Strengthen Digitalization Technologies on Regulation of Labor Migrant Workers Abroad

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ABSTRACT

Our goal is to precisely define the relationship between digitalization process development and labor migrant workers' outflow abroad. This paper contests the claim that any relationship between labor migrant workers and the digital regulation process. The research also aimed to determine how important ICT is for workers' daily activity abroad in evidence from the 5 regions of Uzbekistan. The study uses quantitative analysis to gain insights into migrant workers' pull factors. We analyzed a unique panel dataset of five independent variables in the period of ranging 2017-2021. There is a linear relationship (correlation) between keywords occurrences and their total strength. But, using fixed effects and random effects models, we found significant changes in the model. By analyzing the Hausman test we found test results Prob>chi2 = 0.0001, so we use Random effect model parameters. But in this model, only internet personal users have a negative relationship by 3.428 units. As for sigma_u-303.64505, sigma_e- 824.88704 and rho .1193317 (fraction of variance due to u_i), analysis of the variability over time showed F-test that all u_i=0: F (4, 15) = 0.25 with Prob > F = 0.9075. It means model estimations need not necessarily pooled regression results. Mainly the study provides the first detailed evidence of the association with a migrant who left the country for working in Uzbekistan regions.

KEYWORDS

digital technologies, labor migrants, work performance, internet access, optical line

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1 INTRODUCTION

Digital communication provided by modern technologies, especially mobile phones, affects all aspects of labor migration: it facilitates migration preparation, migration implementation, and access to information in destination countries, facilitates money transfers, and helps migrant families helps to keep in touch. Digital tools and platforms are being used in all sectors, including labor migration and service management. Although some of these technologies raise privacy and security concerns for migrant workers, they offer migrants easy access to information and fast and secure services. Digitization of migration management services can provide efficiency, transparency, and cost-effective solutions to some migration-related problems.

In addition, mobile phones provide migrants with access to a wide range of important information and services, including housing, employment or training opportunities, local health and transport, schools and childcare, and cultural or religious activities. helps them settle in a new country and society by providing (especially in his diaspora). Mobile phones also allow migrants to communicate with authorities while their asylum or residency applications are being processed, and personal safety mechanisms for vulnerable groups such as domestic workers. Language learning and translation programs are increasingly used by migrants. Social media platforms allow migrants to connect with migrant networks within and outside the country of destination. But it should be noted that digitalization technologies are not the solution to all the problems of migrant workers' activity regulation abroad.

2 METHODS AND MATERIALS

2.1 Study area

Traditionally, labor migrant workers have been assessed by measuring digitalization technologies literacy. Previous studies have based criteria for selection on digital technologies but in this case, we used

independent variables related to migrant workers' perspectives who are leaving Uzbekistan.

2.2 Study limitation

The main limitation of this region is that it discloses most workers leaving abroad from selected regions. Regarding independent variables which include digital technology and communication have been selected available data from stat.uz.

2.3 Sampling

We have observed 5 regions (Andijan, Bukhara, Kashkadarya, Samarkand, and Tashkent City) out of 14 in Uzbekistan.

2.4 Research methods

To identify variations in the implementation of digital technologies regulation on variations labor migrant workers abroad, we calculate the variables in OLS, pooled regression, fixed effects, and random effects models.

2.5 Structure

This document is structured as follows:

- The first part shows the title, authors, affiliations, abstract, keywords, and JEL classification codes;
- In the second part, we present the main text: introduction, methods, and materials, literature review, hypotheses formulation;
- In the third part, we indicate the empirical results obtained and analysis;
- In the fourth part, we evidence the results and comparison;
- In the fifth part, the document presents the conclusions;
- Finally, we divulge the references used in this research work.

3 LITERATURE REVIEW

In contrast, fair migration term indicates a condition whereby a migrants' values are protected, fundamental human rights are upheld, and authentic opportunities for quality work are supplied. Statistics revealed that a total of more than 175 million people are living outside of their country till 2000, which equates to about 3% of the world's total population and together will be considered the world's 5th most populous country. International migration has turned into an intense global phenomenon in recent years [1].

Division of labor was generally organized according to differences in age and sex. Since the oldest members of a community would often lack the strength and agility to hunt or forage, they would often conduct more sedentary tasks, while the youngest members would be taught simple food-gathering techniques. While the male members of the group would take on tasks such as hunting, the female members would specialize in food gathering, cooking, and child-rearing [2].

The mathematician Douglas S. Robertson has calculated the combined amount of information that a group or tribe of linguistically capable but illiterate people can access [3].

According to R. Rupananda reality shows up because of their limited literacy level, getting exploited every time by inappropriate information, poor consultancy service, fake agencies, visa approval, human traffickers syndicate, deception by recruiters, legal papers substitute by illegal documents easily, sexual abuse, brutal rape, poor health care, substandard accommodation, no complimentary food, and lowest wages [4].

As for Niel Postman New technology redefines basic concepts such as knowledge and truth; it reprograms society's perceptions of what is important and unimportant, what is possible and impossible, and, above all else, what is real. Reality assumes new expressions. This is what means when he talks of society going through an "ecological" change [5].

As E. Khoda states complexities of the host nations' legal systems, it takes years for families to get death compensation if an accident occurs. At times workers have been returned after becoming partially or completely crippled as a result of accidents, without proper treatment or compensation. Additionally, several social organizations and government officers have been accused of taking advantage of their inadequate knowledge [6].

Khawaja A. Mamun and Hiranya K Nath stated that these issues have been observed for the longest time and for bringing improvement, these issues have been investigated. The Expatriate Ministry's minimal budget allocation indicates a significant gap that was studied for getting amendments. Additionally, an area also investigated is whether mi-grants are familiar with the concept of transparent migration and all the privileges they are eligible for. Their understanding of fair migration issues has estimated the extent to which they may be exploited if they choose unofficial migration channels [7].

R. Anderson referred to the area of sensory perception, or machine perception covers the sensing and processing of external information from sensors and includes the three subfields of visual, tactile, and auditory [8].

J. Manyika and other scholars stated that optimizing and planning for objective outcomes across various constraints can currently be done by a computer with the same precision as the most skilled humans in this field [9].

According to the I. Steadman teaching computer systems and robots to detect sarcasm both in written and verbal conversations as well as the difference between polite and offensive speech currently proves to be very difficult [10].

To generate natural language, a machine must know what to say and how to say it. To know what to say is very difficult for the software to produce grammatically correct and well-formed texts that have natural flows and that fit into an individual's context and needs [11].

If we study briefly D. Autor implies the automation of activities has caused a well-documented shift in the labor market over the past decades. As part of this shift, scholars observed polarization of the labor market in both the United States and Europe [12]

Despite this, this time lag between investment and benefits is especially large in capital-intensive industries where investments in hardware are required. Consequently, it is difficult for companies and regulators to understand the cost-benefit trade-offs of implementing new technologies [13].

But due to privacy concerns and regulations, data is difficult to access or anonymize. In addition, people are afraid of giving out their personal information because they do not know who will have access to it, who will use it, and for what purpose [14]. It also becomes an ethical question when, for example, an employer has access to one's medical records.

Table 1: Descriptive statistical analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
year	25	2020	1.443	2018	2022
labor force	25	1670.74	347.167	1067.1	2142.3
left abroad	25	1084.44	1571.082	68	5169
arrival labor	25	16721.12	8071.93	8360	40333
Internet access	25	19630.64	7284.759	8839	36050
optical line	25	2.596	1.574	1.2	6.5
internet personal	25	940.928	381.574	352.3	1795.4

Table 2: Summary statistics for distributions of the data

Variable	Mean	Std.Dev.	Min	Max	Obs.
labor_~e overall	1670.740	347.167	1067.100	2142.300	N=25
between	8.853	1656.680	1680.680	1680.68	n =5
within	347.072	1060.760	2132.360	2132.36	T =5
left_a~d overall	1084.440	1571.082	68	5169	N=25
between	211.531	773.800	1296.400	1296.4	n=5
within	1559.170	-53.560	4991.440	4991.44	T =5
arriva~r overall	16721.120	8071.930	8360	40333	N=25
between	2861.141	14563.200	9896.400	19896.4	n=5
within	7637.688	6620.720	37157.720	37157.72	T =5
ntern~s overall	19630.640	7284.759	8839	36050	N=25
between	350.200	13030.800	26385	26385	n=5
within	5404.983	11876.640	29295.640	29295.64	T =5
optica~e overall	2.596	1.574	1.2	6.5	N=25
between	1.537	1.540	5.240	5.24	n=5
within	0.714	1.656	4.156	4.156	T=5
intern~l overall	940.928	381.574	352.300	1795.400	N=25
between	330.442	602.060	1397.380	1397.38	n=5
within	233.678	554.748	1338.948	1338.948	T =5

Based on a literature review, the following research hypotheses were formulated:

H1: By increasing the labor force of regions significant impact on leaving abroad of manpower [15].

H2: The arrival of migrant workers from abroad into their own country significant impact on leaving abroad again [16].

H3: Raising internet access personnel in the regions affects leaving abroad migrants for working [17].

H4: Increasing optical line length in the regions significantly impact leaving abroad [18] (Bartling, S., et al., 2019).

H5: By increasing internet user personnel in the region significant impact on leaving abroad of migrant for work.

The H4 and H5 hypotheses are in line with the theory that digitalization process improvement is reflected in new technologies in exchange for the possibility of achieving an attractive rate of return. Therefore, these hypotheses are related to the innovative theory of entrepreneurship.

4 EMPIRICAL RESULTS AND ANALYSIS

The Republic of Uzbekistan has favorable conditions for using digitization opportunities to support labor migrants. In particular, the number of mobile communication subscribers has increased by almost 3 million in the last 3 years. According to the data of the State Statistics Committee, as of July 1, 2022, the number of subscribers has reached 25,857.6 thousand. For comparison, 44% of the population in the Asia-Pacific region uses the Internet, and 78% of the population in Uzbekistan are Internet users [19].

For the econometric model estimation, we used the software Stata 14.0. According to Table 1, seven variables were observed over the 2018-2022 year period among five regions. The mean for left abroad migrant workers is 1084 people. Use the standard deviation to determine how spread out the data are from the mean. A higher standard deviation value indicates a greater spread in the data. In the model, it is equal to 1571 and 95% confidence interval it has been defined as 836040333 people in Uzbekistan.

For data description, we have summarized all model interactions. It is calculated as pooled, between, and within the regions. Table 2 shows that the total observation is 25, and between the entity and within entity data summary is 5. It means over the period has been recorded variations in all scenario (Table 2).

Initially, we began with the multivariate regression analysis. In regression, there are two types of variables i.e. dependent variable

Table 3: OLS Linear regression model

left_abroad	Coef.	St.Err.	t- value	p- value	[95% Conf	Interval]	Sig
labor_force	.978	.638	1.53	.142	-.357	2.313	
arrival_labor	.079	.03	2.62	.017	.016	.141	**
internet_access	.068	.036	1.86	.078	-.008	.144	*
optical_line	437.0	178.426	2.45	.024	63.59	810.491	**
internet_personal	-3.42	.776	-4.4	0	-5.053	-1.803	***
Constant	-1103	825.006	-1.3	.197	-2829.85	623.667	
Mean dependent var		1084.440	SD dependent var			1571.082	
R-squared		0.816	Number of obs			25	
F-test		16.896	Prob > F			0.000	
Akaike crit. (AIC)		407.528	Bayesian crit. (BIC)			414.842	

*** p<.01, ** p<.05, * p<.1

Table 4: Pooled regression model results

left_abroad	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
labor_force	.978	.638	1.53	.125	-.273	2.229	
arrival_labor	.079	.03	2.62	.009	.02	.137	***
internet_access	.068	.036	1.86	.063	-.004	.139	*
optical_line	437.04	178.426	2.45	.014	87.331	786.749	**
internet_persona	-3.428	.776	-4.42	0	-4.94	-1.906	***
Constant	-1103.	825.006	-1.34	.181	-2720.0	513.891	
Mean dependent var		1084.440	SD dependent var			1571.082	
Overall r-squared		0.816	Number of obs			25	
Chi-square		84.482	Prob > chi2			0.000	
R-squared within		0.226	R-squared between			0.907	

*** p<.01, ** p<.05, * p<.1

(also called explained variable) and independent variable (explanatory variable). The summary table of the regression is given below.

The method of Ordinary Least Squares (OLS) is the most widely used model due to its efficiency. This model gives the best approximation of the true population regression line. The principle of OLS is to minimize the square of errors ($\sum$ei2). Several observations: The number of observations is the size of our sample, i.e. N = 25. As a dependent variable, we set left_abroad migrant workers and remain labor_force, arrival_labor, internet_access, optical_line, and internet_personal as independent variables in the model. The Sum of the square is 48362504.4, and the total sum of the square is 59239170.2. The F-test result is 16.90 with significance p<.01 level, Prob > F = 0.0000, coefficient of determination is 82%, root mean square error=756.61. After the analysis we have come following equation:

$$\widehat{left\_abroad} = -1103 + 0.978 \cdot labor\_force + 0.079 \cdot arrival\_labor + 0.068 \cdot internet\_access + 437 \cdot optical\_line - 0.342 \cdot internet\_personal \quad (1)$$

The coefficient term tells the change in left_abroad for a unit change in labor_force i.e. If the labor force rises by 1 unit then migrants left abroad rise by 0.978. If familiar with derivatives standard error, also called the standard deviation is 1571.082. In the summary table, we can see that the p-value for both parameters is equal to 0. This is not exactly 0, but since we have very larger statistics (-12.458 and 17.296) p-value will be approximately 0. Here, 81.6 % variation in left_abroad can be explained by independent variables. As we calculated the probability of F >229.1 for 1 and 148 df, which comes to approx 0. From this, we again reject the null hypothesis stated above.

$$\widehat{left\_abroad} = -1103 + 0.978 \cdot labor\_force + 0.079 \cdot arrival\_labor + 0.068 \cdot internet\_access + 437 \cdot optical\_line - 0.342 \cdot internet\_personal \quad (2)$$

However, there are certain drawbacks associated with the use of OLS. The coefficient term tells the change in left_abroad for a unit change in labor_force i.e. If the labor force rises by 1 unit then migrants left abroad rise by 0.978. Nevertheless, there were no significant differences between OLS and Pooled regression model.

The most striking result to emerge from the data is that internet_access, optical_line, and internet_personal variables are now not statistically significant. The most surprising aspect of the data is in the arrival of migrant workers leaving the country positively increased by 13%. From the estimations the equation can be written

Table 5: Fixed-effects (within) regression model results

left_abroad	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
labor_force	25.695	9.032	2.84	012	6.444	44.946	**
arrival_labor	.13	.03	4.34	.001	.066	.194	***
internet_access	-.04	.052	-0.78	.45	-.152	.071	
optical_line	216.351	148.28	1.46	.165	-99.715	532.418	
internet_personal	-1.822	1.27	-1.43	.172	-4.529	.886	
Constant	-42076	14912	-2.82	.013	-73861	-10292	**
Mean dependent var		1084.44		SD dependent var		1571.082	
R-squared		0.617		Number of obs		25	
F-test		4.827		Prob > F		0.004	
Akaike crit. (AIC)		374.829		Bayesian crit. (BIC)		382.143	

*** p<.01, ** p<.05, * p<.1

Table 6: Random-effects (between) regression model results

left_abroad	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
labor_force	0.978	.638	1.53	.125	-.273	2.229	
arrival_labor	.079	.03	2.62	.009	.02	.137	***
internet_access	.068	.036	1.86	.063	-.004	.139	*
optical_line	437.0	178.426	2.45	.014	87.331	786.749	**
internet_personal	-3.428	.776	-4.42	0	-4.949	-1.906	***
Constant	-1103	825.006	-1.34	.181	-2720.	513.891	
Mean dependent var		1084.440		SD dependent var		1571.082	
Overall r-squared		0.816		Number of obs		25	
Chi-square		84.482		Prob > chi2		0.000	
R-squared within		0.226		R-squared between		0.907	

*** p<.01, ** p<.05, * p<.1

as:

$$\widehat{left\_abroad} = -42076 + 25.695 \cdot labor\_force + 0. .13 \cdot arrival\_labor - 0.04 \cdot internet\_access + 216.351 \cdot optical\_line - 1.822 \cdot internet\_personal \quad (3)$$

The results suggest that Fixed-effects (within) regression analysis group variable: years are 5, R2 for over model within=0.617, between=0.4999 and overall = 0.7981. F-Test (5,15) =14.15, Prob > F=0.0000 and corr (u_i, Xb) = -0.2243. Both numbers of internet_access companies and internet_personal are a negative relationship with leaving abroad of the migrants in Uzbekistan regions.

For estimating variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model we used the random effects model. We assume that across entities have some influence on leaving abroad of migrant workers from Uzbekistan. Now we can derive new assumption increases in labor_force, arrival_labor, internet_access, and optical_line in one unit positively affect left_abroad of migrants respectively by 0.978, .079, .068, and 437.0. But in this model, only internet_personal has a negative relationship by 3.428 units. As is clear from sigma_u-303.64505, sigma_e- 824.88704, and rho 0.1193317 (fraction of variance due to u_i). The analysis of the variability over time showed the F test that all u_i=0: F (4, 15) = 0.25 with Prob > F = 0.9075. It means model estimations need not Pooled regression results (Table 2).

$$(left\_abroad)^{\wedge} = -1103 + 0.978 \cdot labor\_force + 0.079 \cdot arrival\_labor + 0.068 \cdot internet\_access + 437 \cdot optical\_line - 3.428 \cdot internet\_personal \quad (4)$$

For analysis in this research, we have to verify the best model result explanation is the Hausman test. It gives Iteration 3 as log-likelihood = -1014.3519 and Iteration 4 as log-likelihood = -1014.3518. Estimation method = ml (Maximum likelihood estimation). Total Log likelihood = -1014.3518. The null hypothesis is that the preferred model is random effects; The alternate hypothesis is that the model is fixed entity effects. Essentially, the tests look to see if there is a correlation between the unique errors and the regressors in the model. The H0 hypothesis is that there is no correlation between the two. Interpreting the result from a Hausman test is fairly straightforward: if the p-value is small (less than 0.05), reject the null hypothesis and have to accept the fixed effect model [20].

We may be able to do better with one of the other two kinds of regression models that are indicated for panel data sets namely the Fixed Effects and the Random Effects regression models. According

Table 7: Hausman test results for the model

Variables	Coefficients			
	Fixed	Random	Difference	Standard error
labor_force	25.695	.977	24.717	9.009
arrival_labor	.130	.078	.051	-
internet_access	-.040	.067	-.108	.0373
optical_line	216.3	437	-220.6	-
internet_personal		-3.427	1.606	1.005
B =	b = consistent under Ho and Ha; obtained from xtreg			
	inconsistent under Ha, efficient under Ho; obtained from xtreg			
Test: H0	difference in coefficients not systematic			
	chi2(7) = (b-B)'[(V_b-V_B) ^ (-1)] (b-B) 24.91			
	Prob>chi2 = 0.0001			

to the test results Prob>chi2 = 0.0001 so we use Random effect model parameters.

5 DISCUSSION

Among the total services provided under the labor-migration program, the Fergana region took first place with 107,564 services, which made up 18%. Khorezm region took first place in terms of ticket purchases. A 10% discount will be given if you register and buy a ticket through the Labor-migration mobile application. The concept of a new migration economy became a significant attempt to compensate for the limitations of the neoclassical approach. It paid special attention to the micro level and made it possible to take into account the elements of the economy response to the rational expectations of the migrant population []. Ferghana and Namangan regions are the leaders in terms of insurance, and the Andijan region took the first place in terms of obtaining loans with 501 loans.

This paper is a modest contribution to the ongoing discussions about the application of digital technologies for controlling migrant workers' activity abroad. The main destinations of migration from Uzbekistan are Russia, Turkey, Korea, UAE, Kazakhstan, and the EU. All these countries have specific labor migrant protection human rights and duties based on ILO standards. By GO and NGO all ILO member entities are implementing such conventions and recommendations. But many labor migrant workers claim and suffer from various human rights discriminations on wage, race, age, gender, and working conditions. If we study international practice even pregnancy, illness, and new upcoming migrant workers' rights are controlled and monitored by the same government. Especially, in transition states there few problems in this concern.

The author´s attention was focused on whether digital technology strengthening can give effective solutions to such a regional problem. We have addressed not only finding out pull factors but in the country how is digitalization process can be improving in regions. Our results describe for the first time the cause and effect between labor migration intention in process of ICT. According to the setup hypothesis, only H1 can not be rejected at a 0.1 (10%) statistically significant level.

6 CONCLUSION

The evidence from this study suggests that digital tools help in solving some important tasks, including wide use of information technologies, simplification, and unification of migration rules, increasing the efficiency of state management of migration, and the practical effectiveness of state control in the field due to facilitating the use of state services by migrants., in particular, can play an important role in covering many migrants from remote areas. For example, creating a database of returned migrants, information on available services for migrants in countries of destination and origin, and information on the availability of legal aid or referral service. The following one more conclusion can be drawn from the present study is necessary to develop a language application specific to the receiving country for migrants. Taken together, these results suggest connecting employment agencies with potential and returning migrants who intend to work abroad. More research into labor migrant workers is still necessary before obtaining a definitive answer to digitalization reforms.

DECLARATIONS

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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