How to measure human capital for reporting purposes?

Iryna Renkas *

Ternopil National Economic University, Ukraine
*Corresponding author E-mail: irynarenkas@gmail.com

Abstract

The aim of this article is to present thermodynamic models of human capital measurement and their usefulness for the purpose of compiling information on the level of payment of human capital of a company's employees. A study of the literature on the subject reveals the role of Polish researchers in this area.

Keywords: *Human Capital; Reporting for Employees.*

1. Introduction

Research in the sphere of human capital has been going on since the 1960s, when the birth of human capital theory was announced by T. Schultz [Blaug, 1995]. An important date, too, is 1962, because that's when the world saw an issue of the Journal of Political Economy titled „Investing in People", which included chapters of G. Becker's „Human Capital" [1964]. Since then, a lot of publications have appeared in which authors develop issues in the field of human capital measurement theory. An important place among them is occupied by publications that present thermodynamic models of human capital measurement, based on fundamental principles of economic reality [Renkas, 2022]. The given research direction contributed to the revival of the scientific research program in the sphere of human capital, making it progressive. Original solutions for employee reporting were obtained.

2. Models of human capital measurement in the light of the recent scientific research program „SRP-human capital"

A characteristic feature of the human body is that its vital (biochemical) processes operate according to the principles of heat engine operation. So, in the consideration of human capital, the basic principles of thermodynamics find their original applications. Modeling of these thermodynamic influences is as follows:

$$H(a) = H e_0^{at}$$

Where: H(a) - value of human capital, a - economic constant of potential growth (0.08[1/year]), e - Euler number (2.71828...), t - number of years.
Based on the above formula, thermodynamic models for measuring human capital are formulated in accordance with the principles of economic calculation. The change in the value of human capital during the period from birth to the end of working life is determined by necessary inputs, such as the cost of living, the cost of education, capital from experience, and the input of one's own labor, as, for example, in the case of academics earning further degrees, or doctors making relevant professional specializations. Identifying these inputs, and determining the capital growth function as a result of acquired experience, leads to well-developed and theoretically grounded thermodynamic models for measuring human capital, presented in many studies [Dobija, 1997, 2014; Koziol, Renkas, 2021; Kurek, 2011; Renkas, 2013, 2017b, 2022].

2.1. Human capital model of a person without education and work experience

The basic human capital model of a person without education and work experience is presented by the formula:

$$H(k,t,a) = K$$

Where: H(k,t,a) - the value of human capital, K - capitalized cost of living using the appropriate capitalization rate.
Capitalized maintenance costs K is determined using continuous capitalization according to the formula:

$$K = k \times 12 \frac{e^{at} - 1}{a}$$

Where: K - capitalized cost of living, k - monthly cost of living, a - economic constant (0.08 [1/year]), t - number of years of life, e - Euler number (2.71828...).
Note that the monthly cost of living is capitalized, so the model can have its application in any country where there are statistics about the level of these costs. Also it is worth noting that the size of human capital calculated according to the above formula is the basis for determining the level of a fair minimum wage at the state level, since workers who do not have professional education and work experience deserve this wage.

2.2. Human capital model of a person with vocational education

If a young person decides to get a professional education, his or her capital increases by the capitalized outlays from it. Thus, the model for a person with professional education is as follows:

$$H(k,e,t,a) = K + E$$

Where: H(k,e,t,a) - value of human capital, K - capitalized cost of living, E - capitalized cost of education.
As in the previous case, continuous capitalization is used, which leads to the following formula:

$$E = e \times 12 \frac{e^{at} - 1}{a}$$

Where: E - capitalized education costs, e - monthly education costs, a - economic constant (0.08 [1/year]), t - number of years of education, e - Euler number (2.71828...).

2.3. Human capital model of a person with work experience

The working person's human capital model includes an additional variable related to work experience acquired during the course of work [Cieślak, Dobija, 2007, pp. 5-24]:

$$H(k,e,t,T,a) = (K + E) \times [1 + Q(T)]$$

Where: H(k,e,t,T,a) - value of capital attributed to a person with T years of education and experience, K - capitalized cost of living, E - capitalized cost of education, Q(T) - experience growth factor with T years of work.
The magnitude of Q(T) is derived from the known learning curve and is determined by the formula:

$$Q(T) = 1 - T^{\frac{\ln(1-w)}{\ln 2}}$$

Where: T - number of years of professional service, w - learning rate.
The above model can also be presented in additive form:

$$H(k,e,t,T,a) = K + E + D(T)$$

Where: D(T) denotes capital from work experience performed for T years of work and D(T) = (K+E) × Q(T), with D(0) = 0. This model is more convenient for analysis.

2.4. Human capital model of a person continuing education

In the case of continuing professional education or upgrading of qualifications (e.g., postgraduate studies, professional specializations, degrees), the value of an employee's human capital additionally increases by the capitalized costs from continuing education. Therefore, in the model of the increase in the value of such a person's human capital, in addition to the capitalized costs of further education, the capital from experience accumulated since obtaining additional qualifications should additionally be included:

$$H(k,e,t,T,a,L) = (H(k,e,t,T,a) + U)(1 + Q(L))$$

Where: H(k,e,t,T,a,L) - the value of human capital of a person pursuing further education, H(k,e,t,T,a) - the value of human capital at the time of completion of additional education, taking into account capitalized cost of living, capitalized education costs and capital from experience, U - capitalized expenditures related to additional education, Q(L) - experience growth factor as a result of L years of work after obtaining additional qualifications.
In additive form, the capital including additional professional training is as follows:

$$H(k,e,t,T,a,L) = K + E + D(T) + U + D(L)$$

Where: K - capital from cost of living, E - capital from education, D(T) - capital from experience gained until additional education is completed, U - capital from continuing professional education, D(L) - capital from experience gained after additional education is completed.

2.5. Human capital model of a person with creative capital

For some employees, additional abilities can be observed that cause them to be able to perform certain activities more efficiently and better than other employees. The source of these employees' increased productivity is their creativity capital, representing their uncommon ability to do their jobs, which is not available to many others. This capital as non-standard (such as professional education) has no way to be measured other than the general DCF formula (present value of the stream of income generated) [Renkas, 2017a].
In connection with the identification of creativity capital, the general human capital model is supplemented with a Cr component:

H(k,e,t,T,a) = K + E+ D(T) + Cr

Where: K - capital from cost of living, E - capital from education, D(T) - capital from experience, Cr - creativity capital.

The presented model leads to a theoretically justified compensation of an employee with identified creativity capital. It is assumed that an employee characterized by creativity is aware that he has exclusive abilities. The evaluation of these abilities takes place in an efficient market that provides an appropriate wage offer, since additional abilities require appropriate payment. The measurement of creativity capital is presented extensively by J. Renkas [2017a] using the example of an engineer who designs and builds bridges.

Using the models outlined above, it is possible to determine the size of each employee's human capital. However, this would not be possible without identifying the correct cost capitalization rate. As numerous studies have shown [Goetzmann, Ibbotson, 2006; Kurek, 2012; Renkas, 2016], this rate oscillates around the value of 8% per year, referring to the economic constant value of potential capital growth.

3. Human capital theory as a basis for the development of financial reporting

The presented models for measuring human capital provide an opportunity to organize a system for recording data that relates to the human capital of the employed, which refers to the concept of the human capital report. Thus, on the basis of these models, it is possible to determine the value of the human capital of each employee in the enterprise and, accordingly, the summed value in the whole enterprise. The resulting data can be reflected in the relevant company's human capital report (Table 1).

Table 1: Information on the Value of the Human Capital of the Company's Employees

Human capital component	Value
Human capital from cost of living (K)	1 270 014,00
Capital from education (E)	71 830,00
Capital from experience (D(T))	312 130,00
Capital from continuing education (U)	167 100,00
Creativity capital (Cr)	230 000,00

Source: own elaboration.

Accordingly, financial reporting can now be supplemented with information on the value of the human capital available to the company at a particular point in time. This supplement can be included in additional information. This will make up-to-date data available to recipients on the capital held in the company. Information of this kind will allow comparing different companies in light of the human capital at their disposal. However, the cited information requires an additional source of data, which will become employee personnel files supplemented by an appropriate assessment of the individual components of human capital. This clearly argues for the originality of this information. Their introduction will close the information gap regarding employees' human capital. Since capitalism, in the positive sense of the word, provides for the inclusion of all types of capital (regardless of its location) and equal rights for its multiplication, a financial report supplemented with the above information is a manifestation of a social market economy directed also to the interests and information needs of employees.

4. Conclusion

Since every accountant has adequate access to the information necessary to report on the level of paid human capital of employees, the only problem remained to find the right method for determining the size of individual human capital. The concept of human capital measurement presented in this article helped solve this problem. Today, using this concept, accountants have the ability to develop the appropriate calculation sheets themselves for determining the value of the human capital, which in turn makes it possible to report on the level of human capital paid at individual enterprises.

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