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Research paper

Professional and qualification development of enterprise personnel in terms of human capital theory

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Abstract

The subject of the consideration of this article is the theoretically based concept of determining fair remuneration for the personnel of an enterprise who decide to continue their education or upgrade their professional skills. The basic theory that is taken in the article as the basis for determining the level of remuneration is the theory of human capital developed by M. Dobija. The model uses the capitalization rate, which determines the measure of spontaneous natural attrition of human capital and is related to the size of the constant a = 0.08 [1/year].

Keywords: *Fair Wage; Human Capital; Capital from Continuing Education; Professional Development.*

1. Introduction

The development of the theory of capital in its accounting approach on the basis of the principle of dualism in historical and theoretical aspects justifies and presents the theoretical basis of the model of a fair minimum wage determined on the basis of the theory of human capital. This theory has been significantly developed in the scientific research program in human capital conducted at the Cracow University of Economics since the 1990s [Dobija, 2015; Renkas, 2017]. The core of this program is to understand the abstract nature of capital and to develop a model for its measurement in which the economic constant of potential growth is revealed. The research resulted in the possibility of measuring an employee's human capital, and then it was shown that a fair wage is a percentage of the value of this capital. This percentage is a measure of the spontaneous natural attrition of human capital and is related to the size of the constant a = 0.08 [1/year]. This article presents the concept of determining fair remuneration for personnel who continue their professional development and increase their relevant skills related to the increase in their capital from continuing education.

2. Minimum fair wage established on the grounds of human capital theory

The issue of fair compensation finds a positive solution by determining the appropriate capitalization rate for calculating the value of human capital. Previous studies have confirmed [Koziol, 2011; Kurek, Górowski, 2020; Oliwkiewicz, 2020; Renkas, 2016] that the appropriate capitalization rate (a = 8% [1/year]) determines the size of the minimum wage for each employee. The existence of its fixed size indicates the ability of capital to multiply in economic processes.
The ability of capital to generate value is expressed by the Internal Rate of Return (IRR) equation. Applying this equation to an employee's human capital over a one-year period leads to the formula (for simplicity of notation, the human capital variable has been labeled H(T)):

$$H(T)\ (1 + r) = W + H\ (T + 1)$$

Where, W - the amount of annual salary received by the employee, r - the growth rate of human capital, T - the number of years of professional service.
The left side of the above formula shows normatively that an employee's human capital should increase by the amount of (1+r) in a year. This increment has two sources indicating the real values on the right side of the equation. The first source is the salary received (W). The second - the increase in the value of the employee's human capital to the level of H(T+1) as a result of the work experience obtained during the year. According to S. Sunder [1997, p. 37], the capital from the experience gained is used during the course of work, but its size is not reduced.
Based on above equation, the formula for a fair wage (W) can be derived:

$$W = H(T)(1+r) - H(T+1)$$

$$W = H(T) \times r - H(0) \times [Q(T+1) - Q(T)].$$

ie, $W = H(T) \times r - \Delta D(T)$

Where, $H(0) \times Q(T)$ represents the value of the experience gain [Koziol, 2011].
From above equation it can be seen that remuneration, which is characterized as a percentage of capital (r), can be reduced by the magnitude of the increase in experience as the employee gains professional experience $\Delta D(T)$ through his work. The impact of the magnitude of $\Delta D(T)$ is most noticeable in the first years of work [Stando-Górowska, 2014; Renkas, 2022], but loses significance over time.
In light of the above, ignoring the small-meaning factor $\Delta D(T)$, the wage formula can be approximated by the formula:

$W_{min.} = a \times H(k,t,e,l,T,w,a)$

Where, $W_{min.}$ - minimum basic wage, determined by the value of the employee's human capital, a - economic constant of potential growth (a = 0.08 [1/year]).
Monthly labor costs, on the other hand, can be calculated by dividing annual labor costs ($W_{min.}$) by 12. The resulting final value according to human capital theory is the minimum monthly fair wage for a particular worker.

3. Basic models of human capital growth of the employed

The models themselves showing the value of human capital as the capitalized amount of the stream of expenses incurred are presented below. In the case of a person who enters his or her first professional job after completing the applicable education (such a person has no work experience as well as higher education), his or her human capital consists solely of capitalized living expenses, and the model is as follows [Renkas, 2022, pp. 80-82]:

H (k, a, t) = K

Where, K - capitalized maintenance costs, k - annual maintenance costs, t - number of years of capitalization of maintenance costs, a - economic constant of potential growth (a = 8% [1/year]).
This equation is the basis for calculating the minimum fair wage in the economy. The capitalized cost of living is determined as the future value of the stream of expenditures directed to cover the cost of living. In the given case, continuous capitalization is used, which leads to the following formula:

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

Where, K - capitalized maintenance costs, k - annual maintenance costs, t - number of years of capitalization of maintenance costs, a - economic constant of potential growth (a = 8% [1/year]), e – Euler's number (approximately equals 2.7183).
If a young person decides to get a professional education, his capital increases by the capitalized investment in education. The human capital model for such a person is as follows:

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

Where, H (k, e, a) - the value of human capital, K - capitalized maintenance costs, E - capitalized education costs.
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, a) = (K + E) × [1 + Q(T)]

Where, H (k, e, T, a) - the value of capital attributed to a person with T years of work experience, K - capitalized maintenance costs, E - capitalized education costs, Q(T) - experience growth factor with T years of service.
The magnitude of Q(T) is derived from a known learning curve [Stando-Górowska, 2014]. The above model can also be presented in additive form [Koziol, 2010a, pp. 79-80]:

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

Where, D(T) stands for capital from the experience of professional work performed for T years and D(T) = H(0) × Q(T), with D(0) = 0. This model is more convenient for analysis and wage formation.
Separate models take into account the additional capabilities of workers, resulting, for example, from continuing education.

4. Measuring capital from continuing education

The additive form of the worker's human capital model, taking into account capital from cost of living, capital from education, capital from work experience, and capital from continuing education is as follows [Renkas, 2022, p. 106]:

H(k, e, l, w, a, T, t, u) = K + E + D(T) + U

Where, K - capital from cost of living, E - capital from education, D(T) - capital from experience T years of work, U - capital from continuing education.
Based on the model presented above, Table 1 presents the starting data for calculating the human capital value of a model person aged 55. The model person has completed two years of postgraduate studies in her profession during her career, which make up her capital from continuing education.

Table 1: Output Data for Calculating the Value of Human Capital of the Model Person

Specification	Output data
Age of the model person	55 years
Monthly cost of living	PLN 960.00/month
Years of education	5-year college degree, completed at age 24
Higher education costs	PLN 4,500.00/year PLN 4,500.00 × 5 years = PLN 22,500.00
Years of postgraduate studies	2-year college degree, completed at age 32
Costs of postgraduate studies	PLN 6,400.00/year PLN 6,400.00 × 2 years = PLN 12,800.00
Additional education	2 h/day, 22 days per month 2h × 22 days × 12 months = 528 h per year.
Learning rate	0,05

Source: own study.

For the purpose of the calculation, the cost of living was set at the minimum subsistence level, i.e. PLN 960 per month. To calculate the value of human capital from the cost of living (K), it was assumed that their amount would be capitalized until the age of 24, i.e. until graduation and entry into the labor force. Education costs, on the other hand, were assumed at PLN 4,500/year, which refers only to the five-year period of study. In addition, the total amount of human capital is augmented by an experience factor (Q(T)), which was calculated with a learning factor (w) at the 0.05 level to determine capital from experience (D(T)). To calculate capital from continuing education (U), it was assumed that the model worker spends an average of 2 hours per day of free time (500 hours per year) on additional education. The value of an hour of such work was estimated as the quotient of the annual compensation for the use of the worker's capital (8% × H(T)) and an annual work norm of about 2,000 hours. Also, the cost of continuing education consists of two annual tuition fees of PLN 6,400.00/year.
Table 2 shows the calculation of the value of a model person's human capital, detailing capitalized living expenses, education expenses, continuing education expenses and work experience capital. Also in the table is a set amount of fair pay that does not allow the human capital of the model person to dissipate.

Table 2: The Value of Human Capital and the Fair Wage of the Model Person

Specification	Calculations
Capital from cost of living (K), t= 24	$K = 960{,}00 \times 12 \times \frac{e^{0{,}08\times 24}-1}{0{,}08} = 838\,218{,}02 \approx 838\,218{,}00$
Capital from education (E), l=5	$E = 22\,500{,}00 \times \frac{e^{0{,}08\times 5}-1}{0{,}08} = 138\,325{,}70 \approx 138\,326{,}00$
Capital from experience of first 8 years of work ($D(T_8)$)	$D(T_8) = (K+E) \times \left(1 - 8^{\frac{\ln 0{,}95}{\ln 2}}\right) = 976\,544{,}00 \times \left(1 - 8^{\frac{\ln 0{,}95}{\ln 2}}\right) = 139\,279{,}59 \approx 139\,280{,}00$
The value of human capital (H(k, e, a, T_8 , t, l, w)	1 115 824,00
Capital from continuing education (U), n= 2	$U = (u + 6400) \times \frac{e^{0{,}08\times 2}-1}{0{,}08} = 58\,614{,}14 \approx 58\,614{,}00$ $u = \left(\frac{(K+E)\times 0{,}08}{2\,000\ h} \times 528\ h = 20\,624{,}61 \approx 20\,625{,}00\right)$
Capital from the experience of the next 23 years of work ($D(L_{23})$)	$D(L_{23}) = (K + E + D(T_{14}) + U) \times \left(1 - 23^{\frac{\ln 0{,}95}{\ln 2}}\right) =$243 198,00
The overall value of human capital H(k, e, a, T_{14} , t, l, w, u ,n, L)	1 417 636,00
Annual labor costs (W=H(k, e, a, T, t, l, w, u, n, L) × 0.08	113 411,00
Monthly labor costs (W/12)	9 451,00
Gross monthly fair wage*	7 837,00

* Monthly labor costs less employer contributions (20.6%).
Source: author's calculations.

In light of the assumptions discussed, the monthly salary determined in Table 2 for a model person with five years of training in an occupation and two years of skill upgrading can be considered a fair base salary, which results from the application of the economic constant of potential growth (a = 0.08 [1/year]).
Let's turn our attention to the issue of capital from professional education, the value of which in the example presented is PLN 138,326. In the case where the cost of professional education was borne by the state and not the employee, should it be taken into account in determining the fair wage? It is obvious that the omission in the presented account of the amount of capital from education will significantly reduce the determined earnings of the employee, making it wickedly low. Therefore, regardless of how the cost of education is financed (whether by the person himself or the state), capital from education should be included as costs are incurred. This is also confirmed by the fact that if a doctor goes abroad, the cost of education will be taken into account when determining his salary, with the dimension of education costs applicable in the country where he arrives. Hence, among other things, the opinions about much higher wages abroad.

5. Conclusions

The theory of measuring human capital and consistent wages presented in the article is the result of work carried out over the past 20 years by a team of authors from the Cracow University of Economics. The research led to the clarification of the essence of capital, labor and fair wages for work done. A proper understanding of the category of capital, as an abstract ability to do work, has contributed to the development of modern human capital theory. In light of the calculations presented, the essence of fair remuneration for those continuing their education and improving their professional skills was revealed, which for each employee is estimated at his individual level depending on the accumulated human capital.

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