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## Analysis of key indicators of human capital development in Kazakhstan

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### Abstract

**Relevance.** The relevance of studying the phenomenon of human capital and analysing the factors of its growth has increased significantly in recent years, when the development of digital technologies has significantly accelerated the processes of interaction between people, and when assessing the labour potential of an employee, its intellectual component has come to the fore. A particularly strong impetus to the development of digital communication was given by the COVID-19 pandemic, which, with its forced isolation, prompted the personnel of companies around the world to search for effective tools for remote control and monitoring.

**Purpose.** The purpose of this work is to identify key indicators of human capital development in Kazakhstan in general and in the four regions of the Western region of Kazakhstan in particular.

**Methodology.** In the course of the study, the method of statistical analysis, the method of indicative analysis, as well as the method of forecasting were used.

**Results.** As key indicators of the development of human capital, such social and economic indicators as the percentage of citizens who have received higher education, the average level of wages, the number of practising doctors, and the activity of the cultural sphere, as well as the parameters of the innovative development of society – the costs of science and the level of digital literacy were taken.

**Conclusions.** The data were compared in dynamics with the indicators of several previous years, and based on the obtained values, short-term forecasts were formed. The practical significance of the study lies in the formation of

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predictable trends in the development of human capital, the identification of the most significant factors of its growth and the development of recommendations designed to improve the efficiency of national economy enterprises, both throughout Kazakhstan and its four western regions – Atyrau, Mangistau, Aktobe and West Kazakhstan.

**Keywords:** qualification; health; education; wage; employment; working capacity.

## **Introduction**

Initially, at the dawn of the development of economic theories, the essence of the human resource came down, rather, to investments aimed directly at increasing efficiency – compliance with the minimum physiological needs and the formation of the necessary skills. Later, with the development of technology, the concept of “human capital” crystallized as the ability to generate income, which began to include such non-obvious components as the cultural and intellectual level of the employee, his innate talent, the well-being of him and his family, and development potential.

Founder of economic theory A. Smith [1] in his study noted that one of the most important conditions for providing people is “the knowledge, skill, and art with which their labour is applied”. D. Ricardo [2] also emphasized the role of education in shaping the wealth of the nation, and it was precisely the lack of knowledge and skills that explained the different levels of economic development of certain states of their time. However, in the era of the industrial revolution, there was a decrease in the importance of the human factor – as K. Marx [3] noted then, if in the early, “manufacturing” stages of production, tools were only an addition to the qualities of a worker, then after the industrial breakthrough, a person himself became a primitive addition to a complex machine. In other words, at least for the first time the term was introduced into circulation in the twentieth century J. Mincer [4], the formulation of the concept of “human capital” is still the subject of study. The interpretation of this category is also investigated, which allows comparing human resources with physical capital. This, in turn, made it possible to plan and predict their development in terms of the effectiveness of invested resources, as well as ensure gender equality in the structure of the country’s human capital.

Most experts agree that the human resources are a significant factor in economic development and the development of society, which is aimed at creating values – both tangible and intangible properties. At the same time, it is important to note that ecology, as one of the factors in shaping the health of an individual, is also directly related to the value of human capital. The same must be said about security, which is directly related to the level of crime in society, and about the level of culture, which can be quantified through the prism of art exhibitions, staged performances and other cultural events. Especially the role of human capital grows in the conditions of an innovative economy, when the intellectual qualities of the staff become especially in demand. Therefore, it is at this stage that the analysis of development indicators is important in order to understand the dynamics of processes and exert the necessary and timely influence on them, but there are different views on what exactly should be considered key development factors.

At the same time, the increase in the value of human capital is largely due to the development of the information environment itself, which simplifies communication

between the citizen, the education system and the labour market. As noted by N.A. Amanzholov [5], the “e-Residence” digital platform, developed by Kazakh specialists from the Astana International Financial Center (AIFC), is ahead of the existing system of requirements for the composition of professions employed in the labour market and eliminates the shortage of qualified personnel. At the same time, at this stage, there is no fresh cut of diverse indicators of personal growth in the Republic of Kazakhstan and, in particular, a study of the situation with the size of human capital in the Western region of Kazakhstan. The purpose of this work is to fill this gap, including an assessment of the post-pandemic situation and a forecast of key factors for the near future.

## **Literature Review**

The topic of human capital development, as the most important factor in the innovation leap of the world economy, attracts the attention of many researchers, especially in the context of the evolution of digital civilization that has manifested itself in recent years. For example, A. Demircuc-Kunt and I. Torre [6] offer an alternative metric to measure human capital in middle-income countries by including higher education and adult health risk factors. Applying this technique to countries in Europe and Central Asia, the authors found that countries with high levels of basic education do not necessarily have good tertiary education outcomes, and high prevalence of adult health risk factors and bad habits can undermine health programs for children.

In relation to the realities of Kazakhstan, it is important to consider the issue in the context of the so-called. the theory of the “resource curse”, according to which states that possess mineral reserves concentrate their forces on their extraction and do not pay due attention to the development of other areas of activity, which leads to problems in development. K. Eslamloueyan and M. Jafari [7], after examining the association of high levels of human capital with exposure to the “resource curse” in 25 countries, found a threshold at which the negative dependence on mineral abundance disappears. The impact of human capital on economic growth, but already on the example of 141 countries, was also studied by T. Sultana et al. [8]. The conclusion of this team of authors also confirms that all aspects of human capital have a positive effect on economic growth in developing countries. This is especially true of increasing life expectancy, which can be explained by the demographic transition that these countries are going through.

P. Dong et al. [9], examining the impact of the development of the digital economy on the innovation of enterprises at the micro level from the point of view of human capital, determined that the development of the digital economy can effectively reduce the demand gap and the cost of hiring R&D personnel, and significantly increase its efficiency. The experience of China is also indicative in assessing the gap in human capital between

urban and rural areas. After doing research, D. Sun et al. [10] found that digital empowerment significantly promotes the accumulation of human capital in rural areas, which increases the potential of the economy as a whole, including traditionally backward provinces.

The sustainable development goals, which have become especially relevant in the 21st century, are also most directly related to the development of human capital. In a study by S.M. Madero-Gomez et al. [11] highlights the need for organizations to develop sustainable human resource management practices to minimize negative impacts on employee well-being and capitalize on the investment in people made through sustainable initiatives. When considering the problem of human capital, one cannot ignore such an aspect as gender injustice – historically, the work of a woman was valued lower and in the modern world this practice must be eradicated. This problem on the example of Kazakhstan was studied by J.A. Seithozhina [12] and for fair payroll proposed to introduce a special variable CUL – cultural capital, including knowledge of foreign languages, entrepreneurial abilities, level of managerial skills and the ability of an individual to work in several directions. The experience of all the authors mentioned above helps to determine the most complete list of the most important factors contributing to the development of human capital.

## Materials and Methods

In the course of the study, the method of statistical analysis, the method of indicative analysis, as well as the method of forecasting were used. With the help of statistical analysis, key development indicators were compared, whose transformation unequivocally signals a change in the volume of human capital. To one degree or another, all of them are factors in the formation of the value of a potential employee and cover most aspects of his life – the economy, social life, education, culture, health, security. In particular, the following indicators were analysed: the volume of the gross domestic product (GDP); the level of employment of the population; the average level of wages; volume of expenses for environmental protection; share of secondary school graduates who have received higher education; the level of digital literacy of the population; the volume of costs for research and development work (R&D); the volume of electronic commerce; number of practising doctors of all specialities; number of registered marriages; average life expectancy; the number of theatrical productions; the number of reported crimes.

When developing the methodology of this study, the effect of the impact on the indicators of the COVID-19 pandemic and its consequences, especially affecting life expectancy and social activity, was also taken into account, which made it possible to give a more objective assessment of the sharp changes in some parameters in 2020 and 2021. The site of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13] was used as the main source of data. Given this statistical information, indicators were compared over a period of 10 to 5 years, depending on the availability of relevant data. For some indicators, data for 2022 has not yet been processed by the Bureau of National Statistics, in this case, information up to and including 2021 was used. This approach made it possible to see the

situation not just “at the moment” for the current period, but also to track the dynamics, identify trends and, accordingly, make a forecast for the further development of one or another indicator.

For each key national indicator, the dependence was tracked, and a line chart was formed for clarity. Based on the results of each of the parameters, an indicative analysis was carried out, a conclusion was made, and then, using the forecasting method, the prospects for the development of human capital in the future were formed. In addition, a number of parameters of the Western region of Kazakhstan were studied using the method of statistical analysis, including four regions — Atyrau, Mangistau, Aktobe and West Kazakhstan. Statistical data for these areas were considered both separately and in total, and based on the generalized result, line graphs were also built, conclusions were drawn and recommendations were provided. At the same time, depending on the specific indicator of human capital growth, two methods were used to calculate the summary result for the entire Western region of Kazakhstan. To generalize data on investments in environmental protection, the number of doctors of all specialities and the number of staged performances, an arithmetic summation of data was carried out for the four study areas. To obtain the final result for the entire Western region for such indicators as the proportion of graduates who received higher education, the level of digital literacy of the population and life expectancy, the arithmetic mean was calculated from the data obtained for Aktobe, Atyrau, West Kazakhstan and Mangystau regions.

## Results

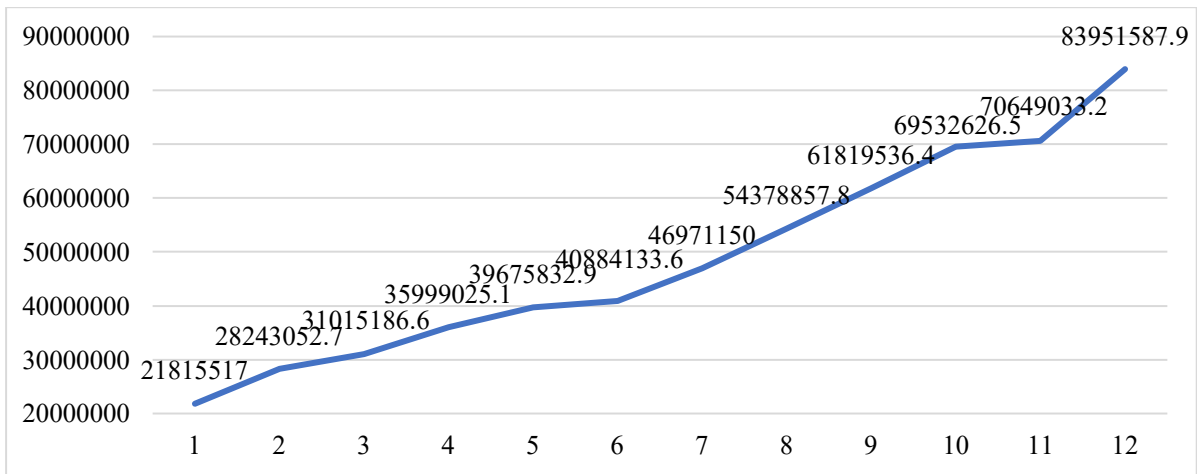
To determine the current state of affairs in Kazakhstan with the capitalization of the human resources, one should, firstly, turn to the data of the World Bank, which has developed a special global initiative designed to promote increased investment in human capital around the world [14]. Thus, according to the national report, the size of this index for Kazakhstan amounted to 63%, which is higher than the global value of 56% [15]. At the same time, when assessing the situation in the labour market of the Republic of Kazakhstan, it is important to take into account its structure, since studies show that this market does not just consist of acts of sale and purchase of labour, but also includes the level of employment of the population, as well as measures to protect able-bodied citizens. For example, as part of protection against the consequences of the COVID-19 pandemic, the government of Kazakhstan subsidized more than 4.6 million people with compensation payments in the amount of 42500 tenge, and more than one million citizens were regularly provided with food packages. In addition, since 2020, the Employment Roadmap program has been implemented, under which 239 thousand people were employed and 6.700 projects were implemented.

Enbek digital ecosystem program, thanks to which 663 thousand citizens got jobs, 319 thousand of them on a permanent basis. As part of the same digital ecosystem, Atlas was developed of new professions and competencies of Kazakhstan [16] is a collection of almost five hundred professions that, according to experts from nine industries, will be in demand in the very near future. At the same time, the National Chamber of Entrepreneurs “Atameken”

polled 600 thousand employers from all over Kazakhstan to find out which professions employees are most in demand on the labour market. According to the data received, the largest number of vacancies is observed in such professions as agronomists, engineers, machine operators, economists, with the greatest demand in rural areas. There are, however, regions with the opposite situation, when the demand for work significantly exceeds the supply. In particular, there are 219 resumes for 100 vacancies in the Mangistau region, 182 in the Kyzylorda region, 112 in Turkestan, and 105 resumes in Almaty.

At the same time, the figures “at the moment” do not provide comprehensive information about development indicators and for a full assessment they are needed in dynamics. Below are a number of the most important social

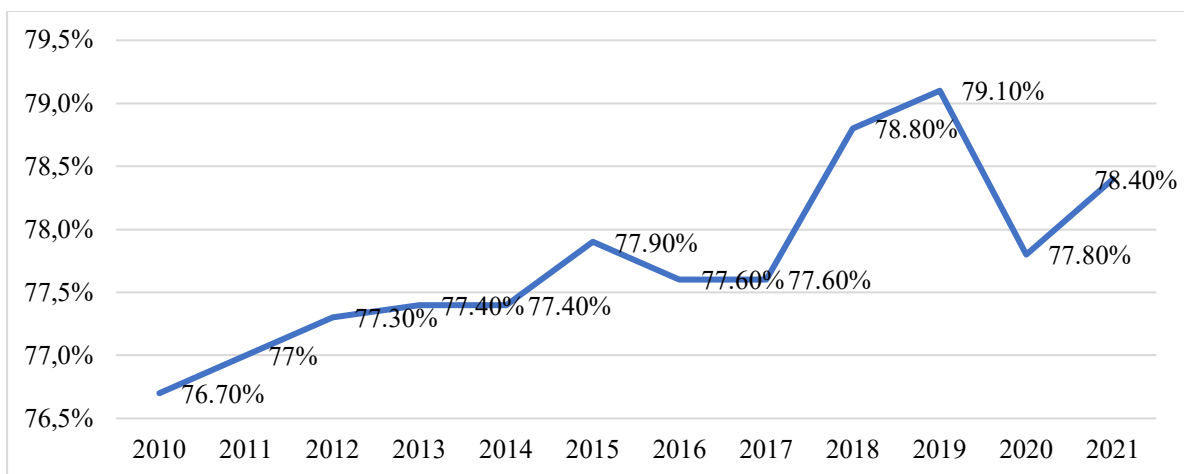
and economic parameters in recent years – in general for the Republic and separately for four regions of the Western region of Kazakhstan – Atyrau, Mangistau, Aktobe and West Kazakhstan. These parameters can be roughly divided into eight categories: the economy (including indicators such as GDP, employment and average wages), the environment, education (the level of higher education and the level of digital literacy of the population), innovation (investment in R&D and the volume of e-commerce), health, social life, culture, and security. Exploring the economic block in more detail, firstly, it is necessary to determine the dynamics of GDP growth. The volumes of gross domestic product in Kazakhstan are shown in Figure 1.



**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

As can be seen from the chart, this indicator of human capital development has a confident upward trend. After a predictable slowdown in the year of the COVID-19 pandemic, indicators resumed growth again. The next

economic indicator, the level of employment of the able-bodied population in the Republic of Kazakhstan, is shown in Figure 2.



**Figure 2.** Graph of the employment rate of the able-bodied population in Kazakhstan by years

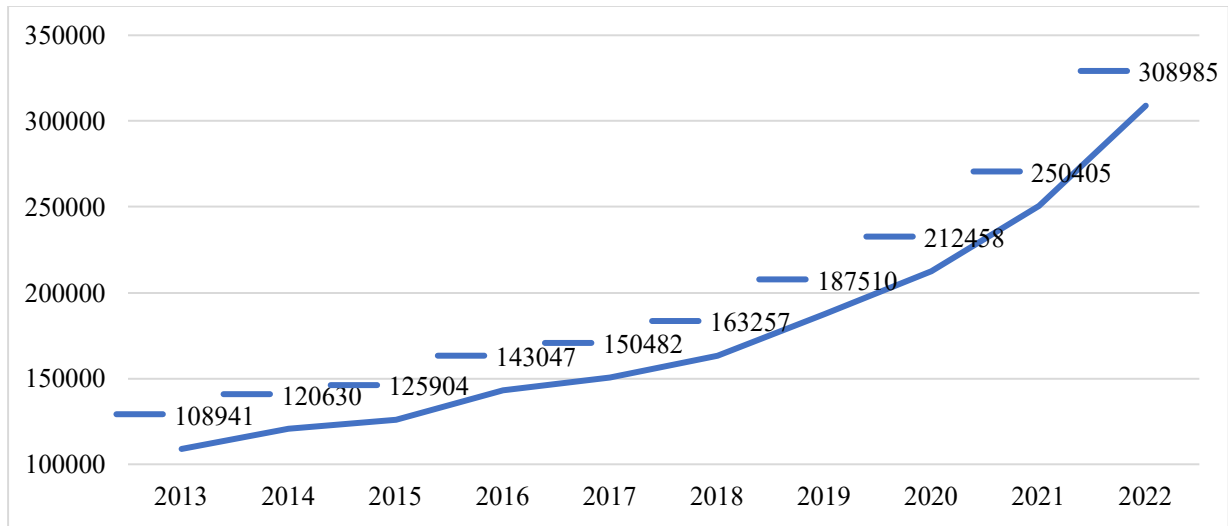
**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

This indicator of human capital development, which reflects the demand for an employee, is also on an uptrend. There was a decrease in the indicator readings in 2020,

when forced isolation significantly reduced the need for specialists in a number of industries, however, with the end of the active phase of the pandemic, the indicators began

to return to their previous dynamics. This was largely due to the growth in the number of self-employment of the population and the development of private entrepreneurship. Thus, in 2020, the number of self-employed people amounted to 2.5 million, while of the total number of employed, 15.1% of men and 16.8% of women worked in urban areas, and 35.8% of men and 34.2% of women worked in rural areas. It should also be noted that a sector of non-state providers of non-formal education has developed in the country. These are non-governmental organizations, youth structures, private business, various seminars, courses. At the same time, the

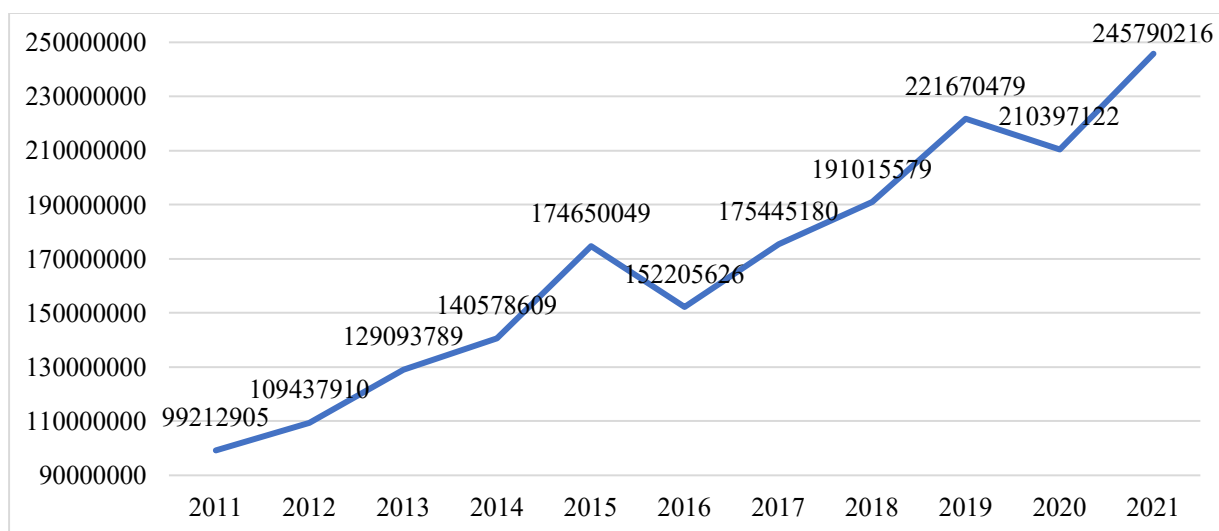
participation of enterprises in non-formal education is relatively small and amounts to only 21.8%-14.7% in the private sector and 32.2% in the public sector. For comparison, in the countries of the Organization for Economic Cooperation and Development (OECD), this figure is 29%. The final factor in the economic block of indicators, but no less important, is the average wage level. As noted above, personal well-being is an important incentive to increase a person's personal capitalization. The average level of wages in the national economy of Kazakhstan is shown in Figure 3.



**Figure 3.** Average salary level by years in Kazakhstan, tenge

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].





**Figure 4.** Graph of expenditures for environmental protection in Kazakhstan, tenge

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

It can be seen from the diagram that, apart from two periods, the costs of environmental protection in the Republic of Kazakhstan are ascending, which has a positive impact on the preservation and restoration of the country's ecology. Therefore, in these circumstances, the growth of human capital also has a positive trend. The processes of formation of personal capitalization of personnel in the Western region of Kazakhstan deserve

special attention. In the process of work, a statistical analysis of the main indicators of the dynamics of human capital was carried out and separately for four regions – Atyrau, Mangystau, Aktobe and West Kazakhstan. The amount of spending on environmental protection in this region is shown in Table 1.

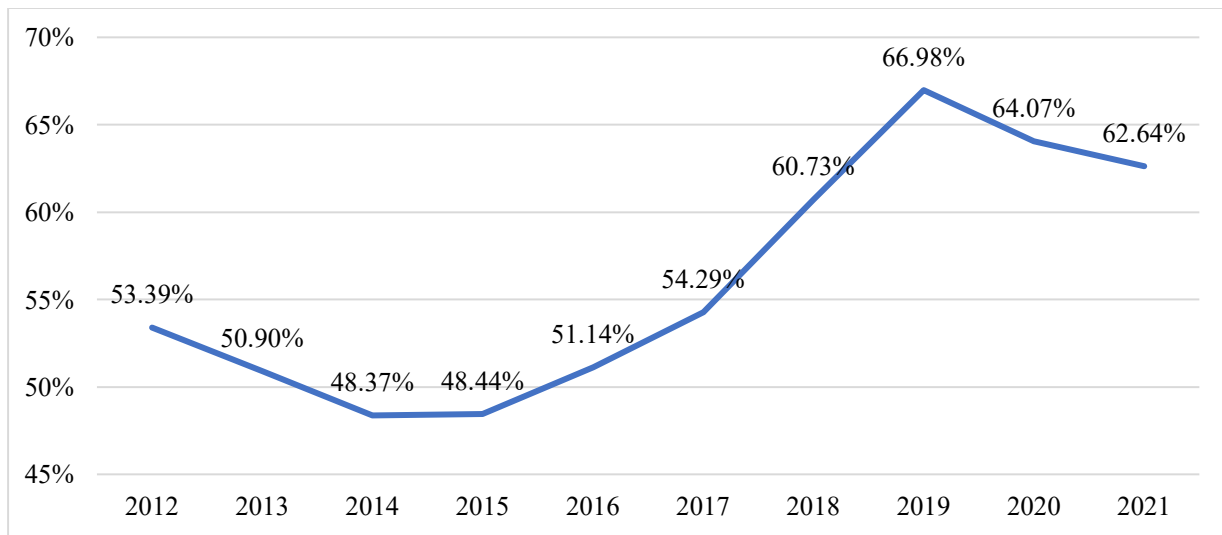
**Table 1.** The level of costs for environmental protection in the Western region of Kazakhstan by regions by years, million tenge

Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Aktobe	12.865	12.063	16.382	18.309	17.711	19.018	23.454	24.812	26.847	32.456
Atyrau	18.551	32.071	25.159	40.254	26.218	36.828	38.409	51.198	39.941	52.132
West Kazakhstan	1.553	6.45	4.964	3.794	7.533	10.744	9.66	12.632	13.686	9.038
Mangystau	5.184	6.87	14.651	29.093	18.427	14.266	11.81	11.127	9.632	7.824
Sum	38.153	57.455	61.157	91.45	69.89	80.856	83.332	99.769	90.106	101.45

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

As can be seen, the total amount of investments in the protection of nature in the Western region of Kazakhstan has practically not changed over the past three years. Given the growth of specific environmental challenges in the region, including on the coast of the Caspian Sea, these costs need to be increased. The relationship between ecology and human development resources has another, non-obvious aspect. The complex of knowledge, skills, abilities – in a word, everything that makes a person a personality, in the final stage is also manifested in his relationship with nature. Without forward-looking nature management, without a system for the rational development of natural resources, both the individual and society as a whole will be forced to face a significant decline in the quality of life. This is especially important to

understand in the realities of the Kazakh economy, which is significantly dependent on the development of land resources. Anthropogenic impact on the environment, and overexploitation of workings have led to the fact that impressive areas are in need of reclamation and restoration. Rising spending on environmental protection is the right signal from the point of view of government regulation, but the dynamics of such investments should be more decisive. Another basic factor in the formation of human capital is training. Parameters such as higher education and general digital literacy of the population determine competitiveness in the modern innovative world. The proportion of secondary school graduates who completed higher education in the last 10 years is shown in Figure 5.



**Figure 5.** Graph of the number of school graduates who received higher education

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

The situation with the percentage of graduates who graduated from high school requires attention. In 2019, after five years of constant growth, there was a turning point, and then the upward momentum was lost. There is reason to believe that this failure occurred due to the transfer of most educational programs to distance learning caused by the pandemic. Probably, in the new circumstances, many final-year students were forced to take academic leave, which negatively affected the percentage of successful completion of institutes,

universities, and academies. If this negative trend continues and based on the results of 2022, measures should be worked out to return students to study, since incomplete education negatively affects the size of human capital. Similar dynamics are observed with the percentage of school graduates in the Western region of Kazakhstan. The proportion of school-leavers who completed higher education in the four western regions is shown in Table 2.

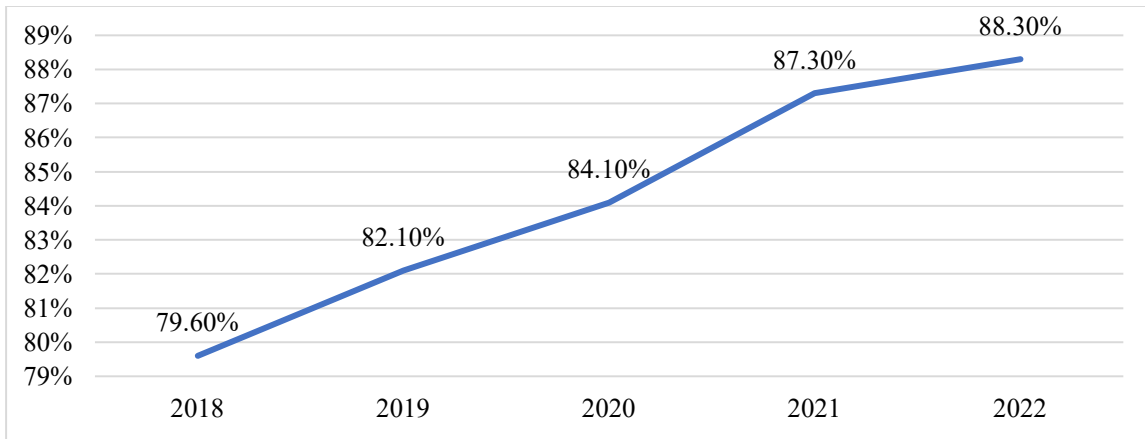
**Table 2.** The share of school graduates with higher education in the Western region of Kazakhstan by region by year, %

Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Aktobe	51.15	49.84	45.63	47.16	51.22	54.87	62.97	70.96	70.47	64.09
Atyrau	38.27	33.81	34.82	34.12	35.39	39.67	42.61	42.09	39.6	37.87
West Kazakhstan	68.56	58.75	67.73	66.98	78.11	87.45	90.48	96.51	85.28	83.2
Mangistau	32.4	31.24	22.34	23.07	25.02	24.84	27.31	33.64	26.52	23.2
Average	47.6	43.41	42.63	42.83	47.44	51.71	55.84	60.8	55.47	52.09

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

The dynamics of university graduates in recent years, as in the whole country, is negative. The pandemic has made a certain contribution to the trend, however, judging by 2021, the crisis has not been overcome. It is necessary to control the indicator of 2022 in order to accurately determine the pattern of development of this indicator of human capital. The second important characteristic of the educational block of development indicators is the general digital literacy of the population. The challenges of the new

technological order and widespread digitalization make this factor an indispensable component of human potential. The share of users who have the skills to use a personal computer, smartphone, tablet, laptop, standard everyday programs and applications, as well as those who have experience in ordering services and services via the Internet over the past five years, is shown in Figure 6.



**Figure 6.** Graph digital literacy population

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

The level of digital literacy in Kazakhstan, as well as throughout the world, is constantly growing, which increases the capitalization of the human resources. The same applies to the literacy rates of the population in the

Western region of Kazakhstan, which are reflected in Table 3.

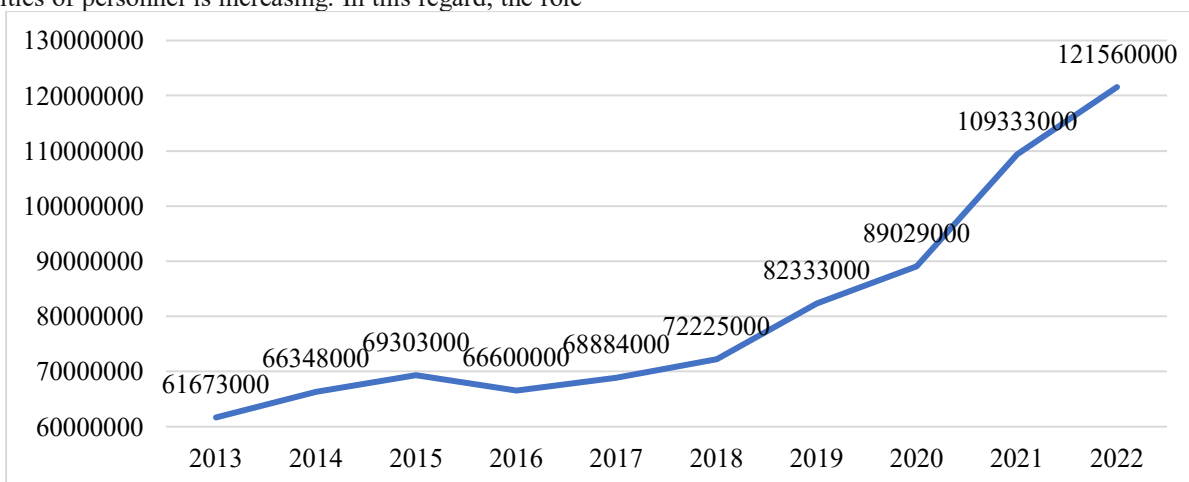
**Table 3.** The level of digital literacy of the population in the Western region of Kazakhstan by regions by years, %

Region	2018	2019	2020	2021	2022
Aktobe	78	80	81	86.8	89.6
Atyrau	81.2	82.6	83.1	85.2	85.4
West Kazakhstan	76.4	78.4	78.8	79.2	82
Mangistau	78.1	78.7	79.6	84.9	86
Average	78.43	79.93	80.63	84.03	85.75

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

The indicators demonstrate the growth of human capital in terms of this indicator and have a trend towards reaching their mathematical maximum. Since, with the development of technology, automated systems are increasingly replacing human participation in purely physical labour processes, the value of the intellectual abilities of personnel is increasing. In this regard, the role

of innovations is growing, and it is these indicators that become decisive in calculating the dynamics of human capitalization. The volume of costs in research and development as one of the indicators of investment attractiveness is shown in Figure 7.



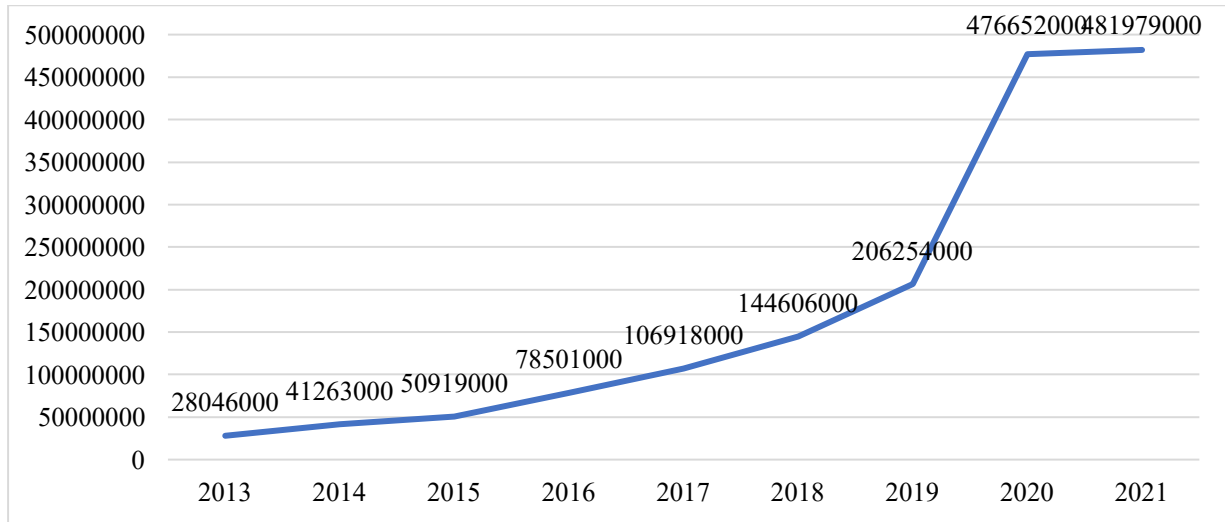
**Figure 7.** Graph of investments in R&D by years, tenge

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].



As can be seen from the graph, the level of investment in science for a long time was approximately at the same level, which negatively affected the sovereign technological development of Kazakhstan. However, since 2019, there has been a qualitative leap and investment in innovation has acquired a pronounced positive trend, which has had a positive impact on the growth of the country's human capital. Another important indicator of

the growth of investments in knowledge-intensive processes and the increase in the digital skills of the population is the volume of trade in the domestic market, conducted electronically. Figure 8 shows the dynamics of these processes in Kazakhstan over the previous nine years.

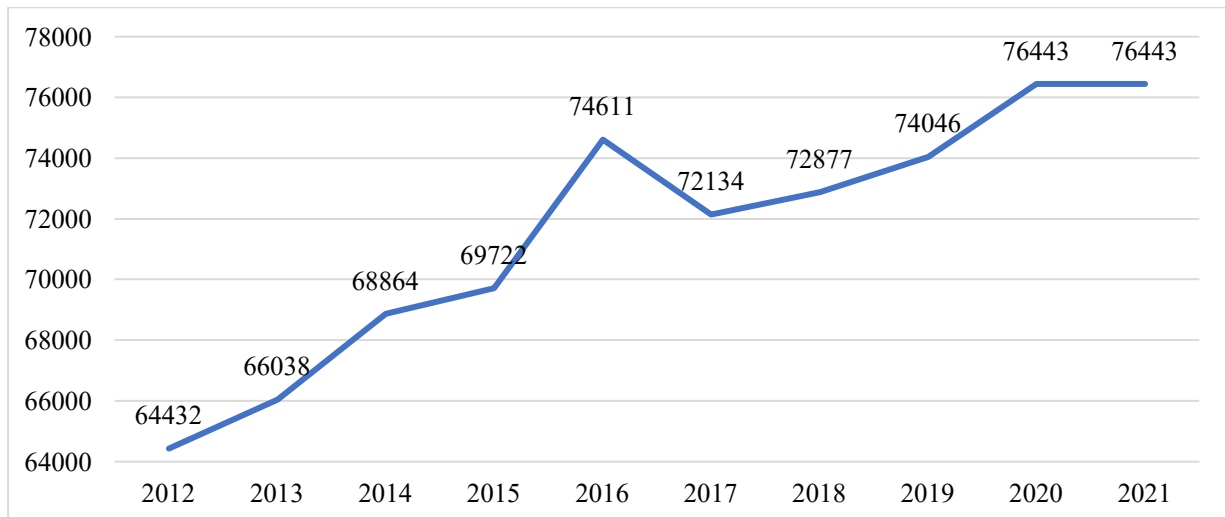


**Figure 8.** Chart of retail trade volumes via the Internet, tenge

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

The qualitative jump in the volume of Internet commerce in 2020 is depressing. People, limited by the fault of the pandemic in movement and personal contacts, were forced to switch to online shopping. However, the not falling indicator in 2021 testifies to the paradox when a forced measure forces a person to improve their digital skills. Now, even after the end of restrictive measures,

many people remain committed to online shopping, discovering an additional level of comfort. Health, as the most important component of human capital, can also be translated into measurable quantities. In particular, the number of practising doctors of all specialities for ten years was analysed. These data are shown in Figure 9.



**Figure 9.** The number of practising doctors in Kazakhstan by years, people

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

Despite the growth in the medium term, the graph shows that at this stage the dynamics of the number of highly qualified medical personnel has stopped. This is a negative factor, and when formulating recommendations

for the growth of human capital, it is necessary to pay attention to it. Perhaps, if the trend continues, government intervention and additional preferences for the healthcare industry will be required. The number of doctors of

different specialities in the Western region of Kazakhstan is shown in Table 4.

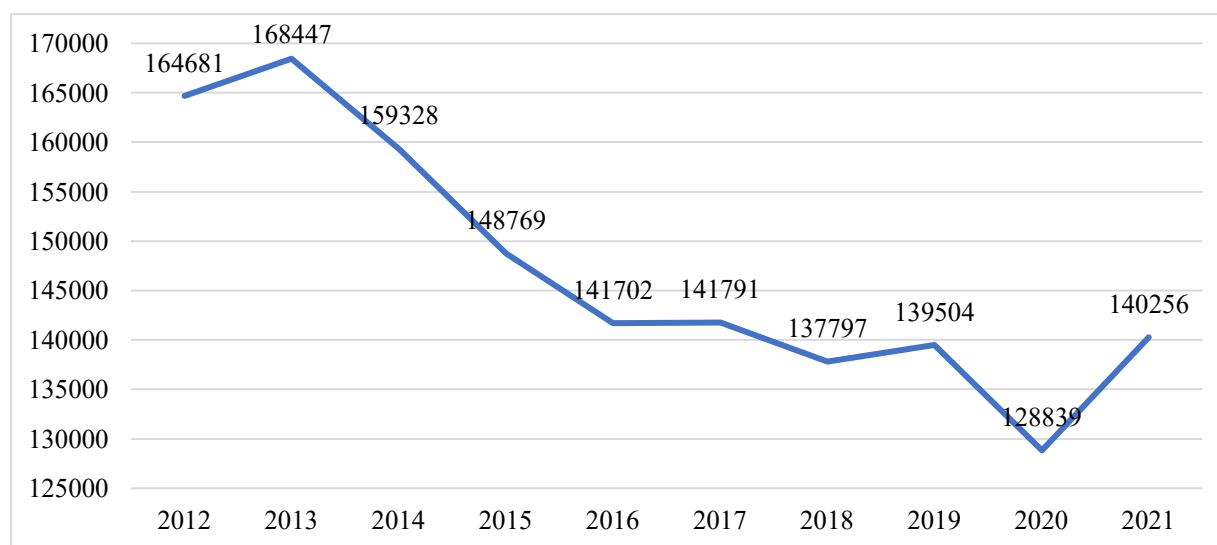
**Table 4.** The number of all doctors in the Western region of Kazakhstan by region by year, people

Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Aktobe	3222	3750	3702	3641	3607	3848	4061	4088	4104	4111
Atyrau	1814	1859	1694	1710	1710	1758	1825	1855	2026	2062
West Kazakhstan	2127	2197	1930	1962	2083	2068	2090	2130	2177	2216
Mangistau	1782	1884	1757	1845	1923	2130	2219	2347	2424	2494
Sum	8945	9690	9083	9158	9323	9804	10195	10420	10731	10883

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

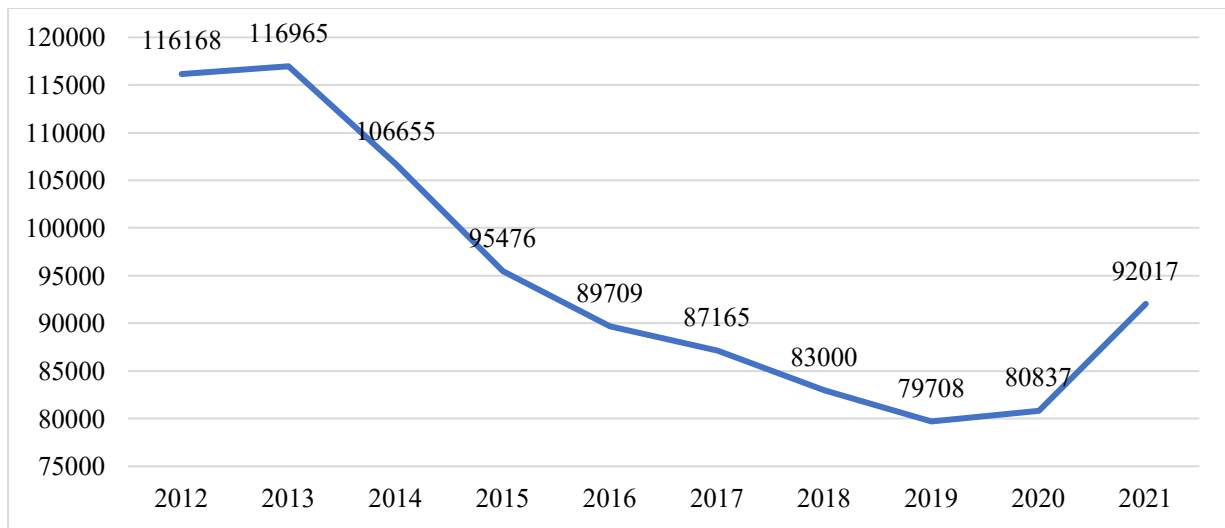
Unlike the rest of the country, this indicator for the Western region of Kazakhstan has a pronounced upward trend. At the same time, the physical condition of a person in most cases is determined not so much by the quality of medical care as by the way of life. The creation by the state of a network of free physical culture facilities, street simulators, workouts, stadiums, the promotion of a proper lifestyle in everyday culture, as well as the resumption of a total ban on alcohol advertising, can increase national health indicators and, as a result, lead to an increase in the personal capitalization of employees. As mentioned above,

the full-fledged work of an employee, the realization of his potential, is impossible without domestic and family well-being. Thus, in the social aspect, the key indicators of development are the dynamics of the number of registered marriages and average life expectancy. To assess the dynamics of family well-being, two parameters should be used – the number of marriages in absolute terms (Figure 10) and the difference between marriages and divorces (Figure 11).



**Figure 10.** Number of registered marriages in Kazakhstan by years

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].



**Figure 11.** Average number of successful marriages in Kazakhstan by years

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

Comparing the graphs of concluded marriages and conditionally successful ones (marriages minus divorces), it can be stated that after a certain decrease, the number of conditionally successful marriages returns to the indicators of 2015. However, the situation for this indicator is unstable enough to draw conclusions about its impact on

the growth of human capital. A similar situation can be observed in the Western region of Kazakhstan. The number of marriages in the four western regions is shown in Table 5.

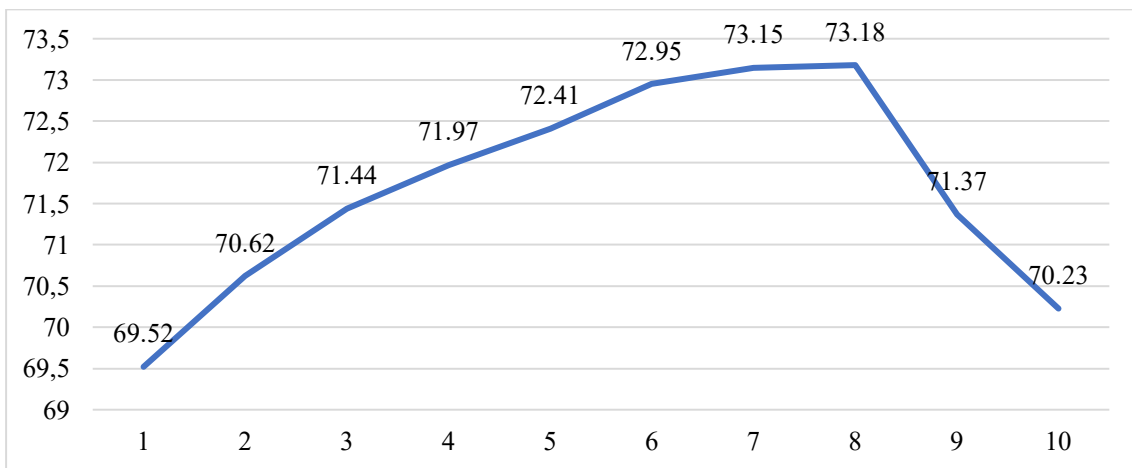
**Table 5.** Number of marriages concluded in the Western region of Kazakhstan by regions by years

Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Aktobe	8815	8547	7999	7149	6761	6693	6538	6661	6474	6632
Atyrau	6316	6069	5543	5097	4888	4940	5032	4953	4907	5210
West Kazakhstan	6184	6170	5782	5279	5028	4986	4880	4703	4467	4658
Mangistau	6672	6424	6028	5806	5576	5527	5548	5390	5026	5640
Sum	27987	27210	25352	23331	22253	22146	21998	21707	20874	22140

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

The number of marriages in the west of Kazakhstan has been declining for a decade, and only in 2021 did the dynamics become positive. Since family well-being is the most important factor in human capitalization, this

indicator requires more careful monitoring in the coming years. Another social factor that deserves attention is the average life expectancy at birth. It is reflected in the dynamics in Figure 12.



**Figure 12.** Graph of average life expectancy in the Republic of Kazakhstan by years, years

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

This indicator of human capital formation raises serious concerns. The decline in life expectancy has a negative impact on the capitalization of the human resources and requires a careful study of the reasons. A significant decline in the indicator in 2020 could be caused by the COVID-19 pandemic, however, the trend that has

continued in 2021 casts doubt on this assumption. In order to check the national figure, life expectancy at birth in the Western region of Kazakhstan should be considered separately. These data are reflected in Table 6.

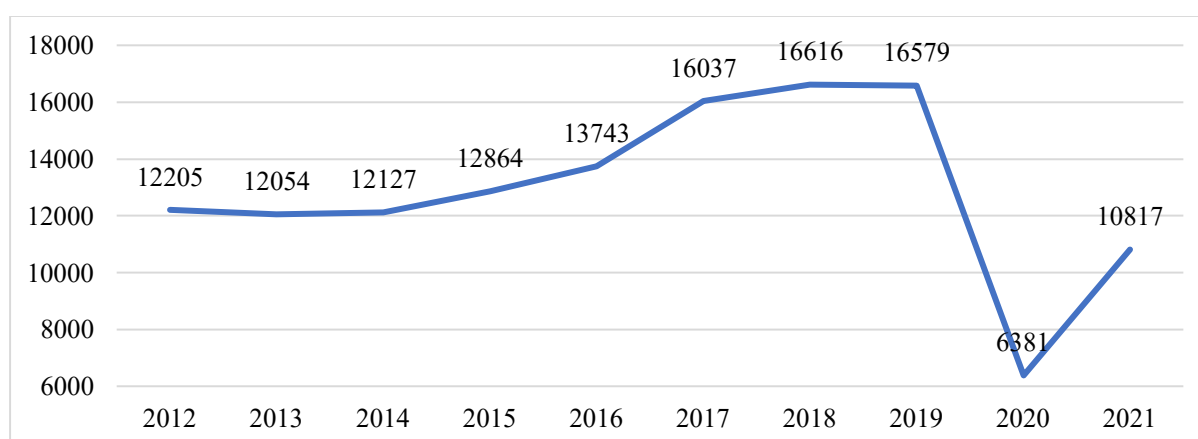
**Table 6.** Life expectancy at birth in the Western region of Kazakhstan by region by year, years

Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Aktobe	70.06	71.38	71.94	72.33	72.82	73.47	73.45	73.58	71.69	70.83
Atyrau	69.34	70.98	71.66	72.26	71.68	73.22	73.13	73.27	70.52	70.01
West Kazakhstan	69.58	70.39	71.11	71.56	71.66	72.38	72.43	72.81	70.87	69.69
Mangistau	71.19	71.73	72.43	72.83	73.58	74.34	73.73	74.14	71.1	70.57
Average	70.04	71.12	71.79	72.25	72.44	73.35	73.19	73.45	71.05	70.28

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

As can be seen, at the regional level, the average life expectancy indicator has also been declining markedly for the second year in a row. Most likely, this is a consequence of the COVID-19 pandemic. The level of cultural development, as another aspect of the formation of human

capital, can be easily tracked by such an indicator as the number of performances in theatres in Kazakhstan (Figure 13).



**Figure 13.** Graph of the dynamics of the number of performances in the Republic of Kazakhstan by years

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

Pre-pandemic indicators indicate the positive dynamics of the development of the cultural life of Kazakhstan and, as a result, the positive impact of this factor on the increase in human capital until 2020. The practice of holding mass events is gradually returning, which means that there is every reason to assume that the status quo will soon be

restored. To confirm this assumption, one should also analyse the number of performances held in the Western region of Kazakhstan. This indicator of the cultural life of the region is reflected in Table 7.

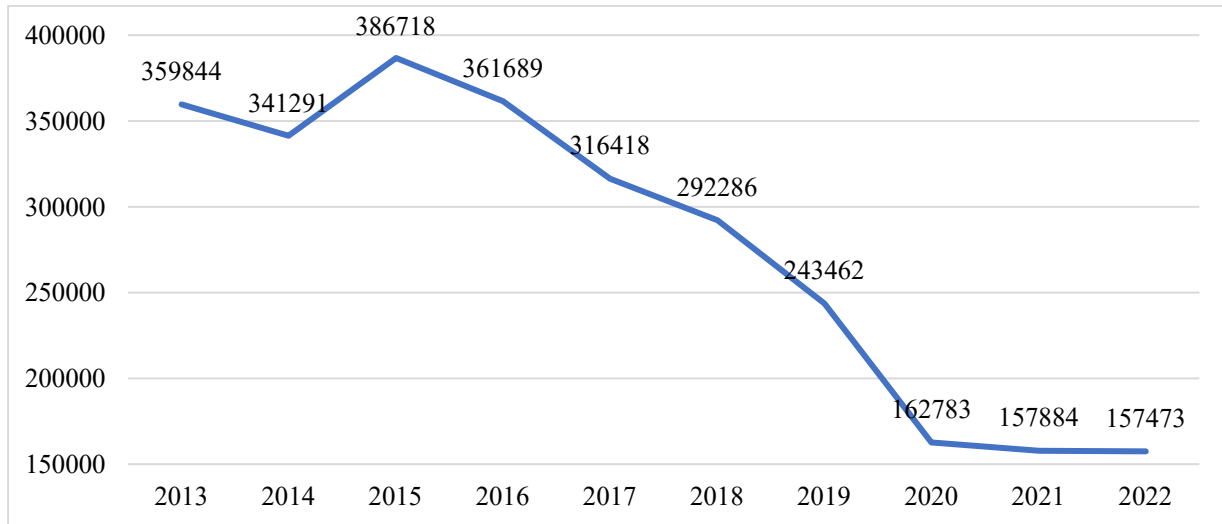
**Table 7.** The number of performances held in the Western region of Kazakhstan by region by year

Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Aktobe	896	938	837	938	984	988	988	986	60	99
Atyrau	51	34	51	52	0	54	65	88	16	54
West Kazakhstan	547	515	459	486	515	653	607	629	43	62
Mangistau	438	414	460	431	443	553	511	510	57	78
Sum	1932	1901	1807	1907	1942	2248	2171	2213	176	293

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

As at the national level, the dynamics of the development of the cultural sphere of the Western region of Kazakhstan was positive until 2020, when the restrictions associated with the COVID-19 pandemic forced the cancellation of all public events. It is important to control further dynamics and make sure that cultural events are resumed, because without a full-fledged cultural

life, human capital will lose its value. The final researched indicator of the development of personal capitalization of personnel is related to security. The level of registered crimes in dynamics will demonstrate how the impact of this factor on the population is changing. The data is shown in Figure 14.



**Figure 14.** Graph of the dynamics of the number of crimes in the Republic of Kazakhstan by years

**Source:** compiled by authors based on the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [13].

There is a pronounced downward dynamics of crime, which indicates an increase in the personal security of citizens and is one of the components of an increase in human capital. Thus, the results obtained have identified the key factors in the formation of personality in the context of the labour market both in the Republic of Kazakhstan and in its western regions. Having this information, it is possible with a high degree of probability to predict the further dynamics of the processes and, if necessary, to give due adjustments on the part of national legislation.

## Discussion

For several decades, specialists from various industries around the world have been studying the problems of formation and principles of filling human capital. The task is complicated by the fact that the concept under study is quite voluminous, includes many aspects of human life and, often, the results of research depend on the interpretation of the term by the authors. So, D.J. Deming [17], combined disparate formulations into four generalized theses. According to his observations, first, human capital explains at least one third of wage differences within countries and at least half of such differences between countries. Secondly, investment in human capital brings the highest economic return, being invested in childhood and adolescence. Thirdly, it is important to develop basic skills such as literacy and numeracy. Fourth, higher order skills such as problem-solving and teamwork are becoming increasingly valuable, and the technology for creating these skills is not well understood.

K.G. Abraham and J. Mallatt [18], dividing such measurements into three conditional approaches:

1. A metrics approach based on the analysis of various parameters such as average years of schooling.
2. A spending approach that measures all costs invested in building human capital.
3. An income approach that includes the amount of expected dividends received from an investment in the employee's capitalization.

In this work, the main attention was focused on indicators that can be conditionally divided into several categories – economy, ecology, education, innovation, healthcare, social sphere, culture, and security. Previously, in scientific papers, there were studies of certain aspects, however, a comprehensive analysis of the entire specified spectrum was practically not carried out. In particular, P. Dong et al. [9] found out the degree of influence on human capital only of innovations in enterprises of the digital economy. After conducting a series of tests for heterogeneity, they came to the conclusion that in enterprises with younger staff, the effect of digital innovations at the micro level is much higher. Also, a number of experiments have demonstrated that the optimization of human capital channels increases the overall volume of corporate innovation.

An important study in the context of environmental reforms was carried out in Saudi Arabia, where university students are considered by the government of this country as the future human capital for the implementation of the large state project “Vision 2030”, designed to reduce dependence on oil production. G. Al-Zohbi and M.A.E. Pilotti [19] conducted a survey among 430 students and found that although they generally professed to support the green economy, their behaviour was often contrary to the principles of sustainable development. Such dualism was interpreted by the authors as a reflection of the internal

conflict between the acceptance of the proposed environmental changes and the desire to exist in the country's traditional paradigm of dependence on fossil fuels. A direct relationship between the growth of human capital and the reduction of harmful emissions of carbon dioxide CO<sub>2</sub> was determined by A.M.P. Adikari et al. [20]. The study found that a 1% increase in human capital reduces carbon emissions by 1.63%, and increasing the personal capitalization of factory workers by increasing investment in their education helps reduce carbon emissions in the long run.

An interesting aspect of the use of human capital was found out by A. Laskowska and J.F. Laskowski [21], having studied the value system, attitudes towards work and professional expectations of people over fifty. The demographic decline and the inevitable ageing of the population of economically developed countries have led to an increase in the average age of employees, which required the formation of a separate management approach in order to maximize the effective use of the accumulated personal capital of this social group. In addition to the process of forming human capital, the features of its management, which were studied by J. Costa et al. [22]. They analysed the impact on the innovation process and human capital development of four different management styles – autocratic, transactional, democratic and transformational – and concluded that developed human capital softens the relationship between leadership styles and the innovation process, i.e. with the same leadership style, the presence of additional skills enhances innovation activity.

Also, the problem of knowledge management and its impact on the potential of the staff was studied by A. Al-Tit et al. [23]. Summarizing the results of surveys conducted among 464 employees working in information and communication technology companies, the authors examined the impact of the employee development system on their intellectual capital through knowledge management. The results of the work showed that the methods of employee development have a significant impact on the principles of forming their own capital. The influence of human capital on the spread of technology was found out by M. Cervellati et al. [24]. By examining the impact of the human capital endowment of industrial enterprises from a historical perspective and linking the delays in the introduction of new technologies with the intensity of their use, they proved that more human capital is associated with shorter delays in the introduction and greater intensity of the use of new technologies, which demonstrated a direct relationship between education and economic development.

An important aspect of the valuation of human abilities has been raised by P. Jandrić [25], considering the problem of employment through the prism of the replacement of company personnel by artificial intelligence. In the process of studying the features of technological determinism and forming models of the labour market of the future, it was determined that the greatest efficiency of human capital is achieved by combining the efforts of man and machine. The relationship between human capital and energy consumption in the long term was studied by S.A. Churchill et al. [26] on the example of the UK. Using traditional parametric methods to study long-term effects

and with data from 1500 to 2020, the authors found a negative relationship between total human capital and energy consumption, as each additional year of training reduced energy consumption by 4-9%, depending on the method of identification. Thus, it has been shown that one of the possible social benefits of increasing human capital is the reduction of energy consumption and, as a result, carbon emissions.

The educational aspect of the accumulation of human capital through the growth of the competence of teachers was investigated by X. Wu and J. Li [27]. Studying the learning process at the university of 28 future teachers, the authors assessed such personal characteristics of the students as participation in elective courses, the ability to conduct critical dialogues and conscious responsibility for the formation of human capital. The results demonstrated that although teacher education programs use critical sociocultural pedagogy and enable teacher candidates to participate in global interaction, it is the personal contribution of the teacher to the formation of human capital in their students that is decisive. One of the components of human capital, according to P. Braunerhjelm and E. Lappi [28], is the concept of "entrepreneurial human capital" (EHC) introduced by the authors, defined by the authors as a person's previous experience in entrepreneurship. They provide evidence that a higher level of EHC among employees is associated with a significantly higher level of firm productivity. Thus, the baseline result implies that a 10% increase in the number of employees who were entrepreneurs increases the productivity of all firms by 3.9%. Evidence is also provided that the heterogeneity of employees' previous entrepreneurial experience (e.g., type of enterprise, employee's personal specialization, or technology connectivity) has a positive impact on EHC on productivity.

Comparing the results of the work done with the experience of other studies, one can observe the confirmation of certain aspects of the principles of the formation of human capital – social, environmental, informational. At the same time, this study explores the problem more fully, drawing on data from all significant areas of human activity and analysing them.

## **Conclusions**

An analysis of thirteen key development indicators relating to various economic and social aspects of human capital formation provides a comprehensive assessment of the dynamics of this process. The COVID-19 pandemic, which has significantly affected the life of society, has also had an impact on the growth of human capitalization, and some of these factors have, oddly enough, a positive impact in the long run. Focusing on the impact of changes on the dynamics of human capital quality development indicators, it can be argued that the pandemic negatively affected such indicators as life expectancy, education of the population and the cultural life of the country, but it also had a positive impact on the digital literacy of citizens and an increase in online sales format.

In general, the analysis of indicators of human capital development in Kazakhstan allows to draw the following conclusions and recommendations. The dynamics of GDP and average wages are on an upward trend, however, the



employment rate of the able-bodied population has not yet reached pre-pandemic levels, which means that it requires increased attention in the coming years. In addition, it is important to remember the need to increase the share of knowledge workers. Investments in nature protection are growing every year, but these funds are not enough for the full restoration of lands damaged in the process of mining. For the long-term development of human capital in the Republic of Kazakhstan, the costs of environmental restoration need to be increased. The number of university graduates, which decreased in 2020, requires additional control. Perhaps government intervention is required to develop programs for the return of senior students from academic leave. At the same time, the level of digital literacy of the population is steadily growing and does not require regulation. The volume of investment in research and development is consistently high, and Internet commerce is also on a significant rise. The declining number of doctors is worrisome and may be indicative of problems in the industry as a whole. It is necessary to control further dynamics. The number of marriages and life expectancy are the most important factors in the formation of human capital. Since these two indicators are of serious concern, it is worth waiting for the publication of the relevant data for 2022 and compare them with the observed trend in order to determine a plan for further action. Such

dynamics of social factors and the formation of recommendations could be the subject of the next study.

Thus, at this stage, attention should be paid to the following recommendations: control over the restoration of the pre-pandemic number of the employed population. Attracting for this purpose the digital ecosystem of opportunities “Enebek”; development of a program for the return to universities of students of higher educational institutions who were forced to transfer to distance learning; activation of cultural events. Since, as it was determined, a full-fledged cultural life is one of the important factors of human capitalization, state support is needed, both at the country level and at the level of individual regions of Kazakhstan. In general, the analysis of indicators shows that the dynamics of increasing human capital in Kazakhstan is positive. From a practical point of view, this means the attractiveness of the Kazakhstan market for foreign and domestic investment.

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### Conflict of Interest

None.

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## Аналіз основних показників розвитку людського капіталу в Казахстані

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### Анотація

**Актуальність.** Актуальність вивчення феномену людського капіталу та аналізу факторів його зростання значно зросла в останні роки, коли розвиток цифрових технологій значно прискорив процеси взаємодії між людьми, а при оцінці трудового потенціалу працівника – на перший план вийшла його інтелектуальна складова. Особливо сильний поштовх розвитку цифрової комунікації дала пандемія COVID-19, яка своєю вимушеною ізоляцією підштовхнула персонал компаній по всьому світу до пошуку ефективних інструментів дистанційного контролю та моніторингу.

**Мета.** Метою даної роботи є визначення основних показників розвитку людського капіталу в Казахстані в цілому та в чотирьох регіонах Західного регіону Казахстану зокрема.

**Методологія.** У ході дослідження використовувалися метод статистичного аналізу, метод індикативного аналізу, а також метод прогнозування.

**Результати.** В якості ключових індикаторів розвитку людського капіталу розглядаються такі соціально-економічні показники, як відсоток громадян, які отримали вищу освіту, середній рівень заробітної плати, кількість практикуючих лікарів, діяльність сфери культури, а також були взяті параметри інноваційного розвитку суспільства – витрати на науку та рівень цифрової грамотності.

**Висновки.** Дані порівнювались в динаміці з показниками кількох попередніх років і на основі отриманих значень формували короткострокові прогнози. Практична значимість дослідження полягає у формуванні прогнозованих тенденцій розвитку людського капіталу, виявленні найбільш значущих факторів його зростання та розробці рекомендацій, спрямованих на підвищення ефективності діяльності підприємств національної економіки, як всієї території Казахстану, так і його чотирьох західних областей – Атирауської, Мангістауської, Актюбінської та Західно-Казахстанської.

**Ключові слова:** кваліфікація; здоров'я; освіта; заробітна плата; працевлаштування; працездатність.