The role of education in the formation of human capital

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Abstract. The article is devoted to determining the role of education in the management of human resources, in their qualitative formation. The authors consider in detail the principles of the concept of human capital, which create the basis for its economic development and labor productivity, it is knowledge, skills, experience and qualification. The authors conducted a review of the literature of foreign and domestic authors on the emerging principles of the concept of human capital, revealing the relationship between learning and adaptation, between health and labor productivity, as well as social ties and networks that affect success in labor and social activities. The study analyzes the literacy level of the population of Kazakhstan, which shows the degree of possibility of realizing the country's potential. The analysis of literacy and assessment of the level of education of the country's population was presented in the context of regions, which allowed to identify the existing problems in obtaining education and professional competencies in the regions. As a result, the authors concluded that human capital plays a critical role in the development of the economy and society as a whole. Investments in education help to increase labor productivity, promote innovative development and improve the quality of life.**Keywords:** Education, Human capital, Management

1 Introduction

The concept of human capital, widely recognized and introduced in economic theory and practice, is an integral element of the modern approach to resource management and society development. The issue of labor force efficiency and its qualitative characteristics are the subject of research of both domestic and foreign scientists.Human resources represent the main element of successful functioning of any country, region and organization. Their management requires understanding of various aspects, including the classification of personnel according to various criteria. Competent management of human resources allows an organization to effectively use human potential and achieve its goals. In all spheres of human activity, human relations with nature and people are guiding, where education plays an important role.

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The purpose and meaning of human life is related to his social ideas and activities.High productivity requires knowledge, which education provides. Hence, the responsibility of selecting the right personnel is high. The same high demands should be placed on institutions of higher education. After all, how often we are faced with poor quality and low productivity in any branch of technology and economy, associated with insufficiently high qualification of workers, which in turn is the result of poor education. We think that the guarantee of high quality is quality education. Sometimes training and education are put on equal footing, which in our opinion is wrong, because education is the joint physical and social development of the individual. Training is the preparation of an individual for a particular specialty.

2 Materials and methods

The term “human capital” was first used by the founder of this school M. Friedman in his work “The Theory of the Quantity of Money” in 1956. Without specifying the essential content of the concept, he attributed human capital to the main forms of wealth [1]. Foreign scientists emphasize the principles of the concept of human capital, i.e. investments in education. Also in the work of Gary Becker “Investment in Human Capital” [2] it is noted that human education is a form of capital that increases the productivity and profitability of an individual. Education is considered as the most important resource that influences the formation of skills and contributes to successful inclusion in modern labor markets.

The work of Theodore Schultz “Investing in People” [3] emphasizes the need for continuous learning and adaptation. The principle is that in order to maintain and increase productivity, human capital must constantly update its skills and knowledge, especially in a rapidly changing technological environment.There is also a close relationship between health and productivity, as indicated in Michael Grossman's “On the Concept of Health Capital” [4]. Health is considered as a part of human capital that affects labor efficiency and productivity level.In the work of Pierre Bourdieu “The Forms of Capital” [5] puts forward the idea of social capital, which is a set of social ties and networks that influence success in labor and social spheres. This principle emphasizes the importance of social relations in “the formation and use of human capital.In Edward Lazer's work “The Economics of Education” discusses the role of motivation and incentives in increasing the productivity of human capital” [6]. The principle is that the creation of incentives, both tangible and intangible, contributes to a more efficient use of labor resources.

The concept of human capital is a set of ideas that describes human knowledge, skills, experience and qualifications as a form of assets that contribute to economic development and productivity growth [7-8]. The core principles of this concept provide an understanding of how the effective management of human capital can have a positive impact on societal and economic well-being. Consider an overview of the core principles of the human capital concept in Table 1.

Table 1. Basic principles of the human capital concept in the scientific literature

No.	Principle	Characteristic
1	Investments in education [9]	Investing in education implies that education is the main source of human capital formation, from primary to tertiary level. It contributes to the development of knowledge and skills, which ultimately improves the skills and productivity of the workforce.

2	The importance of continuous learning and development [10]	Given the rapidly changing environment and technological innovations, constant updating of skills and adaptation to new labor market demands are becoming key aspects of effective human capital.
3	The role of health and well-being [11]	Physical and mental health affect overall productivity and ability to work. Health promotion programs and good working conditions contribute to improved performance.
4	Development of social capital [12]	The principle emphasizes the importance of building social capital in the form of networks of professional connections, interactions and knowledge sharing. A collective intellectual and cultural environment facilitates the sharing of experience and innovative ideas, improving overall performance.
5	Measures to stimulate motivation and satisfaction [13]	The principle assumes that stimulating motivation and creating conditions for employee satisfaction leads to higher productivity. Fair wages, reward systems and career development opportunities help to attract and retain qualified personnel.
6	Integrating human capital into strategic management [14]	The principle emphasizes the importance of including human capital in the strategic management of the organization. This includes building strategies for staff development, talent management and creating conditions for creativity and innovation.
7	Social responsibility and sustainability [15]	The principle draws attention to the social responsibility of organizations towards their employees. Creating the conditions for work-life balance and environmental sustainability affect the overall sustainability and success of a business.
Note - compiled by the authors on the basis of sources [9-15]		

The common feature of these principles is the understanding of human capital as a key factor in the successful development of organizations and society as a whole.

3 Results

In general, the literate population of a country is an indicator of its social and economic development, as well as the effectiveness of educational and social policy. The importance of literacy of the population lies in the high possibility to realize the country's potential, not only human, but also all kinds of national resources. In other words, the more literate the population, the higher the economic, innovative and technological development of the country.

Table 2. Literacy of the population by age groups in the Republic of Kazakhstan, 2021, people

No.	Age	Total	Men	Women
1	10-14	1 737 126	892 161	844 965
2	15-49	9 066 423	4 539 263	4 527 160

3	50 years and older	4 455 971	1 898 422	2 557 549
4	Total	15 259 520	7 329 846	7 929 674
Note - compiled by the authors on the basis of the source [16]				

Census data for 2021 shows that out of 19,421,000 people, 78.5% are literate at the age of 10 and above, according to their level of education. Also, at the age of 50 years and above, there are 659,127 more educated women than men. The clear implication is the rather low life expectancy of men in this age category. The ratio in terms of active labor population of men and women is almost the same in the age range from 15 to 49 years.

As for the localization of the literate population by territorial affiliation, the urban population is naturally more educated than the rural population [17]. Since the urbanized territory has always been the center of attraction for creative, intellectually developed, and cultured population. As a rule, those people who have no education at all or have working and technical specialties remain in rural areas [18]. Therefore, the number of literate populations in the city exceeds the rural population approximately 2 times.

Table 3. Literacy of the population by territorial affiliation in the Republic of Kazakhstan, 2021, people

№	Age	Total		Men		Women	
		Urban	Rural	Urban	Rural	Urban	Rural
1	10-14	979028	758098	502132	390029	476896	368069
2	15-49	5634581	3431842	2740013	1799250	2894568	1632592
3	50 years and older	2755709	1700262	1116269	782153	1639440	918109
4	Total	9369318	5890202	4358414	2971432	5010904	2918770
Note - compiled by the authors on the basis of the source [14]							

Thus, the literate population is an important indicator for assessing the human resources of the country in order to take measures on social and economic development strategies of the country. Table 4 is presented by regions of the Republic of Kazakhstan, the largest number of people studying at postgraduate education programs is accumulated in the cities of republican importance (Astana, Almaty, Shymkent) and three regions (Almaty, Karaganda and East Kazakhstan). What is noteworthy, people who have not completed higher education are also noted in these same regions respectively.

Table 4. Population of the Republic of Kazakhstan, attending educational organizations, by level of education, 2021, thousand people

Regions Republic of	Population aged 10	of them are educated:	no level of education has been

Kazakhstan											achieved, of which:	
		postgraduate	higher	undergraduate degree	technical and vocational	special	professional	general secondary	basic secondary	primary	can read and write	illiterates
Kazakhstan Republic	3600,9	2,0	98,4	0,9	108,4	27,8	14,1	762,7	680,2	1721,7	183,8	0,995
Akmola region	128,1	0,07	2,8	0,034	2,8	1,0	0,6	22,6	27,0	63,0	8,3	0,058
Aktobe region	169,8	0,108	4,4	0,054	4,9	1,6	1,0	36,6	34,7	78,8	7,5	0,052
Almaty region	370,2	0,161	4,8	0,028	6,1	1,0	1,0	58,4	69,2	209,7	19,5	0,076
Atyrau region	125,9	0,053	2,1	0,036	3,2	1,0	0,4	22,3	24,1	66,9	5,8	0,040
West Kazakhstan region	123,2	0,073	2,9	0,062	5,7	1,9	0,7	29,2	23,1	55,0	4,4	0,039
Zhambyl region	231,3	0,090	3,6	0,047	5,0	1,6	0,6	37,2	44,8	127,2	11,0	0,063
Karaganda region	235,3	0,159	7,0	0,079	6,7	2,4	1,2	55,1	45,1	105,1	12,2	0,067
Kostanay region	128,2	0,094	3,2	0,061	3,8	1,6	0,8	27,7	25,3	56,8	8,8	0,055
Kyzylorda region	159,6	0,074	2,9	0,021	3,5	0,7	0,4	26,6	31,3	87,1	6,9	0,0

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Mangistau region	138,4	0,083	2,3	0,020	3,0	0,5	0,5	21,5	29,0	74,5	6,9	0,039
Pavlodar region	126,3	0,103	4,6	0,058	3,6	2,0	0,9	26,1	25,0	55,4	8,5	0,055
North Kazakhstan region	79,3	0,071	2,5	-	1,9	0,4	0,3	15,9	15,9	36,9	5,4	0,037
Turkestan region	422,9	0,107	4,4	0,010	7,6	0,8	0,7	54,0	89,5	241,0	24,5	0,087
East Kazakhstan region	221,5	0,159	7,2	0,097	5,9	2,8	1,3	45,8	44,6	101,5	11,9	0,056
Astana	231,2	0,178	12,7	0,034	8,9	1,3	0,7	62,5	35,7	95,6	13,4	0,070
Almaty	431,1	0,340	23,5	0,128	22,5	4,6	1,8	137,6	68,0	154,6	18,0	0,073
Shymkent	278,7	0,117	7,5	0,095	13,1	2,6	1,0	83,3	47,8	112,4	10,7	0,073
Note - compiled by the authors on the basis of the source [14]												

As for those studying at higher education programs, the largest number is localized in two regions, in Karaganda region and East-Kazakhstan region.Three regions (Karaganda region, Pavlodar region and East-Kazakhstan region) are the leaders in vocational education. The peculiarities of these regions are their specialization in the economy, especially in such sectors as coal, metallurgical industry and ore mining. In these regions, the system of vocational education is quite effective and developed, which in turn allows people to receive secondary technical education by profile.

"At the time of the census in 2021, 3.7 million people had higher education, 4.1 million - specialized secondary education, 4.9 million - secondary education, i.e., every fourth Kazakhstani has higher education Compared to the 2009 census, the share of the population with higher education increased from 19.8% to 27.6% in 2021. Among the regions, the largest number of people with higher education falls on Almaty region - 404.8 thousand people. In terms of the share of population with higher education in each region, the city of Astana is the leader - 25.5% of the population of the capital.

By gender, the share of men and women with higher education is almost the same. The share of men since the last census has increased from 17.8% to 27.9%, women from 21.6% to 27.3%.In general, there are 276 people with a university diploma per 1000 people, in 2009 this indicator was at the level of 198 people, i.e. 4.1 million Kazakhstanis have specialized secondary education At the time of the census in 2021, 4,167 thousand Kazakhs had specialized secondary education. Compared to the 2009 census, their share among the population over 15 years of age increased from 27.6% to 30.8%. More than 120 thousand Kazakhstanis have a degree. At the time of the census in 2021, 120.8 thousand Kazakhs had postgraduate education. A large proportion (17.8%) who have postgraduate education, falls on the age of 30-34 years.Of the total number of scientists 78% have a master's degree (96.9 thousand people), 3.6% - Doctor of Philosophy (PhD), (4.5 thousand people), 13.5% - Candidate of Science (16.8 thousand people), 4% - Doctor of Science (4.9 thousand people)".

Table 5. Population by age and types of attended educational organizations, 2021, thousand people

Ages	Population aged 6 years and older	of them are educated:							
		in the organization of pre-school education and training	primary education	basic secondary education	general secondary education	technical and vocational education	higher education	postgraduate education	refresher/retraining courses
All of them	5066,2	94,5	1555,2	1 721,9	328,9	469,7	607,3	49,1	239,5
6-9	1465,2	94,5	1 370,5	0,160	-	-	-	-	-
10-14	1738,1	-	184,6	1 550,2	0,708	2,6	-	-	-
15-19	1134,8	-	-	171,6	328,2	368,0	259,5	-	7,5

20-24	346,2	-	-	-	-	50,2	255,4	24,3	16,3
25-29	110,5	-	-	-	-	16,5	51,2	13,4	29,4
30 and over	271,3	-	-	-	-	32,4	41,1	11,4	186,4
Note - compiled by the authors on the basis of the source [14]									

The data in Table 5 clearly demonstrate the pyramid by levels of education. The first stages are primary and basic secondary education. With each level of education, the number decreases, but at the stage of higher education their number increases, which suggests that people are interested in obtaining a diploma and the necessary qualifications. In addition, there were 469,696 people studying for working specialties. In 2021, 607,316 people studied for specialists. And on the programs of postgraduate education (master's degree, doctoral studies, advanced training) 49075 people studied.

4 Discussion

Nevertheless, despite these limitations, the concept of human capital remains an important tool of analysis and practice for public and private organizations. Effective human capital management requires a comprehensive approach that includes investing in education and health care, developing social programs to support the population, and creating a favorable environment for the development of talents and skills.Human life is multifaceted. Even if a person is well trained in a certain specialty, it is not yet a guarantee of his/her high cultural level. Education changes a person's thinking, his skills and abilities and accordingly his morality. Managers of enterprises realize that the only way to have highly qualified producers is a high level of education of employees. But, not every city or even country has appropriate higher educational institutions. Hence, there is a need to send their citizens to other countries for training.

The level of training of such students will depend on many factors, such as: health condition, age, financial status, psychological characteristics. For these students, a positive motive for learning is psychological maturity, i.e. the process of perception of learning material will be influenced, among other things, by the psychological characteristics of the individuals studying together with him/her. Under such conditions, the realization of the ultimate goal of learning can be a decisive factor. Thus, the enterprise, without aiming to have employees with degrees, increases the level of education of employees, which in general raises the welfare of the country and is the basis for the development of society.

5 Conclusion

Thus, the concept of human capital is a key aspect of modern economic theory and practice, affecting various spheres of social life, including education, health care, technological innovation and industrial relations. In this review, we have considered various aspects of this concept and its significance and application in the modern world.

Initially, the concept of human capital was introduced as a theoretical model describing the relationship between investments in education and health of an individual and his/her productivity as a worker. However, over time it has been interpreted more broadly to include aspects such as skills, knowledge, work experience, quality of life and social capital.

One of the key conclusions that can be drawn from the analysis is that human capital plays a critical role in the development of the economy and society as a whole. Investments in human capital help to increase labor productivity, improve the level of education and health of the population, as well as promote innovative development and improve the quality of life.

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References

[1] M. I. Ivanov, "Human capital: the concept and its development," *Innovative economics: prospects for development and improvement*, no. 2 (52), 2021. [Online]. Available: https://cyberleninka.ru/article/n/chelovecheskiy-kapital-kontseptsiya-i-ee-razvitie.

[2] G. S. Becker, "Investment in Human Capital: A Theoretical Analysis," *Journal of Political Economy*, vol. 70, no. 5, Part 2: Investment in Human Beings, pp. 9–49, Oct. 1962. [Online]. Available: https://www.jstor.org/stable/1829103.

[3] G. S. Becker, "Investment in Human Capital: A Theoretical Analysis," *Journal of Political Economy*, vol. 70, no. 5, Part 2, pp. 9–49, Oct. 1962. [Online]. Available: https://www.jstor.org/stable/1829103.

[4] V. V. Prokhorova and O. V. Medvedeva, "Health capital as the fundamental principle of human capital," *Bulletin of the Adygea State University. Episode 5: Economics*, no. 3 (245), 2019. [Online]. Available: https://cyberleninka.ru/article/n/kapital-zdorovya-kak-pervoosnova-chelovecheskogo-kapitala.

[5] P. A. Savchenko, "The concept of social capital in P. Bourdieu: difficulties in interpretation," *Sociology and law*, no. 2 (48), 2020. [Online]. Available: https://cyberleninka.ru/article/n/ponyatie-sotsialnogo-kapitala-u-p-burdie-trudnosti-v-interpretatsii.

[6] V. A. Shabashev and S. I. Shorokhov, *The influence of human capital on economic growth in regions with different production structures*, Limited Liability Company "Kuzbas-svuzizdat Publishing House", 2015, pp. 202. ISBN 978-5-202-01332-4. EDN VCCTTL.

[7] D. Turekulova, B. Beisengaliyev, A. Turekulova, and G. Saimagambetova, "Improvement of indicators of socio-economic development of the regions of Kazakhstan," *E3S Web of Conf.*, vol. 402, 2023, 08041.

[8] B. T. Chereyeva et al., "Methodological approach to assessing the effectiveness of public sector infrastructure management," *E3S Web of Conferences*, vol. 402, 09027, 2023. [Online]. Available: https://doi.org/10.1051/e3sconf/202340209027.

[9] O. V. Budzinskaya and A. V. Demidova, "Human capital and investments in education," *RPPE*, no. 9 (71), 2016. [Online]. Available: https://cyberleninka.ru/article/n/chelovecheskiy-kapital-i-investitsii-v-obrazovanie.

[10] A. Serikkyzy, S. S. Baktymbet, and A. S. Baktymbet, "Transformation of human capital in the era of modern challenges," *Journal of Monetary Economics and Management*, no. 2, 2023. [Online]. Available: https://cyberleninka.ru/article/n/transformatsiya-chelovecheskogo-kapitala-v-epohu-sovremennyh-vyzovov.

[11] K. A. Ustinova and A. N. Gordievskaya, "The influence of health status on the social activity of the older population," *Economic and social changes: facts, trends, forecast*, no. 3, 2020. [Online]. Available: https://cyberleninka.ru/article/n/vliyanie-sostoyaniya-zdorovya-na-sotsialnuyu-aktivnost-naseleniya-starshih-vozrastov.

[12] M. Block and N. A. Golovin, "Social capital: to generalize the concept," *Bulletin of St. Petersburg University. Sociology*, no. 4, 2015. [Online]. Available: https://cyberleninka.ru/article/n/sotsialnyy-kapital-k-obobscheniyu-ponyatiya.

[13] A. E. Mitrofanova and G. A. Manvelyan, "Motivation and stimulation as the main tool for retaining staff in an organization," *UPIRR*, no. 1, 2021. [Online]. Available:

https://cyberleninka.ru/article/n/motivatsiya-i-stimulirovanie-kak-osnovnoy-instrument-uderzhaniya-personala-v-organizatsii.

[14] V. M. Tarayan, "Strategic concepts of human resource management and their impact on innovation," *KE*, no. 3, 2016. [Online]. Available: https://cyberleninka.ru/article/n/strategicheskie-kontseptsii-upravleniya-chelovecheskimi-resursami-i-ih-vliyanie-na-innovatsii.

[15] "Sustainable development and corporate social responsibility," [Online]. Available: https://www.tutorialspoint.com/sustainability-and-corporate-social-responsibility.

[16] "Education in the Republic of Kazakhstan. The results of the National Population Census of 2021 in the Republic of Kazakhstan," [Online]. Available: https://stat.gov.kz/upload/iblock/3a8/7c99zhdr5fpt1htbcd1migx7aqgazend/Образование.pdf.

[17] D. Turekulova, R. Dulambayeva, L. Mukhambetova, M. Niyazov, A. Abzhapparova, and A. Omarova, "Management of the Competitiveness of the Region in the Context of Sustainable Development Based on the Concept of 'Evidence-Based Policy'," *Journal of Environmental Management and Tourism*, vol. 13, no. 3, pp. 732–745, Jun. 2022. ISSN 2068-7729.

[18] A. Omarova, M. Niyazov, A. Turekulova, D. Turekulova, L. Mukhambetova, and Y. Mukhambetov, "Socio-economic Development of Youth Policy in the Context of Digital Transformation," *Montenegrin Journal of Economics*, vol. 20, no. 1, pp. 197–208, 2024.

[19] J. Smith, M. Jones Jr., and L. Houghton et al., "Future of health insurance," *N. Engl. J. Med.*, vol. 965, pp. 325–329, 1999.

[20] D. S. Saunders, "The biological clock of insects," *Sci. Am.*, vol. 234, no. 2, pp. 114–121, 1976.

[21] M. K. Slifka and J. L. Whitton, "Clinical implications of dysregulated cytokine production," *Dig. J. Mol. Med.*, DOI: 10.1007/s801090000086, 2000.

[22] B. B. Brown and A. M. Aaron, "The politics of nature," in *The rise of modern genomics*, 3rd ed., J. Smith, Ed., Wiley, New York, 2001.

[23] S.-T. Chung and R. L. Morris, "Isolation and characterization of plasmid deoxyribonucleic acid from *Streptomyces fradiae*," in *Abstracts of the 3rd International Symposium on the Genetics of Industrial Microorganisms*, University of Wisconsin, Madison, 4–9 June 1978.