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EVALUATION OF THE EFFECTIVENESS OF INVESTMENTS INTO HUMAN CAPITAL AT THE MACRO LEVEL

This article is devoted to the study of the problem of evaluating the effectiveness of financing the education sector as an important industry that contributes to the creation of conditions for accelerated economic growth. In the context of the formation and development of an innovative economy, investments in education are of a priority nature and provide an important competitive advantage from a strategic point of view – the accumulation and development of the country's intellectual potential. At the same time, an increase in investment in education does not mean an increase in the effect and cannot guarantee an increase in the quality of educational services. Therefore, one of the topical issues in the implementation of investments in the industry is the evaluation of their effectiveness. The formation of a methodology for evaluating the effectiveness of investment in education at the macro level is based on a comparison of changes in national investment in education and changes in the human development index. Approbation of the proposed method is carried out on a specific example. This article analyzes the works of the classics of philosophy and economics, monographs, scientific and technical research, and articles by foreign and domestic scientists on the analysis and evaluation of the effectiveness of investments in human capital. The results of this study raise an important question for theoretical economists: what the mechanism by which human capital is affects economic growth, how to model the relationship between the stock of human capital, capital, and technological progress, as well as the law of accumulation of human capital in the model.

Key words: human capital, investment, performance evaluation, education, human capital index.

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Макродеңгейдегі адами капиталға инвестициялардың тиімділігін бағалау

Бұл мақала жедел экономикалық өсу үшін жағдай жасауға ықпал ететін маңызды сала ретінде білім беру саласын қаржыландырудың тиімділігін бағалау мәселесін зерттеуге арналған. Инновациялық экономиканың қалыптасуы мен дамуы жағдайында білім беру саласын инвестициялау басым сипатқа ие және стратегиялық тұрғыдан маңызды бәсекелестік артықшылықты – елдің зияткерлік әлеуетін жинақтау мен дамытуды қамтамасыз етеді. Сонымен қатар, білім беруге инвестициялардың ұлғаюы әсердің артуын білдірмейді және білім беру қызметтерінің сапасын арттыруға кепілдік бере алмайды. Сондықтан саладағы инвестицияларды жүзеге асырудағы өзекті мәселелердің бірі олардың тиімділігін бағалау болып табылады. Макро деңгейде білім беруге инвестициялардың тиімділігін бағалау әдістемесін қалыптастыру білім беруге ұлттық инвестициялардың өзгерістерін және адам дамуы индексінің өзгерістерін салыстыруға негізделген. Ұсынылған әдісті сынау нақты мысалда жүзеге асырылады. Бұл мақалада философия және экономика классиктерінің еңбектері, монографиялар, ғылыми-техникалық зерттеулер, шетелдік және отандық ғалымдардың адами капиталға салынған инвестициялардың тиімділігін талдауға және бағалауға арналған мақалалары талданады. Бұл зерттеудің нәтижелері экономист-теоретиктердің алдына маңызды мәселе қояды: адами капиталдың экономикалық өсуге әсер ету механизмі қандай, адами капитал қоры мен капитал және технологиялық прогресс арасындағы қатынасты қалай модельдеуге болады, және де адами капиталдың модельге жинақталуының заңдылығы.

Түйін сөздер: адами капитал, инвестициялар, тиімділікті бағалау, білім беру, адами капитал индексі.

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Оценка эффективности инвестиций в человеческий капитал на макроуровне

Данная статья посвящена исследованию проблемы оценки эффективности финансирования сферы образования как важной отрасли, способствующей созданию условий для ускоренного экономического роста. В условиях становления и развития инновационной экономики инвестиции в образование носят приоритетный характер и обеспечивают важное конкурентное преимущество со стратегической точки зрения – накопление и развитие интеллектуального потенциала страны. В то же время увеличение инвестиций в образование не означает повышения эффекта и не может гарантировать повышение качества образовательных услуг. Поэтому одним из актуальных вопросов при осуществлении инвестиций в отрасли является оценка их эффективности. Формирование методики оценки эффективности инвестиций в образование на макроуровне основано на сопоставлении изменений национальных инвестиций в образование и изменений индекса человеческого развития. Апробация предлагаемого метода производится на конкретном примере. В данной статье проведен анализ работ классиков философии и экономики, монографии, научно-технические исследования, статьи зарубежных и отечественных ученых по анализу и оценке эффективности инвестиций в человеческий капитал. Результаты данного исследования поднимают важный вопрос для экономистов-теоретиков: каков механизм, с помощью которого человеческий капитал влияет на экономический рост, как смоделировать взаимосвязь между запасом человеческого капитала, капиталом и технологическим прогрессом, а также закон накопления человеческого капитала в модели.

Ключевые слова: человеческий капитал, инвестиции, оценка эффективности, образование, индекс человеческого капитала.

Introduction

One of the most fundamental determinants of economic growth, which largely determines differences in income between countries, is often referred to as human capital – the store of knowledge, skills, and experience available to each species. In this sense, human capital is the same means of production as physical capital – additional investment in human capital (in the form of education or training) brings benefits and profits. At the same time, human capital differs significantly from other types of capital in its economic characteristics.

Human capital is the main driver of economic growth, both at the macro and micro levels. Human capital has a tangible impact on the development of firms and on improving competitiveness and sustainability. The competitive advantage of the economy in the international arena, the possibility of its development, and modernization in modern conditions directly depend on the accumulated and employed human capital in the country.

At the macroeconomic level, investment in human capital is an investment in the social sphere, aimed at increasing the productivity of labor in the future and contributing to the future growth of incomes of individual holders of capital and society. Therefore, when analyzing the effectiveness of such investments, it is customary to use indicators of the socio-economic development of a country or region. Investments of this type are heterogeneous in composition and specified by type of cost. For example, the literature most frequently mentions investments in health capital, educational capital, and cultural capital.

Currently, the education sector in Kazakhstan is at the stage of modernization, the main goal of which is to create a sustainable development mechanism and ensure high-quality training of specialists by international standards. In this context, in industrialized countries, the policy of not only the state but also private business is the principle of priority investment in education. In our country, this principle is declared in the Law of the Republic of Kazakhstan “On Education” (as amended and supplemented as of May 1, 2023). For the education system, the main source of financial resources is the budget of all levels.

However, the lack of budget financing and the low level of attraction of extra-budgetary sources of investment, combined with market elements of management, make it much more difficult to create economic conditions for the effective development of the education sector. All this does not allow to fully ensure the required quality of training of

specialists, and mechanisms for attracting additional investment are still at the stage of formation.

Therefore, one of the most pressing issues in the practice of managing investment processes in the field of education today is the effective and rational use of budgetary funds, not only in the formation of national strategic plans but also in the implementation of the budget process by the participants.

Methodology

The methodological basis of this research is the provisions of modern economic theory and the theory of human capital, which are applied through systematic theoretical analysis, as well as a structural and logical research method. This study uses the works of classics of economics and philosophy, monographs, scientific and technical works, and articles by domestic and foreign scientists on the analysis and evaluation of the effectiveness of investments in human capital.

When studying domestic and foreign works, such scientific methods as analysis and synthesis, deductive induction, etc. were used. The information base of the study is the regulations governing investment activities, including in the field of education, as well as information materials of the Ministry of Education and Science, the Statistical Committee of the Republic of Kazakhstan.

Literature review

Currently, there is a noticeable increase in interest in human capital in the economy. Several recent studies have highlighted the positive impact of human capital on long-term economic growth. For example, (Jones, 2014; Manuelli, 2014; Lucas, 2015; Jones, 2019) emphasize that human capital plays a crucial role in the economic development of different countries. At the same time, the study (Caselli, 2019) argues that cross-country differences in human capital cannot explain differences in per capita income between countries.

Evaluation of the effectiveness of educational investments is reflected through a system of various criteria and coefficients, according to the goals and objectives of the researcher.

In international studies conducted within the framework of management accounting, the following cost indicators are usually considered: education costs per student (or as a percentage of GDP), the number of students per teacher, the level of remuneration, the size of the educational area, and others. The indicators of the quality of education are the general education coverage of the population, the level of literacy as a percentage of the total population, the number of students enrolled in general education schools, and the results of an independent assessment of students' knowledge (Sagradov, 2010).

From a substantive point of view, a large proportion of studies devoted to the effectiveness of spending on education mainly affects the analysis of financial and economic indicators and, to a lesser extent, other qualitative and quantitative characteristics of the education system. From a methodological point of view, most studies on the effectiveness of public spending on education conducted in recent decades can be divided into two broad categories: studies based on 1) parametric and 2) non-parametric approaches (Measuring Development: An Index of Human Progress, 2001).

The concept of reforming the budget process improves the efficiency of the use of budget allocations. The task of the supervisory authorities is to assess the effectiveness of the use of budgetary funds and identify their misuse. Currently, such assessments are not always carried out. The reason for this is the lack of a clear methodology for conducting this performance assessment. A variety of criteria and methods for evaluating the activities of budgetary organizations also makes the issue of the effectiveness of the use of budgetary funds highly debatable and debatable.

Each country has its way of managing budgetary funds, which to a certain extent determines the effectiveness of their use. In this case, two fundamentally different approaches can be distinguished: effective and costly.

As part of an effective approach to managing budget funds, management and control of results are carried out when determining spending limits (expenditure of financial resources per cost unit). The recipients of the budget perform the established quantitative and qualitative tasks within the limits of the appropriations allocated to them.

Part of the money saved by optimizing their activities can be used for their own needs. This mechanism allows you to balance the conflicting interests of managers and recipients of budgetary funds. The presence of planned and actual indicators in an effective budget management model ensures the independence of budget recipients in decision-making and allows you to evaluate the results of the work performed.

The essence of the cost models lies in the lack of independence of budget recipients in determining

the spending of the appropriations allocated to them. The lack of legislatively fixed performance results makes it difficult to assess the effectiveness of the use of budgetary funds. However, despite this shortcoming, the cost model is stable, familiar, and convenient not only for managers but also for recipients of budget funds, without requiring a "credit of trust" from budget recipients since it provides them with a very limited amount of authority.

Considering the activities of educational institutions, it is impossible not to note some features inherent in their results. A feature of educational services is that they are not external objects of the recipients, but an improvement of the recipients themselves, contributing to the growth of their intellectual capital. Cognitive factors (changes in the level of knowledge, skills, and abilities of a person) must be considered when assessing the effectiveness of education spending, which is difficult to express in monetary terms. At the same time, some educational services are free for the population (for example, universal compulsory secondary education), while others are paid (higher education). This means that it is impossible to establish a unified and unified system of indicators that reflects the effectiveness of the use of funds in the entire field of education.

Analysis of the effectiveness of budget expenditures and assessment of their impact on the effectiveness of the educational process is one of the most important areas of economic analysis in the field of education. Most economically developed countries of the world spend significant funds on improving the education system and improving the quality of the educational process.

According to the World Bank, in the composition of national wealth in 192 countries of the world, physical wealth accounts for an average of 16% of all wealth, natural capital – 20%, and human capital – 64%. For this reason, a growing number of researchers believe that human capital is the most valuable resource in post-industrial societies, much more important than natural or accumulated wealth. In all countries, human (intellectual) capital now determines the pace of economic development and technological progress (Moiseeva, 2015).

The methods of production and dissemination of knowledge, as well as the person himself, and his intellectual capabilities, come to the fore. However, in most cases, this raises the question of evaluating the effectiveness of the use of funds, since an increase in spending on education does not mean an increase in the efficiency of using these funds.

From the point of view of assessing the effectiveness of budget expenditures in the field of education, an important feature is the high standardization of educational programs to assimilate the same amount of knowledge throughout the country. This feature provides the basis for a comparative analysis of the results of the educational process not only between educational institutions in different regions but also between educational institutions.

The reasons for the decline in the efficiency of the education sector may be related to the low level of spending allocated to the development of the general education system. In our opinion, one of the most important tasks is a deep and comprehensive modernization of education, for which the necessary resources are allocated and mechanisms for their effective use are established, i.e. the study of the problem posed is of importance (Rimashevskaya, 2004).

Economic impact is defined as return on invested capital, which can be measured using various tools, including return on investment, debt-to-equity ratio (debt-to-equity ratio), share price-to-earnings ratio, or other quantitative metrics. In the case of social investment, it makes sense to assess the effectiveness of social investment through a set of indicators characteristic of each resulting impact, separating the economic, social, and socio-economic consequences of each.

From a methodological point of view, the main studies on the effectiveness of public spending on education in recent decades fall into two broad categories – studies based on parametric and non-parametric methods. Of interest are non-parametric methods for assessing the effectiveness of the use of budgetary funds and the quality of education. Its strength lies in the construction of the "production possibilities curve" of the education industry for an individual educational institution, its group, or region of the country, based on the actual amount of funding and the level of results achieved, regardless of the ratio between them. The introduction of results-based management mechanisms in the social sphere, as well as the principles of results-based budgeting, requires a deeper scientific development of theoretical and applied issues of assessing the effectiveness of social investments in the industry.

The quantitative and qualitative growth of the production of goods and services requires an increase in production capacities and the development of a person, that is, the development of all components of capital, of which he is the owner. In turn, the development of a person leads to the emergence of new needs in him. All components of this capital

require additional resources or investments during reproduction. An increase in demand leads to an increase in investment in human capital. On the other hand, the level of investments depends on their efficiency. The more efficient the use of investment in human capital, the less human capital is required, and vice versa.

Results and discussion

Units of human labor are not always equal, and the realization that investing in people can increase their productivity is far from new. Like many other economic concepts, the concept of human capital goes back to A. Smith, who compared education to investment in equipment: "When some expensive machine is being built, it is usually expected that there will be a large amount of work that it will work before as long as it does not wear out, at least to replace the capital expended on it with ordinary profit. Man, having put in a lot of effort and long training, has learned that any occupation that requires extraordinary dexterity and skill can be compared with no less expensive machines. It is to be expected that the labor for which he is trained, besides the ordinary wages for simple labor, will repay all the expenses he has spent on training, at least with the usual rate of return on capital equal to these expenses... This is the basis of the wage gap between skilled and ordinary labor" (Smith, 2007). This short quote formulated the main idea of the theory of human capital, which was not fully developed until 200 years later.

The essence of what is usually called the theory of human capital is the application of the standard theory of capital to some economic phenomena that have not previously been studied from this point of view. Its basic premise is that people spend various resources on themselves not only to meet current needs but also to generate future income (monetary and non-monetary). Thus, many processes – for example, education, health care, job search, access to information, immigration, and on-the-job training – can be considered not only as consumption, but also as investments, and the results of these investments – as forms of capital (human capital). Then, to analyze such phenomena, one can apply the standard tools of the theory of capital and try to explain the effects observed.

Since spending on education, health care, food, and immigration are investments in a person, the theory leads to the following important conclusions. First, differences in wages (between people in the same country and between countries) can be explained by differences in investment in human capital. As a result of training, a person accumulates knowledge, performs work better and faster, and his productivity increases, which means that his income should also increase. Secondly, the growth of total human capital will lead to an increase in national income. An increase in individual human capital increases the stock of human capital at the national level, and human capital is used in the economy to produce more high-tech goods (Bulina, 2020: 163-187).

The term "investment" applied to the costs of building and developing human capital gives these costs a new connotation, so that they are productive rather than consumer, in other words, as investments in individuals that generate a return on investment of funds. measurable long-term economic and/or non-economic impacts. In this regard, investment in human capital is an integral part of the successful development of companies and society (Figure 1).

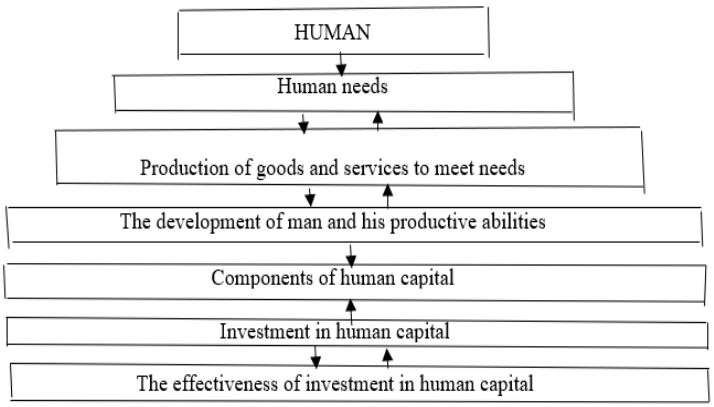

Figure 1 – The role of investment in the process of reproduction of human capital
Note – Developed based on sources (Tsapenko, 2022; Plotaeva, 2022)

The theory initially considers investment in human capital at the individual level. The decision to get an education is made by each person individually, based on some personal qualities (tendency to postpone current consumption), qualities (talents), or personal motives. Thus, by comparing the standard of living of people (considering their income, consumption, or quality of life), it seems possible to trace the return of people from their investment in human capital.

Many empirical studies have shown that graduating from high school or college significantly increases individual income, even after adjusting for direct and indirect costs, adjustment for ancestry and access to education, and national and cultural characteristics of economic systems.

The first illustration of this fact is the Mincer equation – a theoretical model of the dependence of individual income on education and work experience (Mincer, 1958: 281-302; Mincer, 1974: 178):

$$\log w(s, x) = \lambda + \rho s + \beta_1 x + \beta_2 x, \qquad (1)$$

where: w – salary,

ρ is the interest rate,

s is the number of years of study,

x – work experience.

The first part of the equation (1) is related to learning and can be obtained as an equilibrium condition in a model in which the same agents optimally invest in human capital to maximize the present value of their future income.

The second part of equation (1) appears if we additionally consider work experience related to investment in human capital after basic education.

In any case, the interest rate ρ plays a key role in the Mincer equation, which can be interpreted as the rate of return on investment in human capital. Ceteris paribus (if ρ is not very large), an extra year of education is associated with a loss of wages and, thus, is an investment that increases future wages, i.e. leading to additional profit. Therefore, the Mincer equation can be used as an econometric model for estimating returns to education at the individual level (rates of return).

The opinion that human capital largely determines the economic development of a country has also attracted the attention of theoretical economists. By creating a set of mathematical models, the main theoretical mechanism of the influence of human capital on economic growth is determined. Let us briefly dwell on the main provisions of the neoclassical theory of economic growth.

The output (Y) in an economy is determined by the total production function, which depends on the set of production factors (usually physical capital K and labor L) and the total productivity of the factor A: Y = F(K, A, L). At the same time, aggregate productivity can be associated both with efficiency (economic organization, institutions, correct distribution of resources, etc.) and with technological progress, that is, the level of technical development available to society. In the latter case, productivity is described in terms of R&D, the level of knowledge, and scientific developments.

For convenience and ease of presentation of results in theoretical models, production functions of the Cobb-Douglas type (Cobb et al, 1928: 139-165) are often considered:

$$Y = K^{\lambda}(A, L)^{\beta}, \qquad (2)$$

where $0 < \alpha$ и $\beta < 1$.

According to the model, variable A can be interpreted as labor efficiency or technological progress that increases labor.

The famous Solow model (Solow, 1956: 65-94) began to develop modern growth theory in the 1960s, showing that the accumulation of physical capital occurs at the expense of diminishing returns (more capital, slower accumulation, output slower than growth), no guarantees of sustainable economic growth. Long-term economic growth in the Solow model and similar exogenous growth models is provided on the assumption that technical progress A grows at a constant and given growth rate (1+ g):

$$A_{t+1} = (1 + g)A_t. \qquad (3)$$

In this case, the growth rate of production per capita in the long run coincides with the growth rate of technical progress (1 + g), but this constant growth rate has no explanation other than a simple assumption.

The effectiveness of investments in education is assessed from the standpoint of how the results of the functioning of the education system achieve the goals that guide the activities of the system. In this context, one speaks of the internal efficiency of investment in education.

Therefore, two concepts of efficiency are introduced – external efficiency and internal efficiency – to assess the results of education in terms of the implementation of two different systems of goals – what society seeks to achieve by financing education, and what the education system

seeks to achieve: the system itself directs the goals of its activities.

The effectiveness of investments in education largely depends on the form (source) of investments (Okunkova, 2021: 280; Davydov, 2009: 278-280):

1. Government spending. The state receives a material return on investment in education through the labor and social implementation of its citizens. This is manifested in an increase in the quality, intensity, and productivity of labor, an increase in tax revenues, and an increase in the level of employment by increasing the professional mobility of the population. Some authors consider the contribution of human capital to economic growth, they propose a decomposition method to account for employment growth, which is also influenced by the growth of human capital when explaining the growth of total output per employee (Son H. H., 2023).

All this makes it possible to characterize public spending on education as a long-term investment. Evaluation of the effectiveness of investments in education is reflected through a system of various criteria and coefficients, depending on the goals and objectives facing investors and researchers.

2. Budget financing (project financing). The effectiveness of the use of budgetary funds for the implementation of individual programs in the field of education can be assessed based on a comprehensive assessment of the achievement of specific program goals. However, most projects in the field of education are budget-funded (co-financed) but do not contain project performance indicators.

3. Private investment of citizens. A person's level of education is a guarantee of labor income and social mobility, which minimizes the risk of unemployment. The effectiveness of private investment in education can be measured by the rate of return on private investment in education. Statistical studies conducted in Kazakhstan and abroad have proven a strong relationship between a person's level of education and lifetime earnings.

4. Operating funds. Methods for evaluating the effectiveness of investments in corporate education can also be based on the theory of human capital. In this case, the knowledge and qualifications of employees are considered their income-generating capital, and the time and money spent on acquiring this knowledge and skills is an investment in it.

5. Projects of public-private partnership in the field of education. There are many forms of public-private cooperation, and its essence is to provide certain benefits for each participant. At the same time, the desired effect may lie in different areas for each stakeholder with different criteria that do not depend on the area of financial indicators.

Considering the activities of educational institutions, it is impossible not to note some features inherent in their results. In particular, the specificity of educational services is that for the recipients they are not external objects, but the improvement of the recipients themselves, contributing to the growth of their human capital. Cognitive factors (changes in the level of knowledge, skills, and abilities of a person) must be considered when assessing the effectiveness of education spending, which are difficult to express in monetary terms. At the same time, some educational services are free for the population (for example, universal compulsory secondary education), while others are paid (higher education). This means that it is impossible to establish a single and unified system of indicators that reflects the effectiveness of the use of funds in the entire field of education.

Analysis of the effectiveness of budget expenditures and assessment of their impact on the effectiveness of the educational process is one of the most important areas of economic analysis in the field of education. Most economically developed countries of the world spend significant funds on improving the education system and improving the quality of the educational process.

Performance evaluation is a difficult task, especially when it comes to public investment aimed at achieving positive socio-economic outcomes that cannot be directly measured in monetary terms. It is necessary to measure changes in social, environmental, sectoral, and other circumstances after the implementation of certain budget projects, i.e. focus on non-economic factors.

Analytical methods can be used as a tool for assessing the fulfillment of public policy tasks (Markov, 2023):

- Cost-benefit analysis (CBA);
- Cost Benefit Analysis (CEA);
- Cost-utility analysis (CUA);
- Weighted cost-benefit analysis (CEA) and various modifications of these methods.

Cost-benefit analysis assumes that any government initiative aims to achieve social benefits at some cost (or costs), both public (for example, in the form of taxes or targeted budget programs) and private. Social benefits and costs are based on monetary value. Since the national initiative has a period, the discounted cash flow method is used, if the value of money today is higher than the value of money tomorrow. If the benefits of the rebate outweigh the costs, then this is good for national

initiatives. Therefore, it is understood that the national initiative must be cost-effective, i.e. aimed at obtaining the maximum possible benefit at the minimum cost. In addition, all government goals are considered important, so when benchmarking, governments should prioritize those initiatives that maximize overall welfare (benefits) per unit of money spent in the national budget.

Cost-benefit analysis is characterized by significant gaps between theoretical research and the methods used to make practical calculations, in large part because of the difficulty of obtaining complete data to monetize social benefits and costs. In addition, it is often difficult to consider external positive and negative influences that can have a significant impact on the success of government initiatives. In addition to practical limitations, there are methodological limitations related to the fact that government initiatives can affect different social groups in different ways and lead to the redistribution of wealth, and not just to its maximization. In this regard, some economists propose to evaluate the social benefits of different groups and calculate the total benefit as a weighted sum of the benefits of different social groups. In addition, the size of government initiatives should always be considered, as cost-benefit analysis ultimately only shows the difference between benefits and costs, not their absolute value.

At the same time, the main advantages of the cost-benefit analysis method are a quantitative assessment of the effect of government measures, the use of the theory of money time, and the discounting method. At the same time, economists point to a cost-benefit analysis approach as one of the factors by which data-driven decisions about government initiatives can be made, but decision-making should not be reduced to just blindly following the approach.

The cost-effectiveness analysis method is a set of analytical techniques that allow you to determine the resources spent on achieving specific goals set by the public sector, and from this point of view, choose the best solution. The scope of this analysis includes not only productivity measurement itself but also productivity and economics, as they directly affect productivity. At the same time, cost-benefit analysis does not involve comparing dissimilar outcomes between them. In cost-benefit analysis, inputs are valued in kind or cash, and outputs are measured in kind or using tailor-made metrics that directly reflect industry characteristics and goals.

Although cost-benefit analysis is considered a highly explanatory technique in the analysis of any public investment proposal, it is still the most widely used in healthcare analysis. At the same time, in modern literature, this approach is increasingly recognized as the most common and attractive from a practical point of view. The main advantage of this tool is that it is based on a simple idea, and at the same time, the results obtained with this analysis are easy to interpret.

The cost-utility analysis method is a somewhat more complex modification of the cost-benefit analysis, based on a comparison of costs, measured in monetary terms, with the benefits that the population receives from the implementation of budget expenditures, expressed in units of utility (for example, in units of QALY) – years of life adjusted for quality – the number of years of life extension). The assessment of the expediency of budget expenditures is based on the analysis of the following criterion: C/U = Utility / Costs.

The method of cost analysis and weighted performance is often used in estimating budget expenditures related to education and health. The benefits to society from these expenditures often cannot be measured in monetary terms. In addition, such costs lead to different results, so they must be combined to obtain a decision-making tool. The final formula for calculating performance criteria is as follows:

$$wCE = price / \sum w_i E_i, \quad (4)$$

where: E_i – i- th effect,

w_i – the weight of the i-th effect.

The analysis made it possible to conclude that, considering the available information base, the most adequate method for assessing the effectiveness of investments in human capital – education is the method of cost-benefit analysis. The application of this method is not difficult, since the effects must be evaluated with expressions unusual for them, which is an indispensable condition for analysis in the framework of cost-beneficial methods.

When using the classical CEA method as a cost-benefit indicator, they are expressed in incremental form. Therefore, the efficiency of investment in human capital can be expressed as:

$$E = [\Delta I_t / (1 + i_t)] / \Delta HDI, \quad (5)$$

where: ΔC – increase in costs (investments),

ΔHDI is the productivity gain, i is the projected inflation rate for the period t.

The interpretation of this indicator is as follows: the lower the value of indicator E, the lower the

costs associated with achieving a certain level of performance and, therefore, the more effective the intervention under consideration.

The following case can be considered as an example of such an analysis. Let's analyze the implementation of the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020 – 2025. The sources and amount of investment (I) are as follows (About Approval, 2023):

- republican budget – 9565 billion tenge;
- local budget – 716 billion tenge;
- World Bank – 13 billion tenge;
- private investments – 1284 billion tenge.

A total of 11578 billion tenge, including by years are shown in Table 1.

Table 1 – Dynamics of macroeconomic indicators of the Republic of Kazakhstan

Years	Actual values					Predicted values				
	HDI	Δ HDI	I	Δ I	i, %	HDI	Δ HDI	I	Δ I	i, %
2010	0,714	-0,09	797,4	50,9	7.97	-	-	-	-	
2011	0,745	0.031	1000,3	202,9	7.43	-	-	-	-	
2012	0,754	0	1255,6	255,3	6.06	-	-	-	-	
2013	0,757	0.003	1284,4	28,8	4.90	-	-	-	-	
2014	0,788	0.031	1471,7	187,3	7.54	-	-	-	-	
2015	0,794	0.006	1364,8	-10,.9	13.53	-	-	-	-	
2016	0,788	-0.006	1679,4	314,6	8.29	-	-	-	-	
2017	0,800	0.012	1843,2	163,8	7.22	-	-	-	-	
2018	0,800	0	1948,5	105,3	5,43	-	-	-	-	
2019	0,817	0,017	2332,0	383,5	5,43	-	-	-	-	
2020	0,825	0,008	2151.5	-180.5	6,37	-	-	-	-	
2021	-	-	-	-		0,757	-0.068	1336	-815.5	8,50
2022	-	-	-	-		0,781	0,024	1708	372	8,25
2023	-	-	-	-		0,821	0.040	2311	603	8,00
2024	-	-	-	-		0,825	0,004	2383	72	7,70
2025	-	-	-	-		0,845	0,020	2679	296	7,50
Note- Developed from source (Main socio-economic indicators of the Republic of Kazakhstan (1991-2022))										

The result of investments in education will be the Human Development Index (HDI) – an integral indicator calculated annually for cross-country comparisons and measuring the standard of living, literacy, education, and life expectancy as key characteristics of human potential in the area under study. It is a standard tool for general comparison of living standards across countries and regions. The index was developed in 1990 by a group of economists led by Mahbub ul-Haq of Pakistan; its conceptual framework was created through the work of Amartya Sen. The HDI has been published by the United Nations Development Program since 1990 in its annual Human Development Report.

The Human Development Index is compiled by the United Nations Development Program and is used as part of a special series of UN Human Development Reports. The HDI is a composite measure of a country's human development, measuring a country's achievements in terms of longevity, education, and a decent standard of living for the citizens for whom the index is being measured.

According to the Human Capital Report of the UN Development Program for 2010 – 2020 in Kazakhstan, the HDI of human development demonstrates a positive trend in the development of human capital. It should be noted that if in 2008 the republic was in the group of countries with an average level of human capital development, then since 2009 it has entered the group of countries with a high level of development and has managed to maintain its position so far.

The Human Development Index rose due to increased investment. We are faced with the task of determining in what year investments in education are effective, based on the years of implementation of the project under consideration. To do this, it is necessary to determine the dependence of HDI on changes in investment volumes (Figure 2):

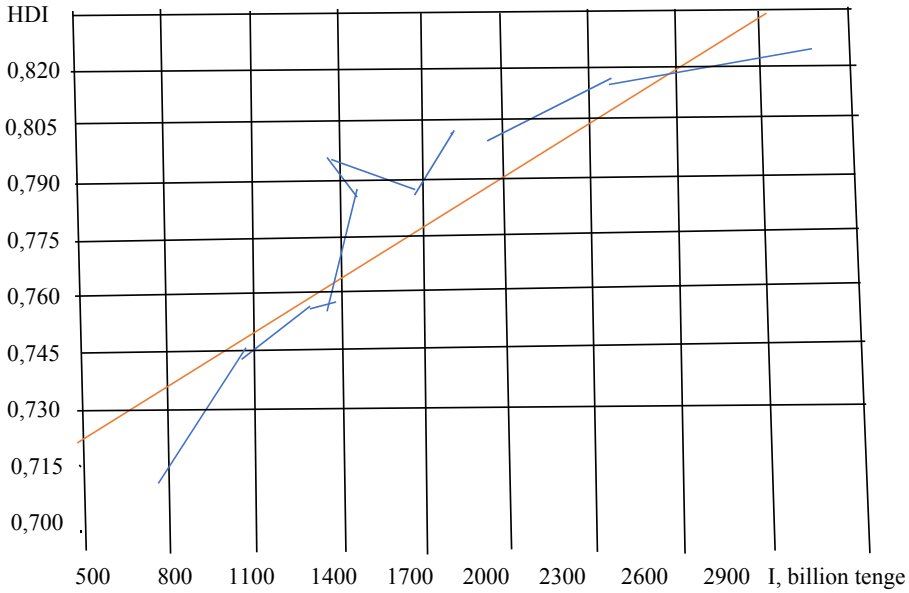

Figure 2 – The relationship of the human development index and investment in education
Note – Calculations were made by the authors independently based on the data in Table 1.

$$HDI = 0.6697 + 0{,}00006534 \cdot I. \quad (6)$$

According to the traditional incremental cost-benefit analysis, the following conclusions can be drawn:

- the costs that ensured the HDI growth to 0.781 in 2022 amounted to 1,708 billion tenge;

- the costs that ensured the HDI growth to 0.821 in 2023 amounted to 2311 billion tenge, etc.

The effectiveness of the implementation of investments in education, according to the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020 – 2025, is shown in Table 2.

Table 2 – Calculation of the effectiveness of investments in education

Years	Investment efficiency	Years	Investment efficiency
2020	0	2023	13958,3
2021	11053,1	2024	16713,1
2022	14318,7	2025	13767,4
Note- Calculations were made by the authors according to the source (State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020 – 2025).			

Conclusion

The application of the standard theory of capital to several economic phenomena (mainly education and training) that had previously been viewed as consumption rather than investment proved to be a fruitful idea. Treating education spending (along with health care, food, and immigration) as an investment in human capital has important implications at both the individual and aggregate

levels. From a microeconomic perspective, everyone has an incentive to accumulate human capital because it increases their productivity and personal income. Versatile human capital has a significant impact on customer satisfaction. This positive effect is a confirmation of the link between innovation and customer satisfaction (Fernán-dez Pérez de la Lastra, Sánchez Gardey,2024).

At the macroeconomic level, the accumulation of human capital has non-diminishing returns to scale, which contributes to long-term economic growth, and can also produce positive externalities that enhance this effect, which is reasonable.

The results of many empirical studies confirm that human capital is one of the main factors explaining the differences in the level of well-being in different countries. This raises an important question for theoretical economists, namely what the mechanism by which human capital influences economic growth is. As mentioned earlier, at this stage in the development of science, there are many theoretical approaches to the study of these mechanisms. The difference between them is not determined by the ratio between individual human capital and total human capital (most models assume the presence of a representative agent, so the total level of social human capital coincides with the level of individual human capital of a representative agent). Instead, how to model the relationship between the stock of human capital, capital, and technological progress, as well as the law of accumulation of human capital in the model. Of course, each model has its technical features that contribute to the theory of human capital.

Spending on education is one of the most important components of any country's investment in human capital. The money spent on educating the younger generation will soon determine the level of education of the country's population and, accordingly, the country's competitiveness in the world market.

It should be noted that human capital can only be formed through effective investment, and in this respect, it is like physical capital. Investments are justified if they have a sufficiently high rate of return and profitability, the main types of which are special training, the physical condition of a person, and the emotional behavior of employees. The formation of human capital is influenced by many factors that cannot be ignored when calculating the return on investment.

Financial literacy is an important element in the relationship between human capital, social capital, and access to finance, although it plays a greater role in the relationship between social capital and access to finance (Hj Talip, Wasiuzzaman, 2023).

The source of funding for the education system is the budgets of various levels. The concept of budgetary reform implies a more efficient use of funds. One of the tools to achieve this goal is to empower budget recipients with greater powers, which brings the existing costly model of managing budgetary resources closer to an effective one.

From the point of view of the effective use of budgetary funds in the field of education, in our opinion, the most important is the integral – the human development index.

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