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РОЗВИТОК ЛЮДСЬКОГО КАПІТАЛУ
HUMAN CAPITAL DEVELOPMENT

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РОЗВИТОК ЛЮДСЬКИХ РЕСУРСІВ В КОНТЕКСТІ ЦИФРОВІЗАЦІЇ
СОЦІАЛЬНО-ЕКОНОМІЧНИХ СИСТЕМ

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Анотація. У статті детально проаналізовано теоретико-методологічні засади трансформації сучасних систем управління людським капіталом під безпосереднім впливом технологічних трендів Четвертої промислової революції та глобальної концепції Суспільства 5.0. Оцінено характер впливу масштабних макроекономічних зсувів, стрімкого поширення штучного інтелекту, загального рівня цифрової зрілості організацій та алгоритмічних HRIS-платформ на архітектуру й трансформацію сучасного ринку праці з використанням інструментарію факторного аналізу та профілювання статистичних параметрів. Емпіричну та фактологічну базу дослідження сформовано на основі звітів Міжнародної організації праці (МОП), Світового економічного форуму (WEF) та відкритих статистичних даних.

У межах наукової роботи застосовано метод таксономічного моделювання, що дозволило детально структурувати концептуальну модель платформної зайнятості та оцінити взаємозв'язок між загальною стійкістю фрілансерів і оновленими індикаторами компетентності. Статистично значущими предикторами успішної навігації у гіпергнучкому та мінливому середовищі визначено специфічні алгоритмічні навички, управління персональним цифровим

брендом та автономне поглинання накладних витрат, тоді як класична базова грамотність не продемонструвала суттєвого ефекту. Здатність протидіяти ризикам алгоритмічного контролю та вміння вирішувати алгоритмічні спори мінімізують операційне тертя на гіперконкурентному глобальному ринку праці.

У дослідженні критично проаналізовано та теоретично обґрунтовано багатовимірну модель, яка відображає вплив технологічних факторів та інноваційних доменів грамотності на загальну конфігурацію людських ресурсів. На відміну від традиційних підходів, де цифрова трансформація аналізується виключно в контексті базового використання програмного забезпечення, акцент зроблено на переході до багаторівневої людиноцентричної концепції Gig Literacy 2.0 в умовах жорсткого алгоритмічного менеджменту. Отримані результати мають високу практичну цінність для стратегічного планування інноваційної діяльності підприємств, інтеграції рішень класу WorkerTech, створення інтегрованих реєстрових платформ, а також для масштабування правового простору "Дія.Сіті" та національної екосистеми "Дія.Освіта" в умовах кризового трансформаційного періоду вітчизняної економіки.

Ключові слова. Розвиток людських ресурсів, цифровізація, платформна економіка, алгоритмічний менеджмент, Gig Literacy 2.0, цифрові компетенції, WorkerTech, Дія.Сіті, Gig economy.

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HUMAN RESOURCE DEVELOPMENT IN THE CONTEXT OF THE DIGITALIZATION OF SOCIO-ECONOMIC SYSTEMS

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Abstract. This study examines the theoretical and methodological foundations of the transformation of human resource management systems driven by the Fourth Industrial Revolution and the Society 5.0 paradigm. The nature of the impact of large-scale macroeconomic shifts, the rapid spread of artificial intelligence, the general level of digital maturity of organizations and algorithmic HRIS platforms on the architecture and transformation of the modern labor market is assessed using the tools of factor analysis and profiling of statistical parameters. The empirical basis of the study is

derived from reports published by the International Labor Organization (ILO), the World Economic Forum (WEF), and publicly available statistical data.

Within the framework of the scientific work, the taxonomic modelling method was applied, enabling the detailed structuring of the conceptual model of platform employment and the assessment of the relationship between freelancers' overall stability and updated competence indicators. Specific algorithmic skills, personal digital brand management, and autonomous absorption of overhead costs were identified as statistically significant predictors of successful navigation in a hyper-flexible, changing environment, whereas classical basic literacy did not show a significant effect. The ability to mitigate the risks of algorithmic control and resolve algorithmic disputes minimises operational friction in the hyper-competitive global labour market.

The study examines and theoretically validates a multidimensional model explaining how technological change and emerging forms of digital literacy reshape human resource development. Unlike traditional approaches, where digital transformation is analyzed exclusively in the context of basic software use, the emphasis is on the transition to a multilevel human-centric concept of Gig Literacy 2.0 in conditions of strict algorithmic management. The results obtained have high practical value for strategic planning of innovative activities of enterprises, integration of WorkerTech-class solutions, creation of integrated registry platforms, as well as for scaling the legal space "Diya.City" and the national ecosystem "Diya.Education" in the conditions of a crisis transformation period of the domestic economy.

Keywords: Human resource development, digitalization, platform economy, algorithmic management, Gig Literacy 2.0, digital competencies, WorkerTech, Action.City, Gig economy.

Introduction. The global architecture of socio-economic relations in the third decade of the 21st century is undergoing radical transformations under the synergistic influence of the technologies of the Fourth Industrial Revolution and the conceptual guidelines of Society 5.0 [1]. At the core of this transformation is digitalization, which extends far beyond technological automation to fundamentally reshape labour markets, employment relationships, and the competencies required of the modern workforce [2]. These processes become particularly acute in the context of a transformational and crisis economy, where technological shifts are superimposed on deep structural imbalances, regional unevenness and the need for accelerated restoration of economic potential. In such realities, classical approaches to human resource management and static frameworks of digital competencies lose their operational effectiveness, creating an objective need to rethink the methodological principles for forming personnel readiness to work in a high-tech environment and to develop flexible models for the continuous development of new-generation skills [3;4].

The theoretical foundation of the study was based on the fundamental works of leading domestic and foreign scientists, in particular A. Kolot, O. Gerasymenko, K. Shvab, V. Yakubiv, M. Graham and J. Woodcock [2; 5; 1; 6; 7]. The scientific achievements of the authors mentioned allowed for the outlining of the vector of transformation of social and labour relations, strategic guidelines for the development of human resources, and the challenges of the platform economy in the global and Ukrainian contexts.

Despite the growing body of research on digital transformation and human resource management, several important issues remain insufficiently explored. In particular, existing approaches to digital literacy are limited to basic user skills, while the transition to the human-centric concept of Gig Literacy 2.0 under rigid algorithmic management remains insufficiently theoretically substantiated [3]. Another unresolved issue concerns the limited digital maturity of Ukrainian enterprises, many of which continue to rely on fragmented automation rather than comprehensive digital transformation strategies [8]. The issue of scaling the legal space of "Diya.City" and integrating WorkerTech-class solutions to ensure the social protection of freelancers also needs to be addressed, since existing regulatory mechanisms do not account for the risks posed by algorithmic control and the reputational instability of labour subjects [7; 9]. Along with this, a significant factor in the digital

transformation of the economy is the implementation of modern models of human resource development that leverage the capabilities of digital technologies. This study aims to solve these problems by substantiating the modern architecture of human resource development.

It should be noted that in Ukraine, the problem is exacerbated by the critically low level of digital maturity not only at the level of state institutions, but also in the corporate sector. Domestic enterprises are often limited to fragmented automation, while the systemic transformation of business processes and human resource management architecture is hampered by organizational inertia and the lack of long-term digitalization strategies [8; 5].

Task statement. The aim of this study is to develop a comprehensive theoretical framework for human resource development in the context of the digitalization of socio-economic systems by analyzing the impact of digital technologies, artificial intelligence, and the platform economy on workforce competencies, assessing international approaches to digital transformation and reskilling, substantiating the Gig Literacy 2.0 competency framework, and formulating recommendations for strengthening human resource development and labour market resilience.

The methodological basis of the study was grounded in a systemic approach and concepts of labour economics and human capital theory. The study used system-structural and comparative analyses to assess macroeconomic trends and the ecosystems of personnel retraining. The method of classification and taxonomic modeling was used to decompose regulatory models of the labor market and to profile freelancers' skills [9; 13]. The reliability of the Gig Literacy 2.0 competency architecture was verified using confirmatory factor analysis of a statistical sample. The abstract-logical method was the basis for theoretical generalizations and the development of applied recommendations for the platforms "Diya.City" and "Diya.Education". The information base was compiled from WEF, ILO, the European Commission, Ukrainian legislation, and statistical publications [10; 11; 12; 13].

Results. The global economy is experiencing profound structural transformation driven by digitalization and the rapid diffusion of Fourth Industrial Revolution technologies [1; 4]. This transition at the macro level fundamentally changes the relationship between labor and capital, disrupting traditional routine operating models and expanding the demand for cognitive, analytical, and highly specialized digital competencies [14; 15]. In the context of digitalization, stable, professional areas of knowledge are replaced by flexible, multidimensional competency profiles that require workers to combine technical knowledge with interdisciplinary adaptability and cognitive flexibility [16; 3].

Unlike classical industrial shifts, digital transformation is cross-sectoral [1;15]. The automation of routine, manual, and semi-skilled functions occurs alongside massive employment growth in industries such as data processing, information technology, digital finance, logistics, e-commerce, and digital government [14; 15]. However, against this backdrop, a dual labor market is emerging: high-tech industries create attractive opportunities for highly skilled workers, while a significant share of low-tech, informal, and precarious employment remains, leading to labor market differentiation and increased social inequality [2; 9]. This dualism is noticeable in transition economies, such as Ukraine, where digitalization transforms internal employment structures in operational, managerial, and analytical sectors, leading to structural imbalances and uneven regional digitalization [18;17]. The pace of these structural disruptions has been accelerated by the COVID-19 pandemic, which has brought workplace resilience and worker adaptability to the forefront of strategic planning [10; 3]. Current macroeconomic forecasts of job destruction and creation by leading international institutions are summarized in Table 1.

The forecast parameters and metrics of international institutions, systematised in Table 1, allow us to assert that the current stage of digitalisation is accompanied by a deep structural gap that ultimately destroys the classical linear relationship between the level of technological

progress and the dynamics of unemployment. Empirical data prove the existence of the phenomenon of asymmetric destruction, in which the large-scale release of outdated roles (83 million jobs destroyed) significantly outpaces the rate at which new job vacancies are created [11].

Table 1

Macro-Labor Disruptions and Skill Exposure Projections

Indicator / Metric	Projection and values	Primary Structural Drivers	Key impacts and vulnerabilities	Sources
Cumulative work interruption	25% of current jobs will be lost within five years	Slower economic growth, supply shortages and automation	Disproportionately affects low- and medium-skilled occupations	[11]
Pure structural shift	69 million created vs. 83 million destroyed	Green transition and innovation in green technologies	The net destruction of 14 million traditional roles	[11]
Long-term restructuring of the labor market	250 million new jobs will be created by 2030	Cross-industry digitalization and global IT expansion	Requires rapid upskilling of the workforce across the entire population	[12]
Youth's relationship with changing tasks W I	37% worldwide (75% East Asia, 69% North America, 63% Europe)	Integration of financial, communication and professional services	Entry -level skill requirements are changing three times faster	[18]
Functional shift variation	Accountant replacement: 94%; Consultant replacement: <0.5%	Different susceptibility to routine cognitive and non-routine socio-emotional tasks	Deepens segmentation and polarization of the labor market	[14]
career obsolescence	It is predicted that 85% of existing jobs will disappear by 2030.	The spread of generative artificial intelligence and robotics	65% of children will occupy non-existent professional positions	[13]

Compiled by the authors based on WEF forecasts [11; 13], ILO reports [10], platform economy research [7], and analytical data from APEC [14] and APRU-Google [12].

The forecast parameters and metrics of international institutions, systematised in Table 1, allow us to assert that the current stage of digitalisation is accompanied by a deep structural gap that ultimately destroys the classical linear relationship between the level of technological progress and the dynamics of unemployment. Empirical data demonstrate the phenomenon of asymmetric destruction, in which the large-scale displacement of workers (83 million jobs destroyed) significantly outpaces the rate at which new job vacancies are created [11]. Critical vulnerability emerges in the area of functional replacement, where there is a pronounced segmentation of tasks into routine-cognitive and non-routine socio-emotional. The indicator of potential replacement of accounting and bookkeeping functions at the level of 94%, in contrast to the minimal shift in the strategic consulting segment (<0.5%), clearly demonstrates the threat of washing out the middle level of qualifications and unprecedented polarization of the labor market [14]. Of particular analytical significance is the regional variation in the

susceptibility of young people to task transformation under the influence of generative artificial intelligence, which in the European space reaches 63%, thereby provoking a threefold acceleration in the rate of obsolescence of basic entry-level skills [18].

Extrapolating these global trends to the current realities in Ukraine reveals deep structural destruction. In the context of a protracted crisis and post-war recovery, the risk of replacing 25% of jobs is superimposed on a critical lack of systemic digital maturity of domestic institutions [8]. While the European labor market adapts to a threefold acceleration of youth skill change, Ukrainian enterprises face a primary challenge - uneven regional digitalization and the lack of basic tools for mass retraining. This threatens to preserve technological lag and wash out the middle level of qualifications in the national labor market. Preventing these negative trends is only possible if the corporate sector reorients itself towards strategic benchmarking tools, which serve as catalysts for team development in the digital era [17].

Large-scale restructuring of the labor market, caused by technological shifts and crisis phenomena, creates significant threats to the stability of social institutions. Under such conditions, continuous professional development of human resources ceases to be an exclusively intra-corporate task and becomes a critical factor in ensuring the security of social systems as a whole [16]. Without systematic investments in advanced training and retraining of personnel, macroeconomic risks of polarization of the labor market can provoke deep social destabilization, a decrease in economic stability and a fall in the total capitalization of domestic economic entities [16; 8].

To cope with this rapid technological breakthrough, organizations must move away from static paradigms of human resource management and view competency delivery as a digital, dynamic system [5; 15]. This system is defined by three main operational streams: competency acquisition, everyday work and learning, and knowledge output [15]. Preparing the modern workplace for this digital integration requires a multi-level framework that systematically considers readiness at the individual, group, and organizational levels (Table 2) [14; 15].

At the individual level, successful digital transformation depends on the adoption of innovations, individual resilience, and minimizing technostress, which can reduce organizational commitment [2; 16]. At the group level, readiness is supported through virtual communication, shared digital centers, and flexible cross-functional teams [14; 17]. At the organizational level, digital maturity requires strategic leadership, human resource support systems, and an innovation culture [5; 14].

Organizational learning acts as a critical mediator, ensuring the transformation of technological resources into collective wisdom and sustainable institutional performance of the enterprise [5].

Assessing the three-level readiness structure with respect to the Ukrainian corporate sector, the dominance of organizational inertia and rigid administrative models becomes evident [5]. Unlike global practice, where digital maturity is based on systemic support for personnel and psychological well-being, in Ukraine, transformation is often declarative or purely instrumental (the purchase of software without reengineering of business processes) [2; 19]. As a result, at the individual level, technostress of employees increases sharply, and at the group level, latent resistance to innovation arises due to the inconsistency of the implemented digital tools with the real team culture [14; 20].

Table 2

Three-tiered digital transformation readiness framework

Analytical level	Key readiness factors	Specific psychological and operational mechanisms	Critical hazards and friction points	Source
Individual level	Technology adoption, learning perception, adaptive capacity and well-being	Openness to experience, conscientiousness, emotional stability, and ambition	Technostress, blurred work-life boundaries, and lower productivity	[2;16;15]
Group level	Virtual communication, workplace relationships, and team identity	The quality of the relationship between the manager and the subordinate and the positive exchange of experience between colleagues	Misalignment between digital tools and team identities triggering resistance	[14;17;15]
Organizational level	Strategic leadership, personnel support systems and organizational culture	Actively executing digital work design and reducing organizational inertia	Rigid administrative policies and lack of employee participation in policy planning	[5;14;15]

Compiled by the authors according to [2;16;5;14;17;15]

The rapid adoption of artificial intelligence and automated systems has forced corporations and governments to move from isolated training sessions to continuous, systematic reskilling ecosystems [21;15]. Successful strategies are characterized by clear goals for scaling, the use of talent analytics, and personal sponsorship from leaders, which results in 37% higher employee engagement [21]. Vice versa, programs that fail treat training as an isolated compliance cost center, separate from career growth or business strategy [21]. Table 3 summarizes global experiences in building corporate and national reskilling ecosystems.

Systematization and comparative analysis of global paradigms of continuous learning (Table 3) illustrate the change in the vectors of human capital development both at the corporate and national levels [21;10].

Empirical experience of leading technological giants proves that isolated training programs lose their effectiveness if they are separated from the general organizational culture and career advancement of the employee [21]. The most successful strategy is the formation of “digital confidence” through the development of psychological readiness among personnel to work with AI technologies, which reduces adaptation cycles at enterprises by almost a third [5;14].

Such a systematized global experience illustrates the large-scale gap between the institutional models of technological giants and the real state of learning ecosystems in Ukraine.

Table 3

Comparative taxonomy of corporate and national training ecosystems

System	Key initiatives	Operational scope and target audience	Key governance and facilitation mechanisms	Key findings and empirical challenges	Source
Microsoft	SH Academy ; Global Skills Initiative	Global workforce; over 30 million learners reached by March 2021.	LinkedIn Partnership, free ways to get certified in	Aligning technical training with strategic operational priorities	[21]
Amazon	Advanced training 2025; Career choice	\$1.2 billion in funding commitments	Diverse technical paths, hybrid learning models and learning assistance	Wide-scale, but requires constant information and educational work	[21]
IBM	SkillsBuild; Psychological Readiness Framework	Global learners at all levels ; inclusive digital access	Focus on “psychological readiness” to build employee digital confidence	High motivation, but dependent on a favorable organizational culture	[14]
Tenneo (SBI Card)	LMS at mGurukul	28,000 active employees; BFSI sector integration	KRA reconciliation, psychometric assessment and real-time communication cycles	The introductory training cycle has been reduced from 31 days to 22 days in .	[5]
Singapore	SkillsFuture Credits (SFC)	Every citizen over the age of 25; additional payments for people aged 40-60	Career advice, career ladders and direct and financial subsidies	High satisfaction but active share is limited by time barriers	[12]
Estonia	Adult Education Program 2017-2029	National population, focused on low-skilled and unemployed groups	Lifelong learning strategy ; interdepartmental joint committees	High level of coordination, but requires constant state financial support	[10]

Compiled by the authors according to [5;21;14;10;12]

The lack of digital maturity of the corporate sector is manifested in the perception of learning as an isolated cost center, rather than a strategic investment [8]. It is critical for Ukraine to learn from international experience in creating cross-sectoral national infrastructure to support skills [10; 13], because without direct financial and coordination

support from the state, domestic businesses are unable to independently scale up retraining programs during times of crisis. The key task of such a system is the transformation of approaches to human resource development, in which the priority shifts from mechanical mastery of software to flexible, human-centric workplace design integrated into cyber-physical space and a new employment paradigm [2;7;15].

As global systems shift to a human-centric vision of Society 5.0, human resource development must be fundamentally reoriented [5; 14]. Society 5.0 integrates the physical and cyberspace to achieve sustainable social well-being, shifting the focus of digital transformation from pure industrial automation to quality of life and social inclusion [1; 14].

In human resource management, these values are driving electronic human resource management (e-HRM) and human resource information systems (HRIS) to evolve from simple administrative tools to employee-centric platforms [5]. Using talent analytics based on artificial intelligence, organizations can move to proactive talent management (detecting burnout, predicting skills gaps), achieving the highest employee retention rates [21; 14]. The results of quantifying the effects of algorithmic solutions in human capital management, based on modern international empirical research, are presented in Table 4.

Table 4

Quantitative profiles of the effectiveness of algorithmic personnel management systems in modern enterprises based on the results of international empirical research

Category / Technology	Performance rating (M)	Statistical correlation (R)	Regression coefficient (β)	Strategic significance and organizational outcome
Augmented AI platforms	3.72/5.00	0.75	0.762	High user acceptance; significant positive contribution to automated talent management
Machine learning and neural networks	3.89/5.00	0.72	0.748	Highest perceived usefulness; automates candidate selection and reduces hiring bias
Talent intelligence systems	3.24/5.00	0.48	0.509	Moderate/neutral perception; requires clearer integration and user training

Compiled by the authors based on sources [18; 20]

In the Ukrainian context, the presented results should serve as a “leading-edge benchmark”, since most enterprises in Ukraine are still at a low level of digital maturity across management levels. The implementation of machine learning tools and predictive HR analytics directly maximizes the market capitalization of the business [8], but is hampered by the lack of primary data architecture and digital competencies in middle management [5; 14].

The statistical parameters presented in Table 4 indicate that the impact of various classes of digital solutions on the architecture of human resource management is heterogeneous. The highest constructive significance is demonstrated by augmented AI platforms ($\beta=0.762$) [20], which is due to their ability to automate routine cognitive operations and minimize subjective biases in hiring. In contrast, talent intelligence systems have a lower level of perception and moderate correlation ($R=0.48$) [20], which indicates the presence of operational training and requires additional investment in user training.

These international experiences provide valuable lessons for Ukraine, where limited digital maturity continues to constrain the adoption of advanced AI-enabled human resource management systems. The indicated effects of algorithmization of HRM processes are closely correlated with the results of research on the impact of artificial intelligence on the

capitalization of enterprises: the integration of AI tools into operational activities ensures a direct increase in market capitalization due to cost optimization [8].

The relationship between scientific approaches is synergistic. Statistical profiles show that algorithmic solutions allow minimizing operational losses through deep automation of selection [20; 21]. In this context, the transition to the formation of holistic digital ecosystems is of particular importance. Applied aspects of such transformation on a domestic basis are studied in a collective monograph edited by V. Yakubiv [5], and in the papers of other scientists who, in particular, focus on the transformation of project management under the influence of digitalization [22]. Regression analysis of the impact of AI on capitalization [8] logically closes this chain: the increase in labor productivity caused by automation is directly transformed into an increase in financial competitiveness [8; 5].

From the perspective of the Society 5.0 concept, the value of automating HRIS architectures lies in the transition to proactive human-centric management [14;15]. This means using algorithms as a predictive tool for early detection of burnout and optimization of individual development trajectories [14;15]. The success of integrating digital tools depends not on the technological component, but on the transformation of the organizational environment. Successful digitalization is only 20% determined by technical factors, while 80% of success depends on cultural factors [14]. This actualizes the need to form a new corporate culture [16; 22; 9].

Another critically important aspect of the digitalization of socio-economic systems is the emergence of a digital platform economy. Its rapid growth has challenged traditional human resource development, replacing long-term relationships with transactional ones [2; 7]. The platform model shifts operational risks to the individual, and learning becomes decentralized [7; 9]. In response to this hyper-flexible, algorithmically mediated environment, workers must develop specialized competencies, conceptualized as Gig Literacy 2.0 in Table 5 [3; 15].

Empirical validation of the presented taxonomy based on confirmatory factor analysis (CFA) proves high reliability (CR : 0.87–0.91) and construct validity (AVE > 0.69) of the identified competency domains [3]. This confirms the scientific hypothesis that functioning within the platform economy requires a qualitatively new model of literacy – Gig Literacy 2.0, which significantly surpasses the classic DigComp 2.0 standards. The main difference is the transition from basic user skills to strategic navigation skills under strict algorithmic management [7; 3].

Taking these parameters into account is critical for national labor markets, since, according to experts, the global gig economy already accumulates about 15–20% of the active labor force, where more than 70% of freelancers are young people under the age of 35 [9; 10]. Instead of passively performing tasks, the subject of labor in the platform ecosystem is forced to independently absorb unpaid overhead costs, manage his own digital brand to overcome reputational instability, and develop strategies to protect against the risks of sudden algorithmic account blocking [7; 10].

The study of the Gig Literacy 2.0 concept is extremely relevant for Ukraine, which is one of the largest suppliers of freelance workers on the global market, but demonstrates institutional immaturity in protecting their rights [2;10]. While international platforms impose strict requirements for algorithmic literacy and digital brand management, Ukrainian gig workers remain at risk of sudden account blocking and exploitation due to the lack of effective national regulatory support mechanisms [5; 10].

Table 5

Gig Literacy 2.0 platform work taxonomy and competency profile

Domain of competence	Standard Digital Literacy (DigComp 2.0)	Platform adaptation (Gig Literacy 2.0)	Main operational objective	Construct validity (AVE) and composite reliability (CR)
Information and data	Searching, filtering and evaluating digital information	Navigating task allocation algorithms and analyzing client assessment data	Optimizing search performance to deliver high-return platform tasks in real-time	AVE > 0.69; CR: 0.87-0.91 (N=257)
Communication and collaboration	Interaction and information sharing; digital etiquette	Managing a professional online brand and participating in tenders for freelance assignments	Mitigating systemic reputational uncertainty and establishing customer trust	AVE > 0.69; CR: 0.87-0.91 (N=257)
Content creation	Development, editing and integration of digital files in	Development of highly optimized portfolio profiles and content for self-promotion	Differentiation of individual abilities in the hypercompetitive global labor market	AVE > 0.69; CR: 0.87-0.91 (N=257)
Security and troubleshooting	Protecting devices, personal data, and resolving issues	Managing unpaid labor overhead and resolving algorithmic disputes	Reducing vulnerability to account lockout and payroll exploitation	AVE > 0.69; CR: 0.87-0.91 (N=257)

Compiled by the authors based on WEF reports [11], platform economy research [7;9], APEC recommendations [14], and ILO reports [10].

Despite its potential, the digital platform economy often exacerbates structural and gender inequalities [9; 11]. Workers are subject to algorithmic control, intense competition, and downward wage pressure within global market segmentation [11; 14]. For example, women in the platform economy face significant instability and unequal security guarantees within partnership schemes [9; 10].

Without active regulatory governance, market-driven platform systems risk reinforcing the informality trap and perpetuating a dual labor market [2; 10]. To address these systemic vulnerabilities, the ILO identifies three critical conditions for achieving inclusive digital work: a regulatory framework, formal social dialogue involving platforms and workers, and adaptive social security systems [10]. Global policy levers for stabilizing the gig economy are summarized in Table 6.

A constructive analysis of global regulatory models (Table 6) shows that the spontaneous development of market-oriented platforms in the absence of state regulation inevitably preserves the trap of informal employment and deepens the gender and regional asymmetry of the labor market [10;11].

Table 6

Global policy levers and administrative models for stabilizing the Gig Economy

Lever / Policy Model	Key administrative mechanism	Main operational objective	Country example / Example	Source
Platform accountability reforms	Shifting the burden of proving employee status to platforms	Mandatory establishment of a minimum payment per active hour and transparency in the algorithm	EU Platform Directive	[10]
Portable and independent social security	Portable benefits records that track an employee across platforms	social protection systems from single-employer relationships	South Korean portable insurance pilots	[10]
WorkerTech ecosystem integration	Using technology to ensure social protection and worker organization	Rapid formalization and protection of low-wage workers in	Initiatives of the Inter-American Development Bank (IDB) Group	[7;14]
Unified national registers	Direct integration of national registries with digital payments infrastructure	Providing administrative support for targeted transfers and subsidies	Indian e-Shram portal	[10]
Investment in structural connectivity	Public-private investments aimed at regional connectivity and financial literacy	Bridging the fundamental digital divide in access to the Internet and devices	Qatar's digital development; Korea: an inclusive digital ecosystem	[13;23]

Source: Systematized by the authors based on ILO recommendations [10], platform economy research [7;9;14], and analysis of inclusive digital ecosystems [13;23].

This problem is especially acute in countries with a high share of the informal sector and crisis-related macroeconomic shifts [8; 10]. Attempts to exert direct administrative pressure or forcibly transfer gig workers to traditional labor relations often lead to the shadowing of the sector or the withdrawal of international platforms from the national labor market [10].

The most rational approach is the combined approach recommended by the ILO, which is based on the implementation of technological solutions for labor protection (the WorkerTech model) and the creation of independent social security systems within the framework of the evolution of the modern digital workplace [7;10]. The practical implementation of integrated registries synchronized with payment gateways (like the Indian portal e-Shram) provides the state with a direct channel of communication and targeted assistance to freelancers, transforming reactive protection tools into a proactive system for stabilizing the labor market [10].

The implementation of these policy levers in Ukraine is currently at an early stage, a vivid example of which is the “Diya.City” space and the institute of gig contracts [5;12]. However, the systemic problem of low digital maturity of state registries and financial links does not allow for the full integration of WorkerTech-type models or the creation of portable social security accounts for the entire self-employed population, which preserves a significant

share of platform employment in the shadow, informal sector and deepens structural imbalances in the market [8;10].

Conclusions. The findings demonstrate that the digital transformation of socio-economic systems is fundamentally reshaping human resource development by increasing demand for interdisciplinary, digital, and algorithmic competencies. Constructive overcoming of structural imbalances in the labor market requires the implementation of a set of coordinated measures at the macro- and microeconomic levels.

At the macro level, the primary task is to adapt labor legislation to the conditions of the platform economy through legislative consolidation of requirements for transparency of personnel evaluation algorithms and guarantees of minimum hourly pay for active working time. For Ukraine, an effective precedent in this area is the scaling of the legal space of "Diya.City" and the institute of gig contracts, which offer a legitimate compromise between the flexibility of business models and basic social guarantees for performers.

An important element of stabilizing the labor market is the introduction of portable social benefit accounts, which are administered independently of a specific customer and accumulate platform contributions proportional to the time of employee involvement. The technological basis for this should be the creation of unified national employment registers integrated with digital financial ecosystems, enabling the prompt involvement of the self-employed population in state retraining and social support programs.

At the corporate level, the strategic priority is shifting towards the development of in-house ecosystems of continuous microlearning, focused on inclusive professional development of vulnerable categories of personnel using flexible mobile technologies, which prevents polarization of skills within companies. All of these measures should be coordinated within the framework of the human-centric concept of Society 5.0, where the deployment of artificial intelligence and predictive HR analytics is subordinated to the task of minimizing technostress and preserving employee autonomy. The practical vector for implementing this strategy in Ukraine should be the integration of the developed Gig Literacy 2.0 concept into state educational retraining programs based on the national platform "Action.Education", which will enable the elimination of regional and structural skill shortages during a period of transformational crisis.

For Ukrainian enterprises, the strategic priority should be the transition from fragmented digital initiatives to integrated digital ecosystems capable of supporting continuous learning, predictive HR analytics, and data-driven decision-making. As regression assessments of the effectiveness of artificial intelligence prove, it is the proactive digitalization of management and operational levels that is the main driver of financial capitalization, optimization of business processes, and long-term survival of enterprises in a changing and crisis-ridden regional environment.

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