PROBLEMS OF ASSESSMENT AND MANAGEMENT OF INVESTMENTS IN HUMAN CAPITAL DEVELOPMENT

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ABSTRACT
The purpose of this study is to analyze and improve the technology of managing the cost and effectiveness of human capital in the process of forming a rational personnel policy in the medical services organization. The article includes the author's methodology for assessing and managing the investments in the development of human capital, which allows assessing the investment attractiveness of the human capital development projects. The proposed methodology was tested on the materials of the human capital development project in KORL LLC. We identified the main risks that directly affect the value of human capital, such as staff turnover due to the lack of career prospects and uncompetitive wages, imperfection of the system of material incentives for managers and specialists, problems of workplace technical equipment, insufficiently comfortable socio-psychological climate in the team. On this basis, we developed the specific proposals to improve the management of value and development of human capital in the organization under study.

Key words: Human capital, intellectual capital, investments in human capital, riskiness of investments in human capital, management of value of human capital

INTRODUCTION

The value of human capital, its structure, quality and efficiency of use are the important factors affecting the strategic competitiveness of the modern company, forming its intellectual capital and fundamental value. In the middle of the last century, *T. Schultz*, a professor at the University of Michigan, firstly proposed the term "human capital" to refer to the totality of knowledge, abilities and skills of people used to solve the personal and social problems and substantiated the macroeconomic approach to assessing and managing the human capital development [15]. In 1964, *G. Becker* developed a methodology for assessing the human capital effectiveness and formulated a microeconomic approach to its management [1]. In 1976 *J. Kendrick* applied a cost method of calculating the value of human capital, based on the statistical data on the accumulated investments of the family and the state in its reproduction [9]. Later, in the 1990's, *J. Mincer* (1994) conducted studies to assess the contribution of education and employment duration in human capital in his work [12]. *C.B.Mulligan* and *X. Sala-i-Martin* (1995) substantiated the original methodology for assessing the stock of aggregate human capital using a system of indices [13]. These and several other methods of assessing the value of human capital were summarized by the World Bank experts in the methodology of measuring the national welfare in the 1990s [6].

A new surge of scientific interest and developments on the topic under consideration is associated with the active development of the intellectual capital management concepts. In 1996 *A. Brooking* investigated the impact of human capital on other structural components of the intellectual capital, that is, the infrastructure and market assets, which is illustrated schematically in Fig. 1 [4].

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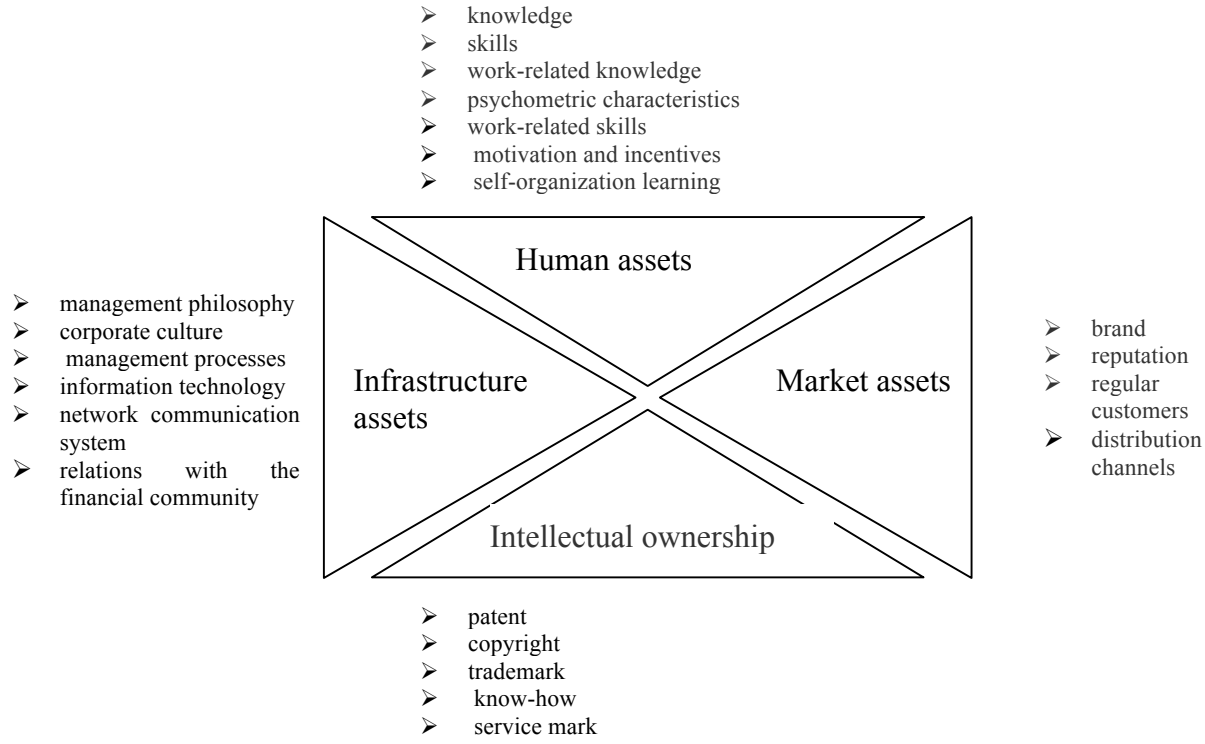

Fig. 1. Model of intellectual capital of E. Brooking

In 1997 *M. Kiernan* [10] positioned a human capital as an important factor in assessing the company's strategic competitiveness. Later, the development of problems of managing the effectiveness of human and intellectual capital at different times was investigated by: *T. Stewart* [17], *L. Edvinsson* [5], *J. Boudreau* [3], *J. Roos* [14], *J. Hayton* [7], *P. Wright* [18], *J. Shaw* [16], *S. Miller* [11], *Hsu Li-Chang* [8] et al.

At the same time, insufficient attention is paid to monitoring the risks of functioning and development of human capital, their accounting in the process of forecasting its cost and efficiency of use, as well as forming an effective personnel policy.

MATERIALS AND METHODS

Creation of an effective mechanism for managing the value of human capital is impossible without an adequate assessment of the optimal amount of investments in its functioning and development, development of tools for scientific forecasting of the economic efficiency of investment use. The authors proposed a methodology based on the synthesis of the cost approach for assessing the accumulated investments and the expert method of accounting for the riskiness of investments at different stages of the

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business career of employees. The general logic of the proposed methodology is shown schematically in Fig. 2.

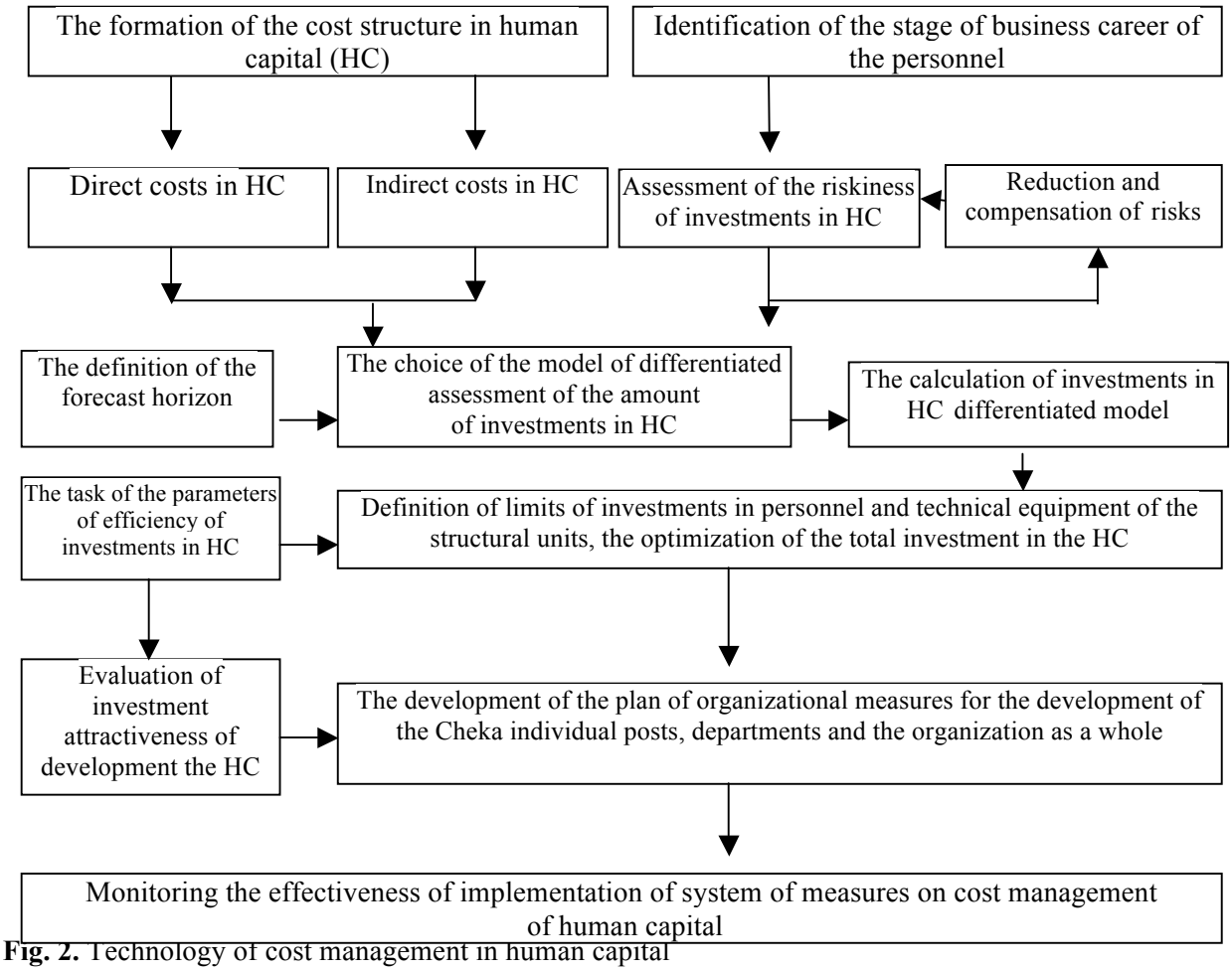

Fig. 2. Technology of cost management in human capital

RESULTS AND DISCUSSION

The microeconomic approach to managing the development of human capital presupposes the organization of its expanded reproduction. Approbation of the methodology on the materials of the human capital development project was carried out in KORL LLC. The basis of the clinic's work is high-tech surgical manipulations using endoscopic technologies and methods of laser and radiosurgery. In a sociological survey conducted in 2015 it became clear that the organization had certain problems in the functioning and development of human capital, which are illustrated in Table 1.

Table 1. The results of a sociological survey of quality of functioning and development of human capital in KORL LLC

Indicators of quality of functioning and development of human capital	Satisfies (% of the respondents)	Not satisfied (% of the respondents)	Difficult to answer (% of the respondents)
1. Business career opportunities within the organization	34	48	18
2. The level of remuneration compared to			3

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key competitors	41	56	
3. The effectiveness of the system of material incentives for providing quality health services	28	63	9
4. The possibility of retraining and advanced training	72	14	14
5. The level of social protection of employees	67	23	10
6. The level of technical equipment of workplaces of employees, the possibility of using new technologies	44	48	8
7. The level of organization of the labor process, the effectiveness of control execution	58	35	7
8. Socio-psychological climate in the organization	47	49	4

The conducted research has revealed the dissatisfaction of some employees, which, in our opinion, is directly related to insufficient investment in the functioning and development of human capital.

The management of KORL LLC set the task of improving the quality of human capital by strengthening the staff composition with the managers and specialists, having experience in the profession of at least 7 - 10 years, scientific titles of candidates and doctors of medical sciences, the highest qualification category. The proposed methodology assumes structuring of costs in the formation and development of human capital on direct and indirect ones. The data analysis on the structure of costs in the functioning and development of personnel of KORL LLC showed the following distribution of costs in the selected areas of human capital development shown in Fig. 2.

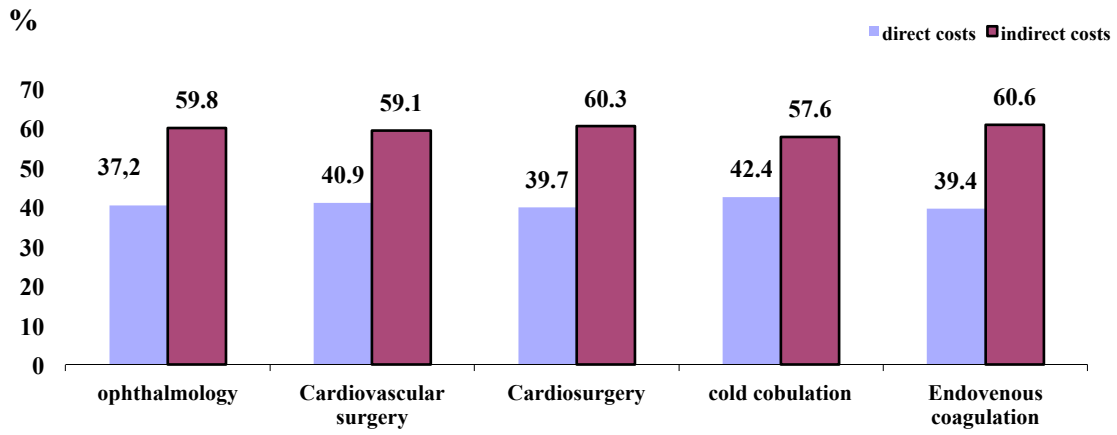

Fig. 2. The structure of costs in human capital in the areas of development

Differentiated models for optimizing the volume of investment in the human capital, taking into account the varying degrees of their riskiness.

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The author's methodology uses the investment approach to forecast the optimal value of accumulated investments in the workplace or the position held in relation to managers and specialists of KORL LLC. To this end, it was developed the differentiated models for assessing the volume of investments in the human capital, taking into account the degree of their riskiness.

We proceeded from the assumption that the approach taken in the framework of financial management to accounting for the average financial risk through the mechanism of investment discounting does not allow making an adequate assessment of the riskiness of investments in human capital. The studies have shown that such investments are more risky than the investments in fixed or working capital, and there are no available tools for insurance and reinsurance of risks, for example, when investing in equipment, buildings and structures, securities.

The dynamics of the riskiness of investments in the functioning and development of human capital is uneven and depends on the employee career phase or the stage of position life cycle (Fig. 3). It is possible to single out the career phases in which the riskiness of investments in personnel undergoes major changes. The initial career phase is characterized by a lower risk of investments in the human capital and low growth rates due to relatively small amounts of investments in the staff motivation and development. This phase corresponds to an investment optimization model with a minimum risk (Umin). The phase of rapid career growth is accompanied by a dynamic increase in the amount of investments in the advanced training of employees and their career advancement. Therefore, the optimization model is characterized by a moderate risk of investments in the human capital and its dynamic growth (Umid). The career peak phase, in which the employee becomes a highly qualified specialist, acquires a unique experience, occupies a key position in the management structure and significantly increases his demand in the labor market. This necessitates the use of an optimization model with the maximum risk of investments in the human capital (Umax). The phase of career endings is accompanied by an ever-increasing fall in the riskiness of investments in human capital by reducing investments in the development of skills and motivation of an employee, reducing the risk of job change and increasing the risk of worsening the decline in efficiency. This allows using a balanced investment policy and a corresponding optimization model (Umid) [2].

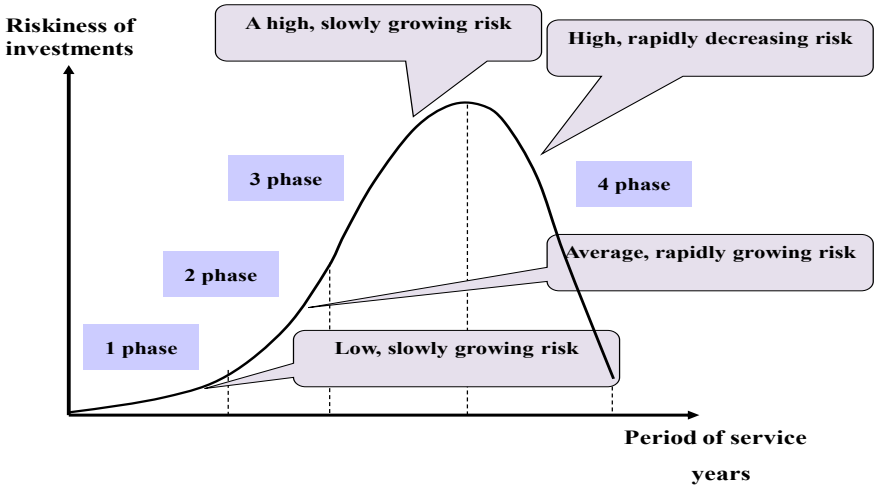

Fig 3. Dynamics of the riskiness of investments in human capital

The calculation results are shown in Table 2.

Table 2. The calculation of the optimal levels of investment in the leaders and specialists of KORL LLC for the period from 2015 to 2019 years

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Position	Optimization model	Parameters of the investment evaluation model											Scope, thousand roubles
		Ori, thousand roubles	Cni	Cci	Jni	Jci	Dci	Dni	Dqi	Dki	Bi	R_h	
1. Head of the Department of Vascular Surgery	Umid	507.2	-	-	1.45	1.1	0.11	0.15	0.13	1.44	0.12	1.19	21312.0
2. Cardio Surgeon	Umax	392.7	-	-	1.44	1.1	0.08	0.14	0.18	1.52	0.12	1.39	38196.6
3. Chief ophthalmologist	Umax	452.9	-	-	1.48	1.1	0.09	0.17	0.21	1.49	0.12	1.35	49273.3
4. Anesthesiologist of the department of cold cobra	Umin	263.5	0.31	0.1	-	-	0.09	0.11	0.12	1.36	0.12	1.13	7925.4
5. Endovenous coagulation surgeon	Umax	421.3	-	-	1.39	1.1	0.12	0.24	0.15	1.54	0.12	1.47	42,165.6
Total investment in human capital development													158,872.8

Ori – Annual salary in the i-th year; Cni – Fixed share of bonus deductions from salary; Cci – Fixed percentage of indexation from salary; Jni – Bonus index in the i-th year; Jci – Indexation coefficient in the i-th year; Dci – Share of insurance deductions from official salary; Dni – Share of social benefits and benefits from salary; Dqi – Share of costs for retraining and further training; Dki – Share of indirect costs per unit of direct costs to staff; Bi – discount coefficient; R_h – Correction factor, taking into account additional risks.

As it comes from Table 3, it is preferably to invest the most important investments in the highly qualified specialists in the priority areas of development of KORL LLC for the period from 2015 to 2019. It is assumed that these positions will be occupied by experienced, ambitious, promising employees of the highest qualification. The most important investment areas are the material incentives, advanced training and improving the technical equipment of the work. It should be noted that the differentiated models for calculating the volume of investments in the development of human capital included the high general and specific risks, which led to a significant increase in investments.

To assess the investment attractiveness, it is advisable to use the UNIDO indicator system, in particular, the most important indicator of investment efficiency - the net present value (NPV) of the project. Since the investments in human capital development are not of a one-time nature, we have used a modified formula for calculating the net present value.

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$$NPV_{HC} = \sum_{t=1}^{n} \left[-I_{HC_t} + \frac{CF_{HC_t}}{(1+N)^t} \right]$$

NPV_{HC} – Net discounted return on investment in human capital:

I_{HCt} – Annual investment in human capital;

CF_{HCt} – The flow of payments for investment in human capital in the t-th year;

N – discount rate;

n – time horizon.

To assess the flow of investment payments in the human capital, CF_{HCt}, we conducted a study of the relationship nature between investments in the human capital development and dynamics of return on net assets of the organization over the previous 3 years.

The calculation results of NPV_{HC} indicator, which confirm the investment attractiveness of personnel decisions on the human capital development in KORL LLC, are given in Table 3.

Table 3. Evaluation of investment attractiveness of the project for the development of human capital of KORL LLC in 2015 – 2019

Position	Volume of investments, mln. rub.	Cash flows, mln. rub.					Net present value, mln. rub.					
	I_{HC} 2015 - 2019	CF_{HC} 2015	CF_{HC} 2016	CF_{HC} 2017	CF_{HC} 2018	CF_{HC} 2019	NPV_{HC} 2015	NPV_{HC} 2016	NPV_{HC} 2017	NPV_{HC} 2018	NPV_{HC} 2019	NPV_{HC} 2015 - 2019
1. Head of the Department of Vascular Surgery	21.31	2.86	5.69	7.27	8.76	9.97	-0.7	0.82	0.92	0.81	0.33	2.17
2. Cardio Surgeon	38.2	2.34	7.51	15.52	18.7	21.29	-0.57	1.08	1.97	1.72	0.69	4.89
3. Chief ophthalmologist	49.27	2.9	9.53	20.15	24.28	27.63	-0.71	1.37	2.56	2.23	0.9	6.36
4. Anesthesiologist of the department of cold	7.93	1.08	2.12	2.69	3.25	3.7	-0.26	0.3	0.34	0.29	0.12	0.8

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cobra												
5. Endovenous coagulation surgeon	42.17	2.71	8.46	17.01	20.5	23.33	-0.66	1.22	2.16	1.89	0.76	5.36
Total for the Human Capital Development Project	158.87	11.88	33.31	62.64	75.48	85.92	-2.89	4.78	7.95	6.95	2.81	19.59

During the implementation of the human capital development project of KORL LLC, we formulated the priority directions for improving the cost management of human capital, the main of which are:

- creation of a special position in the management apparatus for monitoring the value of human capital, monitoring its dynamics, analyzing the factors affecting the efficiency of using the human capital, developing the measures for its development;

- making personnel decisions on leading specialists and managers in the form of development and organization of the investment projects implementation, which provides an assessment of the optimal volume of investments for the foreseeable planning horizon, forecasting the return on investment, assessment of investment risks, which makes it possible to justify the investment attractiveness of the projects;

- forecasting the optimal amount of investments in the development of human capital, taking into account the business career stage of the investment object, which enables to more accurately take into account the investment risks and plan the nature of investment policy in relation to this position;

- improvement of the management and accounting system in KORL LLC in the direction of personalization of accounting for investments and their profitability, which will provide an adequate statistical basis for the development of updated forecasts on the volume of investments and cash flows for investing in the functioning and development of human capital.

CONCLUSIONS

The conclusions on insufficient investment in the development of human capital are based on the personnel dissatisfaction revealed during the sociological survey. In particular, the greatest influence on the dissatisfaction degree has such factors as: the system of material incentives (63%), the compensation level compared to competitors (56%), as well as the socio-psychological climate in the organization (49%). The cost structure analysis has shown that the ratio of direct and variable costs in all clinic areas is approximately the same and is on average from 60% to 40%.

Using a differentiated model of investment volume optimization in the development of human capital taking into account the risk allowed identifying the most priority areas of investments in the staff. The effectiveness of the proposed measures is justified by the NPV calculations of the human capital development project.

SUMMARY

In general, the proposed methodology provides an opportunity to synthesize a cost approach for assessing the accumulated investments in personnel and an expert method for assessing the riskiness of investments at different stages of the business career, predicting the optimal investment volume and their profitability.

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This methodology enables to structure the costs in the functioning and development of human capital, identify the stage of investment risk depending on the position life cycle or employee career phase, choose the optimal investment policy, taking into account the investment risk level, optimize the amount of necessary investments in human capital development, assess the investment attractiveness of such investments, calculate the limits of investments in personnel and technological equipment for each structural subdivision on the basis of given parameters of investment efficiency, develop an organizational plan of measures for the human capital development, ensure control over the effectiveness of planned activities, which forms a reliable methodical and methodological basis for managing its value.

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