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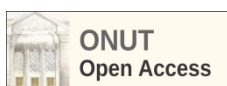
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TRANSFORMATION OF HUMAN POTENTIAL OF UKRAINE IN THE CONDITIONS OF MILITARY CHALLENGES

The aim of the work was to analyze the current state of the labor market and identify ways to preserve and increase the efficiency of the use of labor resources both during the war and in order to ensure the possibility of rapid post-war recovery. It is substantiated that the adaptive reproduction of labor resources in critical conditions requires a transition from traditional management models to the Industry 5.0 paradigm, where the key emphasis shifts from pure automation to the synergy of man and machine, human-centricity and ethical use of high technologies. It is proven that the economic sustainability of enterprises during martial law directly depends on the ability of management to implement flexible forms of employment and digital tools of operational management. The specifics of the functioning of data-driven food ecosystems as a strategic sector of economic security are considered. It has been established that the implementation of data-driven approaches in the agri-food sector allows minimizing the risks of disruption of logistics chains and ensuring the sustainability of production cycles even in conditions of personnel shortage. Mechanisms for stimulating innovative employment based on the principles of inclusiveness and continuous learning are proposed.

Key words: human potential, adaptive reproduction, digital competencies, economic sustainability, data-driven food ecosystems, military challenges, flexible employment, personnel efficiency.



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Statement of the problem and its connection with important scientific and practical tasks. The current stage of Ukraine's economic development is characterized by profound transformations of human potential under the influence of military, demographic, and technological challenges. Disruptions in the labor market balance, large-scale population migration, changes in employment structure, and the growing importance of digital skills necessitate a rethinking of approaches to the formation and utilization of labor resources. Similar processes are observed in other countries undergoing crises or structural economic modernization, where the focus shifts from quantitative labor force parameters to its quality, innovativeness, and adaptability.

The relevance of the study lies in identifying ways to preserve and develop human potential as a key factor in the economic resilience of enterprises and the recovery of the national economy. The practical significance of the work is in the potential use of the obtained

results to improve employment policy, personnel management, and the formation of effective social-labor relations in the context of post-crisis transformation.

The analysis of the latest publications on the problem. Analysis of contemporary scientific sources [1-19] shows that the problem of transforming Ukraine's human potential in wartime is a relatively new research direction, explained by the complexity of collecting empirical data and the rapid change of socio-economic conditions. Most authors focus on labor and educational potential imbalances caused by military events, as well as labor losses and changes in its structure [1;2]. Researchers note regional labor market disparities, rising unemployment, and the need to develop social quality policies in the post-war period [3;4].

Domestic scientists actively analyze changes in labor demand and supply, risks of employment destabilization, and directions for restoring the labor sector. Notable recent works include those by V. Kudelsky [5], N.

Lyubomudrova and V. Boychuk [6], H. Mykhailiak [7], O. Tomchuk [8], and N. Seriogina [9], who highlighted the war's impact on productive employment. Some studies address labor force reproduction and regional labor market peculiarities, though their number remains limited due to a lack of reliable statistical data [10–13]. This indicates the need for further research into state employment regulation mechanisms and economic adaptation to wartime conditions.

Theoretical approaches to defining labor potential describe it as a combination of quantitative and qualitative characteristics of the economically active population, shaped by demographic, educational, and socio-economic factors [14]. Researchers emphasize the role of motivational factors, education, professional experience, and infrastructural opportunities in realizing human potential [15–18]. It is also important to distinguish various levels of labor potential formation—individual, entrepreneurial, and sectoral [19]—highlighting the systemic nature of this category.

Modern research focuses on the impact of internal population displacement, labor market segmentation, and the need to adapt personnel policies to the demands of the new technological economy [20;21]. Scholars underline the significance of innovative strategies, integration into global scientific and technological processes, and seeking new sources of funding for human capital development [22–25]. In this context, innovativeness is seen as a key factor for competitiveness and post-war economic recovery.

International experience also confirms the significant impact of military conflicts on labor market transformations. Research on Bosnia and Herzegovina's post-war labor market shows changes in displaced persons' labor trajectories and the need for their economic integration [26]. Studies on the impact of Syrian refugees on host countries' labor markets demonstrate that migration processes can simultaneously create additional challenges and new opportunities for economic development [27–28]. Such findings allow drawing parallels with the Ukrainian situation and considering international approaches to restoring human capital.

At the same time, scientific literature reveals certain contradictions. Some researchers view war solely as a destructive factor leading to labor potential loss, while others emphasize opportunities for structural economic modernization and the formation of new competencies among workers. Differences also appear in methodological approaches: some authors mainly use demographic and statistical indicators, others apply qualitative indicators of human capital development, complicating result comparisons.

A major gap remains the lack of statistical data and long-term empirical studies, hindering comprehensive labor market assessments, especially regionally. Meanwhile, a strength of current studies is their interdisciplinary nature and focus on practical mechanisms for post-war economic and human capital recovery. Additionally, many researchers stress the need for a new model of social-labor relations combining economic efficiency with workers' social security. The works emphasize

the importance of continuous education systems, workforce retraining, labor process digitalization, and the state's enhanced role in employment regulation amid instability. These approaches indicate a gradual shift from short-term crisis response policies to strategic human capital management as a key resource for economic recovery and long-term national growth.

Under Ukraine's current development conditions, preserving and efficiently using human potential becomes especially critical. Military events, migration processes, job cuts, and rapid digital technology implementation significantly change work nature and worker requirements. This necessitates rethinking labor resource formation, professional training, adaptation to new employment conditions, and personnel management at both state and enterprise levels. Hence, there is a need to study contemporary social-labor sphere changes and explore ways to enhance human capital efficiency amid wartime and post-war economies.

The motivation for this work is to summarize current scientific approaches to understanding human potential and identify practical directions for its restoration and development considering new economic challenges. For future labor accounting and economics specialists, understanding labor market transformations' impact on enterprise activity, employment organization, labor productivity, and socio-economic stability is crucial.

Forming of the aims of the research. To analyze the transformation of Ukraine's human potential amid modern challenges and determine ways to improve the efficiency of its formation, preservation, and use within social-labor relations. To achieve this aim, the study addresses the following tasks: analyze the current state of Ukraine's labor market; identify key factors affecting human potential formation and loss; explore the role of education, innovation, and digitalization in labor resource development; and substantiate practical recommendations to enhance human capital use efficiency during economic recovery.

Methods and Materials. The research preparation employed a set of general scientific and specialized methods enabling a comprehensive analysis of Ukraine's human potential transformation amid military and socio-economic changes. The main method was the analysis of scientific sources (2022–2026), used to summarize modern approaches to defining human capital essence, employment issues, migration processes, and labor market recovery. This allowed systematizing existing research results and identifying key social-labor sector development trends.

To reveal cause-effect relationships between economic challenges and employment structure changes, comparative analysis was applied. It compared pre-war and current labor market conditions and assessed approaches to labor potential restoration in Ukraine and other countries experiencing crisis or war periods.

The system approach method enabled considering human potential as a multi-level category (individual – enterprise – state), shaped by demographic, educational, economic, and technological factors. Through generaliza-

tion and logical modeling, practical directions for enhancing labor resource use efficiency during economic recovery were formulated.

The research object is the process of Ukraine's human potential transformation under wartime challenges and economic digitalization. The research subject includes social-labor relations, state employment policy, enterprises as employers, and the economically active population forming and realizing labor potential. The applied methodology combines theoretical analysis, systematization of scientific approaches, and their practical interpretation, ensuring research reproducibility using similar information bases.

Giving an account of the main results and their substantiation. The study found that the main transformation in Ukraine's social-labor sphere is the shift from quantitative labor force reproduction to a qualitative human potential development model focused on competencies, digital skills, adaptability, and worker multifunctionality. Unlike traditional approaches emphasizing employed population size, current wartime and post-war economic conditions require productivity increases through knowledge, innovation, and employment flexibility. The author's synthesis showed enterprises increasingly adopting remote work, digital HR tools, staff retraining, and internal training as mechanisms for preserving labor potential.

During wartime and post-war periods, Ukraine's social-labor sphere transformation becomes systemic, serving not only as a response to demographic losses, forced migration, and employment reduction but also as a profound structural overhaul of the human potential reproduction model. Focus shifts from quantitative labor force recovery to forming a qualitatively new labor resource capable of functioning amid a technological economy, digitalization, and heightened risks.

The reduction of economically active population and labor resource deficits highlight the transition to a new human capital management paradigm integrating educational, economic, social, and institutional policies into a unified strategic recovery system. In this system, the worker is viewed not only as a production factor but as a bearer of knowledge, innovation, and state economic resilience.

The war is a huge deterrent to human capital development, but the reality as of 2026 is more complicated due to a critical shortage of skilled workers, especially male ones, despite the fact that salaries in the Ukrainian construction and agricultural sectors have risen to levels that rival some Eastern European countries. According to the International Organization for Migration [29], by early 2026, more than 58% of employers in Ukraine are already experiencing an acute shortage of skilled workers. Reports for 2024–2026 indicate that Ukraine will need between 4.5 and 8.6 million additional workers over the next 10 years to achieve its GDP growth target [30;31]. Experts emphasize that if a significant part of the refugees does not return (according to forecasts for 2025, this is about 1.5–2.5 million people), Ukraine will be forced to “import” labor to stabilize the pension system and la-

bor market in order to ensure the pace of reconstruction of more than 3–4% of GDP per year.

In our opinion, raising the retirement age in Ukraine in modern conditions is a premature and socially risky decision, since there is a critical gap between the established retirement threshold and real life expectancy, especially among men. Unlike developed countries, where the retirement age correlates with a long period of post-working life, in Ukraine such a reform can transform the solidarity system into a de facto regressive redistribution mechanism, which does not guarantee the realization of pension rights for the majority of payers.

Given the demographic losses, deteriorating health of the population, age discrimination in the labor market and low employment of people 55+, raising the retirement age without accompanying structural changes will lead to increased social tension and an expansion of the economically vulnerable group. In these conditions, the implementation of a flexible retirement age, the development of the accumulative component, stimulating the employment of older people and restoring life expectancy to an economically justified level should be priorities. Pension reform should be based not on formal approximation to European standards, but on real demographic and socio-economic prerequisites, otherwise it risks losing both economic efficiency and social legitimacy. The post-war demography of Ukraine will be characterized by one of the highest levels of population aging in Europe with a critically low number of workers, which will lead to symbolic payments to the pension fund. After all, there is a dependence of pensions - every 100 thousand people not involved in the labor market (Ukrainians or foreigners) increases the burden on the budget transfer to the PFU by billions of hryvnias.

In 2025, the Cabinet of Ministers and the Ministry of Economy began developing simplified procedures for hiring foreigners specifically for reconstruction projects. Even during hostilities, Ukraine has “islands” of economic activity and a shortage of personnel, which are already attracting foreigners, mainly in the central and western regions of the country. The issue of providing human resources was partially resolved by increasing the requirements for experience to 35 years, which is actually a “hidden” increase in the retirement age, since those who do not have enough experience will be able to retire only at 63 or 65 years old. That is, during the period of labor shortage, such people have already found work in order to “pick up” a few years of experience to the required minimum.

So, an adaptive human potential reproduction approach is proposed, reasonably understood as a multi-level model for forming, restoring, and capitalizing labor resources based on:

- employment flexibility;
- continuous education;
- labor digital integration;
- motivational reintegration of the population into the economy;
- partnership among state, business, and educational institutions.

The concept synthesizes human capital theory, social reproduction theory, lifelong learning concepts, institutional economics, and knowledge economy, allowing worker development to be seen as an investment pro-

cess with long-term economic effects. The structural logic of implementing this approach is summarized in a model shown in Fig. 1.

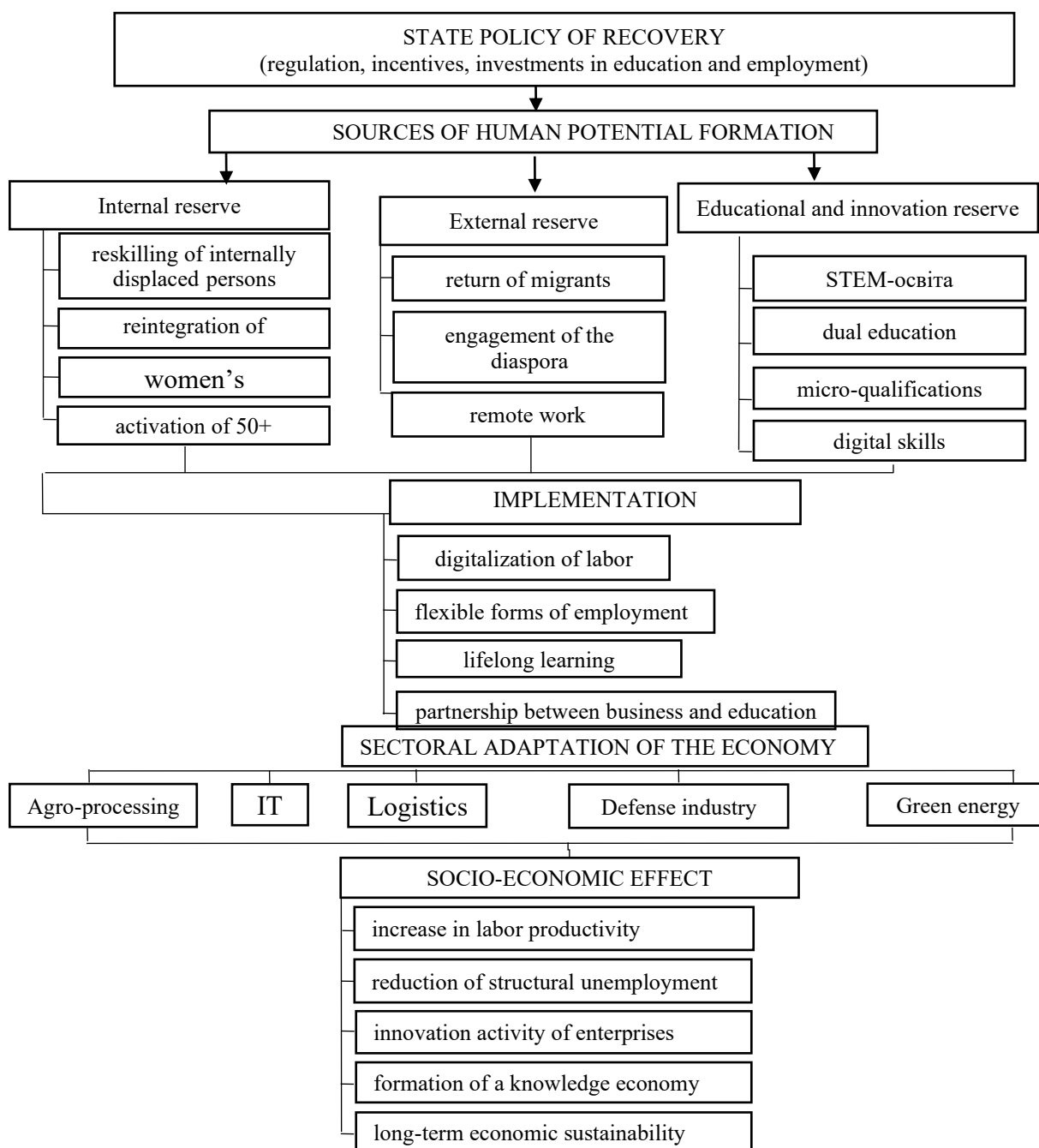


Fig. 1 – Structure of the adaptive model of human strength*

**Source: created by the authors*

The novelty of the proposed approach lies in the transition from a passive model of demographic renewal to an active investment and motivational model of human potential development. Human resources are viewed as a strategic intangible asset that generates a multiplier effect: investments in knowledge and competence cause an increase in innovativeness of production and productivity national economic competitiveness.

Based on the above, the transformation of the social and labor sphere of Ukraine in the minds of war

and military renewal is the transition to a model of adaptive development of human potential, which is based on investments in digital competencies, continuous awareness and motivational mechanisms of the turned and matured youth, forming an innovatively active labor resource as a key official of economic stabilization and long-term growth of the state.

The results of the analysis allowed us to identify the main changes in the structure of labor potential (Table 1).

Table 1

Major transformations of the human potential of Ukraine in the minds of the military economy*

Indicator	Pre-war model	Modern transformational model
Labor market priority	Number of employed	Quality of employees' competencies
Type of employment	Predominantly standard	Flexible, remote, project-based
Role of education	Formal training	Lifelong learning, reskilling
Core resource of the enterprise	Material assets	Human capital and knowledge
Competitiveness	Based on resources	Based on innovation and skills
Function of the state	Employment regulation	Stimulation of competency development

**Source: generalized by the authors based on processed scientific materials*

The obtained results confirm that economic recovery is impossible without investments in the development of the employee as a carrier of knowledge and technology. The practical significance of the study lies in the possibility of using the proposed approach in the formation of enterprise HR policies, employment programs, and educational strategies oriented toward the needs of the post-war economy. The novelty of the article lies in substantiating the necessity of transitioning to a quality-oriented model of human potential development as a fundamental condition for the sustainable socio-economic recovery of Ukraine.

The modern transformation of human potential is taking place under the transition to the Industry 5.0 model, which, unlike previous stages of digitalization, focuses not only on automation but on human-centered interaction between technology, knowledge, and social responsibility. In this model, the employee ceases to be merely an executor of technological operations and becomes a subject of interpretation, control, and strategic validation of artificial intelligence algorithms.

Studies show that the integration of artificial intelligence and big data into the global food industry is already acting as a transformative force for sustainable development, as it increases production efficiency, reduces resource losses, and improves management and decision-making based on data analytics [32-35]. Predictive analytics and machine learning technologies enable precision agriculture, real-time crop monitoring, and yield forecasting, which directly affect food security and ecosystem resilience.

The innovativeness of human potential emerges as the main driver of the fundamental transformation of agri-food systems, ensuring the transition to an intellectual paradigm of data-driven food ecosystems, where the synergy of human intelligence and AI algorithms becomes the basis of economic resilience, as emphasized by international analytical studies [36-40]. Modern data are becoming a resource equivalent to land or energy. Large volumes of information from sensors, satellite systems, and IoT devices make it possible to optimize the use of water, energy, and bioresources, contributing to environmental sustainability and adaptation to climate change (FAO, 2024 [38]). Research in sensor technologies and digital monitoring proves that the combination of artificial intelligence with sensor networks ensures continuous

tracking of environmental conditions, product quality, and food chain safety, forming a new infrastructure of trust between producer and consumer [38-40]. This means that technologies are not a replacement for humans but a tool for expanding their cognitive capabilities.

The current stage of technological development is characterized by a transition from automated production models to intelligent systems based on human-AI interaction. Within the Industry 5.0 concept, technologies are viewed not as a replacement for workers but as a means of enhancing their cognitive capabilities, which increases the importance of knowledge, digital competencies, and lifelong learning. Studies indicate that the use of AI solutions can increase the accuracy of production processes up to 98%, reduce resource losses, and ensure more effective forecasting of economic outcomes; however, their implementation is constrained by a shortage of qualified human capital [43].

At the same time, researchers emphasize that the key factor in the success of digital transformations is not the technology itself but the level of development of human capital capable of working with analytical systems, interpreting model results, and making responsible decisions [41-43].

– Thus, the digital economy generates demand for a new type of competencies:

- systems thinking;
- digital literacy and data handling;
- ethical management of technologies;
- interdisciplinary cooperation.

In 2026, the transformation of human potential occurs through the Industry 5.0 model, where competencies shift from technical execution to the strategic validation of algorithms; artificial intelligence ensures precision in nutrition and ecosystem sustainability; and the main risks include the epistemic opacity of AI "black boxes" and cybersecurity threats to personal biodata.

The generalization of modern approaches to the use of artificial intelligence in the food sector makes it possible to identify key areas of its practical application, technological tools, and resulting effects (Table 2).

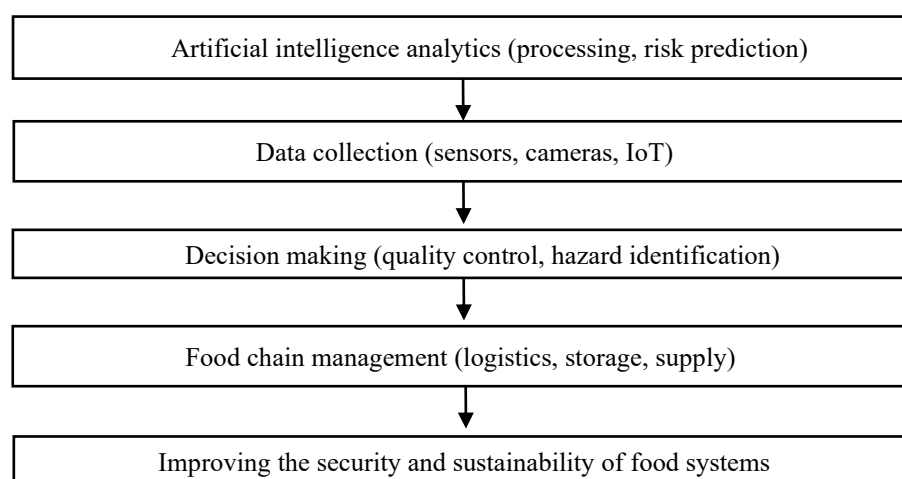
The generalization of the mechanism for applying artificial intelligence in ensuring food safety can be presented as a sequential model of data processing and managerial decision-making (Fig. 2).

Table 2

Main areas of application of artificial intelligence in ensuring food safety*

Area of AI application in the food sector	Technologies used	Practical effect for food safety	Implementation limitations
Product quality control	Computer vision, IoT sensors	Early defect detection, reduced contamination risks	High equipment cost
Supply chain monitoring	Data analytics, block-chain	Traceability “from farm to consumer”	Need for data standardization
Risk prediction	Machine learning	Prevention of spoilage and contamination	Requirement for large datasets
Personalized nutrition	AI recommendation systems	Improved population food safety	Privacy concerns

*Source: compiled by the author based on the analysis of scientific publications and FAO analytical materials [38]

**Fig. 2 – Integration of AI and IoT in ensuring food safety***

*Source: developed by the author based on the analysis of scientific publications and FAO analytical materials [38]

Therefore, modern research emphasizes the dual nature of digital transformation: on the one hand, it opens opportunities for personalized nutrition, resource-efficient production, and reduced environmental impact; on the other hand, it creates challenges related to ethical control, unequal access to technologies, and dependence on algorithmic decisions.

The generalization of the presented approaches shows that the use of artificial intelligence in the food sector is shifting from isolated technological solutions to the creation of integrated digital ecosystems. The combination of data analytics, sensor monitoring, and predictive models enables preventive control of product safety, representing a fundamentally new approach compared to traditional inspection methods.

The results of the study are generally consistent with the findings of contemporary research, which emphasize the intensification of labor market imbalances and the loss of human potential under wartime conditions. As in the analyzed works, our study confirms that migration processes, structural changes in employment, and the destruction of economic infrastructure necessitate new approaches to workforce reproduction. We also agree with scholars who highlight the growing importance of lifelong education, professional mobility, and

state support for employment as key factors in stabilizing the socio-labor sphere [39; 40].

At the same time, in contrast to a number of studies that focus primarily on the quantitative recovery of labor resources, this paper substantiates the need to transition to a qualitative model of human capital development. The proposed concept of “adaptive reproduction of human potential” expands existing approaches by emphasizing not only the return of the workforce but also the formation of new competencies, the digitalization of labor, and the integration of education with practice. The obtained data can be explained from the perspective of human capital theory, according to which knowledge, skills, and innovative abilities of workers become the main drivers of economic growth [35]. The reliability of the results is ensured by the use of systematic analysis of scientific sources, comparison of different approaches, and generalization of current socio-economic trends. Thus, the study complements existing scientific contributions by clarifying the role of human potential as a strategic resource for post-war economic recovery and the development of socio-labor relations.

Conclusions and prospects of the further investigations. The study showed the need for a migration strategy and the premature increase in the retirement age, as well as the fact that the transformation of the social

and labor sphere of Ukraine in the war and post-war period occurs due to a change in labor market priorities: from the quantitative reproduction of the labor force to the quality of competencies, digital skills and adaptability of employees, as well as the importance of targeted infusion of labor into those niches where the Ukrainian economy begins to "suffocate" without people. The proposed concept of "adaptive reproduction of human potential" demonstrates that the development of lifelong education, the integration of digital competencies, and the active role of the state and business are key to stabilizing labor potential. The practical value of the study lies in the possibility of applying its results to the formation of effective HR policies at enterprises, state employment programs, and educational strategies oriented toward the needs of the modern economy. The scientific value lies in substantiating the necessity of transitioning to a quality-oriented model of human capital development as the foundation for sustainable recovery of the economy and socio-labor relations. Therefore, the future of sustainable food ecosystems is determined not by the level of automation, but by the ability of humans to integrate technologies into responsible economic activity. Positive development scenarios are primarily associated with the formation of

team-based science, cross-sectoral cooperation, and the development of human competencies that enable the use of AI as a tool for enhancement rather than substitution of human potential.

The digital transformation of agri-food systems demonstrates a transition to a human-centered Industry 5.0 model, in which artificial intelligence and big data serve as tools for enhancing human capabilities rather than replacing them. The use of data analytics, sensor technologies, and predictive models contributes to increased production efficiency, ensuring food security, and the formation of sustainable ecosystems. At the same time, key conditions for achieving positive effects include the development of competencies, ethical governance of technologies, and interdisciplinary collaboration.

The obtained results can be applied in the development of strategic measures for personnel management, employee reskilling, the implementation of remote and flexible employment, as well as in planning programs to stimulate professional mobility and innovative workforce development. Future research should be directed toward modeling long-term scenarios for the recovery of human potential and studying the impact of digitalization on labor productivity in a post-war economy.

References

1. Novikova, O. F., Khandiy, O. O., & Shamileva, L. L. (2022). Vtraty trudovoho ta osvithnoho potentsialu Ukrainy za period voiennoho stanu. *Business Inform*, 5, 62-69. <https://doi.org/10.32983/2222-4459-2022-5-62-69>
2. Shamileva, L. L., & Khandiy, O. O. (2022). Dysbalansy v trudovii sferi v umovakh voiennoho stanu. *Modern research in world science: Proceedings the 3rd International Scientific and Practical Conference*. (pp. 1673-1678). Lviv, SPC.
3. Vasylytsiv, T., Levytska, O., & Rudkovskiy, O. (2022). Strukturni dysproportsii i dysbalansy rynku pratsi oblastei Karpatskoho rehionu Ukrainy v umovakh viiny: tendentsii, zahrozy, oriientyry polityky stabilizatsii y vykorystannia mozhlyvostei. *Ekonomika ta suspilstvo*, (37). <https://doi.org/10.32782/2524-0072/2022-37-37> (Retrieved February 02, 2026).
4. Heiets, V. M., Blyzniuk, V. V., & Nikiforuk, O. I. (2022). Aktualni aspekty polityky sotsialnoi yakosti v postkonfliktinii ekonomitsi Ukraini. *Ekonomika ta suspilstvo*, 65(6(627)), 3-22. <https://doi.org/10.15407/economyukr.2022.06.003>
5. Kudelskyi, V. (2024). Vplyv viiny na rynek pratsi v Ukraini. *Hraal nauky – Grail of Science*, 40, 150–156. <https://doi.org/10.36074/grail-of-science.07.06.2024.017>
6. Liubomudrova, N., & Boichuk, V. (2022). Zminy na rynku pratsi v umovakh voiennoho stanu ta perspektyvy povoiennoho vidnovlennia. *Ekonomika ta suspilstvo*, (40). <https://doi.org/10.32782/2524-0072/2022-40-31> (Retrieved February 02, 2026).
7. Mykhailiak, H. (2024). Makroekonomichniy analiz rynku pratsi v umovakh viiny. *Ekonomika ta suspilstvo*, 67. <https://doi.org/10.32782/2524-0072/2024-67-43> (Retrieved February 02, 2026).
8. Tomchuk, O. V. (2023). Analiz trendiv rozvytku rynku pratsi v Ukraini: kluchovi zminy ta vyklyky voiennoho chasu. *Innovation and Sustainability*, 2, 110–119. <https://doi.org/10.31649/ins.2023.2.110.119>
9. Serohina, N. O. (2022). Vplyv viiskovykh dii na produktyvnu zainiatist v Ukraini. *Vcheni zapysky TNU imeni V.I. Vernadskoho*, 33(6), 36–40. https://pubadm.vernadskeyjournals.in.ua/journals/2022/6_2022/6.pdf (Retrieved February 02, 2026).
10. Azmuk, N. (2022). Transformatsiia rynku pratsi Ukrainy v umovakh viiny: vyklyky ta stratehii vidtvorenna robochoi syly. *Visnyk ekonomichnoi nauky Ukrainy*, 1, 171-179. [https://doi.org/10.37405/1729-7206.2022.1\(42\).171-179](https://doi.org/10.37405/1729-7206.2022.1(42).171-179)
11. Tutova, A. (2023). Rynek pratsi v umovakh viiny. *Ekonomika i rehion*, 1(88), 91–98. [https://doi.org/10.26906/EiR.2023.1\(88\).2878](https://doi.org/10.26906/EiR.2023.1(88).2878)
12. Diakonenko, O., & Kotenko, T. (2024). Transformatsii rehionalnykh rynkiv pratsi Ukrainy v umovakh viiny. *Statystyka Ukrainy*, 2, 85-94.
13. Pukhalska, Ya. (2023). Vidnovlennia ta rehionalnyi rozvytok ekonomiky pislia viiny z Rosiieiu. *Aktualni problemy ekonomiky*, 7 (265), 88-98. <https://doi.org/10.32752/1993-6788-2023-1-265-88-98>
14. Biletska, K. V. (2014). Trudovi potentsial yak chynnyk aktyvizatsii innovatsiinykh protsesiv. *Efektivna ekonomika*, 4. <http://www.economy.nayka.com.ua/?op=1&z=2932> (Retrieved February 01, 2026).

15. Kholodnytska, A. V., & Motuz, V. O. (2024). Vykorystannia suchasnykh instrumentiv pidtrymanna motyvatsii ta efektyvnosti vykorystannia trudovoho potentsialu personalu. *Problemy suchasnykh transformatsii*, 12. <https://doi.org/10.54929/2786-5738-2024-12-07-03> (Retrieved February 01, 2026).
16. Kychko, I. I., & Kholodnytska, A. V. (2017). Motyvatsiini chynnyky pidvyshchennia yakosti osvity v Ukraini. *Formuvannia rynkovykh vidnosyn v Ukraini*, 9(196), 20-25
17. Radionova, I. (2009). Ekonomichne zrostannia z uchastiu liudskoho kapitalu. *Ekonomika Ukrainy*, 1, 19–30
18. Bazhan, I. I. (2003). Sutnist katehorii «trudovy potentsial»ta yii ekonomichna pryroda. *Problemy rehionalnoho rozvytku ta sotsialno-trudovykh vidnosyn*, 1(20), 69–74
19. Savchenko, M. V., & Balzan, I. V. (2022). Kontseptualnyi pidkhid do upravlinnia rozvytkom trudovoho potentsialu pidpriemstva. *Ekonomichnyi visnyk Dniprovskoi politekhniki*, 2, 123-135. http://nbuv.gov.ua/UJRN/evngu_2022_2_16 (Retrieved February 02, 2026).
20. Akimova, L. M., & Yurchyk, H. M. (2024). Osoblyvosti funktsionuvannia natsionalnoho rynku pratsi v umovakh viisko voi zahrozy ta vnutrishnoho peremishchennia naselennia. *Sotsialna ekonomika*, (67), 15–32. <https://doi.org/10.26565/2524-2547-2024-67-02>
21. Kulishov, V., Herasymenko, Y., Furs, O., & Pakhomov, I. (2024). Labour Market of Ukraine and Meeting Post-War Workforce Supply Market Demands. *Economics Ecology Socium*, 8(3), 27–39. <https://doi.org/10.61954/2616-7107/2024.8.3-3>
22. Bobko, N. (2024). Innovatsiina diialnist v Ukraini: reitynhova otsinka ta perspektyvy rozvytku v suchasnykh umovakh. *Ekonomichnyi analiz*, 34(4), 294–304. <https://doi.org/10.35774/econa2024.04.294>
23. Hanushchak, R. M., & Marhasova, V. H. (2024). Innovatsiini stratehii rozvytku biznesu v umovakh povoiennoho vidnovlennia ekonomiky Ukrainy. *Journal of strategic economic research*, 6, 166–176. <https://doi.org/10.30857/2786-5398.2023.6.17>
24. Hnatkivskiy, B., Revenko, O., & Hudko, T. (2024). Obgruntuvannia tendentsii innovatsiinoi diialnosti pidpriemstv v Ukraini ta poshuk dzherel finansuvannia innovatsiinoho rozvytku. *Ukrainskyi zhurnal prykladnoi ekonomiky ta tekhniki*, 9(3), 104–108. <https://doi.org/10.36887/2415-8453-2024-4-15>
25. Horiashchenko, Yu. H. (2024). Stratehichni imperatyvy innovatsiinoho rozvytku pidpriemnytstva v umovakh turbulentnosti. *Academic review*, 2(61), 216–226. <https://doi.org/10.32342/2074-5354-2024-2-61-15>
26. Kondylis, F. (2010). Conflict displacement and labor market outcomes in post-war Bosnia and Herzegovina. *Journal of Development Economics*, 93(2), 235-248.
27. Fakih, A., & Ibrahim, M. (2016). The impact of Syrian refugees on the labor market in neighboring countries: empirical evidence from Jordan. *Defence and Peace Economics*, 27(1), 64-86.
28. Bahcekapili, C., & Cetin, B. (2015). The impacts of forced migration on regional economies: The case of Syrian refugees in Turkey. *International Business Research*, 8(9), 1
29. DTM Ukraine — Employment, Mobility and Labour Market Dynamics in Ukraine (November 2024) <https://dtm.iom.int/reports/ukraine-employment-mobility-and-labour-market-dynamics-ukraine-november-2024> (Retrieved February 02, 2026).
30. IOM Ukraine — Labour Mobility and Markets Brief (2025) https://ukraine.iom.int/sites/g/files/tmzbd11861/files/documents/2025-12/04.-comms_pillar-iii-labour-mobility-markets-eng-1.pdf (Retrieved February 02, 2026).
31. Global Crisis Response Platform. <https://crisisresponse.iom.int/response/ukraine-and-neighbouring-countries-crisis-response-plan-2026> (Retrieved February 02, 2026).
32. Azmuk, N. A. (2022). Transformatsiia rynku pratsi v umovakh viiny: vyklyky ta stratehii vidtvorennia robochoi syly. *Visnyk ekonomichnoi nauky Ukrainy*, 1(42), 171-179. [https://doi.org/10.37405/1729-7206.2022.1\(42\).171-179](https://doi.org/10.37405/1729-7206.2022.1(42).171-179)
33. Kychko, I. I. (2025). Stratehichni priorytety zberezhenntia trudovoho potentsialu ukrainy v umovakh tsyfrovizatsii ta dii voiennoho stanu. *Problemy i perspektyvy ekonomiky ta upravlinnia*, 2(42), 23-37. [https://doi.org/10.25140/2411-5215-2025-2\(42\)-23-37](https://doi.org/10.25140/2411-5215-2025-2(42)-23-37)
34. Maiboroda, T. M., Kruhliak, D. A., & Pryimenko, O. O. (2025). Upravlinnia liudskym kapitalom u period voiennykh vyklykiv. *Aktualni pytannia ekonomichnykh nauk*, (14). <https://doi.org/10.5281/zenodo.16990102> (Retrieved February 02, 2026).
35. Zamlinskyi, V., Skrypnyk, N., & Fedaka, V. (2025). Upravlinnia personalom v umovakh voiennoho stanu: intehtatsiia tsyfrovyykh tekhnolohii. *Herald of Khmelnytskyi National University. Economic Sciences*, 338(1), 555-563. <https://doi.org/10.31891/2307-5740-2025-338-82>
36. Ohdanskyi, K., & Nazarenko, A. (2025). Upravlinnia liudskym kapitalom v umovakh viiny: optymizatsiia, stratehichni zakhody ta pidtrymka (na prykladi hrupy «interpaip»). *Ekonomika ta suspilstvo*, (82). <https://doi.org/10.32782/2524-0072/2025-82-67> (Retrieved February 02, 2026).
37. Kumar, R. (2026). Emerging role of Artificial Intelligence and Big Data in driving sustainable growth in the global food industry. *Food and Feed Research*, 53(1), 93-106.
38. FAO. (2024). *Digital technologies and data for transforming agrifood systems*. <https://openknowledge.fao.org/handle/20.500.14283/cd7242en> (Retrieved February 02, 2026).

39. Zamlinskyi, V., Skrypnyk, N., & Fedaka, V. (2025). Rozvytok liudskoho potentsialu ahrarnykh pidpryemstv v umovakh voiennoho stanu. *Modeling the development of the economic systems*, (1), 183–195. <https://doi.org/10.31891/mdes/2025-15-25>
40. Ogdansky, K., & Nazarenko, A. (2025). Human capital management in war conditions: optimization, strategic measures and support (used by the example of interpipe group). *Economy and Society*, (82). <https://doi.org/10.32782/2524-0072/2025-82-67> (Retrieved February 02, 2026).
41. Pimenow, S., Pimenowa, O., Prus, P., Niklas, A. (2025). The Impact of Artificial Intelligence on the Sustainability of Regional Ecosystems: Current Challenges and Future Prospects. *Sustainability*, 17(11), 4795. <https://doi.org/10.3390/su17114795>
42. Arévalo-Royo J., Flor-Montalvo F.-J., Latorre-Biel J.-I., Jiménez-Macías E., Martínez-Cámara E., Blanco-Fernández J. (2025). AI Guidelines for Sustainable Rural Development and Climate Resilience in Resource-Constrained Regions. *Sustainable Development*, 33(6), 9385–9397. <https://doi.org/10.1002/sd.70160>
43. Ayoub, A. (2026). Integration of Artificial Intelligence in Food Processing Technologies. *Processes*, 14, 513. <https://doi.org/10.3390/pr14030513>

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ТРАНСФОРМАЦІЯ ЛЮДСЬКОГО ПОТЕНЦІАЛУ УКРАЇНИ В УМОВАХ ВОЄННИХ ВИКЛИКІВ

Досліджено трансформацію людського потенціалу в Україні під впливом воєнних подій, демографічних змін та цифровізації економіки. Метою роботи був аналіз сучасного стану ринку праці та визначення шляхів збереження та підвищення ефективності використання трудових ресурсів як під час війни, так і з метою забезпечення можливості швидкого післявоєнного відновлення. Обґрунтовано, що адаптивне відтворення трудових ресурсів у критичних умовах вимагає переходу від традиційних моделей управління до парадигми Індустрії 5.0, де ключовий акцент зміщується з чистої автоматизації на синергію людини та машини, людиноцентричність та етичне використання високих технологій. Доведено, що економічна стійкість підприємств під час воєнного стану безпосередньо залежить від здатності керівництва впроваджувати гнучкі форми зайнятості та цифрові інструменти оперативного управління. Особлива увага приділяється інтеграції штучного інтелекту в процеси комплектування та професійної перепідготовки персоналу, що дозволяє реалізувати стратегію адаптивного відтворення компетенцій у режимі реального часу. Розглянуто специфіку функціонування продовольчих екосистем, керованих даними, як стратегічного сектору економічної безпеки. Встановлено, що впровадження підходів, керованих даними, в агропродовольчому секторі дозволяє мінімізувати ризики порушення логістичних ланцюгів та забезпечити стійкість виробничих циклів навіть в умовах дефіциту кадрів. Новизна роботи полягає в розробці моделі трансформації ринку праці, яка враховує вимушену міграцію, травматизацію людського капіталу та, водночас, швидку цифровізацію економіки. Запропоновано механізми стимулювання інноваційної зайнятості на основі принципів інклюзивності та безперервного навчання. Сформульовано практичні рекомендації щодо підвищення стійкості підприємств шляхом розвитку когнітивних навичок персоналу, здатного працювати у високотехнологічному середовищі Ін-

дустрії 5.0. Результати дослідження спрямовані на створення основи для повоєнного відновлення України шляхом розвитку економіки знань та інтелектуалізації національного виробництва.

Ключові слова: людський потенціал, адаптивне відтворення, цифрові компетенції, економічна стійкість, керовані цифрові продовольчі екосистеми, воєнні виклики, гнучка зайнятість, ефективність персоналу.

Література

1. Новікова О. Ф., Хандій О. О., Шамілева Л. Л. Втрати трудового та освітнього потенціалу України за період воєнного стану // Бізнес Інформ. 2022. Вип. 5. С. 62-69. <https://doi.org/10.32983/2222-4459-2022-5-62-69>
2. Шамілева Л. Л., Хандій О. О. Дисбаланси в трудовій сфері в умовах воєнного стану // The 3 rd International scientific and practical conference — Modern research in world science. SPC, Lviv, Ukraine. 2022. P. 1673-1678.
3. Васильців Т., Левицька О., Рудковський О. Структурні диспропорції і дисбаланси ринку праці областей Карпатського регіону України в умовах війни: тенденції, загрози, орієнтири політики стабілізації й використання можливостей // Економіка та суспільство. 2022. № 37. URL: <https://doi.org/10.32782/2524-0072/2022-37-37> (дата звернення: 02.02.2026).
4. Гесць В. М., Близнюк В. В., Нікіфорук О. І. Актуальні аспекти політики соціальної якості в постконфліктній економіці України // Економіка України. 2022. Т. 65, № 6(727). С. 3-22. <https://doi.org/10.15407/economyukr.2022.06.003>
5. Кудельський В. Вплив війни на ринок праці в Україні // Грааль науки. 2024. № 40. С. 150–156. <https://doi.org/10.36074/grail-of-science.07.06.2024.017>
6. Любомудрова Н., Гойчук В. Зміни на ринку праці в умовах воєнного стану та перспективи післявоєнного відновлення // Економіка та суспільство. 2022. Вип. 40. URL: <https://doi.org/10.32782/2524-0072/2022-40-31> (дата звернення: 02.02.2026).
7. Михайляк Г. Макроекономічний аналіз ринку праці в умовах війни // Економіка та суспільство. 2024. Вип. 67. URL: <https://doi.org/10.32782/2524-0072/2024-67-43> (дата звернення: 02.02.2026).
8. Томчук О. Аналіз трендів розвитку ринку праці в Україні: ключові зміни та виклики воєнного часу // Innovation and Sustainability. 2023. № 2. С. 110-119. <https://doi.org/10.31649/ins.2023.2.110.119>
9. Серьогіна Н. О. Вплив військових дій на продуктивну зайнятість в Україні // Вчені записки ТНУ імені ВІ Вернадського. Серія: Публічне управління та адміністрування. 2022. Т. 33(72), № 6. С. 36-40. URL: https://pubadm.vernadskyjournals.in.ua/journals/2022/6_2022/6.pdf (дата звернення: 02.02.2026).
10. Азьмук Н. А. Трансформація ринку праці в умовах війни: виклики та стратегії відтворення робочої сили // Вісник економічної науки України. 2022. № 1(42). С. 171-179. [https://doi.org/10.37405/1729-7206.2022.1\(42\).171-179](https://doi.org/10.37405/1729-7206.2022.1(42).171-179)
11. Тутова А. С. Ринок праці в умовах війни // Економіка і регіон. 2023. № 1(88). С. 91–98. [https://doi.org/10.26906/EiR.2023.1\(88\).2878](https://doi.org/10.26906/EiR.2023.1(88).2878)
12. Дяконенко О. І., Котенко Т. М.. Трансформації регіональних ринків праці України в умовах війни. Статистика України. 2024. Т. 105, № 2. С. 85–94.
13. Пухальська, Я. П. Відновлення та регіональний розвиток України після війни з Росією // Актуальні проблеми економіки. 2023. № 7 (265). С. 88-98. <https://doi.org/10.32752/1993-6788-2023-1-265-88-98>
14. Білецька К. В. Трудовий потенціал як чинник активізації інноваційних процесів // Ефективна економіка. 2014. № 4. URL: <http://www.economy.nayka.com.ua/?op=1&z=2932> (дата звернення: 01.02.2026).
15. Холодницька А. В., Мотуз В. О. Використання сучасних інструментів підтримання мотивації та ефективності використання трудового потенціалу персоналу // Проблеми сучасних трансформацій. Серія: економіка та управління. 2024. № 12. URL: <https://doi.org/10.54929/2786-5738-2024-12-07-03> (дата звернення: 01.02.2026).
16. Кичко І. І., Холодницька А. В. Мотиваційні чинники підвищення якості освіти в Україні // Формування ринкових відносин в Україні. 2017. № 9 (Вип.196). С. 20-25
17. Радіонова І. Економічне зростання з участю людського капіталу // Економіка України. 2009. № 1. С. 19–30
18. Бажан І. І. Сутність категорії «трудовий потенціал» та її економічна природа // Проблеми регіонального розвитку та соціально-трудових відносин. 2003. № 1(20). С. 69–74
19. Савченко М. В., Бальзан І. В. Концептуальний підхід до управління розвитком трудового потенціалу підприємства // Економічний вісник Дніпровської політехніки. 2022. № 2. С. 123-135. URL: http://nbuv.gov.ua/UJRN/evngu_2022_2_16 (дата звернення: 02.02.2026).

20. Акімова Л. М., Юрчик Г. М. Особливості функціонування національного ринку праці в умовах військової загрози та внутрішнього переміщення населення // Соціальна економіка. 2024. № 67. С. 15–32. <https://doi.org/10.26565/2524-2547-2024-67-02>
21. Kulishov V., Herasymenko Y., Furs O., Pakhomov I. Labour Market of Ukraine and Meeting Post-War Workforce Supply Market Demands // Economics Ecology Socium. 2024. Vol. 8, № 3. P. 27–39. <https://doi.org/10.61954/2616-7107/2024.8.3-3>
22. Бобко Н. Інноваційна діяльність в Україні: рейтингова оцінка та перспективи розвитку в сучасних умовах // Економічний аналіз. 2024. Т. 34, № 4. С. 294–304. DOI: <https://doi.org/10.35774/econa2024.04.294>
23. Ганущак Р. М., Маргасова В. Г. Інноваційні стратегії розвитку бізнесу в умовах повоєнного відновлення економіки України // Journal of strategic economic research. 2024. № 6. С. 166–176. <https://doi.org/10.30857/2786-5398.2023.6.17>
24. Гнатківський Б., Ревенко О., Гудко Т. Обґрунтування тенденції інноваційної діяльності підприємств в Україні та пошук джерел фінансування інноваційного розвитку // Український журнал прикладної економіки та техніки. 2024. Т. 9, № 3. С. 104–108. <https://doi.org/10.36887/2415-8453-2024-4-15>
25. Горященко Ю. Г. Стратегічні імперативи інноваційного розвитку підприємництва в умовах турбулентності // Academic review. 2024. № 2 (61). С. 216–226. <https://doi.org/10.32342/2074-5354-2024-2-61-15>
26. Kondylis F. Conflict displacement and labor market outcomes in post-war Bosnia and Herzegovina // Journal of Development Economics. 2010. Vol. 93, Iss. 2, pp. 235–248.
27. Fakih A., Ibrahim M. The impact of Syrian refugees on the labor market in neighboring countries: empirical evidence from Jordan // Defence and Peace Economics. 2016. Vol. 27, Iss. 1, pp. 64–86.
28. Bahcekapili C., Cetin B. The impacts of forced migration on regional economies: The case of Syrian refugees in Turkey // International Business Research. 2015. Vol. 8, Iss. 9. P. 1
29. DTM Ukraine — Employment, Mobility and Labour Market Dynamics in Ukraine (November 2024) URL: <https://dtm.iom.int/reports/ukraine-employment-mobility-and-labour-market-dynamics-ukraine-november-2024> (дата звернення: 02.02.2026).
30. IOM Ukraine — Labour Mobility and Markets Brief (2025) https://ukraine.iom.int/sites/g/files/tmzbd11861/files/documents/2025-12/04.-comms_pillar-iii-labour-mobility-markets-eng-1.pdf (дата звернення: 02.02.2026).
31. Global Crisis Response Platform <https://crisisresponse.iom.int/response/ukraine-and-neighbouring-countries-crisis-response-plan-2026> (дата звернення: 02.02.2026).
32. Азьмук Н. А. Трансформація ринку праці в умовах війни: виклики та стратегії відтворення робочої сили // Вісник економічної науки України. 2022. № 1 (42). С. 171–179. [https://doi.org/10.37405/1729-7206.2022.1\(42\).171-179](https://doi.org/10.37405/1729-7206.2022.1(42).171-179)
33. Кичко І. І. Стратегічні пріоритети збереження трудового потенціалу України в умовах цифровізації та дії воєнного стану // Проблеми і перспективи економіки та управління. 2025. № 2(42). С. 23–37. [https://doi.org/10.25140/2411-5215-2025-2\(42\)-23-37](https://doi.org/10.25140/2411-5215-2025-2(42)-23-37).
34. Майборода Т. М., Кругляк Д. А., Приймєнко О. О. Управління людським капіталом у період воєнних викликів // Актуальні питання економічних наук. 2025. Вип. 14. URL: <https://doi.org/10.5281/zenodo.16990102> (дата звернення: 02.02.2026).
35. Замлинський В., Скрипник Н., Федака В. Управління персоналом в умовах воєнного стану: інтеграція цифрових технологій // Herald of Khmelnytskyi National University. Economic Sciences. 2025. Вип. 338(1). С. 555–563. <https://doi.org/10.31891/2307-5740-2025-338-82>
36. Огданський К., Назаренко А. Управління людським капіталом в умовах війни: оптимізація, стратегічні заходи та підтримка (на прикладі групи «інтерпайп»). економіка та суспільство. 2025. Вип. 82. URL: <https://doi.org/10.32782/2524-0072/2025-82-67> (дата звернення: 02.02.2026).
37. Kumar R. Emerging role of Artificial Intelligence and Big Data in driving sustainable growth in the global food industry. Food and Feed Research. 2026. Vol. 53, Iss.1. P. 93–106.
38. FAO. Digital technologies and data for transforming agrifood systems. 2024. URL: <https://openknowledge.fao.org/handle/20.500.14283/cd7242en> (дата звернення: 02.02.2026).
39. Замлинський В., Скрипник Н., Федака В. Розвиток людського потенціалу аграрних підприємств в умовах воєнного стану. Modeling the development of the economic systems. 2025. № 1. P. 183–195. <https://doi.org/10.31891/mdes/2025-15-25>
40. Ogdansky K., Nazarenko A. Human capital management in war conditions: optimization, strategic measures and support (used by the example of interpipe group). Economy and Society. 2025. Вип. 82. URL: <https://doi.org/10.32782/2524-0072/2025-82-67> (дата звернення: 02.02.2026).
41. Pimenow S., Pimenowa O., Prus P., Niklas A. The Impact of Artificial Intelligence on the Sustainability of Regional Ecosystems: Current Challenges and Future Prospects // Sustainability. 2025. № 17. P. 4795. <https://doi.org/10.3390/su17114795>

42. Arévalo-Royo J. et al. AI Guidelines for Sustainable Rural Development and Climate Resilience in Resource-Constrained Regions // Sustainable Development. 2025. Т. 33. №. 6. С. 9385-9397. <https://doi.org/10.1002/sd.70160>

43. Ayoub A. Integration of Artificial Intelligence in Food Processing Technologies // Processes. 2026. № 14. P. 513. <https://doi.org/10.3390/pr14030513>

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