
THE FORMATION OF THE HUMAN CAPITAL CONCEPT: A STAGE IN THE HUMAN CAPITAL THEORY DEVELOPMENT

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Abstract: The evolution of human capital theory can be conditionally divided into three main stages – formation of the concept of the role of man in the economy, theory of human capital and modern development of the theory of human capital, each stage can be further detailed into separate phases. The purpose of this article is to present the second phase of the first stage of the development of human capital theory. The formation of the concept of human capital, preceded by the phase of the emergence of early ideas about the role of man in the economy, represents the first stage of the development of the theory. Within the second phase of the first stage, this article presents the ideas about the valuation of man of economists from different economic schools, starting with William Farr.

The main ideas, contributions and mathematical apparatus proposed by William Farr are presented, through which, through the approach to capitalizing future labor income, the value of man in the economy can be calculated. Next, the contribution of Ernst Engel is summarized, according to which a more accurate assessment of would be obtained if all the costs of raising, training and supporting an individual until reaching working age were summed up. The building blocks of Rudolf Goldscheid, who is a supporter of the so-called cost approach to calculating value, are also examined. The shortcomings and criticisms of the cost approach to valuing a person are analyzed.

The contributions of Louis Dublin and Alfred Lotka are systematized and the mathematical formula they proposed for calculating the value of a person is presented. Special attention is paid to the early developments of Jacob Mintzer, which have a serious effect on the understanding of the role and place of man in the economy, as well as the essence of the ways of valuing him for the needs of the economy. The views of Moses Abramovitz are also presented, which serve as the basis for the later emergence of the classical theory of human capital.

In conclusion, the contributions of Milton Friedman and Simon Kuznets, who are also supporters of calculating the value of a person by discounting his future labor income, are analyzed.

As a main conclusion from the conducted theoretical research, it can be stated that most of the analyzed authors are supporters of using the approach of capitalized incomes over the method of summing up the costs for the formation of a working individual.

Keywords: human capital, economy, stages, development, phases, evolution

1. INTRODUCTION

The genesis of the concept of human capital must be sought in the emergence and development of classical political economy "and the clarification of the category of "capital" in the conditions of the emerging capitalist system with its inherent market economy" (Kirova et al., 2012, p. 12).

The development of the theory can be divided into three main stages – “formation of the concept of the role of man in the economy”, “human capital theory” and “modern development of human capital theory”. The first stage describes the genesis of the understandings of classical economists about the contribution of man – a worker in production and the national economy. With the accumulation of conceptual models and empirical data, the classical theory of human capital, developed by Gary Becker and Theodore Schultz, emerged. The expansion of the scope of human capital with the inclusion of “soft competencies”, leadership, digital skills, motivation, etc. non-cognitive competencies mark the modern stage of the development of the theory. It is necessary to clarify at the beginning of this study that the division is conditional, since there is no clearly delineated boundary between the individual stages in the development of human capital theory.

By deepening the analysis, each of the three main stages can be further detailed into separate phases. For example, within the first stage, two phases can be distinguished - “early ideas about the role of man” and “formation of the concept of human capital”. Early ideas about the role of man in the economy were presented by classical economists such as William Petty, Adam Smith, David Ricardo, John Stuart Mill, Karl Marx, etc (Yangyozov, 2025b). The second phase of the stage of formation of the concept of the role of man is characterized by increasing interest in the connection between better education and economic growth.

In the modern stage of development of the theory of human capital, two clearly expressed trends are observed. The understanding that the magnitude of human capital is a combination of cognitive (education, technical literacy, etc.) and non-cognitive (responsibility, hard work, etc.) knowledge and skills is introduced. Another clearly outlined trend in the development of the theory is related to the digitalization and automation of the economy, which creates a need for the possession of hybrid skills - hard, soft and digital.

The purpose of this article is to present the second phase of the first stage of the development of human capital theory – “formation of a concept of human capital”.

2. FORMATION OF THE CONCEPT OF HUMAN CAPITAL

In their works, the earliest representatives of economic thought made attempts to include people in the category of “capital”, since it was already clear that by actively applying their knowledge and abilities, individuals contribute to the creation and growth of individual and social wealth. Almost all economists have considered human capital as part of the three main forms of capital without separating it into a separate category (Kiker, 1966). The second phase of this stage is characterized by the availability of statistical evidence and analyses on the basis of which it is proven that higher labour qualifications increase productivity, hence the income of workers and welfare in society. Attempts are made to systematize methodologies for measuring the return on investment in education and training and approaches to establishing the monetary value of a person (Yangyozov, 2025).

At the end of the 19th century, William Farr presented his concept of valuing a man through the “capitalized income” of an individual and using the principles of life insurance. The basis of his approach to calculating the value of a person is the understanding of “calculating the present value of the net future income of a given individual (future income minus personal living expenses)” (Zahariev, 2012) taking into account the average life expectancy. Following the same logic, Farr proposed that the economic value of the entire population of a country be calculated by discounting the expected income of the population. The formula describing the idea of valuing a man (1) can be presented as a compilation of two components – the expected survival of the individual to a certain age and the present value of the net income (Farr, 1853, p. 38).

$$H(a) = \sum_{t=1}^T v^t p_a^t [w_{a+t} - c_{a+t}] \quad (1),$$

where:

$H(a)$ – economic value of human capital per person aged a ;

$v = (1+r)^{-1}$ – discount factor at discount rate r ;

r – a rate reflecting both the effective interest rate and survival risk;

t – period for which an individual is expected to work;

$p_a^t = \frac{l_{a+t}}{l_a}$ – probability that a person of age a will survive to t years;

w_{a+t} – the expected income of a person of age a for the next t years;

c_{a+t} – estimated living expenses of a person of age a for the next t years;

$w_{a+t} - c_{a+t}$ – net income per person of age a for the next t years.

The main contributions of Farr's methodology can be summarized as follows (Yangyozov, 2025).

First, the individual's net income is used, which means that for each year, the difference between the income that the worker receives and the expenses that accompany his lifestyle and subsistence is calculated.

Second, net income is discounted at a rate reflecting alternative investment and/or the risk of premature loss of income (disability or death), thus taking into account the fact that one lev received today has a greater value than one lev received in the future.

Third, taking into account mortality when calculating the present value of net income – the probability of the worker living and working each subsequent year is taken into account.

Although simplified by modern standards, since the calculation often uses average life expectancy, Farr's approach contributed to the development of the concept of human capital and laid the foundation for later and more complex models for assessing the economic value of a person.

In parallel with the development of approaches to valuing a person or the components of human capital based on the income approach, Ernst Engel considered it appropriate to measure the value of people based on the costs that are necessary for the “production” of one person/worker.

Ernst Engel considered the idea that the value of a person could be calculated by successively summing up all the costs necessary for his “production” (rearing, upbringing, education, etc.) up to a certain age (Engel, 1883). In his reasoning, Engel makes several assumptions that are the basis for later criticisms of the presented concept and its classification as more theoretical than close to practice.

In his reasoning, Engel makes several assumptions that are the basis for later criticisms of the presented concept and its classification as more theoretical than close to practice. The first assumption is related to determining the value of expenses up to the moment of birth of the individual. The author divides the population of Germany at that time into three groups – lower, middle and upper class with a value of 100, 200 and 300 German marks, respectively (Zahariev, 2012). The second assumption is that the percentage increase in living expenses is linear and fixed at 10%. Third, according to Engel, an individual over 26 years of age is considered “completed” or “fully produced” (Sencini, 1908 cited in Kiker, 1966).

In his later study, Cohn critically pointed out that it’s illogical to base the costs of prenatal care on the subsequent costs of “production” of an individual, since no direct relationship is found between the costs incurred before the individual’s birth and those incurred after (Cohn, 1970). According to him, the costs of maintenance should be predicted and formed on the basis of the costs of raising a child in the first year of his birth. The question of the principle by which the relevant values and the step between them were chosen is also debatable.

Engel’s second assumption is also subject to criticism, since according to him, the difference in the costs of maintenance between an eight-year-old and a seven-year-old would be the same as the difference between a two-year-old and a one-year-old, which isn’t the case. Practice shows that as an individual’s age increases, his costs of maintenance increase non-linearly. This includes direct costs (for food, clothing, housing, etc.), social costs (for education, recreation, etc.), and opportunity costs (forgotten income of parents to raise a child). In general, the costs of “producing” a person increase more rapidly as time goes by and the child grows (Cohn, 1970).

From today’s perspective, the assumption that after the age of 26 an individual is “finished,” meaning that he or she doesn’t need further training and development, is also questionable. Although at the time Engel presents his procedure for valuing an individual, a person who has reached the age of 26 is considered a mature and full member of society, the obsolescence of knowledge and skills due to a number of factors (for example, innovations in production based on scientific and technological progress or forgetfulness due to fatigue and/or routine at work) and the need for continuous updating of what has been learned (the modern understanding of lifelong learning), which leads to the generation of additional costs during the individual’s working period, isn’t taken into account. Engel also misses another important thing: in a market economy, there may be a significant difference between the cost of production of a given asset and its market value (Zahariev, 2012).

Later, Rudolf Goldscheid developed his concept of the so-called “human economy”, in which people are considered as “organic capital”, the production and maintenance of which requires the joint efforts of society, generating “social costs” (Exner, 2010). Building on Engel’s ideas, according to Goldscheid, when calculating the costs of “production” of a worker up to a certain age, all costs should be included, which he classified into three categories: direct, indirect and subsistence costs.

The first group includes the costs of education, healthcare and recreation. The second group includes both the so-called “opportunity costs”, which express the lost benefits for households and/or society, as well as costs arising from the use of child labour, exhaustion of the workforce, occupational accidents, etc. The costs of ensuring the daily needs and existence of the individual fall into the group of “subsistence costs”.

From this perspective, for Goldscheid, poverty, illiteracy and social marginalization represent a “waste” of human potential and generate a loss for society as a whole (Exner, 2010). It can be said that Goldscheid’s contribution to the valuation of a person through the “cost of production” method is conceptual and methodological, as it proposes to account, based on national accounting, all public costs for the reproduction, maintenance and development of human capital. In addition to the calculations for determining the full costs of “production” of a worker, the fact that competencies lose value over time – depreciate (Boarini et al., 2012) is also taken into account.

At the beginning of the 20th century, applying the concept of “organic capital” to public finances, Goldscheid argued that the state budget should reflect investments in human capital (Goldscheid, 1917). Thus, the problems of valuing the human being from private, concerning the costs of the individual and determining his individual economic value, are transformed to the national level, requiring an assessment of the state costs of reproduction and increasing the value of national human capital (Boarini et al., 2012). Goldscheid’s views are inherent in an economy that appears as an alternative to the market economy, and in which financial policy is key to social development and the well-being of individuals.

For most authors, the calculation of the value of human capital would be more accurate if the capitalized income approach were used. The main reason is related to the natural aspiration of individuals to higher future incomes, even at the cost of giving up current income and consumption (Yangyozov, 2025a). At the same time, there are criticisms of this approach, as it can be argued that it assesses the labour market rather than the level of work ability of individuals (Auerbach & Green, 2025). Nevertheless, it is widely used to this day.

As supporters of the income approach, in their later study, Louis Dublin and Alfred Lotka built on the methodology proposed by William Farr by adjusting expected incomes with the levels of employment and mortality in different

age groups of the population (Dublin, 1930 cited in Kiker, 1966). Thus, when determining expected incomes, their value will be adjusted by the probability that the person will be alive and employed at a given age. For this purpose, statistical data on the share of employed people by age and income, data on mortality and unemployment are used (Wiehl, 1947). Algebraically, Dublin and Lotka's idea can be represented by modifying Farr's formula for valuing a person, which takes the following form:

$$H(a) = \sum_{t=1}^T v^t p_a^t [w(y_{a+t} * e_{a+t}) - c_{a+t}] \quad (2),$$

where:

$H(a)$ – economic value of human capital per person aged a ;

$v = (1+r)^{-1}$ – discount factor at discount rate r ;

r – a rate reflecting both the effective interest rate and survival risk;

t – period for which an individual is expected to work;

$p_a^t = \frac{l_{a+t}}{l_a}$ – probability that a person of age a will survive to t years;

w – the expected income of a person of age a for the next t years;

y_{a+t} – average annual income of an individual of age a for the next t years;

e_{a+t} – probability that the person of age a will work in each of the next t years, the value of the component is between 0 and 1;

c_{a+t} – estimated living expenses of a person of age a for the next t years;

$w_{a+t} - c_{a+t}$ – net income per person of age a for the next t years.

In this approach, the expected income and living expenses of individuals are considered as dynamic quantities that undergo changes as the worker ages. The model is more realistic, as it describes the situation in which a young individual realizes high productivity for a longer period of time, unlike a worker of pre-retirement age, i.e. the capital value between the young and the older worker will be different and in favour of the former (Kiker, 1966).

In his early research, Jacob Mincer contributed to the development of the concept of human capital by examining formal education, carried out in an educational institution, and informal education as a capital investment, as well as the relationship between investment in education and the size of workers' incomes. He empirically proves that the size of human capital, expressed through the level of education and skills, is a key determinant in the emergence of income inequalities and emphasizes that "absolute differences in the duration of education lead to percentage differences in annual incomes" (Mincer, 1958, p. 301). According to him, the individual choice to invest in education comes down to a comparison between the present value of future incomes received after education and those received without having undergone such training, taking into account direct (for maintenance and education) and indirect (forgotten benefits) costs.

The results of the study laid the foundation for the function for estimating the return on education, later developed by Mintzer, as a result of his joint work with Gary Becker.

Moses Abramovitz contributed to the formation of the concept of the role and place of man in the economy by considering the problem at the macro level. Abramovitz studied the factors of economic growth and was one of the first economists to argue that a large part of the growth generated by national economies can't be explained by an increase in the value of traditional factors of production (mainly considering the factors labour and physical capital). In his study of the change in resources and production in the United States, he found that a small part of the reported growth from 1870 to 1950 was due to an increased amount of labour and/or increased physical capital, and the remaining larger part was generated by the so-called "residual" (Abramovitz, 1956). This "residual" includes the development of technological innovations, improvements in the quality of the workforce, which later falls into the definitions of human capital and optimization of production processes and labour organization.

This study shows, on the one hand, the importance of the qualitative characteristics of the workforce for generating economic growth, and on the other hand, the idea that the outflows of money directed to education, training, and healthcare shouldn't be viewed only as expenses, but as investments leading to increased productivity and growth of the national economy (Abramovitz, 1956).

Although it doesn't use the term "human capital," Abramovitz's study reveals the problem to which Theodore Schultz, Gary Becker, and a host of followers later provided the solution through the formation and development of the theory of human capital.

At the beginning of the 20th century, Milton Friedman and Simon Kuznets studied five professional guilds in the United States (physicians, dentists, lawyers, accountants, and engineers) to determine the factors that determine the size of their incomes (Friedman, 1954). One of the main conclusions reached by the authors is that the higher incomes of workers in these professions reflect investments in education and training as well as the created “barriers” to entering the relevant professions (so-called professional associations). This raises the question of whether an investment in education and/or training is economically justified. The answer to this question is important, since the higher level of education, the accumulated knowledge and skills generate future higher incomes. For monetarists, income is a function of wealth, and wealth represents capitalized income (Iliev, 2021). Based on this understanding, Friedman and Kuznets propose that the assessment of the profitability of a training should be calculated by calculating the difference between the present value of future earnings and the sum of training costs (tuition fees, books, earnings foregone during training) and the discounted income during the period of education. Later studies categorically indicate that the proposed approach to assessing the return on training is in fact a calculation of the “net present value of future earnings” (Chiswick, 2023) and is a complement to the concept of valuing human capital through the “capitalized earnings” approach. In addition, Friedman and Kuznets are the first to include earnings foregone during training, i.e. the availability of alternative earnings in calculating the economic feasibility of a given training or education. They also form the idea that an individual could sell part of their future income to use to finance current education, which Friedman calls “Income from independent professional activity” (Lleras, 2004).

3. CONCLUSION

This article describes the second phase of the first stage of development of the theory of human capital. The views of a number of economists, representatives of different economic schools, are presented, who, based on mathematical models and collected empirical data, formed a concept of human capital, which in the middle of the 20th century provided the basis for formulating the classical theory of human capital.

The concepts of the ways in which a person can be valued by economists William Farr, Louis Dublin and Alfred Lotka are examined. It has been established that all of them are supporters of the approach to calculating the present value of future labour income - the so-called "capitalized income method". Later, Milton Friedman, Simon Kuznets and Jacob Mincer built on and further developed these ideas. The essence of the "cost of production" method, which is an alternative for determining the economic value of a worker, is described. The theories of the supporters of this method – Ernst Engel and Rudolf Goldscheid – are presented. Finally, the work of Moses Abramovitz, who places man at the heart of the causes of economic growth, is examined in detail. This view is the basis of the later developed classical theory of human capital.

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