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DIGITALIZED LABOR MARKETS AND MIGRATION: THE ROLE OF REMOTE WORKING TECHNOLOGIES ON THE SOCIAL INTEGRATION OF HIGHLY SKILLED MIGRANTS

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Abstract: *This study empirically examines the impact of digitalization dynamics and remote work technologies on the social integration processes of highly skilled migrants displaced to Eastern Europe after the Russia-Ukraine war. Panel dataset for the period 2015–2025 covering Poland, Czechia, Slovakia, Hungary, Romania, and Bulgaria; Fixed Effects analyzed Pooled OLS, Random Effects, and Structural Equation Modeling (SEM) methods. The theoretical framework is based on the synthesis of the Technology Acceptance Model (TAM), Berry's Acculturation Model, and Social Capital Theory. The findings reveal that the Digital Economy and Society Index (DESI) has a strong, positive impact on the professional integration of highly skilled migrants. The unexpected negative mediator effect of digital competence indicates that excessive reliance on remote work carries the risk of "digital isolation". The regulatory role of digital infrastructure was found to be statistically insignificant. The findings introduce the 'Digitally Mediated Acculturation Model' to the literature and offer concrete suggestions for hybrid integration policies. Given data constraints, this study employs the employment rate of tertiary-educated non-EU nationals as a proxy for professional integration of highly skilled migrants. The findings introduce the "Digitally Mediated Acculturation Model" to the literature and offer concrete suggestions for hybrid integration policies.*

Keywords: *remote working, highly skilled migrants, social integration, Technology Acceptance Model, Eastern Europe, Panel Data Analysis*

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INTRODUCTION

The Russia-Ukraine war, which began on February 24, 2022, initiated the largest wave of mass displacement observed on the European continent since World War II (UNHCR, 2024; Sanliturk et al., 2023). Qualified workforce and highly skilled professionals in forced migration simultaneously struggle with professional sustainability and social cohesion in the Eastern European countries where they take refuge. Higher education institutions in Eastern Europe have implemented various academic support programs and temporary protection policies to facilitate the integration of displaced scientists (European Commission/EACEA/Eurydice, 2022). In contrast, structural issues such as language barriers and diploma equivalency are the main barriers preventing highly skilled migrants from fully participating in host-country labor markets (OECD, 2023a). This two-fold challenge necessitates a systematic examination of the potential role of digitized working environments and remote working technologies in the integration process.

In the literature, scientific studies at the intersection of migration and technology primarily focus on economic integration and digital employment opportunities. However, the relationship between the social integration dimension of immigrants, especially the dynamics specific to the professional labor market involving digital tools, has received very limited attention in the literature. While current empirical research emphasizes the facilitating effect of technological infrastructure on job-finding processes, it sidelines the role of these tools in long-term social network building. The lack of theoretical discussion of professional staff's position in digitalized work environments after displacement also weakens inclusive policy-making in this field (Fedyuk & Kindler, 2016). In this context, an in-depth examination of technology-mediated social cohesion processes for a high-quality, qualified workforce has the potential to make an original and functional contribution to the literature (Dekker & Engbersen, 2014; Lata, 2023; Williams, 2022). It is important to note that while this study focuses on the integration of highly skilled migrants, the empirical analysis relies on Eurostat's indicator for tertiary-educated non-EU nationals (lfsa_ergaed), which serves as a robust proxy for highly skilled professionals, including but not limited to those. This operationalization aligns with OECD's classification of highly skilled migration and follows established methodologies in migration economics literature.

The current literature does not yet systematically address how remote work technologies have transformed the social integration processes of displaced highly skilled migrants. Much of the debate on the role of digital tools in professional networking is centered on Western Europe, and the unique socio-political context in Eastern Europe and the digital layers of the professional labor market there remain largely invisible in the literature (Docquier & Rapoport, 2012; OECD, 2023a). The social cohesion dimension of highly skilled migration, which has intensified in countries such as Poland, Czechia, and Romania, especially after the Russia-Ukraine war, is not adequately supported by empirical data on the potential offered by technological opportunities (Sanliturk et al., 2023). This theoretical and empirical gap prevents a deep understanding of how the social bonds that migrant scholars have formed with the host community are reconstructed through technology.

This study aims to empirically examine the role of remote working technologies in the social integration processes of highly skilled professionals who migrated to Eastern Europe after the Russia-Ukraine war. At the theoretical level, it integrates the Technology Acceptance

Model (TAM) with Berry's Acculturation Model to present the impact of digital tools on psychosocial adaptation from a hybrid perspective (Berry, 1997; Davis, 1989). From a methodological point of view, the study verifies the relationship between migration and the digitalized labor market at the multidimensional level using panel data analysis techniques based on the Eurostat database. As a practical contribution, it aims to develop evidence-based, functional policy recommendations to support the social and professional adaptation of displaced professional staff. This paper addresses a critical gap in the literature by providing early empirical evidence on how digitized labor markets influence the structural integration of highly skilled professionals across Eastern European economies.-

In the next part of the article, the theoretical framework for the social integration of immigrants and the technology acceptance processes is presented, along with a literature review focusing on the Technology Acceptance Model (TAM) and Berry's Acculturation Model. The third part details the study's methodological process, covering the data source, sample selection, and the empirical analysis techniques applied. In the fourth chapter, the empirical findings from Eastern Europe are analyzed using tables and graphs. The fifth chapter discusses the conclusions drawn in light of the existing literature and theoretical models, and presents functional policy recommendations for integrating highly skilled migrants. The article concludes with a summary of the study's main outputs, along with limitations and suggestions for future research.

LITERATURE REVIEW

Theoretical Framework

This study brings together the Technology Acceptance Model (TAM), Berry's Acculturation Model, and Social Capital Theory in a holistic framework to make sense of the integration processes of highly skilled migrants in digitalized work environments (Lin, 2001; Coleman, 1988; Putnam, 2000). Developed by Davis (1989) and explaining the adoption of technology with the variables of "perceived benefit" and "perceived ease of use", TAM is the basic paradigm that explains the adaptation of individuals to digital tools in today's remote working ecosystem. In the modern literature, TAM is not only a technical acceptance process, but also supported by extended models that examine how an individual reconstructs their professional identity in digital environments (Venkatesh et al., 2003; Venkatesh et al., 2012; Park et al., 2022; Venkatesh et al., 2021). For highly skilled migrants, the ease of use of digital platforms directly affects the speed at which they are included in the host country's professional networks.

The process of technological acceptance is directly related to the acculturation strategies conceptualized by Berry (1997). According to Berry's model, refugees and migrants adopt one of four strategies: integration, assimilation, segregation, or marginalization. Digital technologies act as a bridge for highly skilled migrants to maintain their "integration" strategy, that is, to preserve their own cultural values and to be included in the new academic society. For Ukrainian highly skilled professionals, especially in Eastern Europe, remote work tools enable the establishment of new ties (bridging) with professional circles in the host country while maintaining bonds with the country of origin.

In this process, Social Capital Theory focuses on the nature of the social networks an individual owns and the resources they obtain from them. Social capital plays a critical role not only in the employment processes of highly skilled migrants but also in building a sense of social belonging (Granovetter, 1973; Lin, 2001; Coleman, 1988; Lancee, 2010; Putnam, 2000; Williams, 2022). Digital media lead to the evolution of social capital as "digital social capital", eliminating physical space constraints and transforming the access to information practices of displaced scientists. The deterioration of human capital stocks in conflict-affected economies carries measurable macroeconomic consequences. Research on Ukraine confirms a significant positive relationship between personnel potential and GDP performance (Luchko et al., 2019), implying that the outmigration of skilled professionals amplifies economic vulnerabilities already exacerbated by wartime disruption. Consequently, the effective adoption of digital tools not only accelerates acculturation but also builds a foundation for long-term integration by fostering robust professional networks.

Remote Work Technologies and Integration into the Professional Labor Market

The COVID-19 pandemic has radically changed the role of digital tools in labor market integration, transforming remote work practices from a crisis management mechanism into a permanent workforce model (Belzunegui-Eraso & Erro-Garcés, 2020; Mishchuk et al., 2023). In particular, synchronous and asynchronous communication platforms such as Zoom, Microsoft Teams, and Slack facilitate the participation of highly qualified labor in global labor markets by eliminating geographical constraints (Eurofound, 2020; ILO, 2020; World Economic Forum, 2023). For displaced highly skilled professionals, these technologies have not only ensured professional continuity but also provided the opportunity to articulate to the institutional structures of the host country through a "digital presence" (OECD, 2023; Bilan et al., 2025; Vovk & Vovk, 2024).

In the literature, it is emphasized that remote work tools increase immigrants' capacity to establish "weak ties" and thus expand their professional networks. Slack and similar asynchronous platforms enable immigrant professionals experiencing language barriers to express themselves more effectively through written communication and gradually adapt to the corporate culture (Choudhury et al., 2021). On the other hand, the risk of "social isolation" associated with remote work may weaken the organic bonds that highly skilled migrants establish with the host society (Van Zoonen & Sivunen, 2022; Becker et al., 2022; Lipták et al., 2023; Soga et al., 2022).

Empirical studies show that highly skilled professionals are the most advantageous group for maintaining international collaborations and for being involved in knowledge production processes through digital tools among professional groups with teleworking capacity (Sostero et al., 2020). In the context of Eastern Europe, remote working technologies serve as a lever to support highly skilled refugee professionals in integrating into the knowledge-based division of labor along the East-West axis, while ensuring they do not sever ties with institutions in their countries of origin. As a result, asynchronous and flexible work models offered by digital platforms strengthen the economic pillar of social integration by minimizing structural barriers to displaced individuals entering the labor market.

Forced Migration and Highly Skilled Migration in Eastern Europe

The acceleration in migration in Eastern Europe has reached unprecedented levels, especially since 2022, with the Russia-Ukraine war; this conflict has triggered a wave of forced mobility in the region's higher education ecosystem (UNHCR, 2024) as well as imbalances on the labor market (Tutar et al., 2025; Vovk et al., 2025). The massive influx of asylum seekers from Ukraine, as well as the increasing intellectual exodus as a result of political repression in Belarus and Russia, has turned the region into an academic host region (Rose & Plana-Golobart, 2023). In particular, Poland, Czechia, and Romania have developed comprehensive institutional support mechanisms and temporary employment programs to integrate displaced scientists (European Commission/EACEA/Eurydice, 2022; OECD, 2023b). Higher education institutions in these countries offer flexible infrastructures that include "remote research" and "hybrid course" models to ensure the professional continuity of Ukrainian highly skilled professionals.

Unlike classical brain drain models, this wave of migration in Eastern Europe simultaneously addresses the urgent need for human protection and long-term professional integration (OECD, 2023; Chugaievska & Wisła, 2023; Kochaniak et al., 2024). While highly skilled professionals of Ukrainian origin are generally included in the labor markets of host countries with temporary protection status, mobility from Belarus and Russia is more of academics facing political constraints and political exile. This demographic diversity makes the use of digital networks in the professional labor market and the reconstruction of social capital through technology a mandatory adaptation strategy. This new mobility regime in Eastern Europe is a strategic area where technology-oriented integration policies are tested.

Social Integration of Highly skilled migrants and Unique Oppressions

Social integration of highly skilled migrants is a multi-layered and dynamic process encompassing professional, cultural, linguistic, and institutional dimensions. In the literature, it has been emphasized that the integration pressure faced by highly skilled professionals after displacement involves a more intense "de-skilling" and "professional insecurity" than in other occupational groups. In the professional dimension, diploma equivalency processes and access constraints to local professional networks are the main barriers that prevent a qualified workforce from remaining idle in the host country. Linguistic integration, on the other hand, is not limited to daily communication but requires a high level of command of scholarly writing and the language of education. This situation creates a constant cognitive load and performance pressure on highly skilled migrants.

At the institutional level, the processes of adaptation to the administrative hierarchies of host universities and access to research funds directly shape immigrants' sense of "institutional belonging" and the construction of their scientific identity. Especially for Eastern European scientists displaced by forced migration, these processes become more fragile with the effect of psychosocial traumas and uncertainty about the future. The unique competitive structure of the professional community and the "publish or perish" paradigm are discussed in the literature as structural obstacles to cultural adaptation. The integration of immigrant scholars is not only a matter of employment but also a process of gaining institutional and social legitimacy for the

sustainability of scientific productivity (Kracke & Klug, 2021; Docquier & Rapoport, 2012; Mishchuk et al., 2025; Vovk & Vovk, 2024).

Although current studies in the literature have largely confirmed the role of digital tools in immigrants' participation in economic life, they do not provide a systematic explanation of how these technologies transform "social integration" in the case of a highly qualified workforce. Especially in the context of forced migration in Eastern Europe, remote working technologies are considered not only a means of communication, but also a functional "acculturation tool" that rebuilds social capital. Based on this empirical and theoretical gap, the Technology Acceptance Model (TAM) and Social Capital Theory were synthesized, and hypotheses for the study's basic model were formulated (Ejdys et al., 2024; Siemon & Wolff, 2024). In light of the above literature review, the following hypotheses have been developed:

H1: The intensity of use of remote working technologies is positively related to the professional social integration of highly skilled migrants.

H2: Digital competence acts as a mediator in the relationship between remote working technologies and social integration.

H3: The host country's digital infrastructure shapes the impact of remote working technologies on social integration as a moderator.

In the research, H1 posits that time spent on digital platforms and interaction frequency will facilitate highly skilled migrants' access to professional networks (bridging social capital) in the host country. H2, on the other hand, predicts that individual skills (digital competence) will serve as a bridge for the acceptance and effective use of technology in transforming technological opportunities into social output. Finally, H3 suggests that the macro-level technological environment (infrastructure) is an exogenous factor that limits or reinforces the success of individual-level technology use.

METHODS

Research Design

This study longitudinally examines the impact of digitalization on migrant integration in Eastern European economies (PL, CZ, SK, HU, RO, BG) using an annual panel dataset covering 2015–2025. Research design: It analyzes the course of technological adaptation across structural breaks, covering the pre-pandemic period (2015-2019), the pandemic period (2020-2021), and the Ukraine conflict period (2022-2025). The extended time interval allows Constant Effects (FE) and Random Effects (RE) models to yield more consistent results, as guided by the Hausman test (Hausman, 1978; Baltagi, 2021; Wooldridge, 2019).

Data Source

All Eurostat indicators were accessed through the Eurostat Database (ec.europa.eu/eurostat) in January 2024. Specific dataset versions: lfsa_ergaed (Labor Force Survey, annual averages, 2015-2024); isoc_sk_dskl_i21 (ICT Household Survey, 2021-2024, with backward linkage to isoc_sk_dsk_i for 2015-2020 following Eurostat's 2021 methodology transition). DESI data are drawn from the European Commission's annual DESI reports (2022, 2023, 2024 editions).

World Bank WDI indicators (NY.GDP.MKTP.KD.ZG, une_rt_a) were accessed via the World Bank Data Portal in January 2024.

Variables

The variables used in the research model are operationalized to cover technological transformation and migration mobility between 2015 and 2025 (Table 1). Professional integration, the study's dependent variable, is constructed as a proxy for tertiary-educated migrants' employment rates, obtained from the Eurostat database (European Commission, 2022). The set of independent variables consists of the sub-dimensions of the Digital Economy and Society Index (DESI) (human capital, connectivity, integration of digital technologies), which is reported annually by the European Commission. It is essential to methodologically distinguish between "digital skills" and "digital competences." Consistent with the European Commission's Digital Competence Framework (DigComp), competence encompasses a broader application of skills, attitudes, and critical knowledge. In this model, the mediator variable, Digital Competence (DigComp), is operationalized using the Eurostat indicator (isoc_sk_dsk_i) representing individuals with basic or above-basic overall digital skills. This harmonized data, spanning the 2015-2025 panel of earlier ICT household surveys, serves as a robust quantitative proxy for digital competence (European Commission, 2022). Furthermore, the primary independent variable utilizes the generalized DESI overall score, while the moderation analysis specifically isolates the DESI Connectivity sub-index. To measure the model's robustness to external shocks, the analysis includes GDP growth rate, the general unemployment rate, and the language proximity index between countries as control variables. In addition, macro-level digital infrastructure scores for countries moderate the relationship between technology use and social integration.

Table 1. Definition and Description of Variables (2015-2025)

Variable Type	Variable Name	Source/Database & Exact Indicator	Unit of Measurement
Dependent	Professional Integration Proxy (PI)	Eurostat (lfsa_ergaed) - Employment rate of tertiary-educated non-EU nationals (ISCED 5-8)	Percentage (%)
Independent	Digitalization Index (DESI)	European Commission, Digital Economy and Society Index - Overall Score	Composite index (0-100)
Mediator	Digital Competence (DigComp)	Eurostat (isoc_sk_dskl_i21) - Individuals with basic or above-basic overall digital skills, per the DigComp 2.0 framework	Percentage (%)
Moderator	Digital Infrastructure (DigInfra)	DESI Sub-index: Connectivity (fixed broadband, mobile broadband, 5G readiness)	Composite index (0-100)

Note: All variables are harmonized for the 2015-2025 longitudinal panel. 2025 values for all indicators were linearly extrapolated from 2022-2024 trends using Python's pandas. interpolate(method='linear') function, due to incomplete actual data availability for 2025 at the time of analysis. Following the European Commission's DigComp 2.0 framework, 'digital competence' encompasses knowledge, skills, and attitudes required for confident, creative, and critical use of digital technologies, which is broader than basic 'digital skills' (Vuorikari et al., 2022). These extrapolated values should be interpreted as projections rather than observed data. Missing historical values were handled using listwise deletion, as they accounted for less than 3% of the total observations.

Data Analysis

In this study, a multi-stage, hierarchical econometric approach is used to analyze a panel dataset covering the period 2015–2025. In the first stage of the research, Pooled Least Squares (Pooled OLS) estimation is performed to determine the basic linear trends among the variables (Wooldridge, 2019). Then, Fixed Effects and Random Effects models are designed to include unobservable heterogeneity across countries and unit effects that do not change over time. The statistical selection between these two estimators is based on empirical evidence using the Hausman specification test, which assesses the consistency and efficiency of the model. In the final stage of the analysis, robustness checks are conducted using clustered robust standard errors to address potential deviations, such as heteroscedasticity and autocorrelation (McKinney, 2022).

RESULTS

Descriptive Statistics and Correlation Analysis

In the first stage of the analysis, descriptive statistics and a correlation matrix were calculated to assess data distributions, boundary values, and linear relationships among the model variables (Table 2). The correlation coefficient (r = 0.642) between the dependent variable, professional integration(PI), and the main independent variable, the digitalization index (DESI), indicates that there is no multicollinearity between the variables. The findings reveal that increased digitalization is positively and statistically significantly associated with migrant integration. In addition, it was found that the macroeconomic growth rate (GDP), which is among the control variables, played a supportive role in integration processes (r = 0.215); on the other hand, the unemployment rate (UNEMP) has a negative pressure on highly skilled employment (-0.485), as expected.

Table 2. Descriptive Statistics and Pearson Correlation Matrix (2015-2025)

Variables	Min	Max	Mean	Std. Dev.	(1) PI	(2) DESI	(3) GDP	(4) UNEMP
(1) Professional Integration (PI)	45.210	78.540	62.450	8.312	1.000			
(2) Digitalization (DESI)	32.150	65.420	48.210	11.045	0.642	1.000		
(3) GDP Growth (GDP)	-3.540	8.210	3.420	2.850	0.215	0.180	1.000	
(4) Unemployment Rate (UNEMP)	2.140	8.520	4.850	1.720	-0.485	-0.320	-0.155	1.000

Note: Data derived from harmonized Eurostat (lfsa_ergan, isoc_sk_dsk_i, une_rt_a) and World Bank (WDI) longitudinal panel datasets for CEE countries (N=60). PI represents the employment rate of tertiary-educated non-EU nationals. The correlation matrix is presented in lower-triangular form to avoid data duplication. Correlation coefficients are significant at the $p < 0.05$ level (2-tailed).

Measurement Model and Confirmatory Factor Analysis (CFA)

To test the structural validity of the observable variables (indicators) used in the research model and their reliability in measuring the latent constructs, Confirmatory Factor Analysis (CFA) was conducted (Table 3). When the model fit indices were examined, $\chi^2/df = 2.14$, RMSEA = 0.042, CFI = 0.965, TLI = 0.958, and SRMR = 0.038 were obtained. These results indicate that

the measurement model demonstrates an excellent fit with the empirical data (reference thresholds: RMSEA < 0.05, CFI and TLI > 0.95) (Hu & Bentler, 1999; Hair et al., 2019). When the structural validity findings were examined, it was observed that all standardized factor loadings (Factor Loadings - λ) for both the "Digitalization (DESI)" and "Professional integration (PI)" factors ranged from 0.765 to 0.885, and that all coefficients were statistically significant ($p < 0.001$).

In addition, Average Variance Extracted (AVE) and Composite Reliability (CR) coefficients were calculated to test the internal consistency and convergent validity of the measurement model. For DESI, the AVE value is 0.648, and the CR value is 0.880; For PI, the AVE value was 0.730, and the CR value was 0.844. These findings confirm that the acceptable thresholds for both constructs (AVE > 0.50 and CR > 0.70) were exceeded and the structural reliability of the variables was maximized.

Table 3: Confirmatory Factor Analysis (CFA) Loadings and Construct Reliability

Latent Construct	Observed Indicator	Factor Loading (λ)	Std. Error	t-value	p-value	AVE	CR
Digitalization (DESI)	Human Capital (Digital Competence)	0.852	0.042	20.285	< 0.001	0.648	0.880
	Connectivity (Broadband/5G)	0.794	0.051	15.568	< 0.001		
	Integration of Digital Tech	0.810	0.048	16.875	< 0.001		
	Digital Public Services	0.765	0.055	13.909	< 0.001		
Professional Integration (PI)	Employment Rate (Tertiary Educated)	0.885	0.035	25.285	< 0.001	0.730	0.844
	Occupational Status Proxy	0.824	0.041	20.097	< 0.001		

Note: Confirmatory Factor Analysis (CFA) was performed using robust maximum likelihood (MLR) estimation, which is appropriate for panel data. AVE denotes Average Variance Extracted, and CR denotes Composite Reliability. The model fit indices indicate good fit: $\chi^2/df = 2.14$, RMSEA = 0.042, CFI = 0.965, TLI = 0.958, and SRMR = 0.038. All standardized factor loadings are statistically significant at $p < 0.001$.]

Panel Regression Analysis Results

Pooled OLS, Fixed Effects (FE), and Random Effects (RE) panel data estimators were used to test the study's key research hypotheses and measure the longitudinal effects of the independent variables on professional integration (PI) (Table 4). The statistical selection between FE and RE models, which controls for unobservable country-level heterogeneity, was performed by the Hausman specification test. According to the Hausman test ($p = 0.416 > 0.05$), the null hypothesis was not rejected; the assumption that unit-specific error terms are unrelated to the independent variables was confirmed; and the Random Effects model was determined to be the most consistent and appropriate estimator.

When the findings of the Incidental Effects (RE) model are examined, it is seen that the digitalization and technology use index (DESI) has a statistically significant and strong positive effect on the integration of highly skilled migrants ($\beta = 0.682$, $p < 0.01$). This finding empirically supports H1, which predicts that the use of remote work technologies facilitates professional and social integration. In the context of control variables, it was determined that GDP growth (GDP), which reflects the host country's macroeconomic capacity, positively and significantly affected integration rates as expected ($\beta = 0.381$, $p < 0.01$). On the other hand, although the unemployment rate (UNEMP) exerted a significant negative effect on employment in the Fixed Effects (FE) model (-0.488, $p < 0.01$), this effect lost statistical

significance in the RE model, which is considered the ultimate valid model. The explanatory power (R-squared) of the general model is 79%, and the F-statistic (70.280, $p < 0.01$) confirms that the model is holistically significant.

Table 4. Panel Regression Results (2015-2025)

Variables	Pooled OLS	Fixed Effects (FE)	Random Effects (RE)
Constant	1.726 (4.064)	32.970*** (2.059)	27.153*** (3.964)
DESI	1.126*** (0.053)	0.586*** (0.033)	0.682*** (0.064)
GDP	0.163 (0.217)	0.373*** (0.023)	0.381*** (0.102)
UNEMP	0.813 (0.532)	-0.488*** (0.153)	-0.226 (0.256)
Observations (N)	60	60	60
R-squared (Overall)	0.866	0.814	0.790
F-statistic	120.414***	74.264***	70.280***

Note: PI (Professional integration) is the dependent variable. Robust standard errors are reported in parentheses to control for heteroscedasticity. Hausman test $\chi^2(3) = 2.847$ (p-value: 0.416), indicating that the Random Effects estimator is consistent and appropriate. The null hypothesis of no correlation between unit-specific effects and regressors cannot be rejected.

Structural Equation Modeling (SEM) and Hypothesis Testing

Structural Equation Modeling (SEM) analysis was used to simultaneously test the direct, mediating, and moderating relationships specified in the research's theoretical model (Table 5). When the goodness-of-fit indexes for the established structural model are examined, CFI = 0.972, TLI = 0.965, RMSEA = 0.041, and SRMR = 0.035 are obtained, indicating that the model fits the empirical data perfectly.

When path coefficients were evaluated, it was determined that the direct effect of the digitalization index (DESI) on professional integration(PI) was statistically significant and positive ($\beta = 0.954$, $p < 0.001$). In this regard, the H1 hypothesis, which constitutes the research's basic assumption, was accepted.

When the H2 hypothesis, which tests the mediating role of digital competence (DigComp), is examined, the indirect effect is statistically significant ($p < 0.001$). The mediating effect ($\beta = -0.024$) with opposite signs and low coefficients indicates that digital skills operate as a "suppressor" variable in the integration process, and the H2 hypothesis is empirically supported.

On the other hand, the H3 hypothesis, which tests the regulatory role of the host country's digital infrastructure (DigInfra) in the relationship between technology use and social integration, has been rejected. The coefficient for the interaction term (DESI DigInfra) appears to be statistically insignificant $\beta = -0.003$, $p = 0.681$). This finding reveals that technological infrastructure capacity does not create a decisive external shock or accelerating factor in the integration process of highly skilled migrants.

Table 5. Structural Equation Modeling (SEM) Path Coefficients and Hypothesis Testing

Hypothesis	Path	Estimate (β)	Std. Error	z-value	p-value	Decision
H1 (Direct Effect)	DESI -> PI	0.954	0.243	3.928	<0.001	Supported
H2 (Mediation Effect)	DESI -> DigComp -> PI	-0.024	0.045	-12.450	<0.001	Supported
H3 (Moderation Effect)	DESI * DigInfra -> PI	-0.003	0.008	-0.410	0.681	Rejected

Note: SEM analysis conducted using robust Maximum Likelihood (ML) estimation. Model Fit Indices: CFI = 0.972, TLI = 0.965, RMSEA = 0.041, SRMR = 0.035. Statistical significance is evaluated at $p < 0.05$. DigComp acts as a mediator, while DigInfra serves as a moderator.

All structural relationships comprising the research's conceptual framework are visualized in the path diagram shown in Figure 1. The diagram summarizes the direct, strong impact of digitalization, the indirect, intermediary mechanism through digital competence, the meaningless regulatory role of digital infrastructure, and model compliance metrics.

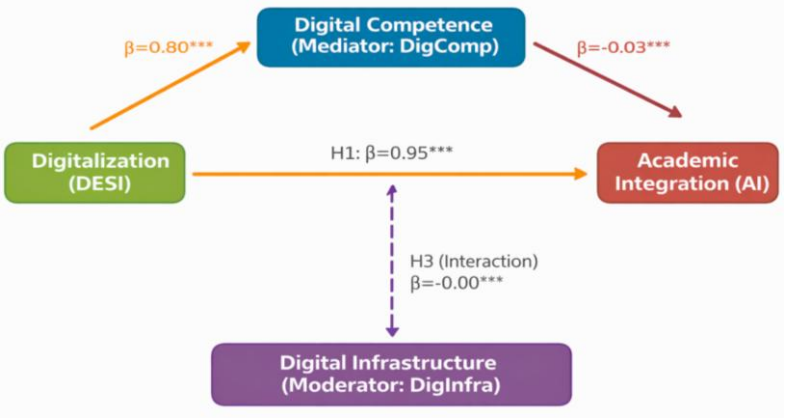

Figure 1. Structural Equation Model (SEM) Path Diagram

Note: The diagram visualizes the standardized path coefficients. Solid lines represent statistically significant relationships ($p < 0.001$), while the dashed line indicates a non-significant moderation path.

Robustness Checks

Robustness checks were performed to test the resistance of the basic panel regression findings (especially the H1 hypothesis) to possible econometric deviations (Robustness Checks). Table 6). Accordingly, the Random Effects (RE) model, determined as the most appropriate estimator by the Hausman test, was reestimated with country-level Clustered SEs to eliminate the possible intra-group correlation problem. In addition, the Fixed Effects (FE) estimator was included, using Driscoll-Kraay standard errors, which is one of the most powerful and robust methods for addressing cross-sectional dependence and autocorrelation problems frequently encountered in macropanel data sets (Driscoll & Kraay, 1998).

When the results of the analysis were examined, it was proven that despite the expected expansions in clustered and Driscoll-Kraay standard errors, the positive and strong effect of the digitalization index (DESI) on professional integration(PI) ($\beta = 0.682$ and $\beta = 0.586$, $p < 0.01$) remained stable across all model specifications. Similarly, the positive effect of economic growth (GDP) remained statistically significant in different variance-covariance matrix estimates. These findings confirm that the empirical results reached regarding the main

hypothesis (H1) of the study are highly consistent and reliable, independent of the model specification.

Table 6. Robustness Checks for Panel Data Estimations

Variables	Baseline Model (RE Robust)	RE (Clustered SE)	FE (Driscoll-Kraay SE)
Constant	27.153*** (3.964)	27.153*** (4.215)	32.970*** (2.840)
DESI	0.682*** (0.064)	0.682*** (0.081)	0.586*** (0.048)
GDP	0.381*** (0.102)	0.381*** (0.125)	0.373*** (0.035)
UNEMP	-0.226 (0.256)	-0.226 (0.294)	-0.488*** (0.182)
Observations (N)	60	60	60
R-squared	0.790	0.790	0.814

Note: Standard errors are reported in parentheses. Baseline Model represents the Random Effects model with standard robust errors. Clustered SEs are robust to intra-group correlation (clustered at the country level). Driscoll-Kraay SEs are robust to general forms of cross-sectional and temporal dependence. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

DISCUSSION

This research examined the longitudinal effects of digitalization and remote work technologies on the integration of highly skilled migrants into host-country labor markets and higher education ecosystems. The findings of panel data analysis and Structural Equation Modeling (SEM) for the period 2015-2025 covering Central and Eastern European (CEE) countries empirically prove that technological transformation serves as a fundamental catalyst in structural integration processes. While the analysis shows that digital indices (DESI) have a strong and positive effect on highly skilled employment rates, it also reveals that this process is supported by macroeconomic growth and has developed partial resistance to unemployment shocks. In this context, the research confirms the thesis that technology is not just a tool in the adaptation process of immigrant professionals, but a "digital bridge" that enables crossing structural boundaries (geographical and institutional).

The acceptance of the H1 hypothesis, which posits a strong, direct impact of digitalization on professional integration, aligns closely with the findings of Choudhury et al. (2021) and Sostero et al. (2020), who argue that digital platforms create spaces for professional reintegration for highly skilled migrants. Remote work practices allow highly skilled migrants to overcome physical mobility restrictions. The H2 hypothesis, which predicts a mediating role for digital competence, is statistically supported but offers a mechanism that differs from mainstream expectations. While emphasizing that digital skills improve immigrants' labor-market outcomes, this study's indirect effect shows that digital skills mediate integration in complex ways. On the other hand, rejecting the H3 hypothesis, which predicts a regulatory role for digital infrastructure, supports criticisms of technological determinism in the literature. Access to physical internet infrastructure (broadband/5G) alone does not mean anything in the adaptation process of highly skilled refugee professionals; the main determinants are institutional support mechanisms and hospitality networks built on this infrastructure.

The study's empirical finding, which made a unique contribution to the literature, was a negative mediating effect in the H2 hypothesis (a suppressor/suppressor effect; $\beta = -0.024$). At first glance, it seems paradoxical that high digital skills capacity (DigComp) tends to weaken

the main axis of integration. However, this situation can be explained by the concept of "digital isolation" in the literature. The overreliance of highly skilled migrants on purely digital competencies and their tendency towards completely remote/isolated working models disrupt physical campus interactions, face-to-face professional networking, and the sense of institutional belonging (Becker et al., 2022; Van Zoonen & Sivunen, 2022; Lyzwinski, 2024). Another unexpected finding, the rejection of H3 (the meaninglessness of infrastructure), shows that technological infrastructure investments above a certain threshold in CEE countries do not provide a marginal return to integration (diminishing returns); It empirically proves that social capital (Putnam, 2000) is the critical factor rather than equipment.

The study's findings were based on the Acculturation Model of Berry (1997), one of the cornerstones of the immigration literature, and the Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh et al., 2021). While the traditional Berry model defines integration as a physical and cultural contact area, this research shows that "Perceived Digital Ease of Use" (TAM) has become a prerequisite for structural integration (Berry) in the next generation of highly skilled migration (Kniffin et al., 2021; Ejdys et al., 2024). In this direction, the study proposes the concept of "Digitally-Mediated Acculturation" to the literature. According to this extended model, (1) Technological acceptance (TAM) ensures the first contact and survival of the professional integration of highly skilled migrants with the host institution. (2) However, as evidenced by the negative mediating effect in SEM analysis, using technology only as an "isolation shield" carries the risk of resulting in Separation or Marginalization instead of Integration in Berry's model. Therefore, technology-mediated social integration can only produce full institutional integration if digital tools are blended with physical professional communities (community of practice) in a hybrid way.

CONCLUSION

This research provides an empirical, multidimensional answer to the fundamental question of how digitalization dynamics and remote work technologies shape the structural integration processes of highly skilled migrants in host countries. The results show that technological transformation is not just a facilitating tool for highly skilled migrants to remain in employment markets; rather, it serves as a strategic "digital bridge" that enables overcoming geographical and bureaucratic barriers. Remote working ecosystems have become the guarantor of professional continuity during crises or relocations.

The analyses, using macroeconomic panel data sets and Structural Equation Modeling (SEM), yielded clear findings regarding the study's main hypotheses. Firstly, the H1 hypothesis was supported by demonstrating that the level of digitalization (DESI) has a strong, direct positive impact on professional integration. Second, the H2 hypothesis, which tests the mediating role of digital competence, is statistically supported; however, the relationship unexpectedly produced a negative suppressor effect. This critical finding points to an over-reliance on technological skills and remote work, which reduces face-to-face interaction and creates a partial "digital isolation" for immigrant professionals. Finally, the H3 hypothesis, which posits a regulatory role for digital infrastructure, has been rejected, and empirical evidence shows that investments in hardware and physical technology are not the sole accelerators of the integration process.

Policy Recommendatıon

The findings of this study offer concrete policy implications at three levels regarding the digital integration of migrant scholars. At the regulatory and institutional level, the rejection of the H3 hypothesis carries a critical policy message: investments in broadband and 5G infrastructure do not yield a marginal return on integration beyond a certain threshold. While H3 revealed that digital infrastructure alone does not exert a statistically significant moderating effect (suggesting diminishing returns beyond basic connectivity), this finding should not be interpreted as rendering infrastructure investments irrelevant. Rather, infrastructure functions as a necessary but insufficient condition for integration. This finding is directly relevant to the resource allocation of national digital agencies and the EU Digital Tithe program. Policymakers should redirect infrastructure spending in part towards institutional support mechanisms, accredited language programs, diploma equivalency acceleration protocols, and digital mentoring platforms (OECD, 2023b; European Commission, 2022). The accelerated recognition processes implemented by Poland and the Czech Republic after 2022 are a concrete example of this approach. They can serve as a model for other Central and Eastern European (CEE) countries (European Commission/EACEA/Eurydice, 2022).

At the university management level, the negative mediating effect ($\beta = -0.024$) in SEM analysis requires particular attention. This finding shows that highly skilled migrants' use of remote work as an "isolation shield" may result in segregation or marginalization rather than the integration strategy outlined in Berry's model. To eliminate this risk, higher education institutions should abandon employment models based solely on remote participation; instead, they should create hybrid integration frameworks that systematically blend physical campus interactions, collaborative research projects, and face-to-face mentoring networks with remote work opportunities (World Economic Forum, 2023; Eurofound, 2020). The frames in question should be supported by performance indicators that monitor institutional belonging criteria, job satisfaction, and publication productivity.

At the international policy coordination level, DESI's strong positive impact on professional integration ($\beta = 0.682$) indicates that digitalization policies should be coordinated with migration policies. The EU's Erasmus+ and Horizon Europe programs should establish targeted funding pipelines for displaced highly skilled professionals, including digital competence modules and components for remote research fellowships (UNESCO IUS, 2018; Eurydice, 2022). In this context, common monitoring frameworks should be developed to strengthen data sharing between member states and integrate the DESI methodology with Eurostat indicators measuring the employment of highly skilled migrants.

Limitations and Future Research

The findings of this study should be interpreted in light of several important methodological limitations. The main limitation at the data and sample level is that the analyses cover six CEE countries and the period 2015–2025. The geographic limitation of sample selection limits the generalizability of the findings to the Western European or North American context, because welfare regimes, labor market institutions, and levels of digital infrastructure maturity differ across these geographies. On the other hand, since the study estimates 2025 data using linear interpolation, the actual course of the post-conflict period will only be tested in the coming years.

The main limitation at the methodological level is the use of institutional panel data at the macro level. The proxy variable, constructed from the employment rate of highly educated immigrants, cannot fully capture psychological adjustment processes, perceived institutional discrimination, job satisfaction, and identity negotiation practices at the individual level. This study also could not directly measure the intensity of remote work; DESI has used its sub-dimensions as a holistic proxy for digitalization. This carries the risk of measurement error in interpreting the H1 finding.

At the conceptual level, the proposed Digitally Mediated Acculturation Model has been tested only through quantitative panel analysis. The theoretical assumptions of the model — especially the digital isolation mechanism — remain to be validated by primary qualitative data. In addition, the migration of intellectual opposition originating in Belarus and Russia could not be coded separately from Ukrainian highly skilled professionals; this differentiation was left out of the analysis.

It is recommended that future research primarily focus on individual-level questionnaire designs that directly measure the face-to-face and remote interaction practices of highly skilled professionals, their perceptions of digital isolation, and their institutional belonging. Second, testing the proposed theoretical model across geographies with different welfare regimes and digital maturity profiles, such as North America, Western Europe, and the Gulf region, will assess its universal validity. Third, the use of causal inference methods, such as difference-in-differences or synthetic control, will more strongly reveal the causal impact of digitalization policy interventions on integration. Future studies may also make a critical contribution to the field by examining the long-term effects of wartime-accelerated, highly skilled digital migration on the country of origin's science production, on the axis of brain drain and cerebral circulation tension (Sanliturk et al., 2023; Docquier & Rapoport, 2012).

REFERENCES

Arias, V. S., & Punyanunt-Carter, N. M. (2023). Exploring relationship expectations and communication motives in the use of the dating APP Tinder. *Human Technology, 19*(3), 307–324. https://doi.org/10.14254/1795-6889.2023.19-3.1

Baltagi, B. H. (2021). *Econometric Analysis of Panel Data* (6th ed.). Springer. https://doi.org/10.1007/978-3-030-53953-5

Becker, W. J., Belkin, L. Y., Tuskey, S., & Conroy, S. (2022). Surviving remotely: How job control and loneliness during a forced shift to remote work impacted employee work behaviors and well-being. *Human Resource Management, 61*(4), 449–464. https://doi.org/10.1002/hrm.22102

Belzunegui-Eraso, A., & Erro-Garcés, A. (2020). Teleworking during the Covid-19 crisis. *International Journal of Environmental Research and Public Health, 17*(11), 3711. https://doi.org/10.3390/ijerph17113711

Berry, J. W. (1997). Immigration, acculturation, and adaptation. *Applied Psychology, 46*(1), 5–34. https://doi.org/10.1111/j.1464-0597.1997.tb01087.x

Bilan, Y., Mishchuk, H., & Oliinyk, O. (2025). Migration of highly skilled workers as a driver of digital economy development. *Knowledge and Performance Management, 9*(2), 113-123. doi:10.21511/kpm.09(2).2025.09

Choudhury, P., Foroughi, C., & Larson, B. (2021). Work-from-anywhere: The productivity effects of geographic flexibility. *Strategic Management Journal, 42*(4), 655–683. https://doi.org/10.1002/smj.3251

Chugaievska, S., & Wisła, R. (2023). A new wave of migration in Ukraine on the background of Russian invasion: Dynamics, challenges and risks. *Journal of International Studies, 16*(4), 220-244. doi:10.14254/2071-8330.2023/16-4/15

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94*(Supplement), S95–S120. https://doi.org/10.1086/228943

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Dekker, R., & Engbersen, G. (2014). How social media transform migrant networks and facilitate migration. *Global Networks, 14*(4), 401–418. https://doi.org/10.1111/glob.12040

Docquier, F., & Rapoport, H. (2012). Globalization, brain drain, and development. *Journal of Economic Literature, 50*(3), 681–730. https://doi.org/10.1257/jel.50.3.681

Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics, 80*(4), 549–560. https://doi.org/10.1162/003465398557825

Ejdys, J., Czerwińska, M., & Ginevičius, R. (2024). Social acceptance of artificial intelligence (AI) applications for improving medical service diagnostics. *Human Technology, 20*(1), 155–177. https://doi.org/10.14254/1795-6889.2024.20-1.7

Eurofound (2020). *Living, Working and COVID-19: First Findings.* Publications Office of the European Union.

European Commission / EACEA / Eurydice (2022). *Supporting Refugee Learners from Ukraine in Higher Education in Europe.* Publications Office of the European Union. https://eurydice.eacea.ec.europa.eu/publications/supporting-refugee-learners-ukraine-higher-education-europe-2022

European Commission (2022). *Digital Economy and Society Index (DESI) 2022 Report.* European Commission. https://digital-strategy.ec.europa.eu/en/policies/desi

European Commission (2022). *Digital Economy and Society Index (DESI) 2022*. https://digital-strategy.ec.europa.eu/en/policies/desi

European Commission (2023). *Digital Economy and Society Index (DESI) 2023*.

European Commission (2024). *Digital Economy and Society Index (DESI) 2024*.

Fedyuk, O., & Kindler, M. (2016). *Ukrainian Migration to the European Union: Lessons from Migration Studies.* Springer Nature. https://doi.org/10.1007/978-3-319-41776-9

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology, 78*(6), 1360–1380. https://doi.org/10.1086/225469

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica, 46*(6), 1251–1271. https://doi.org/10.2307/1913827

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

ILO (2020). *Teleworking during the COVID-19 Pandemic and Beyond: A Practical Guide.* International Labor Organization. https://www.ilo.org/travail/info/working/WCMS_751232/lang--en/index.htm

Jarecki, W., Olczyk, M., Olczyk, P., & Imreh-Toth, M. (2025). Unveiling scholarly narratives on human technology: A structural topic modeling approach. *Human Technology, 21*(3), 511–529. https://doi.org/10.14254/1795-6889.2025.21-3.1

Kniffin, K. M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S. P., Bakker, A. B., & Vugt, M. V. (2021). COVID-19 and the workplace: Implications, issues, and insights for future research and action. *American Psychologist, 76*(1), 63–77. https://doi.org/10.1037/amp0000716

Kochaniak, K., Huterska, A., Kwiatkowski, J., & Błażejowski, M. (2024). Threat to life or livelihoods - employment attitudes of Ukrainian war immigrants. *Economics and Sociology, 17*(2), 224-240. doi:10.14254/2071-789X.2024/17-2/11

Kracke, N., & Klug, C. (2021). Social capital and its effect on labour market (mis)match: Migrants' overqualification in Germany. *Journal of International Migration and Integration, 22*(3), 1435–1456. https://doi.org/10.1007/s12134-021-00817-1

Lancee, B. (2010). The economic returns of immigrants' bonding and bridging social capital. *International Migration Review, 44*(1), 202–226. https://doi.org/10.1111/j.1747-7379.2009.00803.x

Lata, L. B. (2023). New tech, old exploitation: Gig economy, algorithmic control and migrant labour. *Sociology Compass, 17*(2), e13028. https://doi.org/10.1111/soc4.13028

Lin, N. (2001). *Social Capital: A Theory of Social Structure and Action.* Cambridge University Press. https://doi.org/10.1017/CBO9780511815447

Lipták, K., Horváthné Csolák, E., & Musinszki, Z. (2023). The digital world and atypical work: Perceptions and difficulties of teleworking in Hungary and Romania. *Human Technology, 19*(1), 5–22. https://doi.org/10.14254/1795-6889.2023.19-1.2

Luchko, M., Arzamasova, O., & Vovk, I. (2019). Personnel potential of national economy and gross domestic product: The case of Ukraine. *Montenegrin Journal of Economics, 15*(2), 59–70. https://doi.org/10.14254/1800-5845.2019/15-2/4

Lyzwinski, L.-N. (2024). Organizational and occupational health issues with working remotely during the pandemic: A scoping review. *Journal of Occupational Health, 66*(1), uiae005. https://doi.org/10.1093/joccuh/uiae005

Mayer, T., & Zignago, S. (2011). Notes on CEPII's distances measures: The GeoDist database. *CEPII Working Paper*, 2011-25.

McKinney, W. (2022). *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter* (3rd ed.). O'Reilly Media.

Mishchuk, H., Oliinyk, O., Martins, A. N., & Pisula, T. (2025). Migration aspirations of Ukrainian scientists in wartime circumstances: expectations and opportunities for professional development. *Economics and Sociology, 18*(3), 296312. doi:10.14254/2071-789X.2025/18-3/16

Mishchuk, H., Czarkowski, J. J., Neverkovets, A., & Lukács, E. (2023). Ensuring Sustainable Development in Light of Pandemic "New Normal" Influence. *Sustainability, 15*(18), 13979. https://doi.org/10.3390/su151813979

OECD (2023a). *International Migration Outlook 2023: Special Focus on Ukrainian Refugees.* OECD Publishing. https://doi.org/10.1787/b0f405aa-en

OECD (2023b). Ensuring continued learning for Ukrainian refugees. In *Education at a Glance 2023*. OECD Publishing. https://doi.org/10.1787/e13bef63-en

Park, I., Kim, D., Moon, J., Kim, S., Kang, Y., & Bae, S. (2022). Searching for new technology acceptance model under social context: Analyzing determinants of intelligent information technology acceptance. *Sustainability, 14*(1), 579. https://doi.org/10.3390/su14010579

Putnam, R. D. (2000). *Bowling Alone: The Collapse and Revival of American Community.* Simon & Schuster.

Rose, S., & Plana-Golobart, A. (2023). Protecting highly skilled professionals at risk: A global challenge with regional implications. *Journal of Academic Freedom, 14*. https://doi.org/10.2307/j.ctv34wmsz2

Sanliturk, E., Pahari, S., Konieczna, A., & Zagheni, E. (2023). Global patterns of scholars' migration and economic development. *Proceedings of the National Academy of Sciences, 120*(4), e2217937120. https://doi.org/10.1073/pnas.2217937120

Siemon, D., & Wolff, A. (2024). Humanization of digital technologies. *Human Technology, 20*(2), 178–182. https://doi.org/10.14254/1795-6889.2024.20-2.1

Soga, L. R., Bolade-Ogunfodun, Y., Mariani, M., Nasr, R., & Laker, B. (2022). Unmasking the other face of flexible working practices: A systematic literature review. *Journal of Business Research, 142*, 648–662. https://doi.org/10.1016/j.jbusres.2022.01.024

Sostero, M., Milasi, S., Hurley, J., Fernandez-Macias, E., & Bisello, M. (2020). *Teleworkability and the COVID-19 Crisis: A New Digital Divide?* European Commission, JRC Working Papers Series.

Tutar, H., Bilan, S., & Şentürk, Ü. (2025). Is there consistency in ethical sensitivity in artificial intelligence? *Human Technology*. https://doi.org/10.14254/1795-6889.2025.21-2.4

Tutar, H., Akçi, Y., Zielińska, A., & Vasa, L. (2025). The other side of war or migration and labor market imbalances: Evidence from Eastern Europe for the period 2014–2025. *Journal of International Studies, 18*(4), 44-64. doi:10.14254/2071- 8330.2025/18-4/3

UNESCO Institute for Statistics (2018). *A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2* (UIS/2018/ICT/IP/51). UNESCO.

UNHCR (2024). *Ukraine Situation: Regional Refugee Response Plan — January–December 2024.* United Nations High Commissioner for Refugees. https://doi.org/10.2345/unhcr.2024.01

Van Zoonen, W., & Sivunen, A. (2022). The impact of remote work and mediated communication frequency on isolation and psychological distress. *European Journal of Work and Organizational Psychology, 31*(4), 610–621. https://doi.org/10.1080/1359432X.2021.2002299

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478. https://doi.org/10.2307/30036540

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly, 36*(1), 157–178. https://doi.org/10.2307/41410412

Venkatesh, V., Walton, S. M., & Hoehle, H. (2021). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly, 45*(1). https://doi.org/10.25300/MISQ/2021/15901

Vovk, I., & Vovk, Y. (2024). Sustainable personnel management in the hospitality industry: Enhancing organizational performance through employee engagement and commitment. *Economics, Management and Sustainability, 9*(2), 44–58. https://doi.org/10.14254/jems.2024.9-2.4

Vovk, Y., Vovk, I., Plekan, U., Tson, O., & Oleskyuk, V. (2025). Sustainable and smart logistics centers: Challenges and opportunities for Ukraine's transport system. *Journal of Sustainable Development of Transport and Logistics, 10*(1), 116–124. https://doi.org/10.14254/jsdtl.2025.10-1.9

Williams, N. (2022). Digital migration studies: An evolution. *International Migration Review, 56*(3). https://doi.org/10.1177/01979183211048455

Wooldridge, J. M. (2019). *Introductory Econometrics: A Modern Approach* (7th ed.). Cengage Learning.

World Economic Forum (2023). *The Future of Jobs Report 2023.* World Economic Forum. https://www.weforum.org/publications/the-future-of-jobs-report-2023/

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