева. – Витебск: Общественное Объединение «Ассоциация нанимателей и предпринимателей», 2019. – 44 с. Электронный ресурс [kef.by/publications/research/konkurentosposobnost-regionovbelarusi/predprinimatelstvo-vitebskoj-oblasti-problemy-perspektivyrazvitiya/] – Дата доступа 07.09.2022.
2. Яшева Г. А. Кластеры как инструмент развития инновационного предпринимательства / Г. А. Яшева, Ю. Г. Вайлунова // Экономический вестник университета. Сборник научных трудов ученых и аспирантов. Выпуск 44/2. Министерство образования и науки Украины ГВУЗ «Переяслав-Хмельницкий государственный педагогический университет имени Григория Сковороды»; под ред. Л.А. Мармуль и др., Переяслав, 2020. – С. 53–61.
3. Карта кластеров Республики Беларусь. Электронный ресурс [https://economy.gov.by/ru/karta_klasterov-ru/] – Дата доступа 07.09.2022.
4. Яшева Г. А. Методические аспекты оценки уровня и перспектив развития интеграционных связей организации в контексте создания кластерных структур / Г. А. Яшева, Ю. Г. Вайлунова. – 2019. – № 1(36). – С. 187–204.
5. Яшева, Г. А. Теоретико-методологические основы кластеров и их роль в повышении устойчивости национальных экономик / Г. А. Яшева, В. А. Кунин // Региональная экономика и управление: электронный научный журнал, 2014, № 1 (37), Режим доступа: [http://region.mcnip.ru].
6. Яшева Г. А. Кластерные структуры в инновационном развитии экономики / Г. А. Яшева // Интеграция науки и образования как основа эволюции Евразийского экономического союза: сб. ст. из материалов

Евразийского научного форума 08 декабря 2017 г. / Общ. научн. ред. М. Ю. Спириной. Часть IV. – СПб.: Университет при МПА ЕврАзЭС, 2018. – С. 347–359.

UDC 339.13

**THE USE OF ARTIFICIAL INTELLIGENCE IN
ECONOMICS AND MARKETING**
**ПРИМЕНЕНИЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА
В ЭКОНОМИКЕ И В МАРКЕТИНГЕ**

Yashava G.A. , Panchenko E.V.*

Vitebsk State Technological University, Belarus

*e-mail: gala-ya@list.ru**

Яшева Г.А. , Панченко Е.В.*

Витебский государственный технологический университет, Республика Беларусь

Keywords: artificial intelligence, chat-bot, marketing, efficiency, advertising.

Ключевые слова: искусственный интеллект, чат-бот, маркетинг, эффективность, реклама.

Abstract. The article describes the concept and use of artificial intelligence in the modern world. It explains how artificial intelligence helps to increase the effectiveness of campaigns, collecting and analyzing the information received. The scope of application is described: personalization of services; predictive analytics; communications; content generation. The study of the experience of using artificial intelligence made it possible to determine the marketing tasks that can be solved with the help of artificial intelligence, as well as the main steps for the implementation of artificial intelligence.

Аннотация. В статье изложено понятие и использование искусственного интеллекта в современном мире. Объясняется, как искусственный интеллект помогает увеличить эффективность кампаний, сбора и анализа полученной информации. Описана сфера применения: персонализация услуг, предиктивная аналитика, коммуникации, генерация контента. Изучение опыта применения искусственного интеллекта позволило определить маркетинговые задачи, решаемые с помощью искусственного интеллекта, а также основные шаги по внедрению искусственного интеллекта.

Introduction of elements of Industry 4.0. and the concept of Society 5.0 in the real sector of the economy significantly change business processes, including marketing. Marketing research, the purpose of which is to refine products to the desired level or to remove a product from the product range, in Belarusian organizations is currently carried out on the basis of statistical observations using a survey (self-registration, correspondence). This method entails a representativeness error and requires a lot of