REPUBLIC OF AZERBAIJAN

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ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

ENHANCING MECHANISMS FOR HUMAN CAPITAL DEVELOPMENT IN THE INDUSTRY OF THE REPUBLIC OF AZERBAIJAN

Speciality: 5312.01 – "Field economy"

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Applicant: **Latif Vidadi oglu Zeynalli**

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The dissertation was completed at the Azerbaijan State Oil and Industry University
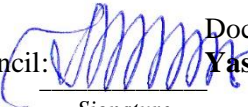
Official opponents: Doctor of philosophy in economics, assistant professor
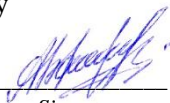**İlham Samil oglu Rustamov**

Rəsmi opponentlər: Professor, Doctor of Economic sciences
Vahid Tapdıq oğlu Novruzov

Doctor of philosophy in economics, assistant professor
Parviz Samad oglu Hasanov

Doctor of philosophy in economics
Vusala Musa qizi Babayeva

Dissertation council ED 2.10 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at Azerbaijan State University of Economics

Chairman of the
Dissertation council: _____ Doctor of Economic sciences, Professor
Yashar Atakishi oglu Kalbiyev
Signature

Scientific secretary
of the Dissertation
council: _____ Doctor of philosophy in economics
assistant professor
Sugra İngilab qizi Humbatova
Signature

Chairman of the
scientific seminar: _____ Doctor of philosophy in economics,
Professor **Ramil Zahid oglu Huseyn**
Signature

GENERAL DESCRIPTION OF THE RESEARCH

Relevance of the topic and degree of elaboration. The human capital theory serves as a pivotal framework that establishes a connection between theories of economic development and the concept of human development. The concept of human capital has evolved significantly, particularly driven by advancements in science and technology, leading to transformations in the economy and various societal domains. This evolution encompasses both individual aspects and the broader context of labor-related activities and the associated processes involved in their execution. The advancement of society and the deepening scientific understanding of human beings have contributed to the progressive evolution and enhancement of human capital.Human capital is consciously employed in various domains of social production, exerting a positive influence on labor productivity and production efficiency, consequently leading to individual salary increments. Furthermore, it encompasses specific aspects such as knowledge, habits, abilities, health, and motivation.Thus, establishing a lucid framework for comprehending human capital becomes essential.In the realm of international politics, there has been a notable shift from prioritizing territorial expansion to emphasizing the cultivation of enhanced human capital.Notably, World Bank research reveals that 16 percent of economic growth in the contemporary world is attributed to physical capital, 20 percent to natural resources, and a substantial 64 percent to human capital. According to studies conducted in Western countries, the level of profitability of investment in human capital in developed countries more than doubles the profit from other factors. The state has the opportunity to create a solid human capital base with intellectual and high management skills by leveraging the experiences of developed countries and implementing this initiative, which is a step towards great goals in terms of strategic development perspectives.

The concept of human capital and its development has been the focus of research by Azerbaijani and foreign scholars. In Azerbaijan, notable institutions, such as the Economic Reforms Scientific Research Institute of the Ministry of Economy of the Republic of

Azerbaijan, the ANAS Institute of Economics, as well as economists U.K.Alakbarov, G.C.Imanov, Y.H.Hasanli, A.J.Muradov, Sh.M.Muradov, R.T.Hasanov, A.I.Shiraliyev, E.N.Karimov, B.O.Osmanov, F.T.Mammadov, A.N.Muradov, F.Q.Musayeva, Sh.S.Məmmədova et al. explored human capital issues, including the use of human potential in their scholarly work. Although various scientific-practical studies on human capital have been conducted by researchers, there remain unexplored theoretical and practical aspects concerning its developmental mechanisms.

From scientists of foreign countries T.W.Schultz, G.S.Becker, J.J.Heckman, O.Nordhauk, M.Blaug, M.Fischer, C.J.Kendrick, L.Turow, K.S.Minser, R.E.Lucas, M.C.McCulloch, C.B.Say, J.S.Mill, S.S. Kuznets, E.E.Denison, R.M.Slow, J.S.Fabrikant, V.A.Yuryev, T.V.Yanchenko, S.A.Dyatlovu, R.I.Kapelyushnikov, M.M.Kritskin, S.A.Kurganskin, A.A.Bolotin, K.N.Chigoryayev, V.G.Medinsky, A.S.Numerous other studies have been published on this topic.

The object and subject of the research. The object of the study is the stimulation of the development of human capital in the industry in the Republic of Azerbaijan. The main subject of the research is the study of the current situation and enhancement of mechanisms aimed at stimulating the growth of human capital in the industry within the Republic of Azerbaijan.

Research goals and objectives. The main goal of the research is to develop scientifically based proposals and recommendations for their improvement based on the research and study of the mechanisms of stimulating the development of human capital in the industry in the Republic of Azerbaijan industry. In line with this objective, the following tasks have been defined:

- the study of the conceptual foundations of human capital development, the identifying of the main mechanisms of growth in the industry;

- justification of the theoretical and methodological provisions of human capital development;

- identification and justification of the relationship between the development of human capital and some macroeconomic indicators;

- determination of the current state of human capital development in the industry, including the current state of human capital development in various industrial enterprises;

- justification of the impact of the development of human capital in the industry on product production and profit;

- identification of perspective directions of mechanisms for promoting the development of human capital in the industry;

- identifying directions for improving mechanisms that promote the development of human capital in the industry.

Research methods. Throughout the research process, various research methods were employed, including analysis, synthesis, comparative analysis, and the utilization of economic statistics. Additionally, an economic-focused statistical software package like Eviews was utilized for data analysis and interpretation.

The main provisions of the defense. The main provisions submitted to the defence are characterized by the following:

- ideas on the scientific-theoretical basis of human capital development are summarized;

- evidence of the relationship between the development of human capital and the main macroeconomic indicators;

- the components that determine the development of human capital in the industry were discovered;

- the impact of human capital development on product production and profits was evaluated;

- prospective aspects of mechanisms for promoting human capital development have been identified;

- guidelines for improving mechanisms for promoting the development of human capital in the industry have been established;

Scientific novelty of the research. The following scientific innovations were obtained in the comprehensive study of the mechanisms of stimulating the development of human capital in the industry in the Republic of Azerbaijan:

- mathematical-statistical models of the relationship between human capital development and macroeconomic indicators were proposed, and their economic interpretation was given;

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- the level and limits of the factors influencing the development of human capital were determined, and mathematical-statistical models were proposed for evaluating the impact of the effect of human capital on product production and profit in the industry;

- the model of human capital development in the industry, the schematic structure of research and development stimulation models was proposed;

- the application of cloud technologies in the industry's training and development process was proposed.

Theoretical and practical significance of the research. The findings and insights gained from this research can be effectively utilized to inform and guide the practices of human capital development and the improvement of incentive mechanisms in various sectors of the country's industries.

Approbation and application of the research. The main provisions and conclusions of the dissertation work were reflected in authoritative local and foreign journals recommended by the High Attestation Commission under the President of the Republic of Azerbaijan and in the materials of national and international scientific-practical conferences.

The institution where the dissertation work has been implemented: The dissertation was carried out at the Azerbaijan State Oil and Industry University.

The total volume of the dissertation with a sign indicating the volume of the structural sections of the dissertation separately: Dissertasiya işi girişdən (10294 işarə), üç fəsildən (I fəsil 78541, II fəsil 81762, III fəsil 54544 işarə), nəticədən (10) və istifadə edilmiş ədəbiyyat siyahısından (116 adda) ibarət olub, ümumi həcmi 148 səhifədir. İşdə 27 cədvəl, 4 şəkil, 9 qrafik vardır. Dissertasiyanın ümumi mətn hissəsi (cədvəllər, sxemlər, diaqramlar, qrafiklər və ədəbiyyat siyahısı istisna edilməklə) isə 225141 işarə təşkil edir.

SUMMARY OF THE DISSERTATION

The dissertation comprises an introduction, three chapters, main conclusions and a bibliographic list of used literature. The introduction of the dissertation serves to justify the significance of the chosen topic, elucidate the research objectives, outline the problems addressed in pursuit of the established goals, present the core arguments defended, and highlight the scientific novelty and practical importance of the achieved outcomes.

In the first chapter of the dissertation entitled **"Theoretical and methodological foundations of the concept of human capital"**, theoretical views on human capital, economic growth models based on human capital, issues related to human capital development concepts and international experience were studied.

The concept of human capital began developing in the West for the first time in centuries. The story of the theory of human capital in the 20th century is associated with the name of the American economist Theodore Schultz. According to Schultz, human capital is a set of knowledge, skills, relationships and professionalism of a person that allows a person to fully form himself in society and fully use the opportunities of society [97., s.26-28]. In addition, he stated that human capital is a source of income for the future. When T. Shults studied the causes of the plight of the lower class of the population in underdeveloped countries, he concluded that increasing the material well-being of the population does not depend on land, technology or power but primarily on knowledge. He emphasized this qualitative aspect of the economy as "human capital"[47., s.56-67]. American economist G. Becker who made outstanding contributions to the development of the theory of human capital, published in the 60s of 20th century in his works "Investments in Human Capital" and "Human Capital: Theoretical and Empirical Analyzes" presented the theoretical and methodological foundations of human capital, investment in human capital. He created an economical approach to human behaviour by justifying the effectiveness of his investment, improving the idea of human capital [45., s.168]. Schultz was awarded the Nobel Prize in Economics in 1979 and Becker in 1992 for creating the theory of human capital. Professor Urkhan Alakbarov, a full member of ANAS,

emphasized in the book "Human Development" that human capital is considered a set of competencies, knowledge, social attributes, as well as individual qualities such as creative imagination, concentrated in the ability to perform labour activities to create economic value. Professor Shahbaz Muradov, one of Azerbaijan's economists, defined human capital as the totality of physical and intellectual capabilities of society in his work entitled "Human Potential: main tendencies, realities and problems" [20., s.471].

After looking at the opinions of various economists, it can be concluded that human capital consists of the sum of investments made in the knowledge and skills of an individual, which can generate profit in the future activity of the individual. It also became clear that the microeconomic approach considers human capital from the point of view of business and management, while the macroeconomic policy considers it as a factor of development and formation of economic growth. In addition, the particular importance of human capital in the life of society and the degree of influence of the elements included in the structure of the market value approach on the development of human capital stipulates that research on this issue should be conducted on a broader context.

The study of the theoretical foundations of human capital makes it essential to determine approaches to it. In this context, approaches to human capital are divided into microeconomic and macroeconomic. The microeconomic system can be categorized into two forms, namely the business and management approach.In the business approach, human capital is seen as a factor of business production, namely material, property and human labour. The managerial approach sees human capital as a source of business or an asset reflected in the organisation's market value. Human capital in the macroeconomic process is treated as a factor in the formation of development and economic growth. The following table provides a structure of current approaches to understanding human capital (Fig 1)

In contemporary times, there is a growing global trend where countries are placing greater emphasis on the creation of value through human efforts and investing in people-centric development within their economies.As a result, it is not surprising to encounter the notion that "we must turn natural resources into human resources".
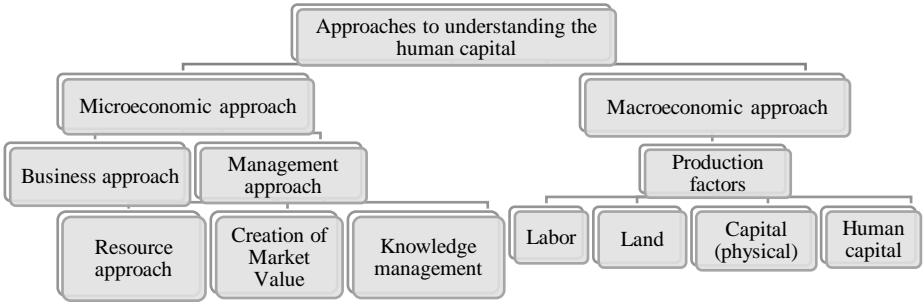
Figure 1. Structure of approaches to human capital [79]

Because natural resources can be exhausted, but human resources are inexhaustible. Natural resources are depleted faster as they are used, and people add more value as they are used. Based on these ideas, the resource (reserve) approach to human capital considers people the most valuable resource. Because when a person is treated as a worthwhile investment, it can be turned into a "profitable enterprise". And the business creates value when continually invested in it. This reflects a value approach to human capital.
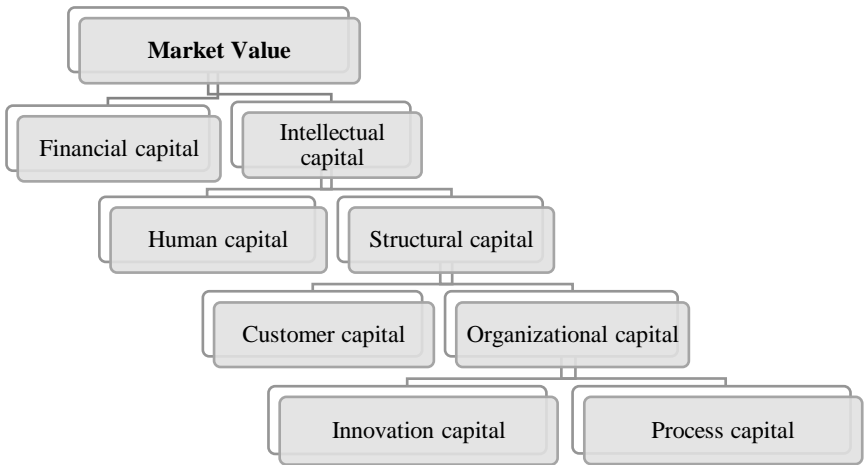
Figure 2. Process of Creating a Market Value of the Company [65]

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After looking at the opinions of various economists, human capital consists of the sum of investments made in the knowledge and skills of an individual that can generate profits in future activities. It was also revealed that the microeconomic approach considers human capital in business and management, while the macroeconomic policy considers it a factor in developing and forming economic growth. In addition, the importance of human capital in the life of society and the degree of impact of the elements in the structure of the market value approach on the development of human capital necessitates more comprehensive research on this subject.

The second section of the thesis, entitled "**Analysis and Evaluation of the Current State of Human Capital Development in the Industry**," focuses on examining the correlation between human capital development and macroeconomic indicators. It involves analyzing the present conditions and assessing the impact of human capital development on product volume and profitability.

Table 1. Relationship of human capital in Azerbaijan with some macroeconomic indicators

Years	Expenditure on human capital (X)	GDP (Y1)	Incomes of the population (Y2)	Poverty level (Y3)
2004	425.8	8530.2	6595.1	40.2
2005	567.1	12522.5	8063.6	29.3
2006	740.2	18746.2	10198.5	20.8
2007	1119.4	28360.5	14558.2	15.8
2008	1528.3	40137.2	20735.4	13.2
2009	1791.8	35601.5	22601.1	10.9
2010	1871.2	42465.0	25607.0	9.1
2011	2057.9	52082.0	30524.6	7.6
2012	2420.1	54743.7	34769.5	6.0
2013	2448.5	58182.0	37562.0	5.3
2014	2637.4	59014.1	39472.2	5.0
2015	2698.9	54380.0	41744.8	4.9
2016	3254.5	60425.2	45395.1	5.9
2017	2810.5	70337.8	49187.9	5.4
2018	3093.8	80092.0	53103.7	5.1
2019	3527.4	81896.2	56769.0	4.8
2020	4803.9	72432.2	55726.1	6.2

Source: Compiled by the author based on the data of the State Statistics Committee of the Republic of Azerbaijan [6]

Based on the data presented in Table 2, which reflects the relationship between the volume of total expenditure on human capital and the volume of GDP, that the coefficient of determination R-square = 0.9489 shows that the approximation is relatively high. The coefficient of determination R-square = 0.9489 means that the corresponding regression equation explains 94.9% of the variance with the outcome indicators and 5.1% with the influence of other factors. The high coefficient of determination indicates that the regression equation expresses the initial data better and that 94.9% of the resulting element is explained by the factors included in the model.

Table 2. The relationship between the total expenditure on human capital and the volume of GDP

Dependent Variable: UDM				
Method: Least Squares				
Date: 11/30/21 Time: 16:55				
Sample: 2004 2020				
Included observations: 17				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IKX	0.948964	0.054445	17.42975	0.0000
C	3.491491	0.411765	8.479333	0.0000
R-squared	0.952948	Mean dependent var		10.64183
Adjusted R-squared	0.949811	S.D. dependent var		0.652045
S.E. of regression	0.146077	Akaike info criterion		-0.899240
Sum squared resid	0.320076	Schwarz criterion		-0.801214
Log likelihood	9.643537	Hannan-Quinn criter.		-0.889496
F-statistic	303.7963	Durbin-Watson stat		1.390551
Prob(F-statistic)	0.000000			

Source: Compiled by author based on data from Table 1

Based on the data of Table 2, the regression equation expressing the dependence between GDP and human capital costs in Azerbaijan for 2004-2020 will be as follows.

$$UDM = 0.948964*IKX + 3.491491$$

From the obtained relationship equation, it can be concluded that one unit increase in human capital costs leads to an increase in GDP by 0.95 units.

Table 3. The relationship between the total expenditure on human capital and the income of the population

Dependent Variable: EG				
Method: Least Squares				
Date: 11/30/21 Time: 16:57				
Sample: 2004 2020				
Included observations: 17				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IKX	1.012998	0.040842	24.80304	0.0000
C	2.575515	0.308883	8.338158	0.0000
R-squared	0.976198	Mean dependent var		10.20834
Adjusted R-squared	0.974611	S.D. dependent var		0.687704
S.E. of regression	0.109579	Akaike info criterion		-1.474219
Sum squared resid	0.180112	Schwarz criterion		-1.376194
Log likelihood	14.53086	Hannan-Quinn criter.		-1.464475
F-statistic	615.1908	Durbin-Watson stat		1.212914
Prob(F-statistic)	0.000000			

Source. Compiled by the author based on the data of Table 1

It can be seen from Table 3 that the total expenditure on human capital has a strong correlation with the income of the population. Thus, the coefficient of determination R-square = 0.9761 shows that the relationship between the variables is relatively high. Accordingly, 97.6% of the variance in the regression equation is explained by the outcome indicators, and 2.4% is defined by the influence of other factors. The high coefficient of determination indicates that the regression equation expresses the initial data better and that 97.6% of the resulting factor is explained by the factors included in the model. Based on the data of Table 3, the regression equation expressing the dependence between the incomes of the population and human capital costs in Azerbaijan for 2004-2020 will be as follows.

$$EG = 1.012998*IKX + 2.575515$$

From the received relationship equation, it can be concluded that one unit increase in human capital costs increases the population's income by 1.01 units. Therefore, reducing such revenues will hurt the total cost of human capital.

Table 4. The relationship between total expenditure on human capital and the level of poverty

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dependent Variable: YS				
Method: Least Squares				
Date: 11/30/21 Time: 16:58				
Sample: 2004 2020				
Included observations: 17				
IKX	-0.009262	0.001381	-6.705042	0.0000
C	31.66155	3.176709	9.966775	0.0000
R-squared	0.775698	Mean dependent var		12.30000
Adjusted R-squared	0.758444	S.D. dependent var		10.43401
S.E. of regression	5.128143	Akaike info criterion		6.230930
Sum squared resid	341.8721	Schwarz criterion		6.325337
Log likelihood	-44.73198	Hannan-Quinn criter.		6.229924
F-statistic	44.95759	Durbin-Watson stat		0.631788
Prob(F-statistic)	0.000015			

Source. Compiled by the author based on the data of Table 1

Based on the data of Table 4, the regression equation expressing the dependence between the poverty level and human capital costs in Azerbaijan for the years 2004-2020 will be as follows.

$$YS = -0.009262*IKX+ 31.66155$$

From the obtained relationship equation, it can be concluded that one unit increase in the expenditure on human capital reduces the poverty level by 0.009 units. Table 4 also shows that the relationship between the total spending on human capital and the poverty level is strictly inversely proportional. As human capital develops, poverty levels decrease. The strong correlation between these two indicators gives rise to another concern. This concern is that the decline in oil revenues may hurt total expenditure on human capital in the future. If

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the cost of human capital formation and development is reduced, it can seriously impact the poverty level. Therefore, it is more appropriate to reduce the dependence of the volume of expenses on human capital on oil revenues.

As a result of the received report, it was determined that a 1 per cent increase in human capital costs increases the GDP by 0.04 per cent and the population's income by 0.07 per cent but reduces the poverty level by 1.8 per cent.

Now, let's look at the composition of human capital for three enterprises to analyze individual sectors of the industry. The following table shows the main components of the human capital of Sumgayit Technology Park in 2016-2020 (Table 5). By analyzing these components, it is possible to determine the main cost directions of human capital in Sumgait Technology Park.

Table 5. Sumgait Technology Park's main spending directions in 2016-2020 (in thousand manats)

İnsan kapitalının tərkibi	İllər				
	2016	2017	2018	2019	2020
Təlim xərcləri	64.53	98.25	116.97	132.24	197.52
Tədqiqat xərcləri	94.34	149.22	169.34	194.63	255.63
Təhlükəsizlik xərcləri	24.31	41.55	51.28	79.52	88.94
Sağlamlıq xərcləri	33.14	57.85	75.25	117.01	120.25
Cəmi	216.32	346.87	412.84	523.4	662.34

Source: Prepared by author based on data from STP [25]

Table 5 also shows that during 2016-2020, dynamic growth was observed in Sumgait Technology Park for each component of human capital (training, research, safety and health costs). Thus, in 2020, the training costs of the enterprise increased by 49.4% compared to 2019 and equalled 197.52 thousand manats. In 2020, the total amount of research expenses of the enterprise was equal to 255.63 thousand manats, which is 61 thousand manats or 31.3% more than the indicators of 2019. At the same time, in 2020, an increase in the level of security and health costs of the enterprise was observed. On the other hand, in 2020, compared to 2019, security expenses increased by 11.8% to 88.94 thousand manats,

and health expenses increased by 2.7% to 120.25 thousand manats. In contrast to Sumgayit Technology Park, ASK-Glass LLC's human capital consists of education, security and health expenses as the main expenditure directions (Tab. 6).

Table 6.

Composition of human capital of ASK-Glass LLC in 2016-2020 (in thousand manats)

Composition of human capital	Years			
	2017	2018	2019	2020
Training costs	104.24	162.39	234.65	301.22
Safety costs	35.42	55.62	70.21	84.52
Healthy costs	64.96	83.21	108.09	111.49
Total	204.62	301.22	412.95	497.23

Source: Prepared by the author based on the information of ASK-Glass LLC [3]

Thus, in 2020, the institution's total volume of educational expenses was 301.22 thousand manats, which means an increase of 28.4% compared to 2019. Last year, the enterprise's total security expenses increased by 20.4% compared to 2019. It was equal to 84.52 thousand manats. In 2020, there was an increase in the enterprise's health expenses. On the other hand, the number of health expenses of the enterprise increased by 3.1 per cent compared to 2019 and was equal to 111.49 thousand manats. Based on the above, during 2017-2020, dynamic growth was observed in all components of the human capital of ASK-Glass LLC.

Table 7. Composition of human capital in Matanat-A company in 2016-2020 (in thousand manats)

Composition of human capital	İllər				
	2016	2017	2018	2019	2020
Education costs	3541.63	4831.52	5524.39	7694.44	9452.31
Research costs	5241.6	6542.17	7861.24	9851.29	12634.57
Healthy costs	2705.74	3190.19	3940.8	3910.66	3411.01
Total	11488.97	14563.88	17326.43	21456.39	25497.89

Source: prepared by the author based on the data of Matanat-A company [16]

Table 7 also shows that the composition of human capital in Matanat-A company was determined by different divisions. Thus 2020, compared to 2019, education costs increased by 22.8%, research costs increased by 28.3%, and health costs decreased by 12.8%. From the analysis of the composition of the human capital of Matanat-A company, it is known that during 2016-2020, although a dynamic increase was observed in the piece of the educational and research expenses of the enterprise, the same cannot be said about health expenses. As mentioned above, the analysis allows to say that the Matanat-A company is one of the industrial enterprises of particular importance in developing human capital today. At the same time, other industrial enterprises that were studied (Sumgayit Technology Park, ASK-Glass LLC) are also among the leading industrial facilities that serve the development of human capital. However, the Republic's enterprises producing industrial products are represented by more than just these 3 companies. For this reason, there is a need to increase the volume of investments in the human capital of industrial enterprises in the Republic of Azerbaijan and, simultaneously, to involve innovative measures in the production process to speed up the production process with digital technologies. This makes analyzing the directions of improvement of the human capital development mechanism in industrial enterprises in Azerbaijan an actual research object.

Table 8.

Cost indicators directed to human capital with the main macro-economic indicators for the industrial sector.

Years	Gross profit in the industry (in million manats)	Production volume in industry (in million manats)	Training and Development costs (in million manats)	Medical costs (in million manats)	Research and Development (in million manats)
1995	-	1771.20	62.42	24.65	3.24
1996	-	2392.80	89.14	35.11	4.20
1997	-	2742.70	97.96	33.69	6.25
1998	-	2575.00	87.04	23.28	4.72
1999	-	2882.00	121.38	28.40	6.03
2000	-	3639.00	140.22	31.55	7.17
2001	-	3769.00	132.02	29.78	6.67
2002	-	4019.00	126.75	29.70	7.56

2003	-	4982.10	163.69	38.55	11.57
2004	-	5961.40	205.53	51.37	13.98
2005	5340.0	9308.80	276.90	85.68	21.41
2006	9763.0	15544.00	397.23	134.33	26.53
2007	15811.0	22495.60	573.48	204.01	34.82
2008	22258.0	29773.30	726.74	256.83	46.07
2009	16316.0	22563.60	727.52	255.01	52.79
2010	20743.0	27978.20	777.97	282.78	61.14
2011	26602.0	35026.90	853.11	331.83	71.36
2012	25286.0	34565.00	917.55	384.77	73.68
2013	24440.0	33898.10	837.64	360.58	68.17
2014	22215.0	32110.30	845.50	362.00	67.58
2015	15803.0	26369.40	778.33	343.41	54.89
2016	19902.6	32300.20	937.81	375.52	58.91
2017	25466.4	39892.50	988.38	399.67	62.27
2018	32643.1	47677.00	1170.67	422.59	70.12
2019	30489.5	46999.20	1260.08	501.35	70.19
2020	20884.2	37269.9	1427.51	868.35	-

Source: State Statistics Committee of the Republic of Azerbaijan [6]

To increase the research orientation of the research, according to the rules of conducting economic analysis in the Eviews econometric application software package, according to the data in Table 8, let's first examine the degree of influence of the cost factors incurred for the development of human capital in the industry on the gross profit (GP) obtained in the industry. I have grouped these cost drivers into training and development (T&D), medical costs (MC), and research and development costs (R&D). It should be noted that the coefficients given for the cost factors were determined based on the share of the volume of the product produced in the industry in the country's GDP.

Table 9. The result of estimating the parameters of the multiple regression linear model in the Eviews package

Dependent Variable: GP				
Method: Least Squares				
Date: 11/19/21 Time: 15:53				
Sample (adjusted): 2005 2019				
Included observations: 15 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
R&D	218.2996	90.99623	2.398997	0.0353
T&D	38.84111	11.38537	3.411494	0.0058
MC	-58.34694	29.87399	-1.953102	0.0767
C	-4319.741	2555.474	-1.690387	0.1191
R-squared	0.916786	Mean dependent var		20871.91
Adjusted R-squared	0.894091	S.D. dependent var		7361.144
S.E. of regression	2395.588	Akaike info criterion		18.62382
Sum squared resid	63127282	Schwarz criterion		18.81264
Log likelihood	-135.6787	Hannan-Quinn criter.		18.62181
F-statistic	40.39622	Durbin-Watson stat		1.847173
Prob(F-statistic)	0.000003			

Source: Compiled by author based on data from Table 8

Based on the Eviews application software package, the regression equation will be as follows:

Table 10. Evaluation of the relationship between indicators in the Eviews package

Estimation Command:
LS GP R&D MC T&D C
Estimation Equation:
GP = C (1) * R&D + C (2) * MC + C (3) * T&D + C (4)
Substituted Coefficients:
GP = 218.2996* R&D + 38.84111* T&D -58.34694* MC - 4319.741

Source: Compiled by author based on data from Table 8

Based on the regression equation of the established model and the Eviews application software package, the dynamics of the (Fitted) and actual (Actual) values obtained from the model and the residuals between

them (Residual) are given. chart below. As can be seen from the figure, the real values of profits and the values obtained from the model are quite close.
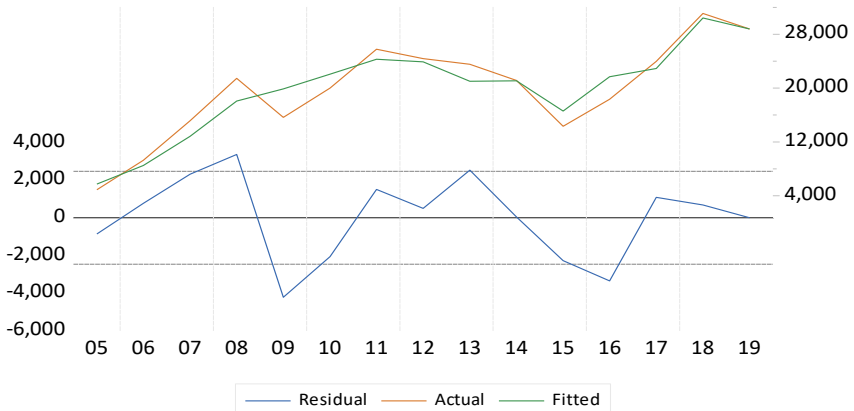
Graph 1. The dynamics of the model's Fitted and Actual values obtained by the regression equation and the Residuals between them

The Eviews practical package basically tests the hypothesis of the cohesion of the peers of the regression model. According to the results of the Eviews software package, it was determined the relationship between the total profit in the industry in the Republic of Azerbaijan and the costs incurred for the development of human capital in the industry - training and development, medical, research and development costs. From the relationship equation obtained as a result of the estimation of the parameters of the linear model of the multiple regression, which expresses the relationship between the total profit obtained in the industry and the costs of human capital development in the Eviews software package, it can be concluded that an increase of 1 unit of training and development costs results in a total profit of 38.84 units, while a 1-unit increase in research and development costs increases total profit by 218.3 units, a 1-unit increase in medical costs decreases total profit by 58.34 units. In addition, the statistical significance of the obtained regression equation can be checked with the help of the F-Fisher test. For this purpose, the F-Fisher criterion should be compared with the value Ftable (a; m; n − m −

1). According to the tabular data showing the result of the Eviews software package,

F- statistic = 40.39622

If the table value F is determined in Excel with the help of the formula $F\,table$ (a; m; n − m − 1) = F.Dist.Rt, Ftable (a; m; n − m − 1) = F.Dist.Rt (0 ,05; 3; 11) = 0.114111836

When comparing the F-Fisher criterion with the value of $F\,table$ (a; m; n − m − 1), it can be seen that the F-Fisher criterion > $Fcədvəl$ (40.39622>0.114111836). This means that the regression equation as a whole is statistically significant. This means the adequacy of the established model. If I calculate the elasticity coefficient according to the coefficient of the free variables in the relationship equation and the average values of the total profit obtained in the industry and the costs incurred on human capital in the studied periods, the following result will be obtained:

$$Etd = (\alpha \times \overline{X})/\overline{Y} = (38{,}84111 \times 843{,}53) / 20872{,}7 = 1{,}5696$$
$$Erd = (\alpha \times \overline{X})/\overline{Y} = (218{,}2996 \times 52{,}50) / 20872{,}7 = 0{,}5490$$
$$Emc = (\alpha \times \overline{X})/\overline{Y} = (-58{,}34694 \times 348{,}04) / 20872{,}7 = -0{,}9729$$

As a result of the received report, it was determined that although a 1 percent increase in training and development costs increases gross profit by 1.6 percent, a 1 percent increase in research and development costs increases gross profit by 0.5 percent, a 1 percent increase in medical expenses decreases gross profit by 0.9 percent.

Furtmermore, the study examines the impact of the cost factors (training and development (T&D), medical costs (MC), research and development costs (R&D)) on the volume of output produced in the industry (VIP) and the development of human capital in the industry.

The result of estimating the parameters of the multiple regression linear model in the Eviews package.

Dependent Variable: VIP				
Method: Least Squares				
Date: 11/19/21 Time: 16:50				
Sample (adjusted): 1995 2019				
Included observations: 25 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
R&D	21.74449	65.95003	0.329712	0.7449
T&D	42.18148	8.477543	4.975672	0.0001
MC	-10.00040	21.75753	-0.459629	0.6505
C	-1564.749	791.1905	-1.977715	0.0612
R-squared	0.986035	Mean dependent var		19649.45
Adjusted R-squared	0.984039	S.D. dependent var		15691.40
S.E. of regression	1982.373	Akaike info criterion		18.16762
Sum squared resid	82525838	Schwarz criterion		18.36264
Log likelihood	-223.0953	Hannan-Quinn criter.		18.22171
F-statistic	494.2365	Durbin-Watson stat		1.960736
Prob(F-statistic)	0.000000			

Mənbə: Cədvəl 8-in məlumatlarına əsasən müəllif tərəfindən tərtib edilmişdir

Eviews tətbiqi proqram paketinə əsasən alınmış reqressiya tənliyi aşağıdakı kimi olacaqdır:

VIP = 21.74449*R&D - 10.00040*MC + 42.18148*T&D - 1564.661

Based on the regression equation of the established model and the Eviews application software package, the dynamics of the (Fitted) and actual (Actual) values obtained from the model, as well as the residuals (Residual) between them, are given in the graph below. As can be seen from the figure, the actual values of the product volume and the values obtained from the model are quite close.

Graph 2. The dynamics of the model's Fitted and Actual values obtained by the regression equation and the Residuals between them

According to the results of the Eviews software package, it was determined the relationship between the volume of the product produced in the industry in the Republic of Azerbaijan and the costs incurred for the development of human capital in the industry - the costs of training and development, medicine, research and development. Based on the regression analysis results from the Eviews package, the derived relationship equation demonstrates the connection between the volume of product produced in the industry and the costs associated with human capital development. The findings indicate that a one-unit increase in training and development costs leads to a volume increase of 42.18 units. Similarly, a one-unit increase in research and development costs corresponds to an output increase of 21.74 units. Conversely, a one-unit increase in medical costs results in a decrease of 10 units in the output volume.

In addition, the statistical significance of the obtained regression equation can be checked with the help of the F-Fisher test. For this purpose, the F-Fisher criterion should be compared with the value Ftable (a; m; n − m − 1). According to the tabular data showing the result of the Eviews software package,

F- statistic (Fisher's criterion) = 494.2365

If the table value F was determined in Excel with the help of the formula Ftable (a; m; n − m − 1) = F.Dist.Rt, $F\text{c}ədvəl$ (a; m; n − m − 1) = F.Dist.Rt (0 ,05; 3; 21) = 0.115553 F-Fisher's criterion, comparing with the value of $F\text{c}ədvəl$ (a; m; n − m − 1) shows that F-Fisher's criterion > $F\text{c}ədvəl$ (494.2365>0.115553). This means that the regression equation as a whole is statistically significant. This means the adequacy of the established model. If the elasticity coefficient was calculated according to the coefficient of the free variables in the relationship equation and the volume of products produced in the industry in the studied periods and the average prices of human capital costs, the following result will be obtained:

$$E\text{td} = (\alpha \times \overline{X})/\overline{Y} = (42{,}18148 \times 566{,}25)/\ 20327{,}2 = 1{,}1750$$
$$E\text{rd} = (\alpha \times \overline{X})/\overline{Y} = (21{,}74449 \times 35{,}05)/\ 20327{,}2 = 0{,}0374$$
$$E\text{mc} = (\alpha \times \overline{X})/\overline{Y} = (-10{,}00040 \times 226{,}72)/\ 20327{,}2 = -0{,}1115$$

As a result of the received report, it was determined that a 1 percent increase in training and development costs increases the total product volume by 1.18 percent, a 1 percent increase in research and development costs increases the total product volume by 0.04 percent, but a 1 percent increase in medical costs decreases the total product volume by 0.1 percent.

In conclusion, the evaluation shows that investment in training and development and research and development as human capital development mechanisms in the industry lead to an increase in production and profits in the industry. Therefore, it is recommended to enhance and optimize these mechanisms to foster the growth of human capital in the industry.

In the **third chapter** of the dissertation, titled "**Strategies on enhancing mechanisms for stimulating human capital development in the Industry,**" the focus is on identifying the perspectives for stimulating human capital development and outlining strategies for improving the mechanisms that facilitate such development in the industry.

Several measures can be considered for the implementation of perspective strategies aimed at stimulating human capital development in the industry. These measures encompass the following initiatives:

- development of human capital through vocational training, employee retraining and improvement of the qualification system;

- harnessing the incomes obtained as a result of the development of the industry towards the improvement of human capital

- to analyze the current situation in the labor market and determine the demand for various qualified workers as a result of the accurate analysis;

- implementation of education at the workplace, along with the development of self-education opportunities, improvement of the continuous professional education system, application of progressive forms of training and development;

- formation of a convenient infrastructure for the involvement of young people, university students in seasonal and social work;

- expansion of science-intensive industrial enterprises, for this purpose creation of technology parks, business incubators, etc.;

- attracting modern technology and investments aimed at the development of human capital in the industry, increasing the number of economic zones;

- to determine the optimal ways of identifying high potential personnel and in this direction to create an effective mechanism of action in accordance with modern requirements.

In summary, it is essential for the government to enhance the effectiveness of projects and investments aimed at developing human capital in the industry. This should be accompanied by transparent and accountable implementation practices, active involvement of stakeholders, and the establishment of a competitive environment that allows citizens to freely participate. By adopting these measures, not only will socio-economic well-being improve for individuals, but it will also create favorable conditions for the growth and development of human capital.

To enhance and foster the research and development system within industries, a tripartite framework is necessary. The central concept of the university-industry-state cooperation model in research and development

is to stimulate regional innovation activities by leveraging their unique resources and capabilities. Overall, to enhance research and development within the industry, it is deemed appropriate to take into account the following aspects:

- it is necessary for the industry to keep up with the rapidly developing technology, and for this purpose, researching development policies in the field of science and technology;

- implementation of a number of activities related to the establishment of relations between local and international scientific and technical organizations and business subjects in the application of the research and development system;

- development of innovative entrepreneurship by strengthening business relations between business entities and field researchers;

- conducting research in a number of universities and scientific-research institutes in the direction of scientific, scientific-technical and innovation activities through university-industry-state cooperation;

- providing support to university students for industrial experience in enterprises operating in the industry;

- formation of the ecosystem by organizing joint trainings both in industry and for specialists of relevant scientific and educational institutions.

Training and development, another mechanism for human capital development, involves formal, ongoing activities within an industry to improve employee performance and self-development through various educational methods and programs. From the results obtained in the assessment of the current state of stimulation of human capital development in the industry, it became clear that investments in training and development as an indicator of human capital development have an exceptional role in increasing the overall profit and product volume in the industry. Training and competency development should be conducted for all field and office staff of the industry as per the training matrix. Thus,the improvement of the training and development mechanism in the industry can be implemented in the following form:

- firstly, it is recommended the industry to determine what training is relevant to the employees' work;

- on the other hand, it is recommended industry to determine what training will improve employee performance;

- the industry are required to determine whether the training will ultimately make a difference;

- at the same time, the industry are required to distinguish training needs from organizational problems;

- Finally, the industry are required to achieve organizational objectives and results to increase business performance.

The application of cloud technologies in the training process leads to the optimization of activities, the increase of the effectiveness of communication links, and the reduction of the costs of the industry. On the other hand, through this system, the participants' motivation for learning activities increases, and a more favorable opportunity for online learning is created.

CONCLUSION

As a result of the analysis and evaluation of the current state of the mechanisms for stimulating the development of human capital in the industry in the Republic of Azerbaijan, the following were determined:

1. In summary, according to the perspectives of researchers studying human capital, it can be concluded that human capital encompasses all the investments made in knowledge and skills that have the potential to generate value in an individual's future endeavors.

2. Through the investigation of economic growth models rooted in human capital, it was determined that a viable approach to achieving sustainable development is by transforming existing technological knowledge within businesses into labor capacity.

3. Drawing upon international expertise in human capital development, it can be inferred that governments of countries that have achieved notable advancements in this domain within a short span of time have adopted unified strategy and program documents encompassing long-term goals and objectives across all facets of human capital. My research in this realm leads us to the deduction that it is advisable to pursue the formulation of a comprehensive program document, referred to as "Lifelong Learning," which integrates interconnected objectives,

spanning the development of all constituents comprising human capital, in order to foster effective endeavors in human capital development.

4. According to the association equation derived from the examination of the relationship between the development of human capital and macroeconomic indicators, a 1% rise in human capital costs raises GDP by 0.04 percent and population income by 0.07 percent;

5. However, it is also evident from the study that there is a strict inverse link between the level of poverty and the overall amount spent on human capital. Poverty levels fall as human capital increases. Consequently, it is more acceptable to lessen the amount of investments in human capital's dependency on oil income;

6. Upon examining the existing state of human capital development in the sector, it was observed that research costs played a prominent role at Sumgait Technology Park, indicating the park's engagement in research-oriented activities.The cost of training is the foundation for human capital in "ASK-Glass" LLC. This shows that the business invests in training more skilled workers. In addition, as "ASK-Glass" LLC uses foreign technology in the manufacture of glass, the company is required to invest more in educating employees who are prepared to manage these technologies. On the basis of human capital, Matanat-A's corporation spends the majority of its money on research and education. Costs associated with doing research are increased by the company's need to continually incorporate new technology into its manufacturing process. The representation of industrial product-producing industries in the Republic of Azerbaijan extends beyond these three businesses. Therefore, it is crucial to increase investments in human capital across enterprises in the country. Simultaneously, innovative measures should be introduced in the production process, leveraging digital technologies to expedite production. Given these circumstances, the analysis of directions for enhancing mechanisms that foster human capital development in industrial sectors in Azerbaijan becomes an important and worthwhile research objective.

7. According to the coefficient of the free variables in the relationship equation obtained as a result of the estimation of the parameters of the linear model of multiple regression, which expresses the relationship between the total profit obtained in the industry and the costs incurred for

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the development of human capital in the Econometric Statistical software package, and the average values of the total profit obtained in the industry and the costs incurred for human capital in the studied periods when calculating the elasticity coefficient, it can be concluded that although a 1 percent increase in training and development costs increases total profit by 1.6 percent, a 1 percent increase in research and development costs increases total profit by 0.5 percent, a 1 percent increase in medical costs decreases total profit by 0.9 percent;

8. In addition, in the Econometric Statistics software package, the coefficient of the free variables in the relationship equation obtained as a result of the estimation of the parameters of the multiple regression linear model, which expresses the relationship between the volume of the product produced in the industry and the costs incurred for the development of human capital, and the average of the costs incurred for the volume of the product produced in the industry and human capital in the studied periods when calculating the elasticity coefficient according to their prices, it was determined that although a 1 percent increase in training and development costs increases the total product volume by 1.18 percent, a 1 percent increase in research and development costs increases the total product volume by 0.04 percent, a 1 percent increase in medical costs decreases the total product volume by 0.1 percent;

9. Vocational training, retraining of employees to promote the development of human capital in the industry, as well as the implementation of the system of professional development, training at the workplace, development of opportunities for self-education, improvement of continuous professional development of the education system; attraction of modern technology and investments in the development of human capital; expansion of science-intensive industries; determination of the most appropriate ways of identifying talented personnel and the creation of an effective mechanism of action in accordance with the requirements of the age in this direction is one of the important issues;

10. The appropriate organisation and use of mechanisms for research and development, training, and development can be used to stimulate the growth of human capital in the industry. Because the long-term growth of the sector is required to rely on cutting-edge, competitive training and

research in order to stay up with the escalating competition. These processes allow for the continuing growth of the human capital component of national wealth. As a result, there will be more opportunities for industry employees to learn high-quality information, personnel training will be tailored to the needs of the labour market, and experts will be prepared in accordance with international standards as part of efforts to advance the professional training system. Through the development of cutting-edge goods for the market and the formation of a skilled workforce, these processes will provide the groundwork for the realisation of a contemporary innovation space and competitive human capital. It is appropriate to use cutting-edge methods in industries to improve human capital through contemporary training, research, and development.

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Address: AZ 1001, Baku, Istiglaliyat Street 6

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