

THE HDI INDEX AND HUMAN CAPITAL IN ROMANIAN PRE-UNIVERSITY

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Abstract:

The Human Development Index (HDI) measures the well-being of a population, considering factors like life expectancy, education, and income. This paper examines the link between the HDI and human capital in Romanian pre-university education. Human capital is crucial for advancing both the education sector and the economy, impacting social inclusion and long-term growth. The paper highlights the importance of knowledge development, professional training, and adapting to societal changes. It also explores how technological advancements and the knowledge economy shape education, emphasizing the need for continuous adaptation to labor market needs. Fostering human capital through education is key to improving Romania's HDI and ensuring sustainable development.

Keywords: Human capital, HDI index, pre-university education, knowledge economy, educational development

1. Introduction

According to Sen (1993), "development is essentially a process of expanding people's choices," and human development reports have transformed the way we perceive the world. This concept revolves around the "true wealth of the world" and represents the path to human progress.

The Human Development Index (HDI) is a measurement tool established by the United Nations to assess the degree of human development within different countries. It takes into account factors such as average annual income and expected years of education to rank and compare nations.

The UN continues to rely on the Human Development Index in its efforts, emphasizing sustainability and reducing disparities across continents. This approach evaluates not only individual income levels but also considers aspects like education and overall living conditions.

As a holistic model for assessing and analyzing human development, the HDI incorporates multiple factors. Alongside life expectancy and living standards, education plays a fundamental role in this measurement.

Ștefea and Pirtea (2015) highlight that education levels "reflect the extent of training and access to quality education". This is determined by analyzing data related to adult literacy rates and school enrollment levels.

Since 1979, the Global Competitiveness Report has been the flagship publication of the World Economic Forum (WEF) in Davos and is widely recognized for its role in comparing factors that influence competitiveness and economic growth.

Each year, the World Economic Forum (WEF) publishes the Global Competitiveness Report (GCR), which includes the Human Capital Index (HCI). Countries are ranked on a scale from 0 (lowest) to 100 (highest) based on the quality of their investments in human capital.

The Romanian Chamber of Commerce and Industry (2020) describes the GCR as "a set of factors that have a direct impact on productivity". These factors include "institutions, infrastructure, macroeconomic stability, health, skills, product market efficiency, labor market conditions, financial systems, business dynamism, and innovation capacity".

Among the key topics analyzed, human capital development is assessed in terms of how well the education system aligns with the needs of a competitive economy. Specific aspects include "innovation, creativity and problem-solving skills, digital and technological competencies, as well as proficiency in mathematics and science."

The report also examines the extent to which companies invest in employee training and development, as well as the availability of opportunities for reskilling and career advancement. An important consideration is how businesses perceive spending on human capital – whether as "a cost to be minimized or as a crucial investment".

The World Bank (WB) evaluates economic success through the Human Capital Index, measuring how much countries invest in education and healthcare. The 2019 report, *The Changing Nature of Work*, highlights the index's relevance by discussing the impact of technology on labor markets and the future of work (World Bank, 2019)

2. The connection between economic growth and human development

Economic development has traditionally been understood as a means of improving "social well-being," primarily through the ability to generate "wealth" (typically measured by GDP).

In this framework, increased production translates to higher per capita income. However, this approach does not guarantee an improved quality of life for the majority of the population.

For this reason, human development – the process of expanding people's capabilities – plays a more crucial role. This concept extends beyond the scope of economics alone.

In essence, the link between economic and human development within a country reflects the connection between production levels and overall social well-being.

The Human Development Index (HDI) serves as a tool for measuring the expansion of opportunities that enable individuals to live long and fulfilling lives (life expectancy). Additionally, it assesses access to education and skill acquisition (years of schooling) and the availability of resources necessary for a decent standard of living (GDP per capita).

HDI is strongly connected to a country's ability to enhance its human capital. As a quantitative measure, its primary focus is on people rather than economic

growth. In terms of human capital, HDI reflects whether a country's human capital is advancing or declining within the framework of economic progress.

The HDI value helps define national priorities by highlighting inequalities in three key aspects of human well-being: access to quality education, longevity and health, and a fair standard of living. In the education sector, two indicators have been used over time: literacy rate and school enrollment (from 1990 to 2018), later replaced by Mean Years of Schooling (MYS) and Expected Years of Schooling (EYS).

Mărginean (2019) explains that "the MYS indicator applies to individuals aged 25 and over," while EYS "estimates the number of years of schooling a student entering the education system is expected to complete, assuming they follow the same trajectory as those already enrolled". Other indicators have been applied in different fields.

The news agency of the Romanian Radio Broadcasting Society has reported findings from a recent UN study on the Human Development Index, indicating that "expectations regarding education, economic growth, and life expectancy have worsened since the pandemic. In light of multiple global crises, including the COVID-19 pandemic, the war in Ukraine, and the escalating effects of climate change, development is in decline. The consequences are evident in areas such as education, income, and, most notably, life expectancy" (RADOR, 2022).

Steiner A. (2022), Administrator of the United Nations Development Programme (UNDP), pointed out that "more than 90% of countries experienced a drop in their HDI scores in either 2020 or 2022," and "over 40% saw declines in both years".

The Human Capital Index (HCI) evaluates the future workforce by determining the level of human capital that a child born today is likely to attain. This assessment considers potential obstacles related to health and education within the child's country of residence.

As defined by the World Economic Forum (WEF) (2020) the Human Capital Index (HCI) comprises three key components:

- Survival – This reflects the necessity for children born today to reach an age where they can begin developing human capital through formal education. It is measured using the under-five mortality rate.
- Years of Schooling – This refers to "the expected amount of education a child will receive by the age of 18," combined with "a measure of educational quality, based on how much students actually learn, as indicated by their performance in international assessments (PISA)".
- Health – This component incorporates two indicators to assess a country's overall health environment. "The first evaluates conditions affecting health from prenatal stages through early childhood," while "the second considers potential health outcomes that a child born today may experience in adulthood" (World Bank, 2020).

The education and health components of the index are integrated in a way that reflects their impact on worker productivity, based on extensive empirical economic studies. The resulting index score falls within a range of 0 to 1.

Since the HCI is grounded in development accounting research, it is designed to capture real disparities in long-term income generation. Its structured approach to

aggregating diverse components and its broad coverage of measurable national indicators contribute to its framework.

An outcome-based index, rather than one focused solely on inputs, helps direct attention to tangible results. This approach encourages countries not only to invest more in human capital but also to ensure that investments are made effectively.

Stiglitz, Sen, and Fitoussi (2009) emphasize that human capital encompasses multiple dimensions.

Academic literature has acknowledged the value of transitioning from a broad and diverse set of indicators to a single, summarized measure.

The 2020 edition of The Global Competitiveness Report by the World Economic Forum (WEF) (2020) explores the evolving priorities related to human capital over the past decade, presenting key findings:

"The talent shortage has become increasingly evident, exacerbated by outdated education systems. Over the last ten years, progress in human capital development has stagnated in advanced economies, while some developing nations have made foundational investments in modernizing education and training systems.

Both developed and emerging economies continue to experience significant talent gaps, with education systems struggling to keep pace. Furthermore, restrictions on international mobility have intensified. Compared to 2008, the capacity to attract global talent has declined by 17% in advanced economies and by 12% in emerging markets."

The report (World Bank, 2020) underscores the urgency of "revitalizing and transforming human capital, given the deepening talent shortage caused by outdated education systems".

A particularly pressing issue is the "deficit of digital and emerging skills required for the new economy, as technological advancements continue to reshape labor markets".

As a result, "enhancing reskilling and upskilling initiatives, alongside active labor market policies," has become a critical priority.

This focus directly impacts "the modernization of educational curricula and the expansion of investments in skills that align with the future of work and evolving labor markets."

From the World Bank's perspective, the Human Capital Index (HCI) redefines human capital and quantifies the role of education in shaping the productivity of future generations.

Nations can utilize this index to measure the economic losses associated with human capital gaps and determine how swiftly these deficits can be converted into economic gains.

According to the World Bank (2020), the HCI is based on six key indicators:

- Probability of survival until the age of five
- Estimated years of schooling
- Harmonized test scores
- Learning quality
- Adult survival rate
- Proportion of children not experiencing stunted growth

Most of these indicators focus on education and training aspects.

The World Bank (2020) highlights that human capital is "linked to higher incomes for individuals, increased national revenues, and greater social cohesion."

However, human capital gains achieved in many national economies over the past decade are at risk of being eroded due to the COVID-19 pandemic.

This situation necessitates "urgent measures to safeguard progress, especially for vulnerable and disadvantaged populations".

The design and targeted implementation of effective interventions make "investing in more accurate human capital measurement more important than ever."

Looking ahead, "in the short term, improved data collection and analysis can inform pandemic mitigation strategies and support those most affected".

"In the medium term, better management and utilization of administrative, survey, and identification data can help policymakers navigate fiscal constraints and competing priorities."

Over the long term, "the hope is that economies will not only recover lost ground but also make further advancements beyond pre-crisis levels".

Post-pandemic trends indicate a decline in HCI scores, primarily due to setbacks in deep learning and public health outcomes.

The most recent Human Development Index, compiled by the United Nations in 2016 based on 2015 data, ranked Romania 50th out of 188 countries.

In the education sector, the development of an indicator system began in the 1970s alongside the expansion of educational systems. This process continued into the 1980s with the integration of discussions on new resources, costs, and high-quality standards.

According to Ziarul Financiar (2017) Romania's education-related statistics include "an average of 10.8 years of schooling for adults over 25 years old and an expected 14.7 years of education for students entering the system".

The use of indicators in education is crucial for policy development, relying on data-driven decision-making (evidence-based policy making).

Sauvageot (2001) explains that "an indicator system should function like a dashboard, highlighting issues and measuring their magnitude. This enables a more detailed diagnosis and the search for appropriate solutions". Sauvageot (2001) further outlines the role of indicators: "identifying problematic areas, justifying concerns underlying educational policies, comparing differences against a benchmark or previous values of the same indicator".

Jigău *et al.* (2014) define a statistical indicator as "a numerical representation of phenomena, processes, activities, or economic and social categories, measured over time and across different regions".

Most field-specific manuals, such as those by the OECD and Eurostat (2019) adopt a simplified definition: "An indicator is a tool for assessing the functionality of education systems, either as a whole or in specific areas or levels".

Institutions such as the Ministry of Education, the National Institute of Statistics, and ARACIP collect and aggregate extensive primary data into key education indicators.

Examples of primary education system indicators (as defined by the National Education Indicator System/SNIE) (Jigău *et al.*, 2014):

- Human resources: Number of teaching staff, support staff, administrative personnel, and maintenance staff across educational levels.

To capture trends and impacts within the education system, relative or derived indicators are employed.

Jigău *et al.* (2014) provide examples of derived indicators that align with Eurostat, OECD, and UNESCO standards:

- Educational resources: Public expenditure on education as a percentage of GDP; government spending per student; personnel expenses.
- Human resources: Average number of students per teacher; average class size; proportion of qualified teaching staff.
- Material resources: Average number of students per computer; percentage of schools with internet access.

For Romania's pre-university education system, both primary and derived indicators are incorporated into the National Education Indicator System, ensuring compatibility with Eurostat classifications.

Examples include:

- Human resources: Number of teachers by age group and gender, proportion of qualified versus unqualified teachers, staff employed in extracurricular institutions (e.g., children's clubs, youth palaces).
- Teacher-related factors: Number of teachers by professional rank, number of teachers commuting from other locations, percentage of teaching positions covered by qualified personnel, and the presence of unfilled teaching positions by subject area.
- Professional development: Number of teachers who participated in accredited continuous training programs per academic year, percentage of staff with digital competencies, and personnel trained to manage and disseminate educational information.

Examples of human resource indicators within SNIE, as defined by Jigău *et al.* (2014), are outlined in Table 1.

Table 1. Human Resource Indicators According to the National System of Education Indicators. [12]

Indicator Name	6. Expenditure on Professional Training and Teacher Evaluation per Student
Definition	Expenditures for teacher training and evaluation incurred within a financial year, per student.
Purpose	Expresses the level of expenditure on teacher training/evaluation per student, serving as a basis for planning the following year's budget.
Symbol	ExpTrain/student
Calculation Method	Ratio between expenditures on professional training/evaluation of teachers and the number of enrolled students.
Formula	$\text{ExpTrain_h/student} = \text{ExpTrain_h} / N_h$ where: ExpTrain_h – expenditures on teacher training and evaluation within a financial year <i>t</i> , for education level <i>h</i> ; N_h – number of enrolled students in a school year at education level <i>h</i> ; <i>h</i> represents a specific level of education according to the ISCED 2011

Indicator Name	6. Expenditure on Professional Training and Teacher Evaluation per Student
	classification (ISCED 0 – preschool, ISCED 1 – primary, ISCED 2 – lower secondary, ISCED 3 – upper secondary, ISCED 4 – post-secondary non-tertiary, ISCED 5-6 – tertiary).
Required Data	Expenditure on teacher training/evaluation and number of students.
Data Sources	Ministry of Education (MEN)
Aggregation Level	National, county, urban/rural areas, education levels.
Indicator Interpretation	The indicator reflects the level of expenditure on teacher training and evaluation, as an expression of interest in teacher professional development.
Quality Standards and Limitations	The indicator may be influenced by the number and structure of teaching staff involved in this activity.
Indicator Name	2. Number of Teaching Staff by Education Levels (ISCED 0-6)
Definition	Number of teaching staff by education levels: preschool education (ISCED 0), primary education (ISCED 1), lower secondary education (ISCED 2), upper secondary education (high school/vocational education – ISCED 3), non-university tertiary education (ISCED 4), university tertiary education (ISCED 5-6).
Purpose	Determines the level of human resource availability for each education level. Also serves for calculating other indicators in the field of human resources (e.g., student-teacher ratio).
Symbol	NTS _h (NTS – number of teaching staff) (<i>h</i> – education level, as per ISCED 2011 classification: ISCED 0 – preschool, ISCED 1 – primary, ISCED 2 – lower secondary, ISCED 3 – upper secondary, ISCED 4 – post-secondary non-tertiary, ISCED 5-6 – tertiary).
Required Data	Number of teaching staff in each education level.
Data Sources	National Institute of Statistics (INS), Ministry of Education (MEN), national education database.
Aggregation Level	National, regional, county, urban/rural areas, education levels, types of ownership of educational institutions (public/private), age groups, genders.
Interpretation	The indicator, together with the number of students at each education level, expresses the conditions for ensuring human resources in education. The age group distribution, correlated with student flow forecasts, allows for planning the necessary teaching staff for the coming years.

Indicator Name	6. Expenditure on Professional Training and Teacher Evaluation per Student
Quality Standards and Limitations	The quality of the indicator depends on the accuracy of recorded data.

3. Conclusions

Human capital plays a crucial role in the education sector, having a significant impact both socially and economically. Individual development contributes to strengthening education and directly influences economic prosperity. This influence should not be viewed solely from a productivity perspective, but rather from a humanistic viewpoint that emphasizes inclusion and educational accessibility for all.

Education is not only a means of professional preparation but also a tool for social development, progress, and equity. In this context, human capital represents the driving force that can transform education into a sustainable and adaptable field, capable of evolving with societal changes.

The COVID-19 pandemic highlighted, more than ever, the importance of this capital, revealing both the vulnerabilities and the adaptability and innovation capacities of the educational system.

The concept of human capital must be analyzed with a balanced perspective, combining both productive and humanistic views. In education, human capital is defined by the accumulation of knowledge and its social impact.

This resource is not static but is constantly evolving, influenced by factors such as human resource management, demographic dynamics, and technological advancements. Therefore, the development of human capital is a complex process that requires continuous investment in education and professional training. The effects of this process extend beyond the individual level, influencing both the economy and society as a whole.

The efficiency of human capital can be measured by analyzing the links between it and economic performance, thus highlighting the importance of quality education and an adaptable training system.

The transition to a knowledge-based economy has redefined the role of human capital, bringing the value of knowledge and skills to the forefront in relation to traditional resources. In this new context, a clear distinction is made between intellectual capital, generated through education and innovation, and biological capital, determined by the physical characteristics of the workforce.

The development of technological skills and adaptation to the new demands of the labor market have become essential, as the modern economy increasingly values knowledge rather than just material resources.

Organizations today function as hubs for the accumulation and utilization of knowledge, developing both technical skills and a deeper understanding of the market dynamics and the needs of beneficiaries.

In this context, ongoing professional development has become essential for ensuring adaptability and innovation in education. By continuously updating their skills, employees not only realize their potential but also contribute to the progress and modernization of the educational system.

Education and professional training are strategic investments that influence the quality of human capital and, implicitly, economic development. However, discrepancies between the demand and supply of skills on the labor market can create imbalances, reducing the efficiency of these investments.

In this regard, it is essential to align educational systems with the needs of the modern economy to ensure the optimal use of available human resources.

In a world where information circulates rapidly and access to knowledge is increasingly easier, the knowledge-based economy is growing through innovation and the efficient transfer of information. This economic dynamic highlights the crucial role of human capital in generating progress and competitiveness. Its quality is directly influenced by the level of education and the opportunities for both initial and continuous professional training.

Organizations that effectively utilize intellectual resources and the knowledge of their employees become more sustainable and competitive. This process involves restructuring traditional resources, optimizing human capital, and integrating new technologies.

Thus, continuous learning, organizational learning, and adapting to changes in the labor market are essential for long-term success.

Technological advancements, digitalization, and automation have significantly reshaped the labor market, creating new forms of employment and eliminating some traditional jobs. In a constantly changing environment, adaptability has become an essential requirement for professional success.

Technical skills must be complemented by non-technical abilities such as critical thinking, problem-solving, and teamwork.

In this context, applying the principles of the knowledge-based economy in education can facilitate the sustainable development of this sector. There is a direct link between the use of human capital and the long-term viability of the educational system.

Therefore, investments in education should focus on developing relevant skills and efficiently integrating new technologies into the learning process.

As society moves towards an economy based on innovation, intellectual resources become more valuable than material ones. This process necessitates the intelligent management of human capital to optimize the use of available resources.

Educational institutions and organizations must adopt new knowledge-based management models, leveraging individual expertise and skills to create a sustainable and efficient system.

In such an economic and social landscape, changes in the workforce structure are inevitable. Digitalization, automation, and new economic models present both opportunities and challenges, leading to the disappearance of some jobs and the emergence of others.

To navigate these transformations, a strategic approach to education is essential, combining both technical and non-technical skills, preparing individuals for a professional environment that is in constant evolution.

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