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ELECTRONIC GOVERNANCE IN THE HUMAN CAPITAL ASSESSMENT SYSTEM

Current affairs in our country necessitate the introduction of effective steps for the post-war restoration of various spheres of the state and society. One of the most important aspects of Ukraine's post-war restoration is currently considered to be the recovery of human capital, which will have a positive impact on improving various aspects of the state's functioning. At the same time, it is important to continuously assess human capital by determining the relevant indexes, which should be facilitated by electronic governance. The aim of the research is to study the possibility of using electronic governance in Ukraine as a tool for reflecting the process of post-war recovery of human capital. The research was conducted using methods of theoretical generalization, comparative and systemic analyses, modeling. The paper analyzed the concept of human capital as a special type of capital that is expressed in the form of intellectual abilities and practical skills that were acquired in the process of education and practical activity of a person. The state of human capital in Ukraine before the war, which remained relatively stable until 2021, and during the war period, when there were noticeable losses of human capital under the influence of various factors, were analyzed. The prospect of post-war recovery of human capital was considered, with special attention. In addition, the concept and features of electronic governance as a tool for reflecting the recovery of human capital and one of the strategies for Ukraine's post-war restoration were considered. The dynamics of the Human Capital Index in Ukraine for 2010–2021 was analyzed. It was found that electronic governance, by analyzing ІЛЬЇНА Анастасія,

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ЕЛЕКТРОННЕ УРЯДУВАННЯ В СИСТЕМІ ОЦІНКИ ЛЮДСЬКОГО КАПІТАЛУ

Сучасні події у нашій країні зумовлюють необхідність запровадження дієвих кроків повоєнного відновлення різних сфер життя держави та суспільства. Одним із важливих аспектів повоєнного відновлення України наразі вважають саме відновлення людського капіталу, що позитивно впливатиме на вдосконалення різних аспектів функціонування держави. При иьому важливою є постійна оиінка людського капіталу шляхом визначення відповідних індексів, у чому має допомогти електронне урядування. Метою дослідження є вивчення можливості використання електронного урядування в Україні як інструменту відображення процесу повоєнного відновлення людського капіталу. Дослідження проводилося з використанням методів теоретичного узагальнення, порівняльного та системного аналізів, моделювання. Досліджено поняття людського капіталу як особливого різновиду капіталу, який виражається у формі інтелектуальних здібностей та практичних навичок, що були отримані у процесі освіти й практичної діяльності людини. Проаналізовано стан людського капіталу в Україні до війни, який залишався відносно стабільним до 2021 р., та у воєнний період, коли відбулися помітні втрати людського капіталу під впливом різних факторів. Особливу увагу приділено перспективі відновлення людського капіталу у повоєнний період. Крім того, розглянуто поняття та особливості електронного урядування як інструменту відображення відновлення людського капіталу та однієї зі стратегій повоєнного відновлення країни. Проаналізовано динаміку Індексу людського капіталу в Україні за 2010-2021 роки. Встановлено, що електронне урядування шляхом аналізу даних дає



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data from official sources, makes it possible to calculate the Human Capital Index. It was noted that Big Data and artificial intelligence can be used to determine changes in human capital, which is possible due to the availability of electronic governance. The results allow us to state that there are significant opportunities to use electronic governance to assess human capital with a reflection of its post-war recovery.

Keywords: electronic governance, human capital, Human Capital Index, post-war recovery.

можливість прорахувати Індекс людського капіталу. Зазначено, що для визначення змін людського капіталу можуть бути використані великі дані та штучний інтелект, користування якими є можливим завдяки наявності електронного урядування. Результати аналізу свідчать про наявність значних можливостей використання електронного урядування для оцінки людського капіталу із відображенням його повоєнного відновлення.

Ключові слова: електронне урядування, людський капітал, Індекс людського капіталу, повоєнне відновлення.

JEL Classification: J24, O15, O33, O38.

Introduction

Today, an important issue for researchers is the development of effective ways of post-war restoration of Ukraine, which will take into account all important aspects of the life of society and the state. At the same time, post-war recovery strategies are being developed, which include both global trends in the country's development and specific areas to which the Government of Ukraine should pay attention. So, an important aspect of modern research development of the strategy of post-war recovery is the study of a peculiar concept of human capital. The scholars consider a person to be the real wealth of a country, which, together with material goods, has a positive effect on its development. Thus, the researches and public figures consider the improvement of human capital to be an important component of the revival of Ukraine. At the same time, it is important to take into account the methods of human capital assessment, which will make it possible to clearly follow the dynamics of its changes.

Under modern conditions, problems of human capital development are actively considered by Ukrainian and foreign researchers. So, for example, Boikivska, Saladiak, (2022); Grishnova (2001); Kozhyna, Razina, Kravchenko, Kuprii, & Melnyk (2022); Nicolaescu, Florea, Kifor, Fiore, Cocan, Receu, & Zanetti (2020); Prushkivska, Pereverzieva (2007); Fonaryova (2017) devoted their works to the study of human capital in the education system, including training, retraining and advanced training of personnel of enterprises, institutions and organizations that exercise their powers in the sectoral direction, while not paying enough attention to the study of human capital in public authorities. Along with this, Antonyuk (2022); Zaloznova, Azmuk (2022); Mishchenko (2022) studied the phenomenon of human capital in the conditions of war and in the post-war perspective, paying insufficient attention to the study of the process of improving the human capital analysis methods, where electronic governance plays a significant role. Along with this, the researches Arkhypova (2015); Zhekalo, Zaiats, & Vakun (2020); Kosariev, Lazebna, & Pasyk-Kosarieva (2019); Pogrebnyak (2014); Furashev (2012) devoted their works to the study of electronic governance as a systemic means of improving the work of public and private institutions. However, here scholars mainly study the essence of electronic governance and its impact on the activities of the public and private sectors, where it would not be superfluous to work out the problems of the connection of the development of electronic governance with human knowledge, as well as the skills and abilities to apply it, which reflects human capital. All this will significantly contribute to the improvement of the human capital management system in the public and private sectors in the post-war period.

Therefore, analyzing the current trends of scientific and technological development in Ukraine during the period of martial law, it is important to emphasize that further research is needed, firstly, the features of human capital and the factors influencing its development, in particular during the wartime in the country; secondly, the features of electronic governance and its impact on the post-war recovery of human capital in the country; thirdly, the interdependence between the development of electronic governance and the quality of human capital assessment both under the conditions of martial law and in the future period of post-war recovery.

The aim of the research is to study the possibility of using electronic governance in Ukraine as a tool for reflecting the process of post-war recovery of human capital.

The study consists of two main parts: the first part characterizes the concept of human capital using the method of theoretical generalization, analyzes the pre-war state of human capital in Ukraine and the impact of military actions on its development using the method of comparative analysis. The second part characterizes the concept of electronic governance using the method of theoretical generalization, describes the interaction of the principles of the introduction of electronic governance according to the method of system analysis, and determines the possibilities of using electronic governance as a process of reflecting the post-war recovery of human capital in the country according to the modeling method.

1. Human capital

1.1. Content of the concept and analysis of human capital in Ukraine during the pre-war period.

Human capital is a special kind of capital, which is expressed in the form of intellectual abilities and practical skills, obtained in the process of education and practical activity of a person. The founders of the theory of human capital are considered to be H. Becker and T. Shultz, according to which human capital is a set of expenses for obtaining education, qualifications, upbringing, etc. This is a peculiar economic category as a key factor of economic growth and social well-being of the nation and the state (Fonaryova, 2017).

In addition, human capital is a certain accumulated stock of knowledge, skills and abilities that are used in various spheres of social reproduction, and also have a positive effect on the growth of labor productivity and, therefore, on the increase of income of an individual (Prushkivska, Pereverzieva, 2007).

Human capital is also considered as a set of productive abilities, personal traits and motivations of individuals formed and developed as a result of investments, which are in their possession, used in economic activity, contribute to the growth of labor productivity and, thanks to this, affect the growth of the income of its owner and the national income (Grishnova, 2001).

Thus, human capital occupies an important place in the sustainable development of the country. However, given the state of war, the position of human capital in Ukraine is in a difficult position and needs significant recovery. However, in order to find out to what extent the current state of human capital in the country requires the application of certain recovery measures, taking into account the negative factors of the influence of military actions, it is worth analyzing the Human Capital Index (HCI) in Ukraine in the pre-war period until 2022 (*Figure 1*).



Figure 1. Human Capital Index in Ukraine for 2010–2021

Source: developed by the author based on: Our World in Data, 2020; Kozhyna et al., 2022.

As you can see, the HCI fluctuated moderately in Ukraine for the period from 2010 to 2021. If in 2010 the financial and economic crisis became a significant demotivation for the activity of innovative and active

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enterprises, which was reflected to some extent on the HCI, then the gradual decline of the indicator from 2017 to 2020 has a close interdependence with the reboot of the system of management relations. This is connected, firstly, with the approval of 2017 year of the Concept of e-Governance Development in Ukraine (Order of the Cabinet of Ministers of Ukraine, 2017), which forced the management staff of public authorities to waste time and spend funds on the purchase of the latest software in order to introduce electronic systems aimed at ensuring prompt provision of necessary services at a highquality level, and, accordingly, at increasing the level of professional competence of personnel in the direction of working with information and communication technologies (ICTs). Secondly, with the COVID-19 pandemic, which began in 2019 and continued until the end of 2021, when many enterprises, institutions and organizations were forced to switch to online work. And this, in turn, created many inconveniences both for service personnel and for the vast majority of specialists who had not previously worked remotely and required time to adapt to work in the mode of using ICTs during the provision of necessary services (including educational, social, medical, etc.). However, the increase in the HCI in 2021 may indicate the acquisition of digital literacy of the population, which made it possible to quickly adapt to new working conditions. Here, a deep level of organization of training, retraining and advanced training of personnel in the sphere of human capital management, which combines the fields of education, science, culture, tourism, sports, social protection and health care, played a huge role.

Thus, the introduction of electronic governance in Ukraine can become an important factor in the recovery of human capital in Ukraine in the post-war period, given the detrimental effects of the war on the sustainable development of the country.

1.2. Analysis of factors influencing military operations on the state of human capital in Ukraine.

It is important to note that in the conditions of a full-scale Russian-Ukrainian war, there are significant changes in the characteristics of human capital caused by military actions. So, it is possible to list the following losses of human capital of Ukraine in war conditions (Zaloznova, Azmuk, 2022):

• an increase in the number of forcibly displaced persons both within Ukraine and those who left the territory of the country as a result of military operations: as of May 3, 2022, the total number of displaced persons was 13.7 million people, of which 5.7 million people left Ukraine, where the vast majority of emigrants are women and children;

• forced "evacuation" of Ukrainian citizens from the occupied territories to the Russian Federation: as of April 16, 2022, 808 thousand people were forcibly deported to the Russian Federation, of which 147 thousand were children of various ages, including infants;

• large losses of both conscripts during the performance of military duties in the combat zone, as well as the civilian population due to enemy shelling of populated areas of Ukraine;

• indirect losses in the form of the inability to fully pay wages and use the intellectual and creative potential of human capital.

- V. Antonyuk (2022) supplements this list of losses:
- deterioration of physical and mental health of citizens;
- increase in the share of orphans, destruction of families, etc.;
- damage and destruction of infrastructure;
- suspension and deterioration of the educational process.

Therefore, there is already a need to implement effective steps to improve the state of human capital, which will also make it possible to restore the country's economy destroyed as a result of military operations. Accordingly, human capital is closely related to the economic growth of the state. Therefore, as the analysis of the development of human capital in the pre-war period showed, the improvement of the process of its management in the context of the development of the information society and the electronic state is an integral component of the post-war restoration of Ukraine (Boikivska, Saladiak, 2022).

1.3. Ways of recovery and development of human capital in Ukraine in the post-war period.

So, the full-scale Russian-Ukrainian war, which has been ongoing since February 24, 2022, has caused a number of changes in various spheres of life in Ukraine. Therefore, the government and researches are currently working on the development of measures aimed at ensuring the effective post-war restoration of Ukraine, an important direction of which is the recovery of human capital.

According to the official information of the official website of Ukraine's Government portal, the development of human capital is one of the important components of the country's sustainable development strategy and the basis for the growth of the national economy and the strengthening of Ukraine's competitive position in the world, for which a number of transformations should be carried out in Ukraine, namely:

- to ensure equal access to quality medical services;
- to create conditions for the transformation of the education system;
- to implement a fair pension reform;

• to improve the process of providing social support to vulnerable sections of the population (Government portal, 2020).

Such steps will make it possible to positively influence the development of human capital in the country, which will benefit the development of the information society and the electronic state, the combination of which forms an electronic governance system.

2. Possibilities of using electronic governance to reflect the postwar recovery of human capital

2.1. Electronic governance: concepts and principles of application in the post-war recovery of human capital in the country.

Before analyzing the features of electronic governance, let's turn to the definition of the concept itself. In general, governance is the process of making state management decisions in the spheres delegated by the state and their implementation in the life of society. Electronic governance is a form of public administration organization, which is aimed at ensuring the improvement of efficiency, openness and transparency of the activities of public authorities using ICTs for the most simple and accessible communication with individuals and legal entities, non-governmental organizations, stipulating the formation of information society (Furashev, 2012). Therefore, here, in the first place, reforms of public administration should be carried out.

It is also worth paying attention to the fact that public administration belongs to the exercise of political, economic and administrative powers in the management of the country's affairs, including explaining to citizens their interests and the exercise of their legal rights and obligations. Here, electronic governance can be understood as the performance of public administration functions through electronic media in order to facilitate an effective, fast and transparent process of disseminating relevant information to the public and other institutions (Kosariev, Lazebna, & Pasyk-Kosarieva, 2019).

Taking into account the above, it is necessary to consider the principles according to which the introduction of electronic governance in Ukraine in the post-war period will take place (*Figure 2*).

So, the principle of openness and transparency and the principle of efficiency can become the main principles of the introduction of electronic governance in the country in the post-war period. At the same time, the interaction between the relevant principles gives rise to the principle of systematicity, which is the basis of the target task of the country's government to switch to a single system of electronic governance. So, compliance by government officials with the principle of openness and transparency when exercising their powers with the use of ICTs will contribute to the transformation of ICTs into the main element of the country's development strategy. This approach creates conditions for the involvement of broad masses of the population to participate in management processes, taking into account the expansion of the rights of remote access of individuals and legal entities to information resources. Accordingly, the analysis of the views of the participants on various proposals from government officials suggests the adoption and further development of a joint government strategy for the comprehensive use of ICTs in accordance with the principle of systematicity. Here, the implementation of the specified

strategy formulates a unified approach to the future model of ICTs application in state management, which accompanies quality control over the provision of electronic services to representatives of the state and society from both the public and private sectors.



Figure 2. The interaction of the principles of the introduction of electronic governance in Ukraine in the post-war period

Source: developed by the author based on (Pogrebnyak, 2014).

All this increases the probability of obtaining the effect of involving potential foreign investors for the country's economy and creating attractive conditions for the return from abroad of national manufacturers of high-tech products, which public authorities will purchase for the introduction of special electronic systems and other means of information and telecommunication into their activities. And this, in its turn, will contribute to increasing the level of digital literacy of the staff of public authorities and encourage the development and approval of programs aimed at investing in increasing the level of their professional competence. In this context, the principle of systematicity is closely interdependent with the principle of efficiency, the observance of which combines the planning of ICTs implementation and the creation of proper investment conditions for investors and investment recipients, forming the value of ICTs implementation as a way to develop human capital. After all, it is ICTs that can become a convenient tool for investing in objects of innovative infrastructure, the implementation of which increases the number of newly

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created jobs and increases the solvency of the population, which, in turn, will contribute to the increase in business profitability, and therefore to the filling of budgets at all levels and the equalization of their balance, which will allow more investing in qualified personnel and in the restoration of the country's infrastructure in the post-war period.

2.2. The methods of using electronic governance during the human capital assessment.

One of the particularly important areas of the use of electronic governance is the control over the dynamics of human capital, first of all, in war conditions, when the question of its post-war recovery arises. It was previously stated that an important direction of the post-war restoration of Ukraine is the recovery of human capital, as an important resource for the development of the state. Electronic governance, for its part, should not affect the process of human capital recovery itself, but play an important role in reflecting this process, which is possible thanks to the functions of electronic governance.

Electronic governance has a number of opportunities for monitoring the process of post-war recovery of human capital, simplifying various administrative, management and other issues, which will contribute to reducing the frequency of contact between citizens and representatives of public authorities. This, in turn, will improve the psychological climate in the country, because residents will not have to experience difficulties with solving issues related to obtaining public services.

So, one of the methods of using electronic governance when assessing human capital is the direct determination of human capital by measuring the HCI, which consists of four components (UIFuture.org, 2021):

- adult literacy level;

- combined ratio of primary, secondary, tertiary gross enrollment;

- estimated years of education;

- average years of education.

Mathematically, the HCI is expressed as follows:

$$HCI = \frac{1}{3}ALR + \frac{2}{9}GER + \frac{2}{9}EYE + \frac{2}{9}AYE,$$
 (1)

where HCI – Human Capital Index;

ALR – Adult Literacy Rate;

GER – Gross Enrollment Ratio;

EYE – Estimated Years of Education;

AYE – Average Years of Education.

At the same time, an important aspect is obtaining information about the percentage of people who have sufficient skills and abilities related to learning; about the share of students studying at different levels of education; about the number of years of education that the child can count on in the future, etc. In the absence of an electronic governance system, in order to determine the HCI, it is necessary to conduct detailed field and statistical studies, which complicates the calculation procedure. However, with the availability of this system, the HCI can be calculated based on digitally available information obtained from relevant sources, which will provide an opportunity to obtain more accurate data in a limited period of time. In the post-war period, such use of the possibilities of electronic governance is especially relevant, because it will make it possible to systematically study human capital and the trends of its post-war recovery.

In addition, there are other methods of determining the HCI by using electronic governance. So, a group of Romanian scholars who researched the features of human capital assessment believe that it is possible to effectively calculate the HCI by analyzing Big Data (Nikolaescu et al., 2020). Big Data are machine-readable information arrays that can be used to analyze various features of modern society, they are stored in digital form, and various organizations can have access to them, including those engaged in sociological and statistical research. The use of Big Data can be one of the methods of assessing the post-war transformations of human capital. At the same time, the use of electronic governance will be integral, as public authorities will have the opportunity to accumulate large amounts of data using the capabilities of electronic governance. Thanks to this, a set of Big Data about citizens of Ukraine will be digitally created, which can be used in the future to determine human capital (Zhekalo, Zaiats, & Vakun, 2020).

Electronic governance will provide opportunities to combine state registers, statistics bureaus, as well as certain reporting information into a single entity. Thanks to this, there is an opportunity to properly analyze the available data, which is necessary to further determine the dynamics of changes in human capital. In addition, the assessment of post-war changes in human capital can be carried out using the method of artificial intelligence (AI), which will allow analyzing a large amount of data in a limited period of time and avoid the human factor, which can cause errors during the calculation of the HCI (Arkhypova, 2015).

2.3. Digitization as a component of post-war recovery

In order for the country to be able to assess human capital by various methods using ICTs, it is necessary to take into account such aspects of postwar recovery as digitization, security and defense potential in synergy with completed judicial, anti-corruption and other reforms (Mishchenko, 2022).

So, the digitization of Ukraine was actively taking place even before the start of military operations, primarily in the field of digitization of public services. Already today, large-scale changes in this plane can be observed. Taking into account the integration of modern technologies into various aspects of the life of society and the state, one can hope that digitalization will be one of the driving forces for proper post-war recovery of the country. After all, digitalization involves the use of digital platforms connected to the Internet, acting as an improved form of organizing social relations, which helps to speed up the process of providing the necessary services and reduce the time for processing issues related to their provision. Accordingly, digitalization of the activities of state authorities and local self-government bodies involves the introduction of electronic governance into their activities as an integrated corporate system to increase their efficiency, openness and transparency with the possibility of communication with the population.

So, the introduction of electronic governance will, firstly, contribute to the development of electronic democracy, which is based on the involvement of public representatives (citizens, public organizations, industrial enterprises, scientific institutions, etc.) through ICTs to participate in the processes of public and administrative decision-making due to the provision of electronic support of their rights through the introduction of online communication tools with public authorities. After all, such decisions will primarily concern the solution of problems accumulated during the martial law regime, in particular, the restoration of infrastructure in Ukraine and social security of the population. Secondly, it will strengthen public control over the performance by public authorities of necessary tasks formulated in an officially approved document (order/protocol of assignments) as a result of public participation, thanks to providing members of the public with access to information resources that reflect the process and result of the implementation of relevant tasks. And this, in the end, will encourage the management staff of public authorities to improve the selection process and increase the level of professional competence of specialists whose powers are aimed at managing the development of human capital in a certain field of activity.

Along with the development of human capital, an important direction of the country's recovery should be the improvement of the state management system and various aspects of society's activities, that is, governance. Given the emphasis on digitalization in recent years, this phenomenon can be implemented in order to improve the governance system, which will encourage public authorities to purchase the latest ICTs for their gradual introduction, staff training and improvement of the process of public service provision. All this will make it possible to effectively control the process of improving the work of the system of public authorities, and therefore will contribute to the development of electronic governance aimed, among other things, at the gradual recovery of human capital in the country in the post-war period.

Conclusions

In Ukraine, one of the main strategies of post-war restoration is the strategy of human capital recovery, which can be closely intertwined with digitalization, one of the main manifestations of which is electronic governance.

An important role is played by the determination of the features of electronic governance in the context of the interaction of the principles of its implementation, which reflects the creation of a single system of electronic governance aimed at restoring human capital in the post-war period thanks to effective investment in people and ICTs. After all, the presence of electronic governance in the country makes it possible to determine the dynamics of changes in human capital by calculating the HCI using various methods, including under the conditions of using specialized digital data on the country's population, which will contribute to the improvement of the general system of public administration.

The prospects for further research studies will be to study the possibilities of introducing the latest ICTs in public authorities and how to use them through training, retraining and advanced training of personnel, which is based on learning to analyze the peculiarities of the development of human capital in the country, taking into account the factors of influence in the war and post-war periods. It is important to pay attention to the study of the peculiarities of the post-war recovery of human capital in Ukraine, and, taking into account the further development of the relevant system, in perspective, electronic governance itself will allow to clearly monitor any changes related to the development of human capital in the country.

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