

**THERMODYNAMIC BACKGROUND OF MODELING THE MEASUREMENT OF RETURNS
ON HUMAN CAPITAL: AN EXAMPLE OF THE RUSSIAN ECONOMY**

Wojciech Koziol

Cracow University of Economics, Cracow, Poland

ABSTRACT

There are times when we wonder whether investments in human resources or physical resources are more profitable. In both cases, we invest the same capital, and the creative use of human and physical resources leads to the creation of new capital carriers. The article presents an original method of calculating the rates of return on human capital. This method was used to calculate the profitability of the human capital of employees in Russia in 2013 - 2018. The article uses a model for measuring the individual human capital of employees derived from the general concept of capital. The category of capital used in the work meets the requirements of the methodology of natural sciences, and thus takes into account the fundamental laws of nature, the abstract nature of the issues under consideration, and allows for the existence of constants. In the developed concept, capital is an abstract quantity that is subject to natural influences. The analysis of these interactions also led to the discovery of the economic constant included in the formula of capital. The value of this constant represents the natural potential of capital for growth, equal to 8% per annum. Capital is an abstract category that does not come from nothing, it is possible to indicate its origin. Capital is a category with a value that changes over time and is transferred in economic processes. It can be concluded that the value of capital is influenced by thermodynamic processes. Ultimately, a proper description of capital and its sources of growth is possible through the application of the first and second laws of thermodynamics. The discovered economic constant is the consequence of the constant flow of time. It is indispensable in modeling the most important economic issues such as capital and human capital measurement, profit and remuneration analysis.

The rate of return on human capital is calculated as the relation between the received annual remuneration and the value of human capital. The calculations were carried out at the macroeconomic level, which required the total amount of annual wages in Russia and the value of human capital of all employees. Information on the aggregate amount of wages was obtained directly from the Russian statistical office. Human capital is a function of the cost of living, the employee's level of education and the scope of his

professional experience. Obtaining the aggregate value of the human capital of employees required the development of a model of the distribution of the human capital of the employed. The distribution of human capital is a derivative of the distribution of education and work experience among those employed in the Russian economy. The calculations show that the average rate of return on human capital in the analyzed period is 8.15% (minimum 7.44%, maximum 8.79%). An additional conclusion from the calculations is the confirmation of the 8% value of the economic constant as a deterministic value. This means that the economic constant also determines the level of human capital remuneration.

Keywords: Economic constant, capital, human capital, rate of return on human capital, laws of thermodynamics