

Regional Determinants of Lifelong Learning in Russia: the Impact of Infrastructure Quality, Crime Level and Cultural Development on the Human Capital Strategies of the Employed

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Abstract.

Lifelong learning (LLL) is a crucial strategy for the development of human capital, particularly in the face of challenges such as an aging population, a significant decrease in birth rates, and the outflow of qualified personnel, which pose a threat to the national labor market. The objective of this article is to examine the factors that influence LLL and assess the specific impact of regional variables that reflect infrastructure quality, access to social services, cultural development, and crime rates. This study utilizes data from a Rosstat survey on the well-being of the population, which was conducted in all Russian regions in 2022. Research methods include exploratory factor analysis, regression analysis of the Mincer equation with regional variables, and the estimation of logistic regression coefficients. The dependent variable in this analysis is a binary variable indicating participation in LLL. The findings reveal that LLL has a significantly positive effect on the income of the employed population. The likelihood of participating in LLL is influenced by the level of social engagement, various individual characteristics of respondents, as well as a range of regional factors. Limited access to essential social services and inadequate infrastructure have a negative impact on the likelihood of LLL participation, while the level of cultural development does not show statistically significant effects. The estimated results are consistent across all regions. Furthermore, the perceived level of crime also positively correlates with the likelihood of LLL participation. This may be attributed to education being perceived as a means of social mobility and enhanced job security. The subjective assessment of crime is relatively high in populations with high education attainment and income levels, which are the primary individual determinants of LLL participation.

Keywords: human capital; lifelong learning; regional development; quality of infrastructure; employed population

JEL: J24, J83

DOI: <https://doi.org/10.52244/c.2023.11.6>

For citation: Chernenko I. (2023) Regional Determinants of Lifelong Learning in Russia: the Impact of Infrastructure Quality, Crime Level and Cultural Development on the Human Capital Strategies of the Employed. International Scientific Conference "Human Capital, Institutions, Economic Growth". Proceedings. Kutaisi University. pp. 71 - 75. DOI: <https://doi.org/10.52244/c.2023.11.6>

Introduction

Lifelong learning (LLL) is a critical strategy for retaining and developing human capital in the modern era, particularly as the labor market undergoes polarization due to digitalization and the growth of high-skilled jobs. Unfavorable changes in population age structure, increased geographic and intra-industry labor mobility, and declining birth rates in developed and some developing countries are compelling society and governments to shift their focus towards maintaining and enhancing human capital from the existing workforce. This is essential because every investment in human capital is becoming progressively costlier (Varlamova & Sinyavskaya, 2021). In the midst of geopolitical fragmentation and Russia's period of sanctioned

isolation, these issues take on a fundamental character that impacts the competitiveness of the entire national economy (Kapeliushnikov, 2023).

The existing literature demonstrates that lifelong learning is influenced by a myriad of factors, including both individual and external aspects of the labor market. Nonetheless, studies yield inconclusive results and often lack comparability. Variables such as education level, gender, age disparities, social status, and social engagement exert varying influences on workers' inclination to engage in continuous educational programs. Implementation of digitalization further alters the influence of social and regional factors on formal education and self-education (Kim & Park, 2020). One recurring challenge for governments is to formulate strategies for

achieving sustainable, long-term participation of the broader population in the LLL system (Holford et al., 2023).

Previous research adopts a range of conventional and innovative techniques to assess the likelihood of participation in LLL among the employed workforce. Kim & Park (2022) employ machine learning to predict intentions for further study and reveal the pivotal role of prior educational attainment in the propensity to continue learning. Korpi & Tåhlin (2021), using regression analysis, highlight that the link between participation in training and education is more closely intertwined with job skill requirements than individual human capital. Other studies draw inferences through mixed methods, macroeconomic data, and the insights from preceding research (Kim & Park, 2020; Sabrià-Bernadó et al., 2017). Based on a concise review of the literature, the following hypotheses are formulated:

H1. Individual characteristics, such as gender, education level, social engagement, and the use of digital technologies in the workplace, significantly impact the likelihood of participation in LLL among the employed population.

H2. Regional variables related to socio-economic development significantly impact the likelihood of participation in LLL among the employed population.

Methods and data

The study utilized data from sample surveys conducted by Rosstat in 2022, focusing on issues related to living conditions. The survey questionnaire included variables that captured the health, well-being, and labor market activity of the population. In the initial stage of the analysis, exploratory factor analysis was employed to identify underlying factors using 17 variables that reflected various issues within regions. Respondents were asked to evaluate the level of crime, the quality and accessibility of infrastructure, and socially significant services in their respective regions. Each observed variable in the factor analysis was treated as a binary variable, taking the value of 1 if the respondent

identified problems in the specified area. For the purpose of the subsequent regression analysis, the average value of these variables was computed for each respondent. The analysis focused exclusively on the employed population aged between 20 and 55 years. Furthermore, due to inconsistencies in respondents' answers when assessing regional development, the North Caucasus Federal District was entirely excluded from the analysis.

In the second stage, the study estimated the coefficients of the Mincer equation in its standard form, which included only control variables and excluded respondents' work experience. Least squares regression was used for estimation. The dependent variable in this stage was the natural logarithm of the hourly wage rate in rubles. Participation in lifelong learning was measured as a binary variable, taking the value of 1 if the respondent had engaged in formal training or self-education, including digital learning, within the past six months. A regression equation was subsequently estimated, incorporating all regional variables that reflected the quality of regional infrastructure and crime rates.

During the third stage of analysis, logistic regression coefficients were estimated, with the dependent variable being the probability of participation in lifelong education. To interpret the results, a transformation was applied, and logarithms of the coefficients were computed. These logarithms provide insights into how much more or less likely a respondent with specific characteristics is participating in lifelong learning.

Results

The results of the factor analysis are presented in Table 1. The analysis successfully grouped the 17 observed variables into four factors, collectively explaining approximately 57% of the total variance in the data. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy exceeded the required threshold, with a value of 0.866, indicating that the results of the analysis can be considered reliable and suitable for interpretation.

Variable (measure)	Factor	FL	VE, %
Inaccessibility of state and municipal preschool and school education services	Access to socially significant services	0,711	16,2
-- document preparation services		0,695	
-- medical care		0,684	
Large distance of pharmacies		0,645	
Large distance of retail outlets		0,643	
Distribution of drugs	Crime level subjective assessment	0,812	14,8
Spread of alcoholism		0,760	
Vandalism		0,678	
Environmental pollution		0,603	
Existence of a high level of crime		0,546	
Great remoteness of places of recreation and leisure	Cultural development	0,847	13,9
-- cultural institutions		0,795	
-- physical education and sports facilities		0,782	
Poor organization of housing and communal services	Quality of infrastructure	0,695	12,6
There are problems with the condition of roads and road safety		0,683	
General lack of amenities, lack of landscaping in the settlement		0,654	
Poor organization of public transport		0,639	

Table 1 – Results of factor analysis. FL – factor analysis, VE – variance explained. Obtained by author

The results of estimating the coefficients in the Mincer equation are presented in Table 2 below. In the equation, all control variables are statistically significant; male respondents, entrepreneurs, and employed who use computers at work tend to have higher wages. Among the regional variables, all are statistically significant except for the level of cultural development, which does not appear to significantly impact the

earnings of the respondents. The assessment of variance inflation factors (VIF) indicated that there is no substantial correlation between the independent variables. The inclusion of regional variables in the equation marginally enhances the model's explanatory capacity, but the overall proportion of explained variance remains relatively modest, not exceeding 20%.

Independent variable	Control only		All variables	
	b	SE	b	SE
Constant	6,332*	0,021	6,419*	0,021
Male = 1	0,106*	0,005	0,102*	0,005
Entrepreneurs or business owners = 1	0,137*	0,018	0,134*	0,018
Actual number of years of education	0,040*	0,001	0,039*	0,001
Self-rated health	0,095*	0,004	0,089*	0,004
Participation in LLL and self-education = 1	0,100*	0,006	0,094*	0,006
Use of computer at the job at least once a week = 1	0,092*	0,006	0,086*	0,006
Ability to work remotely via the Internet = 1	---	---	0,058*	0,006
Regions - poor access to socially significant services	---	---	-0,167*	0,011
Regions – high crime level	---	---	0,071*	0,010
Regions – low cultural development	---	---	-0,004	0,008
Regions - low quality of infrastructure	---	---	-0,130*	0,009
Regional dummy variables	Yes		Yes	
R^2	0,182		0,196	
Adjusted R^2	0,181		0,195	
R^2 change	---		0,014	
F	771,5*		645,6*	
Number of observations	45 214		45 132	

Table 2 – Results of regression analysis. b – coefficients, SE – standard errors, * - significant at the level less than 1%. Obtained by the author

The results of the regression analysis employing a logistic model are depicted in Table 3. All coefficients are statistically significant, except for the coefficient related to the cultural development variable. The obtained values, which reflect the model's ability to accurately

classify more than 70% of the observations, suggest an acceptable level of explanatory capability. However, the pseudo-R² indicators indicate a relatively modest level of explanatory power.

Independent variables	b	SE	exp(b)
Male = 1	-0,277*	0,024	0,758
Wage, log of rubles per hour	0,385*	0,024	1,470
Actual number of years of education	0,185*	0,006	1,203
Tourist trips during the year = 1	0,231*	0,023	1,260
Participation in social associations and organizations = 1	0,412*	0,041	1,510
Sports, creativity and art activities = 1	0,666*	0,031	1,946
Use of computer at the job at least once a week = 1	0,608*	0,028	1,838
Ability to work remotely via the Internet = 1	0,411*	0,025	1,509
Coaching or mentoring on the job = 1	0,373*	0,035	1,452
Actively searching for a more suitable job = 1	0,165*	0,041	1,180
Poor access to social services	-0,293*	0,059	0,746
High crime level	0,338*	0,048	1,402
Low cultural development	-0,013	0,038	0,987
Low quality of infrastructure	-0,173*	0,043	0,841
Cox and Snell R-square	0,15		
Nagelkerke R Square	0,22		
Percentage of correctly predicted values	74,52		

Table 3 – Results of regression analysis (logistic regression). Obtained by the author

Discussion and conclusion

Based on the results of factor analysis, regional development indicators can be categorized into several distinct factors. Firstly, there is the level of accessibility to social services, which includes services of local authorities and educational institutions. According to the findings of the regression analysis, this regional variable has a positive impact on the likelihood of engagement in retraining or self-education programs. Secondly, there is the perceived level of crime in the respondent's residential region. The results indicate that a higher crime rate, as subjectively assessed by respondents, corresponds to a higher level of participation in LLL. Those who perceive their region as less safe may find more motivation to acquire new skills and education to enhance their employment prospects, economic security, and overall quality of life. LLL can offer opportunities for both personal and professional growth, which may be viewed as a means to mitigate the adverse effects of residing in a high-crime area. LLL programs can also

serve as a form of community support and social engagement. Thirdly, cultural development is also an indicator of regional development. The presence of recreational facilities, sports organizations, and cultural institutions does not significantly affect the participation of the population in LLL programs. Lastly, a fourth key factor is the issue of infrastructure quality, which has a negative impact on education. More comprehensive cause-and-effect relationships can be established through further detailed analysis at the regional level. It is likely that populations in regions with lower levels of development are less motivated to engage in human capital development programs due to limited labor market opportunities and an overall low accumulation of human capital, which diminishes in value over time.

Practical implications of this study underscore the necessity of formulating strategies to enhance educational infrastructure and adult social services in regions, thereby increasing the likelihood of their participation in lifelong education programs. Moreover, education

demonstrates its role as a tool to raise awareness about social issues, crime, and create secure job opportunities and social conditions within the region of residence.

Acknowledgements

The study was supported by the Russian Science Foundation grant No. 23-78-10165, <https://rscf.ru/project/23-78-10165/>.

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