Analysis of methods for human capital assessment at the micro level

Galina Krushnitska

The article considers *the main features of human capital assessment methodologies at the micro level; the problems of human capital valuation methodologies at the individual level and human capital at the firm's level, based on the investment approach and income capitalization approach, their combinations and some other approaches, their objectivity and sufficient data for estimation of human capita have been analyzed.*

Key words: *human capital, human capital assessment, methods of evaluation of human capital, investment approach, the income capitalization approach.*

INTRODUCTION

As it is widely known, one of the main problems of economic theory since its emergence as an independent scientific discipline was to evaluate the worker's productive abilities. Human Capital Assessment Methodology was developed in the scientific literature of both foreign and domestic scholars. In particular, investment (costly) approach to assessing human capital is reflected in the scientific literature by H. Bekker, E. Enhel, J. Kendryk, J. Mintser, E. Flemholts, T. Shults, V. Allaverdyan, K. Chyhoryayev, V. Antonyuk, O. Hrishnova, O. Zaharova, Yu. Kaloshyna, M. Nikolaychuk and others. Assessment of human capital in terms of the ability to generate income incarnated in a man are considered in the works of T. Vitsteyn, L. Dublin, A. Lotka, L. Turow, V. Farr, I. Fisher, M. Fridmen, A. Yevstratov, V. Tsarov, V. Antonyuk, I. Zhuravlova, A. Kudlay, O. Russiyan and others.

The numerical evaluation of variations in human capital shows that at this time there is no one that would really meet its real volume. This is due to, firstly, imperfect measurement technologies, mathematical models, difficulties of statistics and its accuracy. Secondly, for reliable assessment of human capital, it is necessary to take into account a number of operating factors, which are principally impossible to assess. Thirdly, it is difficult to predict the consequences of events caused by the combination of these factors. Thus, the purpose of the research is to study the reliability of methodological tools for quantitative assessment of human capital at the micro level.

PRESENTMENT

A large number of works, both by foreign and domestic scholars, is dedicated to human capital assessment methodology; these researches show that a great variety of approaches used in such cases. Analyzing the methodology for assessing human capital, it should be noted that most of the researchers used two methods of cost estimates of human capital: the cost of production and the process of capitalization of earnings, and their combinations. The first procedure is to assess the real costs (usually net costs of livelihood) on the "production" of a man, the second one is to assess the actual (reduced to the present time) value of the future income stream of the individual (net or gross) [1, p.73; 2, p.28]. It should be mentioned that the estimation of the human capital components is being done at different economic levels: micro level - human capital at the individual level and human capital of enterprises and companies; macro (mesolevel) level - human resources of large corporations and regions; macro - aggregate human capital in terms of national economy (society); mega level - integrated human capital on a global, worldwide scale [3, p.84-86].

Taking into account the purpose of the study, let us analyze the methodological tools of human capital quantitative assessment at the micro level - human capital at the individual level and human capital of enterprises and companies. Thus, at the individual

level the evaluation of human capital is needed to determine the value of a particular employee of an enterprise to differentiate salaries, as well as a part of the procedure of further human capital assessment of the organization as a whole. At the enterprise level evaluation of human capital is needed to assess the effectiveness of human resource management (efficiency of investments in staff development), innovational activity of the enterprise, guaranteeing and improving its competitiveness and evaluation of the business' cost in case of selling or business merger.

One of the methods of evaluation of human capital at the individual level and human capital of firms, where investment (costly) approach to the assessment of the value of human capital is used, is a technique offered by Russian scientist K. N. Chyhoryayev [4, p.54-56]. The author of the methodology notes that "in order to assess the impact of a company's human capital on its financial results, it is necessary for it to have a quantitative expression. According to this method, all costs associated with human capital are divided into three main groups: the payroll (all payments to employees, including wages, taxes, bonuses, incentive bonuses, etc.), the cost of intellectual capital (costs of training, retraining, qualification improvement training, participation in thematic conferences, workshops, R&D, etc.), and the cost of "health capital". The term "health capital" means investments in people, committed to the formation, maintenance and improvement of their health and working abilities, for example, the costs of health care (checkups of employees, additional health insurance, and other measures of prophylactic care and disease prevention).

Thus, in a formalized form, the expression for the quantitative determination of human capital will appear as an additive model that serves as the sum of three components:

$$HC = A + B + C \qquad (1) \qquad [4, p.55]$$

where A - enterprise's payroll fund, B - enterprise's expenses on intellectual capital, C - enterprise's spending on "health capital".

The authors of this method indicate that the calculation should take into account the fact that each element has its own return expenses, and therefore, it is advisable to introduce $\beta_1, \beta_2, \beta_3$ weights for each return expense:

$$HC = \beta_1 A + \beta_2 B + \beta_3 C, \qquad (2) \qquad [4, p.55]$$

where the return expenses represent the costs of: β_1 - payroll, β_2 - the intellectual capital β_3 - the "health capital".

In general, this technique deserves certain attention. Its positive side, by contrast to other methods of evaluation of human capital at the individual level and human capital of firms, is the relative ease of calculation and taking into account not only the educational component, but also the wage bill and the component of "health." However, the method offered by K. N. Chyhoryayev has its drawbacks. In particular, firstly, this method does not include an inflation component. Secondly, it makes it impossible to trace the relationship between the investment "paid" and the level of accumulated human capital.

Among the methodologies for assessing human capital at the individual level and human capital of firms, where an investment (costly) approach to the evaluation of the volume of human capital is used, the method of evaluating the potential of the company, offered by Russian expert on investment projects V. V. Allaverdyan, also deserves attention [5]. This technique is based on the calculation of human potential goodwill of each employee. The author of this technique of an employee's value assessment offers to use the following formula:

$$S = Z + G_p, \qquad (3) \qquad [5]$$

where S - the estimated value of employee Z - wages predictable or paid to an employee G_p - coefficient, goodwill of an employee's human resources, calculated value.

The author notes that goodwill of an employee's human resources is a factor which reflects the real, market, individual value of a worker, not as a head unit, but as a specific individual who is able to perform certain functions, and solve certain tasks [5].

This technique can be applied in determining workers with higher levels of human potential, and therefore, other things being equal, they will bring greater economic returns from investing in their professional development. However, this technique is time consuming and requires considerable time to evaluate as HR goodwill of staff must be calculated separately for each employee and with certain time intervals. However, the main difficulty in applying this technique is the need to determine the level of goodwill of human potential of each employee must take into account all the factors affecting the market value of the employee. This technique also makes it impossible to determine the impact of investment in human capital on the performance of an employee.

Another method of assessing the value of human capital at the individual level and human capital of enterprises and companies is the method of earnings capitalization. This approach to assessing the value of human capital was used by many economists, including V. Farr, L. Dublin, A. Lotka, I. Fisher, H. Bekker, B. Chyzuik and others.

American economists and sociologists L. J. Dublin and A. Lotka also elaborated the problems involved in evaluation of human capital. They derived the following formula:

$$\mathrm{V}_0 = \sum_{x=0}^{\infty} V^x \times P_x (Y_x \times E_x - C_x), \qquad (4) \qquad [6, \text{c.14}]$$

where V_0 - the value of the individual at the time of birth; $V^x = \frac{1}{(1+i)^x}$ - the current value of a dollar earned in x years; P_x - the probability of a person to live to age x; $\mathrm{Y_x}$ - annual earnings of a worker since x to $x+1$; E_x - the proportion of employees in manufacturing aged x to $x+1$; $\mathrm{C_x}$ - the value of the cost of human life from the age of x to $x+1$.

In order to determine the monetary value of a person of a certain age (for example a,) this formula (4) can be transformed to the following:

$$\mathrm{V_a} = \frac{P_0}{P_a}\left[\sum_{x=a}^{\infty} V^{x-a} \times P_x (Y_x \times E_x - C_x)\right] \qquad (5) \qquad [2, \text{p.39}].$$

This individual income capitalization method, deriving any costs of consumption or abstinence, gives useful evaluation for many purposes. Indeed, these authors developed methods for assessing the economic significance of human ability to work (or human capital) is technically perfect and suitable for practical use on real data.

In particular, I. Fisher offered the methodology for assessing human capital that reflects only income that will be received in the future. In his opinion, the use of capital means receiving an interest as a universal form of any income (wages, profits, rents). Discounted sum of future income is the volume of capital being used. Methods of assessing human capital, offered by I. Fisher, are based on the discounting of the amount of income that an enterprise can receive in the future due to all kinds of investment in human capital. The formula of counting looks as follows:

$$\mathrm{D_c} = \frac{D_t}{(1+i)^t}, \qquad (6) \qquad [7, \text{p.55}]$$

where $\mathrm{D_c}$ - the present amount of income, $\mathrm{D_t}$ - the future amount of income i - current interest rate t - number of years.

This technique is not quite fair, since it makes it possible to determine only the income that is received by the enterprise in the future not taking into consideration the amount invested in human capital resources, changes in the workers' professional level as

a result of investment, the level of staff education, the costs of research and development, healthcare, additional costs, etc. In general, as noted by O.Zaharova and Yu.Kaloshyna, this technique can only be used as a method of planning of both the expected amount of income from investment in the future and of current income [7, p.55].

H. Bekker suggested using the standard method of discounting to assess the human capital:

$$V_a = \sum_{i=a}^{n} (B - C)(1 + i)^{-s} \qquad (7) \qquad [8, p.49],$$

where V_a - evaluation of human capital of the worker aged a; B - income of the worker; C - wages for ordinary labor and investment costs; n - the age at which active employment activity is finished; and i - the rate of return of human capital.

H. Bekker's method of assessing human capital, that is based on discounting of the volume of wages, which is associated with an increase in professional development of personnel and with other factors of influence throughout working life, makes it impossible to accurately determine the impact of investment in human capital. This technique can be used to determine the impact of investment in human capital along with other factors changing the value of human capital.

Another method of human capital assessment is a technique developed jointly by H. Bekker and B. Chyzuik. They developed a single formula for calculating the income of owners of both human and physical capital. According to the authors of this method, "total income of any person, after he/she finished investing in human capital, equals the sum of income on these investments and earnings from its initial human capital" for the owner of human capital [9]. The formula they offered for calculating income is as follows:

$$E_i = X_i + \sum_{j=1}^{m} r_{ij} \times C_{ij} \qquad (8) \qquad [7, p.55],$$

where E_i - income (earnings) of a person; X_i - the effect of the initial capital of this person; j - specific investments; i - interest rate; r_{ij} - rate of income of that person from investment; C_{ij} - the amount of the funds invested.

This technique has a specific advantage because it takes into account both earnings and revenues for investment in human capital and its use enables to calculate the income of the employee as a result of investment in human capital very reasonably. However, this technique does not allow determining the effectiveness of enterprise funds invested in staff development.

There are other approaches to the valuation of human capital. In particular, the concept of "Analysis of human resources" (AHR), offered by E. Flemholts in the early 60^{-ies} of the XX century, is one of the most famous attempt to use the theory of human capital at the corporate level among the methods of cost valuation of human beings [10]. The emergence of AHR is associated with the emergence of interest in staff as an important resource of the organization, the use of which hides significant reserves. Since any resource is characterized by economic efficiency of its use, it was necessary to develop tools that allow managers to more effectively use their personnel, to assess this effectiveness and to bring it to the total monetary valuation, along with other types of resources. According to the concept of "Analysis of human resources", the term *the value of human resources* refers not only to the price of their purchase, but to their value to the organization or the ability to generate future profits.

As it can be seen, the concept of AHR is based on the use of both expenditure and income approaches to human capital assessment. Thus, the analysis uses the concept of initial costs and renewable costs. Initial costs include the costs of search, acquisition and pre-training of employees, their composition depends on the particular case, the purposes for which these costs are calculated, and data availability. Renewable (replacement) costs

represent today's costs needed to replace an employee who is working now on a new worker, who is able to perform the same functions.

However, the concept of the value of human resources is based on the assumption that human resources have value if they are able to generate income in the future by providing their workforce. Thus, the cost of personnel, as well as any other resource, is the current value of the estimated future services and benefits that it provides or sells, working in the organization. The cost of the employee to the organization also depends on the duration for which it can provide its services to the organization and be profitable, i.e. the term of work in the organization. If the first condition determines the conditional expected value of the worker, then both of them together determine the expected real value.

Thus, the assessment of individual value of human capital is based on the developed probabilistic model that takes into account the possibility of the employee to occupy a certain position in the organization and the duration of work in this organization, cost of revenue for the organization that the employee can bring to it being in this position.

It should also be noted that, in addition to the above reviewed methods of quantitative assessment of human capital at the individual level and at the level of human capital of firms, there exist a lot of other methods, both in the investment (costly) approach and in the income capitalization approach, and their combination is offered by a number of researchers. In particular, this is the method of estimating human capital at the corporate level by Ya. Fittsents, the methodology of discounted cost evaluation of the potential of an enterprise's employee by V. Tsarova and O. Yevstratova, the model of evaluating effectiveness of investment in personnel training by J. Fillips and several others.

CONCLUSION

Despite the variety of approaches and methodologies for assessing human capital at the individual level and at the level of human capital of enterprises, offered by scientists, either of these methods does not take into account certain important aspects. This is primarily due to the fact that not all structural components of human capital allow to be quantified. To solve this problem it is necessary to use various indirect methods of estimation, which in their turn appear to be a time-and-labor consuming process. However, this is not the only difficulty in constructing estimates of human capital as a much greater complexity lies with collection, processing, and statistical counting of the informational data at all levels of research. So in this respect, an important task is to improve the current statistics by developing metrics to measure human capital - namely, to introduce a system of statistical indicators that would provide both value assessment as well as full assessment of available human capital at the micro level. The list of indicators should primarily include expenses of enterprises and individual entrepreneurs, aimed at personnel social development, including on-job education and qualification improvement training, health care, health insurance, leisure, and cultural development of employees.

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About the author

Galina Krushnitska, PhD, associate professor of the department of entrepreneurship economics of Chernivtsi Branch of Interregional Academy of Personnel Management. Ukraine. Phone:0969983467, E-mail: galine.kruch @ ukr.net

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