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ASSESSMENT OF IMPACT OF ARTIFICIAL INTELLIGENCE ON LABOR MARKET AND HUMAN CAPITAL

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Abstract. In this article, the impact of artificial intelligence technologies on the development of the country's human capital and changes in the labor market is analyzed empirically and econometrically. The research was carried out on the basis of the sociological research method, and the questionnaire was prepared on the basis of the Likert scale. The validity and reliability of the survey options based on the Likert scale is based on the evaluation of its internal consistency. "Cronbach's alpha" coefficient was used to evaluate the internal consistency and reliability of internal consistency of the questionnaire using the IBM SPSS Statistics 22.0 program. As a result of the study, the result of testing the hypothesis that human capital has a positive effect on the state of digital development as a result of the impact of artificial intelligence on the labor market shows that there is a strong relationship between them. It has become clear that the impact of artificial intelligence on the education system can also directly affect the digital development of human capital in the country. It also became known that the healthcare system under the influence of artificial intelligence will have a positive effect on the digital development of human capital.

Keywords: artificial intelligence, digital development of human capital, labor market transformation.

Introduction. In today's "Industry 4.0" era, artificial intelligence can fundamentally change work processes. Another concern is that AI could have a negative impact on the labor market if human capital is not developed to accommodate the new changes. According to scientists, artificial intelligence has the potential to be "the most important general-purpose technology of the present and foreseeable future". However, there is also concern that advances in artificial intelligence could lead to mass automation and job losses.

The question of whether artificial intelligence will complement or replace human labor is an important issue with policy implications. For example, if artificial intelligence replaces human labor, governments may reconsider retraining or digital skills training programs for affected individuals. On the other hand, if AI complements human labor and spurs growth, policymakers may instead support policies to encourage investment in AI.

The introduction of artificial intelligence creates gaps in human capital, which can deprive them of various opportunities and affect productivity. AI also creates the need for governments, organizations and higher education institutions to develop a national-level

roadmap for developing new skills and upskilling to ensure the relevance and competitiveness of human capital.

In many scientific and applied studies, there are mainly two views, some of them evaluate artificial intelligence as a substitute for labor, while others describe artificial intelligence as a complement to human labor. However, there is little systematic evidence on the impact of AI on the labor market. One of the reasons for the lack of evidence is that the rapid development of artificial intelligence is a nascent phenomenon and, accordingly, the appropriate tools and methods to assess its impact have not yet been developed. In order to fill this gap, we consider it appropriate to develop a new approach to assess the impact of artificial intelligence on the labor market and occupations in our research and call it the occupational impact of artificial intelligence. We also aim to explore the impact of artificial intelligence on the digital development of human capital from this evaluation approach.

In order to study these problems, we conducted a questionnaire survey in cooperation with the "Public Opinion Center". The main goal of this study is to more accurately study the impact of artificial intelligence on the labor market and its changes, as well as the development of human capital in Uzbekistan. To achieve the main objective, the following three objectives are critically considered:

- analyzing the relevant impact on human capital in the adoption of artificial intelligence;
- analysis of the impact of the newly developing artificial intelligence technologies on the labor market and changes in professions in it;
- it will be analyzed in which fields and industries artificial intelligence technologies can be introduced more in the near future.

160 respondents took part in this online survey and expressed their attitude to the survey questions. The answers given by the respondents to the survey questions were analyzed, their average statistical value and standard deviation were calculated, and the results were presented in tables and graphs.

Analysis of literature on the subject. Michael Webb, one of the leading researchers in the field, believes that the relationship between artificial intelligence employment and wage growth should be analyzed according to the specific characteristics of different occupations in the labor market. That is, it first considers how AI might affect the relationship between employment and wages in low-, middle-, and high-income occupations, and that this result may affect the polarization of the labor market under the influence of AI[1]. Another economist argues that AI may also affect the labor market through more indirect channels. For example, it can lead to the creation of new products, which can affect the demand for labor, and more effective education, which can affect the supply of labor[2].

Researcher Daniel Schiff and his team believe that the impact of artificial intelligence on the educational system leading to the digital development of human capital can be viewed in two ways. That is, as the impact of artificial intelligence on the education system and the impact of the education system on the development of artificial intelligence. When assessing the impact of AI on the education system, it can be studied from the perspective of AI-based teaching and learning tools in the education system and AI tools used in the management of the education system. Also, the influence of the educational system on the development of artificial intelligence is considered to be possible to deeply study the level of literacy of the population on artificial intelligence, the development of necessary skills for artificial intelligence, and the directions of training specialists in the field of artificial intelligence [3]. Loeks, an economist, also points out that artificial intelligence can be an effective learning tool that reduces the

burden on teachers and students in the educational process and offers an effective learning experience for students. Coupled with current educational reforms such as digitization of educational resources, gamification, and personalized learning experiences, there are many opportunities for the development of AI applications in education. As a result of this, it is believed that the ability of educators to quickly and easily learn modern skills will increase [4].

Artificial intelligence has the potential to transform the efficiency of the healthcare delivery system. The findings of the European Union's EIT Health report explore how AI can help improve patient experience and access to healthcare services. As a result of the study, it became clear that the introduction of artificial intelligence technologies into the healthcare system can increase the efficiency of medical care and enable healthcare institutions to provide more and better care to patients. AI can also improve the experience of medical doctors, allowing them to spend more time directly caring for patients and reduce burnout. artificial intelligence also creates great opportunities for the delivery of online health services to the population. A critical component of these capabilities includes connecting large numbers of patients with artificial intelligence through a variety of automated, easily scalable methods of patient health care, such as text messaging and patient portals.

Research methodology. Research organization includes the following stages: organization (preparation); the process of creating a questionnaire; stage of processing the obtained results; drawing up conclusions based on the results and developing suggestions and recommendations for improving activities.

The research questionnaire was created based on the Likert scale. According to this method, answers to 5 questions based on 5 parameters (scales) are formed in the following order: "5" - I strongly agree, "4" - I agree, "3" - I am not sure, "2" - I do not agree, "1" - I do not agree at all.

The validity and reliability of the survey options based on the Likert scale is based on the evaluation of its internal consistency. "Cronbach's alpha" coefficient was used to evaluate the internal consistency and reliability of internal consistency of the questionnaire using the IBM SPSS Statistics 22.0 program.

$$\alpha = \frac{N * \bar{c}}{\bar{v} + (N-1) * \bar{c}},$$

Here, α = Cronbach's alpha coefficient; N = number of studied respondent enterprises; $\bar{c}$ = average correlation of obtained results; $\bar{v}$ = mean difference.Cronbach's alpha coefficient ranges from 0 to 1, and its value is if α ≥ 0.9, then the internal consistency of the results obtained from each survey is “excellent”, if α ≥ 0.8, “good”, if α ≥ 0.7 indicates “acceptable” if α ≥ 0.6, "doubtful" if α ≥ 0.5, and finally “unacceptable” if α ≥ 0.5. In the study, it was found that this coefficient is equal to 0.82. This means that the statistical reliability of the research is positive. Also, analyzes such as data regression test and hypothesis test were performed using the SPSS tool.The classification of respondents participating in any research questionnaire can be defined as demographic indicators [5], which have the ability to display statistical information based on the information provided by the participants, as it is very important for generalization. The demographic table below shows the demographics of the participants in this study (Table 1).

Table 1.

Demographic information of respondents

Demographic indicators of respondents		Frequency	Percentage
Gender	Эркак	111	70.3
	Аёл	46	29.7
Age group	18-25	30	25.7
	26-35	51	30.8
	36-45	52	31.1
	46-55	13	6.8
	56≤	11	5.6
Field of activity	Public administration	12	7.5
	Construction	4	2.5
	Finance and insurance	20	12.5
	IT	28	17.5
	Production	23	14.3
	Education	55	36.3
	Trade and commerce	15	9.4

The response rate of male respondents to the survey was 70.3% and 29.7% of female respondents. Most of the participants are between 36 and 45 years old (52%), with more than 15 years of work experience (47.5%), which may be closely related to maturity level. Also, it can be emphasized that some participants do not have fundamental knowledge about artificial intelligence and its positive impact on the growth of human capital and its impact on the labor market and professional changes in it.

The questions in the questionnaire are divided into three sections, each section representing the elements that can be affected by artificial intelligence. That is, the first element refers to the labor market and professional changes in it, while the second and third elements consist of variables related to education and health care systems, which are part of human capital. Each independent variable represents the important elements of human capital and implies an assessment of how they can affect the digital development of human capital under the influence of artificial intelligence. The dependent variable in this study is the state of digital development of human capital. For each of the independent variables selected for the study, separate research hypotheses were formulated and these hypotheses represent the research objectives in determining how artificial intelligence can affect the digital development of human capital (Figure 1).

As a first hypothesis, we determined that the impact of artificial intelligence on the labor market and professional changes in it can positively affect the digital development of human capital.

In the second hypothesis, we estimated that the effect of artificial intelligence on the educational system may have a positive relationship with the digital development of human capital.

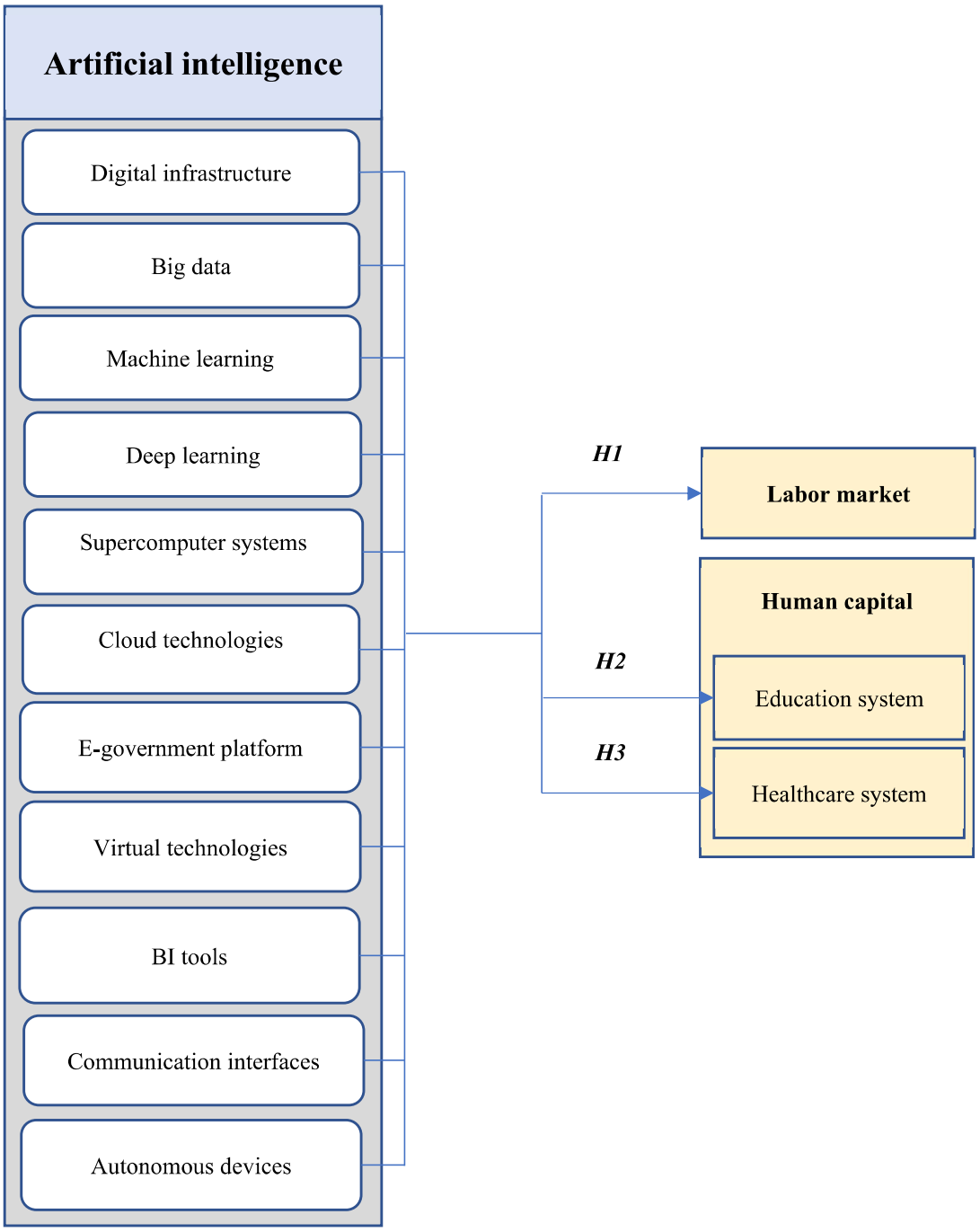

Figure 1. Research hypothesis

And finally, our third hypothesis was that the healthcare system under the influence of artificial intelligence can have a positive effect on the digital development of human capital.

Analysis and results. Thus, Table 2 below describes the descriptive statistics of the econometric evaluation of the impact of artificial intelligence on human capital and the labor market. According to him, the average value of variables close to 4 values and higher values reflected "good" and "high" results.

Table 2.

Descriptive statistics for each construct in the survey

Variables	N	Minimum	Maximum	Mean		Standard deviation
	Statistics	Statistics	Statistics	Statistics	Standard error of the mean	Statistics
Artificial intelligence	157	1	5	4,11	,073	,910
Labor market	157	1	5	3,99	,095	,885
Education system	157	1	5	4,22	,078	,976
Health care system	157	1	5	4,17	,088	,705

This table also shows the standard error of the mean and the standard deviation of the variables. The standard error of the mean measures the precision of the sample mean, meaning that it is designed to approximate it.According to it, the smallest average values of the independent variable (artificial intelligence) and dependent variables (labor market, education system, health care system) are in artificial intelligence (.073) and education system (.078) variables, and these variables average means that their values are measured with greater precision than other variables. These descriptive statistics also describe the standard deviation values, where the standard deviation estimates the variability from the data points to the mean. According to the results of the table, the standard deviation values of artificial intelligence (.910) and education system (.976) variables are smaller than other variables, which means that the data of these variables are more or densely clustered around the mean value. In general, it can be seen that there is a strong correlation between the opinions expressed by most of the respondents.

The content of the questionnaire and the normality of its variables were also checked.

Table 3.

The content of the survey questionnaire and the normality of the variables in it are statistics

Questionnaire sections	Skewness	Kurtosis
The impact of artificial intelligence on the labor market	0.891	2.077
The impact of artificial intelligence on the educational system	0.887	2.579
The impact of artificial intelligence on healthcare	0.897	2.062

The normality of each section of the questionnaire and its variables was determined by “Skewness” (asymmetry aspect) and “Kurtosis” (the location of the data being higher or lower than the normal distribution), which were within ± 3.0 and were within the acceptable range for the study.

Regression analysis of the obtained data also helps to assess the suitability of the developed model. R, R-squared, and adjusted R-squared are

estimated using the goodness-of-fit model. This helps to determine the strength of correlation between the variables and the selected model.

Table 4 describes the correlation matrix of the econometric assessment of the impact of artificial intelligence on human capital and the labor market, and the correlation coefficient is a statistical indicator that expresses the degree of linear relationship between variables. Pearson's correlation was used because the measurement unit of the variables was in the interval measurement unit.

Table 4.

Correlation matrix of econometric assessment of artificial intelligence impact on human capital and labor market

			Artificial intelligence	Health care system	Education system	Labor market
Artificial intelligence	Pearson coefficient	correlation	1	,740**	,789**	,732**
	p-value			<,001	<,001	<,001
Health care system	Pearson coefficient	correlation	,740**	1	,625**	,368**
	p-value		<,001		<,001	<,001
Education system	Pearson coefficient	correlation	,789**	,625**	1	,461**
	p-value		<,001	<,001		<,001
Labor market	Pearson coefficient	correlation	,732**	,368**	,461**	1
	p-value		<,001	<,001	<,001	

According to the results of the analysis, there is a high and positive correlation between the variables “Artificial Intelligence” and “Healthcare System” (r=0.740 p-value < .001), a high and positive correlation between the variables “Artificial Intelligence” and “Education System” (r=0.789 p-value < .001), a high and positive correlation (r=0.762 p-value < .001) was found between the variables “Artificial intelligence” and “Labor market”.

A linear regression analysis of artificial intelligence and health system variables was conducted in the study. In this case, R - .740 means that there is a strong and positive correlation between the variables, R2 - .548 means that artificial intelligence affects the healthcare system by 54.8%, adjusted R - .545 means that the linear regression model is moderately reliable (Table 5).

According to the results of linear regression analysis of artificial intelligence and educational system variables, R is .789, which means that there is a strong and positive correlation between these variables. R2 is .622, which means that the artificial intelligence affects the educational system by 62.2%, and the adjusted R is .620, which means that the linear regression model has medium reliability.

Table 5.

Regression analysis of results

Variables	R	R-squared	Adjusted R-squared	Expected standard error	R squared change
Health care system	,740a	,548	,545	,745	,548
Labor market	,732a	,536	,533	,810	,536
Education system	,789a	,622	,620	,602	,622

According to the results of the linear regression analysis of artificial intelligence and labor market variables, R is .732, which shows that there is a strong and positive correlation between these variables, R2 is .536, which indicates that artificial intelligence affects the labor market by 53.6%, adjusted R – , 533 represents the medium reliability of the linear regression model.

A reliability test was also conducted to check the reliability of the data collected from the survey questions sent to the respondents. Cronbach's Alpha was chosen as the reliability test. According to the test result, Cronbach's α = 0.827, which means that the reliability coefficient of the test is high.

According to the results of the impact of artificial intelligence on the labor market, more than 70 respondents rated the impact of artificial intelligence on the labor market as high and more than 40 respondents rated the impact of artificial intelligence on the labor market as good. The overall evaluation result is 3.99, which means that the impact of artificial intelligence on the labor market is positive and good.

Table 6.

Hypothesis testing and analysis

	Non-standard coefficient		Standard coefficient	t	
	B	Std. Error	Beta		Sig.
Artificial intelligence	1.608	.415		3.873	.000
Labor market	.355	.082	.364	4.314	.000
Education system	.092	.074	.100	1.240	.217
Health care system	.082	.102	0.74	.804	.422

The results on the impact of artificial intelligence on the education system are also described, and in these results, about 80 respondents rated the impact of artificial intelligence on the education system highly. The overall evaluation result is 4.22, which means that the impact of artificial intelligence on the education system is positive and high.

According to the results of the impact of artificial intelligence on the health care system evaluated by the respondents on a 5-point scale, more than 80 respondents rated the impact of artificial intelligence on the health care system highly. The overall evaluation result is 4.17, which means that the impact of artificial intelligence on the healthcare system is positive and high.

As a result of the impact of artificial intelligence on the labor market, the result of testing the hypothesis that human capital has a positive effect on the state of digital development shows that there is a strong connection between them. It has become

clear that the impact of artificial intelligence on the education system can also directly affect the digital development of human capital in the country. It also became known that the healthcare system under the influence of artificial intelligence has a positive effect on the digital development of human capital.

Conclusion. Researchers in the field, Thames and Sheife state that the introduction of artificial intelligence can significantly increase the efficiency of human capital in many ways[6]. Based on the obtained results, it can be said that artificial intelligence has its advantages and disadvantages compared to human capital.

Human capital skills and cognitive abilities are cited as important factors to support the transition process, and if these are neglected, these jobs may be at risk of being lost. It is also difficult to predict the true impact of AI on human capital and labor market changes, as the technology is still developing and the potential impact on jobs remains uncertain.

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EVOLUTION OF MANAGEMENT SCIENCE

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Abstract: Scientific formation and innovation management are two closely related areas of great importance for the development of modern society. In this article, we consider the stages and foundations of the scientific formation of innovation management, which are the main factors of the development of science and technology. The main stages and role of the scientific formation of innovation management in the modern world are considered in the article. The main stages of the evolution of management science under the influence of different schools and approaches are discussed.

Keywords: Management, management, innovation management, the ability to create wealth in new ways, planning stage, conditions and organization, execution stage, leadership stage, innovation cycle, distance-time aggregates, Classical school, Moral school, Scientific school, Process approach, System approach, Life Cycle Approach, Quantitative Mathematical Approaches, Project Approach, Marketing Approach.

The first stage of scientific formation began in antiquity, when people studied their surroundings and created the first scientific theories. One of the first great scientists was Aristotle, who formulated many theories in various fields of

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