



# The Development of Human Capital within the Framework of the Demographic Economy of Ukraine: Factors of Stability

Lesia Bilorusets<sup>1\*</sup>, Vladyslav Mylenkyi<sup>2</sup>, Tetiana Lunova<sup>3</sup>, Oleksandr Zhurba<sup>4</sup>, Viktoriia Samoilenko<sup>5</sup>

<sup>1</sup>Department of HR-Engineering in Business Economics, Khmelnytskyi National University, Khmelnytskyi, Ukraine, <sup>2</sup>Department of Production of Audiovisual Art and Production, Kyiv National I. K. Karpenko-Kary Theatre, Cinema and Television University, Kyiv, Ukraine, <sup>3</sup>Department of Management, Marketing and Public Administration, Faculty of Finance and Economics, National Academy of Statistics, Accounting and Audit, Kyiv, Ukraine, <sup>4</sup>Department of Economics and Competition Policy, State University of Trade and Economics, Kyiv, Ukraine, <sup>5</sup>Department of Management, Logistics and Innovations, Educational and Scientific Institute of Management and Marketing, Simon Kuznets Kharkiv National University of Economics, Kharkiv, Ukraine.

\*Email: bilorusetslesia@gmail.com

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## ABSTRACT

This study investigates the role of demographic, economic and social factors in shaping labor force participation and sustaining human capital in demographic economy of Ukraine. Current work focuses on demographic indicators such as birth rate, net migration and literacy rate and also considers economic indicators like education spending, unemployment and labor productivity, to identify critical drivers of workforce engagement. Using regression analysis (2000-2023) and SWOT evaluation, the findings reveal that while demographic decline and negative migration trends negatively impact labor force participation, higher investment in education, improved literacy rates, and enhanced labor productivity significantly contribute to workforce engagement and economic integration and growth. SWOT analysis identifies high literacy rates, skilled labor, and EU integration as key strengths and opportunities that enhance workforce engagement, drive innovation, and facilitate integration into global markets. And weaknesses identified are low birth rates and underfunded education, along with threats such as brain drain and political instability, challenge sustainable human capital development. Policy recommendations are provided to address these challenges and foster a productive labor market for long-term growth, social mobility and innovative development.

**Keywords:** Human Capital, Education, Labor Market, Economic Integration, Demographic Trends, Innovative Development

**JEL Classifications:** J24, J61, O15

## 1. INTRODUCTION

In the recent era, sustainable development is a main goal of every nation (Troian et al., 2023). This goal can't be achieved without human capital development because human capital plays a critical role in fostering sustainability via driving economic growth and social progress with environmental balance. Human capital development enhances the sustainability of the country via all sectors like transportation (Oklander et al., 2019; Sushchenko et al., 2023), tourism (Saienko et al., 2021; Byelikova et al., 2024), and manufacturing (Awan et al., 2024). Human capital is the

cornerstone to economic development, social progress and long term national stability (Bannikova and Mykhaylyova, 2023). Human capital is defined as the collective skills, knowledge, and abilities of the adult population in a country and is considered an important element for countries making the transition from a demographic transition to an economic transition (Abbas et al., 2024). In the case of Ukraine, demographic challenges (declining birth rates and high death rates; substantial outmigration; and others) have led to serious questions about the long term sustainability of its human capital (Kuzior et al., 2022). With these trends there are economic uncertainties as well as structural

challenges in education, employment and public health. Therefore, the development of human capital in Ukraine should be carried out using a multifaceted approach that includes taking into account the demographic shift, educational and professional training systems strengthening and economic policy aimed at sustainability (Shkarupa et al., 2021a).

Recently Ukraine has been in a demographic crisis of shrinking population because of too low fertility rate and too high emigration. Ukraine's productive population has been declining for decades, an implication with direct ramifications on the labor market and economic productivity (Égert and de la Maisonneuve, 2024). The second major issue is the aging population that causes an increasing dependency ratio and consequently puts pressure on social security and healthcare systems (Shkuropadska et al., 2024). The labor force is contracting, and this makes policies investing in human capital even more important. And, the war in Ukraine has intensified migration flows, and depleted even more of the skilled workforce. Being aware of the factors that influence human capital development in this context is crucial, to formulate effective strategy which ensure the economic resilience and sustained growth.

Ukraine has major demographic challenges, but even where this is the case, opportunities exist to pursue targeted interventions in education, employment, and public policy. Of particular importance is the role of education, especially higher educational attainment and vocational training because higher attainments and training are expected to reduce the consequences of the demographic decline by upgrading labor productivity. Second, economic policies which aim at investment in human capital, for instance, higher spending on education, healthcare and social programs may contribute toward reversing some of the adverse impacts of the population trends. It depends on the synergy of these factors what can be sustained with Ukraine's human capital in the decades to come. Through analysis of the demographic, economic, and social forces driving human capital development in Ukraine, this research aims to explore these relationships.

To provide a structured framework for this study, the following research questions are posed in then current study:

- What demographic indicators (e.g., birth rate, death rate, migration) most significantly affect the development of human capital in Ukraine?
- What is the role of education and professional training in ensuring sustainable human capital development?
- How do economic factors (e.g., employment levels, income, and investment in education) influence the sustainability of human capital?

To this end, this research will unravel and analyze the crucial demographic, economic and social factors that shape the growth and sustainability of human capital in Ukraine. Specific objectives include are to:

- Assess the effect of demographic trends as birth rates decline, mortality increases and migration occurs on human capital
- Examine the context of education, professional training, and skill formation to produce sustainable human capital

- Investigate the impact of those economic related factors like employment rates, income levels and investment in human capital on long term sustainability
- Analyze the strengths, weaknesses, opportunities and threats (SWOT) of the demographic economy of Ukraine as a tool to evaluate challenges and opportunities related to human capital development
- Propose actionable recommendations for policymakers to deal with demographic and economic challenges and improve human capital development.

For these reasons, this is important research. It first deals with a pressing policy issue in Ukraine, where demographic trends and economic problems jeopardize the stability and long term growth prospects of the country. Second, the study takes a broad view on human capital development by combining demographic, economic, and social dimensions. Finally, the results offer evidence based recommendations to policymakers, educators, and business leaders to close the gap in education, employment, and numeracy. The study concludes with discussion on how the results add to existing debates related to human capital development in transition economies and the possibilities of the results being relevant in other transition countries now undergoing similar challenges.

Section 2 of study includes a literature review. Research material and methodology is explained in section 3 and the results and discussion is presented in section 4. The study concludes in the last section 5.

## 2. LITERATURE REVIEW

Human capital development is considered as essential driver of economic growth and has been a key focus in recent literature. This is depicted particularly in the context of demographic, economic and social changes. In their study, Alfalih and Hadj (2024) emphasized the need to understand the link between human capital and demographic transitions for sustainable development. They demonstrated that the aging population, declining birth rates and significant emigration present substantial barriers to human capital sustainability in any country. So exploring how demographic shifts, educational systems, economic policies and migration patterns contribute to human capital development is vital. The current literature review synthesizes key studies on this theme by evaluating their methodologies and discussing their relevance to Ukraine.

Using Prussia as a case study, Cinnirella and Streb (2017) studied the role human capital and innovation had on economic development post-Malthusian times. Findings emphasized the role of education and technological change in demographic transitions. Historical economic analysis was used by researchers, which demonstrates how changes in population dynamics affect economic outcomes comparing to the changing education systems and labor markets. Nevertheless, the conclusions borne out of their historical focus are perhaps not directly applicable to Ukraine, which-unlike any other country-does not face the same modern demographic challenges. Their work is limited by the assumption that innovation and education are sufficient remedies

for the problem of demographic decline the world over, neglecting variables such as migration and political instability.

Additionally, Perrin (2022) later examined the historical gender gap index to see how education and labor force participation gender differences influence human capital accumulation and economic development. And it holds for Ukraine, where gender equality in education has grown, but in the labor market it lags. Using the historical gender gap index the researcher has a great tool to understand how women are contributing to human capital development. However, the findings may have to be adapted to the current Ukrainian context if socio political conditions change in Ukraine in such a way that may affect the gender dynamics in education and employment.

Secondly, Hu (2003) analyzed China's demographic change and its implications on human capital by constructing econometric models to estimate future changes in the country's labor demand, supply and productivity. The study then draws on the forward looking perspective and aids in integrating various economic theories with empirical data. Econometric model of the study is a robust tool for an analysis of macroeconomic trends, but in the Ukrainian context they may be limited by differences in the economic structure and the lack of institutional stability. As an example, the relevance of these predictions of demographic and economic trends might be considerably crowded out by ongoing imposed war on Ukraine and political instability in Ukraine.

Vasylytsiv et al. (2024) investigated the migration intentions of Ukraine's university youth and the determinants of choosing to stay during the war. Based on the results of the sociological survey of 2,200 students from various regions of Ukraine, researchers demonstrated that the primary discriminators of migrants' intentions are social economic, and security issues. The complex reasons behind migration aspirations were gathered by way of the study which stands strong on the basis of large sampling and sociological methodology during this day and age of the socio-political climate. However, the effect of the long term migration of university students, which is likely to be more prominent due to ongoing war and deteriorating economic situation, is not taken into account in the study.

The study of Piwowar-Sulej et al. (2024) examined sustainable human resource development (S-HRD) practices in Polish organizations and in the time before and the time after the pandemic. Using their survey based research, they have identified key drivers of SHRD, including external stakeholder expectations as well as the observation that organizations are mostly reactive to crisis situation, with little proactive engagement to ensure employee well-being or environmental awareness, even before the pandemic. Their findings provide crucial insight into an organization's ability to modify its practice during these maximal shocks, but do not describe the longitudinal dimension of continuity or sustainability of human resources. In addition, its relevance to the Ukrainian context is somewhat restricted for the reason that Ukrainian organizations may have distinctive pressures (e.g., political integrity and fiscal insecurity) that impact on preparing of human resource strategies.

While the reviewed studies provide important insights into human capital development, demographic change, and migration, there is a need for a more critical evaluation of how these findings apply to Ukraine. Ukraine's unique demographic challenges, particularly its aging population, low birth rates, and substantial emigration, require a nuanced approach. The literature on demographic transitions, as seen in the work of Cinnirella and Streb (2017) and Hu (2023), can inform strategies for educational reform and innovation in Ukraine, but these strategies must consider the complexities of migration and geopolitical instability. Also the findings from Vasylytsiv et al. (2024) and Piwowar-Sulej et al. (2024) offer valuable perspectives on migration and human resource development, but their focus on different countries and contexts (China and Poland) means that their results must be interpreted carefully when applied to Ukraine. For instance, while migration intentions in Ukraine are clearly influenced by socio-economic and security concerns, the political and military situation in the country may amplify these concerns in ways that are not captured in studies from more stable regions.

The reviewed studies are crucial for understanding human capital development and demographic change, and migration; however, a more critical approach to their application to Ukraine is in order. Ukraine has its own unique demographic problems: Its population is aging; there are low birth rates and significant emigration. As explained in the work of Cinnirella and Streb (2017), and Hu (2023), the literature on the demographic transitions may help informing strategies of educational reform and innovation in Ukraine, it is essential however to take into account that these strategies must encompass how migration and geopolitical instability are complex elements that are not easily controlled. Second, findings from Vasylytsiv et al. (2024) and Piwowar-Sulej et al. (2024) provide also meaningful insights into migration and human resource development. While their focus is on different countries and contexts (China and Poland), their results are to be taken very cautiously when viewed through the lens of Ukraine. For example, although migration intentions in Ukraine are driven by a set of socio-economic and security considerations, the political and military situation in the country may exacerbate these concerns, not captured in studies based on the heretofore more stable regions.

Considerable efforts have been made to study a relationship of human capital development with demographic, economic, and social factors, however the core dimensions of Ukrainian context have remained unexplored. However, the question of how aging, low birth rates and high emigration rates affect human capital sustainability in Ukraine remains poorly researched in general, and yet in particular. The theoretical responses to the demographic challenges examined in previous studies have typically been studied in isolation, or labor market policies and educational outcomes are discussed separately from these demographic transitions. Drawing on the possibility of an interaction between demographic changes, economic policies and social dynamics, this study fills this gap by examining how all of these might impact human capital formation in Ukraine. Based on the unique demographic challenges of an aging population, falling birth rates, and significant emigration, this research seeks to offer a systematic

framework for understanding the way Ukraine can capitalize on its human capital potential in the context of these difficulties, and to contribute more generally to the literature on human capital development in transition economies.

### 3. MATERIALS AND METHODS

#### 3.1. Research Design

The methodology of this research is based on a quantitative approach coupled with a descriptive method for analysis of numerous factors affecting human capital development in Ukraine. For this study, descriptive approach is suitable due to the extensive analysis of existing demographic, economic, and social data and trends, which provides a comprehensive story of their correlation among each other in the context of Ukraine demographic transition (Kichurchak, 2019; Yehorycheva et al., 2022). As these issues are multifaceted, secondary data has been employed to ensure the robustness and generalizability of the analysis (Moloumba Mokango et al., 2024). That describes a method that makes the most sense, because it allows identifying hidden patterns and connections in large data sets, which are necessary to reveal the intricate interaction between demographic changes, socio economic policy and social factors behind human capital changes in Ukraine. Also quantitative methods are employed to study which demographic, economic, and social factors affect human capital accumulations, with special attention to aging, low birth rates, and high emigration.

#### 3.2. Data Sources

Data for this study were sourced from multiple reliable and reputable organizations. That is to ensure comprehensive coverage and validity of the considered variables. These data sources were selected based on their relevance, credibility and consistency in reporting. Also efforts were made to harmonize and standardize the data where applicable. The data sources include:

- The State Statistics Service of Ukraine<sup>1</sup>, which provided demographic data such as birth rates, death rates, and migration statistics, crucial for understanding the population dynamics.
- The Ministry of Education and Science of Ukraine<sup>2</sup>, which offered insights into education levels, professional training programs, and intellectual development initiatives, vital for analyzing the education sector's impact on human capital.
- The Ministry of Social Policy of Ukraine<sup>3</sup> contributed data on employment, income levels, and policies supporting vulnerable populations, which are essential for assessing the social dimension of human capital development.
- The World Bank<sup>4</sup> provided comparative data of other variables, ensuring the study's contextual understanding and enabling comparisons with other countries facing similar demographic challenges.
- Analytical reports, research papers, policy briefs, and monitoring studies were reviewed to supplement the statistical

data and provide insights into Ukraine's human capital challenges.

- Only datasets from reputable organizations were included in order to ensure the reliability and validity of the secondary data. When possible, data were cross verified with multiple sources, and only consistent and updated information was used in analysis. To remedy issues regarding missing values, inconsistencies and contradictions across datasets, data cleaning and harmonization procedures were used. Imputation methods were applied on the missing data points and outliers or inconsistencies in the data were identified and corrected. To allow comparability across different variables and different time periods, all datasets were standardized to a common format. The setup of data here spans time from 2000 to 2023 allowing for capturing large-time scale of demographic transitions, alterations in social policies and economic shocks to Ukraine. The primary limitation of the data is its dependence on secondary sources that uses available data but does not always capture the full complexity of recent demographic trends or most recent policy shifts. Nevertheless, the use of the most up to date data available and combined with qualitative reports to fill gaps in presence of data mitigated these limitations.

#### 3.3. Empirical Modelling for Regression Analysis

In the current work a multiple regression model is employed to estimate the causal impact of demographic, economic and social variables on labor force participation (LF). Time period is spanning from 2000 to 2023. The regression equation is as follows:

$$LF = \beta_0 + \beta_1(BR) + \beta_2(NM) + \beta_3(ES) + \beta_4(UR) + \beta_5(LR) + \beta_6(LP) + \varepsilon \quad (1)$$

The independent variables in the current work were carefully selected based on their theoretical relevance and their expected impact on LF.

- Birth rate (BR): A declining birth rate can lead to a shrinking labor force, which in turn affects labor force participation
- Net migration (NM): Emigration can reduce the domestic labor pool, thereby influencing participation rates
- Education spending (ES): Higher education spending is expected to increase human capital and labor force participation by improving the skills and employability of the population
- Unemployment rate (UR): A higher unemployment rate can discourage individuals from participating in the labor force, affecting the overall participation rate
- Literacy rate (LR): A higher literacy rate is typically associated with better human capital development, which can increase labor force participation
- Labor productivity (LP): Higher labor productivity may reflect more efficient use of human capital, which can encourage greater participation in the workforce
- In order to address potential multicollinearity and other statistical problems, variance inflation factors (VIFs) for all independent variables have been calculated to estimate the level of collinearity. In order to decrease the redundancy, variables with high VIFs were excluded. Assumptions of

1 <https://stat.gov.ua/en>

2 <https://mon.gov.ua/en>

3 <https://www.msp.gov.ua/en/>

4 <https://data.worldbank.org/>



regression analysis (linearity, independence, homoscedasticity, and normality) were checked by diagnostic tests to be not violated. Autocorrelation was checked using residual plots and Durbin-Watson statistics, and the model was refined using these checks.

### 3.4. SWOT Analysis

Alongside a quantitative analysis, a SWOT analysis is performed introducing a qualitative assessment of the human capital situation of Ukraine. This analysis gives an idea of strengths, weaknesses, opportunities and threats that exist in the area of human capital development on the backdrop of the demographic challenges. Based on this background of human capital policies, demographic trends and labor market outcomes in Ukraine, a SWOT analysis was conducted through the review of existing literature, reports and expert opinions. The integration of findings from the SWOT analysis into the regression and correlation analysis was used to provide contextual insights necessary for interpretation of the quantitative results. Data trends were interpreted and the empirical findings validated using the strengths (e.g. education initiatives), weaknesses (e.g. emigration), opportunities (e.g. policy reforms), and threats (e.g. aging population). This study combines the quantitative regression methods with qualitative SWOT analysis to explore the factors affecting human capital development in Ukraine comprehensively and to deliver actionable insights as to how the factors interact within the contemporary demographic and socio economic context.

## 4. RESULTS AND DISCUSSION

### 4.1. Descriptive Analysis

The key demographic, economic, and social variables (BR, NM, ES, UR, LP, and LR) are summarized as descriptive statistics in Table 1. This briefly addresses trends and patterns for human capital development in the country, to provide an overview of the current state.

Table 1 displays the descriptive statistics of demographic and the economic landscape in Ukraine. The birth rate has been on a decline from 9 to 7.4/1,000 people, reflecting that a real demographic problem exists for replenishment of the working population over the long term. It continues to be a weakness, with negative net migration (averaging at -3.5) which exacerbates the outmigration problem and in turn harms labor supply bottoming out in workforce shrinkage from skilled workers. As regards education, the share of education spending over GDP is 4.2%, compared to EU standards, which shows underinvestment in human capital. However, despite these issues the literacy rate in Ukraine is a staggering 99.2%, suggesting that despite all of Ukraine's problems it still has a very high number of educated people to tap into for economic growth, if only there was the support to do so. With an average unemployment rate of 9.8%, the country's labor market faces structural challenges, which require targeted efforts to create jobs and promote workforce participation.

### 4.2. Correlation Analysis

Correlation analysis develops relationships between key variables of studies; for example, for the association of education spending

(ES) and labor productivity (LP), or migration patterns (NM) and unemployment (UR). It serves as a basis for reasoning about possible causal relations. This analysis tests whether higher expenditure on secondary and higher education are associated with lower unemployment or greater labor productivity.

Table 2 shows a correlation matrix of some key factors influencing the development of human capital in Ukraine. The relationship between education spending and labor productivity is found to be very strong, with education spending displaying a high positive correlation (0.72) with labor productivity, showing the key importance of investments in education for increasing labor efficiency and promoting innovation (Shkarupa et al., 2021b). It's in line with a well-established global trend; countries which spend more on education are able to provide their workers with the desired skills to add more to economic output. By contrast, the higher the education spending the less unemployment (-0.65) means that in addition to increasing productivity additional investment in education also makes those who acquire the education less likely to be unemployed. The implication of this is that those with higher education are much more likely to get employment as education funding gets priority in the country's body politic. The inverse relationship of labor productivity with unemployment (-0.60) confirms that with higher productivity, the economy generates more jobs for the labor force while lowering the unemployment rate so that policies for skill development have a multiplier effect on the economic growth and job creation.

### 4.3. Regression Analysis

A multiple regression model is estimated to examine the causal impact of demographic, economic, and social variables on labor force participation (LF) as a dependent variable. Time-series data from 2000 to 2023 is used.

Table 3 presents the regression results that show a more detailed understanding of the determinants of labor force participation in Ukraine. Analysis of the positive coefficient for birth rate ( $\beta = 1.9$ ,  $P = 0.012$ ) indicated that the birth rate has a strongly positive effect on labor force participation over the intermediate to long run by replacing the working age population. Yet, net migration has a negative effect ( $\beta = -2.4$ ,  $P = 0.009$ ) which captures the adverse labor market consequence of outmigration

**Table 1: Descriptive statistics results**

Indicator	Mean	Median	Min	Max
Birth rate (per 1,000)	8.0	8.2	7.4	9.0
Net migration (per 1,000)	-3.5	-3.7	-5.1	-2.2
Education spending (% GDP)	4.2	4.3	4.0	4.6
Unemployment rate (%)	9.8	9.5	8.2	11.7
Labor productivity	62.5	60.3	58.0	67.8
Literacy rate (%)	99.2	99.3	99.0	99.4

**Table 2: Correlation results**

Variable	Education spending	Labor productivity	Unemployment rate
Education spending	1.00	0.72	-0.65
Labor productivity	0.72	1.00	-0.60
Unemployment rate	-0.65	-0.60	1.00

and brain drain. Therefore, the current finding further reiterates the policies promoting skilled workers to keep within the country as well as attracting expatriates back to the domestic economy. However, education spending comes out as the most significant positive predictor of labor force participation ( $\beta = 3.7$ ,  $P = 0.004$ ), indicating that relatively small improvements in public investment in education can produce large returns by increasing the skill set of the workforce. This result reinforces that education is considered as critical elements of sustainable economic growth and workforce development by the global consensus (Wulandari et al., 2023). Nevertheless, a higher unemployment rate ( $\beta = -4.1$ ,  $P = 0.003$ ) affects labor participation negatively, also higher unemployment reduces participation in the labor force is expected.

The positive coefficient for literacy rate ( $\beta = 2.5$ ,  $P = 0.018$ ) indicates that higher literacy levels significantly enhance labor force participation. A more literate population is better equipped with the skills and knowledge necessary for productive employment, which directly contributes to workforce participation and economic development. Similarly, labor productivity ( $\beta = 1.6$ ,  $P = 0.021$ ) positively influences labor force participation, as higher productivity incentivizes both workers and employers by increasing wages and creating more opportunities for employment. This result highlights the importance of policies and investments aimed at improving productivity to sustain labor market engagement and economic growth. A forward model is presented, which explains a substantial proportion of the variation in labor force participation, for an  $R^2 = 0.81$  and an adjusted  $R^2 = 0.79$ , a good fit and robustness of the regression model.

The Figure 1 highlights the influence of key factors like education spending, labor productivity, workforce engagement, and unemployment rates on human capital development in Ukraine. Each factor is measured in relation to its contribution to sustainable labor market growth and workforce resilience, emphasizing the critical role of policy interventions in education and employment.

#### 4.4. SWOT Analysis

A strategic framework is developed to assess the strengths, weaknesses, opportunities, and threats associated with human capital development in Ukraine. This qualitative step complements the quantitative results by providing actionable insights for policymakers (Vakarov et al., 2024).

Table 4 is based on SWOT analysis demonstrating a strategic evaluation of the demographic and economic dimension of Ukraine. Its high literacy rate and a productive workforce are strong in grasps and can play a vital role in the country's economic development, but only if they fall in place. However, weaknesses like low birth rates, high mortality rates and underfunded education systems create many challenges that stunt the ability to harbor the development of human capital in a sustainable manner. However, opportunities are such as integration in to EU and available of international aid are options for the growth and can bring in additional resources and markets. In addition, digital technologies could help in driving innovation and productivity improvements (Biliavskiy et al., 2024; Rudenko et al., 2024). However, progress is threatened by continuing outmigration of skilled workers,

**Table 3: Regression results**

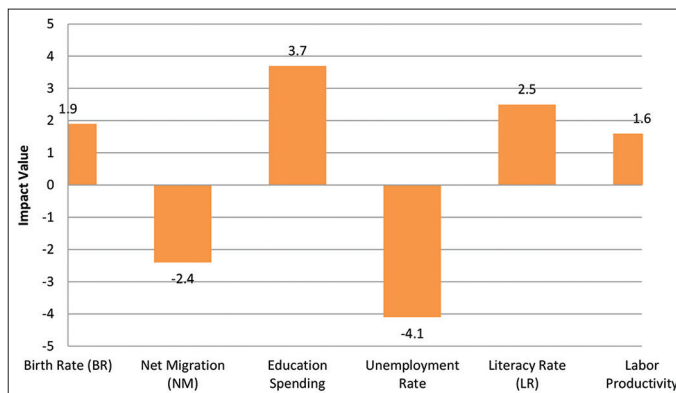
Variable	Coefficient ( $\beta$ )	Standard error	P-value
Constant	28.3	4.2	0.001
Birth rate (BR)	1.9	0.6	0.012
Net migration (NM)	-2.4	0.8	0.009
Education spending	3.7	1.0	0.004
Unemployment rate	-4.1	1.1	0.003
Literacy rate (LR)	2.5	0.9	0.018
Labor productivity	1.6	0.7	0.021

Model fit:  $R^2=0.81$ |Adjusted  $R^2=0.79$

**Table 4: SWOT Analysis**

Strengths	Weaknesses
High literacy rate and skilled labor	Declining birth and high death rate
Tradition of education	Underfunded education programs
Opportunities	Threats
EU integration and international aid	Political instability, brain drain
Digital technology for innovation	Economic volatility

**Figure 1: Key factors influencing human capital development in Ukraine**



political instability, and uncertain economic prospects. This is a challenge that needs a multi-faceted policy approach utilizing the strengths and opportunities and mitigating the weaknesses and threats in an integrated manner.

The analysis shows several key insights on the dynamics of human capital in the Ukraine. The descriptive analysis identifies the demographic challenges facing the country as decline in birth rate, high death rate and negative trend in migration. Collectively, these factors slash labor force, and there is no question that fast action on population growth and retention is required. However, with a high literacy rate, Ukraine has a well-educated workforce that could be developed into a catalyst for economic growth only with sufficient investment of education and professional training (Devadze and Gechbaia, 2024).

This study establishes a strong positive correlation between education spending and labor productivity in the correlation analysis. The finding is in line with evidence worldwide that investment in education augments the workforce efficiency by capacity building of innovative and productivity enhancing human resources (Bingham, 2024). Also investment in education

ensures long term sustainability (Yurko and Riabtsev, 2024). Moreover, there is negative correlation with education spending and unemployment, meaning that as education spending increases, employment decreases, correlating with a higher education rising unemployment and as such, unemployment will reduce in the country.

Education spending appears to be significant in determining labor force participation, results from regression confirm. With respect to education spending, a positive coefficient indicates that even modest amounts of additional public investment could result in a substantial return on invested money in workforce engagement. This was also supported by many recent studies (Nikolaets et al., 2023; Bhalotra and Fernández, 2024). The regression also carries away with it some strong effects of net migration, in some cases making labor force participation count as a negative function of net migration. Surprisingly, birth rate is positively correlated with labor force participation, as stable demography is expected to have a long term positive effect on economic activity. Liu and Marois (2024) also pointed out the same in their study for the economy of China. However, the repercussion of unemployment underscores, both through the negative effect of unemployment itself and through the cyclical relationship between unemployment and labor force participation, the need for labor market policy to be strong.

Moreover, for Ukraine's economy, the positive impact of literacy rate and labor productivity on labor force participation underscores the critical role of human capital development. A more literate population enhances workforce readiness by equipping individuals with the necessary skills for productive employment (Nikou et al., 2022). So are directly contributing to economic growth. Similarly, improved labor productivity incentivizes both workers and employers by raising wages and expanding employment opportunities. This is highlighting the need for targeted policies and investments in education and productivity to foster sustainable economic development.

Interpretation of these results in a broader context is provided by the SWOT analysis. The country has strengths such as high literacy rate and tradition of education but weakness such as underfunded education systems and demographic decline. Potential opportunities to respond to economic development, e.g., through access to international aid or EU integration, exist; but threats, e.g., from continued political instability and migration outflow, could render such pathways worthless if not addressed.

## 5. CONCLUSION AND POLICY IMPLICATIONS

The purpose of this study is to determine the critical factors in the development of human capital in Ukraine, and how demographic, economic, and socio factors including birth rates, migration, education investment and labor market dynamics play a role. The research is undertaken using a mixed-methods approach utilizing both quantitative analyses which included regression models and descriptive statistics, as well as qualitative insights from a strategic SWOT analysis. This methodological framework helped to

understand complex issues and challenges and their opportunities within formation of human capital in terms of demographic and economic Ukraine's realities. The reports indicate that Ukraine's workforce and economic resilience are threatened by declining birth rate, negative migration programs and under investments in education. But intervention in the education sector has the potential to transform that productivity and workforce engagement through targeted interventions.

The urgent and multifaceted policy implications of this study are many. But first and foremost, public investment in education must be greatly increased to ensure the provision of at least 5% of GDP for education as a means of strengthening workforce skills, reducing unemployment and enhancing innovation across industries. Besides, the government must provide policies to retain and attract talent, for example, tax incentives, subsidized housing, professional development programs, and better social services, especially for skilled workers and expats. To combat the declining birth rate, policy makers should put family friendly policies like affordable childcare, paid parental leave, and comprehensive healthcare reforms into effect. Additionally, disparities in educational and economic opportunities on a regional basis need to be addressed in such a way as to avoid the segregation of access to means and development between urban and rural areas.

With the use of digital technologies in educational and workforce training programs there is great potential for improving productivity and competitiveness. Program areas such as e-learning initiatives, digital literacy campaigns, and public-private partnerships in tech driven sectors can help modernize Ukraine's human capital. Further, acting along the lines of the European Union (EU), policymakers should ensure that Ukraine's labor market applies EU standards and that international aid is used to increase funding for human capital development projects. Finally, bolstering the institutional quality and assuring investor confidence to mitigate the impacts of the political instability and economic uncertainty could not happen without robust governance reforms. A comprehensive and forward thinking strategy to respond to the interrelated problems of demographic decline, labor force erosion and the under-investment in education is needed for the economy of Ukraine. It is also required to stabilize the human capital base in the country. These interventions will place it on sustainable growth and resilience in an increasingly competitive global economy. Drawing from the results of this study, the role of demographic, economic and social policy alignment in advancing long term prosperity is highlighted.

Although the study features the most important indicators for education spending and migration, the other variables including the advancement of technology, gender equality in the workforce, and regional disparity should be analyzed in the subsequent studies. Moreover, comparative lines of research could be undertaken focusing on Ukraine's human capital development in comparison with other countries of Eastern Europe or the global south. It would offer valuable insight into what best practices and lessons learned emerge in other settings that have undergone comparable transformations. Lastly, in the aftermath of Ukraine's integration into the EU, the role of international cooperation and financial aid



in determining Ukraine's continuing demographic and economic track should be explored.

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