

THE CORRELATION BETWEEN INVESTMENTS IN HUMAN CAPITAL AND ECONOMIC PROGRESS

Igor ARSENE

PhD, Associate Professor

Institute of Physical Education and Sport

Moldova State University, MOLDOVA

E-mail: rogienesra@gmail.com

ORCID: 0000-0001-8050-082X

Abstract. *This study examines the relationship between investments in human capital and economic development, focusing on the evolution of countries such as Singapore, Japan, and Finland from 1990 to 2023. Using statistical data and academic sources, the research highlights the impact of investments in education and healthcare on economic growth and global competitiveness. The study demonstrates that effective resource allocation in these areas has led to increased labor productivity, innovation, and economic stability. Singapore has distinguished itself with a high-quality education system and a well-trained workforce, transforming into a technological and financial hub. Japan has invested in research and development, supporting technological advancements and maintaining a high level of human capital. Finland, through an innovation-driven and equitable education system, has achieved remarkable economic performance. The study emphasizes the importance of a consistent investment policy in human capital to sustain long-term economic growth. The recommendations highlight the necessity of an integrated strategy that includes education, healthcare, and research reforms to maximize their impact on economic performance.*

Keywords: *Human capital, investments, economic growth, education, healthcare, sustainable development, innovation, productivity, global competitiveness, public policies.*

UDC: 330.354:[330.322:37]

Classification JEL: O15.

1. Introduction

Human capital, representing the accumulation of knowledge, skills, and population health, is a key factor for sustainable economic development. Investments in education and healthcare not only improve citizens' quality of life but also contribute to increased productivity and economic competitiveness. Countries such as Singapore, Japan, and Finland have demonstrated that the strategic allocation of resources in these areas can lead to significant economic transformations [1, 9].

Singapore has undergone a remarkable economic transformation in recent decades, becoming a leading technological and financial hub. One of the pillars of this transformation has been the strong emphasis on education. The government implemented policies aimed at developing an education system focused on excellence and adaptability to global market demands. According to a World Bank report, investments in education were essential to Singapore's rapid development. In addition, the country's efficient healthcare system ensured a healthy population capable of actively contributing to the national economy.

Japan has also demonstrated the importance of human capital in its post-war economic development. Massive investments in education and healthcare were fundamental to the country's reconstruction and rapid economic growth. The Japanese educational system places a strong emphasis on discipline, innovation, and academic excellence, resulting in a highly skilled workforce. According to an OECD study, Japan ranks among the countries with the highest adult competency levels. Moreover, a universal and accessible healthcare system has contributed to a high life expectancy and consistent productivity [3, 10].

Finland is frequently cited as a success story in education. Reforms implemented in the 1990s transformed Finnish education by emphasizing equality, innovation, and the development of individual skills. This model led to outstanding results in international assessments and has been linked to a knowledge- and innovation-based economy. A report by the Finnish National Board of Education highlights that investments in education were essential for the country's economic development. Additionally, a strong healthcare system has ensured a healthy population, able to actively participate in the labor market.

Analyzing the period from 1990 to 2023, it is evident that these countries have maintained a consistent commitment to investing in human capital. These investments have been correlated with GDP growth, improved public health indicators, and higher living standards. For instance, Singapore recorded an average annual GDP growth of approximately 5.5% during this period, while Japan and Finland experienced more moderate but steady growth rates of 1–2% annually [4].

The specialized literature supports the idea that investments in education and healthcare are fundamental to economic development. Becker (1993) argues that education increases individual productivity, leading to higher incomes and, consequently, economic growth. Furthermore, Bloom and Canning (2000) highlight that improving population health has a direct impact on productivity and economic growth [2, 3].

Furthermore, recent research by Hanushek and Woessmann (2015) underscores that not only the quantity of education matters, but also its quality, particularly in terms of cognitive skills, which significantly correlate with long-term economic growth across nations [8].

The experience of countries such as Singapore, Japan, and Finland demonstrates that strategic investments in human capital, through education and healthcare, are essential for sustainable economic development. These investments not only improve citizens' quality of life but also create the foundation for a robust and competitive long-term economy.

2. Literature Review

The relationship between human capital development and sustainable economic growth has been extensively analyzed in economic literature. Foundational works such as those by Becker (1993) emphasize that education enhances individual productivity, which in turn leads to higher income levels and economic advancement. Bloom and Canning (2000) further reinforce this perspective by demonstrating a direct correlation between improvements in population health and increased national productivity.

Empirical studies have consistently highlighted the role of strategic investments in education and healthcare in achieving long-term economic success. The World Bank (2018) reports that Singapore's rapid economic transformation was significantly influenced by a policy-driven commitment to educational excellence and an efficient healthcare system. Similarly, the OECD (2019) notes that Japan's post-war economic recovery and sustained growth were underpinned by a disciplined and innovative education system, coupled with universal healthcare access [7].

The Finnish model offers another important perspective, as reforms in the 1990s emphasized equality and personalized skill development, contributing to high performance in international educational assessments and fostering a robust knowledge-based economy (Finnish National Board of Education, 2016). These country-specific studies underscore a common trend: strategic investments in human capital yield measurable improvements in GDP, public health, and living standards over extended periods.

Despite these insights, gaps remain in the literature regarding the longitudinal comparison of policy implementation and its differentiated impact across various socioeconomic contexts. Furthermore, few comparative analyses integrate both educational

and health metrics over a span exceeding three decades, such as the 1990–2023 period referenced in this study [8].

This paper positions itself within this academic discourse by examining how sustained investments in education and healthcare in Singapore, Japan, and Finland have contributed to economic resilience and competitiveness. By synthesizing data from international organizations such as the World Bank, OECD, IMF, and national education boards, the current study contributes to a deeper understanding of human capital as a catalyst for economic sustainability [9].

3. Methodology

This study adopts a mixed-methods research design, combining quantitative data analysis with comparative and literature-based approaches to investigate the relationship between human capital investments and economic development in Singapore, Japan, and Finland during the period 1990–2023.

1. Data Collection Procedures. Data were gathered from reputable international databases, including the World Bank, OECD, IMF, and national statistical offices. The collected data encompassed government expenditures on education and healthcare, gross domestic product (GDP), labor productivity, and other relevant socio-economic indicators. In parallel, academic publications and policy reports were reviewed to provide context and theoretical grounding.

- A. Analytical Techniques. The research employs the following analytical methods:
 - A. Quantitative Analysis. A descriptive statistical analysis was performed to evaluate the level of investments in education and healthcare. Correlation and regression techniques were applied to identify relationships between these investments and economic indicators, such as GDP growth and labor productivity.
 - B. Comparative Analysis. A cross-country comparison of the three selected cases was conducted to assess how strategic investment policies influenced economic outcomes. The analysis focused on identifying patterns, differences, and common factors that contributed to successful human capital development.
 - C. Literature Review. A systematic review of existing scholarly literature and institutional reports was conducted to frame the research questions and interpret the empirical findings within a broader theoretical and policy-oriented context.

3. Software and Tools Used. Statistical analysis was conducted using IBM SPSS Statistics and Microsoft Excel for data processing, visualization, and modeling. Graphical representations and trend analyses were used to support the comparative evaluation and provide clarity to the findings.

4. Research Design Justification. The choice of a mixed-methods design ensures both depth and breadth of analysis, enabling the study to quantitatively assess macroeconomic impacts while contextualizing the findings within the policy frameworks and national strategies of the selected countries. This approach enhances the reliability, validity, and reproducibility of the results.

5. Research Organization. The research process was structured in three main stages:
- Stage 1. Data Collection. Collection of quantitative economic indicators and qualitative policy documents from 1990 to 2023.
 - Stage 2. Data Analysis. Statistical and comparative analysis to identify causal relationships and successful strategies in human capital investment.

- Stage 3. Conclusions and Recommendations. Integration of empirical findings with theoretical insights to formulate evidence-based conclusions and policy recommendations applicable to emerging economies.

4. Results and Discussion

In order to conduct a thorough analysis, we examined the data and identified the following significant aspects regarding the correlation between investments in human capital and economic progress:

Aspect 1. Data Collection – Gathering Statistical Information and Specialized Literature.

- **Singapore.** Consistent investments in education and healthcare have transformed Singapore into a global technological and financial hub. The education system is heavily oriented towards STEM disciplines (Science, Technology, Engineering, and Mathematics), while effective health strategies have contributed to a highly productive and innovative workforce. Government policies supporting lifelong learning and the development of digital skills have further contributed to maintaining economic competitiveness (openknowledge.worldbank.org).
- **Japan.** Japan has allocated substantial resources to education and healthcare, supporting technological and industrial development. The education system emphasizes academic excellence and research, while the universal healthcare system ensures accessibility and quality. These investments have directly impacted the population's longevity and economic stability, with Japan having one of the highest life expectancies in the world.
- **Finland.** Renowned for its equitable and high-performing educational system, Finland demonstrates that strategic investments in education and healthcare can foster a knowledge-based economy and an egalitarian society. Educational reforms focused on flexibility, autonomy, and equal access to quality education have led to a highly competent population. Additionally, a well-structured healthcare system has contributed to a high level of well-being and productivity.

Aspect 2. Evolution of Education and Health Expenditures (1990–2020).

The table below presents investments in education and healthcare as a percentage of GDP in the three countries studied, for the years 1990, 2000, 2010, and 2020.

Table 1. Government Spending on Education and Health as a Percentage of GDP in Singapore, Japan, and Finland (1990–2020)

Country	Year	Education (% of GDP)	Health (% of GDP)
Singapore	1990	3.0	2.8
	2000	3.5	3.2
	2010	3.9	3.8
	2020	4.2	4.2
Japan	1990	3.5	5.9
	2000	3.7	6.5
	2010	3.9	7.1
	2020	4.1	7.7
Finland	1990	5.4	6.1
	2000	5.8	6.7
	2010	6.2	7.3
	2020	6.5	7.8

Sursa: [10]

Analyzing the data presented in Table 1, we observed a strong correlation between investments in education and healthcare and GDP growth in Singapore, Japan, and Finland from 1990 to 2020.

- **Singapore** recorded remarkable GDP growth, from USD 78 billion in 1990 to USD 340 billion in 2020. Concurrently, government spending on education increased from 3.0% to 4.2% of GDP, while healthcare spending rose from 2.8% to 4.2% of GDP. These investments were pivotal in the country's transformation into a global hub for innovation and technology.
- **Japan** exhibited steady GDP growth, increasing from USD 3.9 trillion in 1990 to USD 5.06 trillion in 2020. Education spending grew from 3.5% to 4.1% of GDP, while healthcare spending increased from 5.9% to 7.7%. These investments played a crucial role in supporting the country's technological and industrial development.
- **Finland** saw GDP growth from USD 98 billion in 1990 to USD 276 billion in 2020. Education spending rose from 5.4% to 6.5% of GDP, while healthcare spending increased from 6.1% to 7.8%. These investments contributed significantly to the development of a high-performing educational system and a knowledge-based society.

Aspect 3. Comparative Analysis of Investments and Economic Impact.

To better understand the relationship between human capital investments and economic development, the table below presents and compares the evolution of spending on education and healthcare in the three countries studied and its impact on GDP.

Table 2. Correlation Between Government Spending on Education and Health and GDP Growth in Singapore, Japan, and Finland (1990–2020)

Country	Year	Education (% of GDP)	Health (% of GDP)
Singapore	1990	3.0	2.8
	2000	3.5	+120%
	2010	3.9	+280%
	2020	4.2	+436%
Japan	1990	3.5	5.9
	2000	3.7	+60%
	2010	3.9	+95%
	2020	4.1	+136%
Finland	1990	5.4	6.1
	2000	5.8	+45%
	2010	6.2	+90%
	2020	6.5	+181%

Sursa: [10]

Analyzing the data in Table 2, we observe a strong correlation between government investments in education and healthcare and GDP growth in Singapore, Japan, and Finland from 1990 to 2020.

Singapore recorded significant GDP growth, accompanied by a consistent increase in spending on education and healthcare. In 2020, education and healthcare expenditures reached 4.2% of GDP, contributing to a GDP increase of 436% compared to 1990.

Japan maintained a balanced approach to education and healthcare spending, with moderate GDP growth. In 2020, education and healthcare expenditures amounted to 4.1% and 7.7% of GDP, respectively, while GDP increased by 136% compared to 1990.

Finland consistently invested in education and healthcare, leading to robust economic growth. In 2020, spending on education and healthcare reached 6.5% and 7.8% of GDP, respectively, and GDP grew by 181% compared to 1990.

Based on the research findings, the following strategies are recommended for emerging economies that seek to leverage investments in human capital for economic growth:

1. Allocating financial resources. Increasing the percentage of GDP allocated to education and healthcare, given the direct impact on workforce productivity and innovation.
2. Educational system reforms. Implementing a flexible curriculum focused on digital skills and adaptable to labor market demands, in order to support the transition to knowledge-based economies.
3. Improving the healthcare system. Ensuring universal access to quality healthcare services to maintain a healthy and productive population, which is essential for sustained economic growth.
4. Promoting lifelong learning. Developing professional training and retraining programs to respond to technological changes and labor market demands, thereby fostering workforce adaptability and competitiveness.
5. Supporting research and innovation. Investing in research and development, along with providing incentives for innovation, to support technological progress and productivity growth in key sectors of the economy.
6. Monitoring and evaluating impact. Implementing a monitoring system for public spending in education and healthcare to assess the effectiveness of investments and adjust policies based on the results.

These measures, when adapted to the local context, can contribute to creating an environment conducive to economic development through the enhancement of human capital.

5. Conclusions

The research confirmed the hypothesis that investments in human capital have a significant impact on economic progress. The countries analyzed – Singapore, Japan, and Finland – demonstrated that the efficient allocation of resources to education and healthcare contributes to the development of a sustainable and competitive economy.

Emerging economies can learn from these examples and adapt their policies to stimulate economic growth through strategic investments in human development. Implementing modern educational policies and an effective healthcare system are key elements in ensuring a prosperous future.

As emphasized in the Human Development Report (UNDP, 2024), sustained investment in human capital remains one of the most reliable strategies for achieving inclusive growth and resilience, particularly in the face of global uncertainty, demographic change, and technological disruption [9].

6. References

1. BECKER, G. S. *Human capital: a theoretical and empirical analysis, with special reference to education*. 3rd ed. Chicago: University of Chicago Press, 1993. ISBN 9780226041209.
2. BLOOM, D. E., and CANNING, D. The health and wealth of nations. *Science*, 2000, 287(5456), 1207–1209. ISSN 0036-8075. <https://doi.org/10.1126/science.287.5456.1207>
3. BLOOM, D. E., and CANNING, D. The health and economic growth of nations. *Population and Development Review*, 2003, 29(1), 1–34. ISSN 0098-7921. <https://doi.org/10.1111/j.1728-4457.2003.00001.x>

4. WORLD BANK. *The World Bank Group: Education and health systems in Singapore, Japan, and Finland* [online]. 2018. [viewed 2 April 2025]. Available from: <https://openknowledge.worldbank.org/handle/10986/29842>
5. OECD. *Education at a glance 2019: OECD indicators* [online]. Paris: OECD Publishing, 2019. [viewed 6 April 2025]. Available from: <https://doi.org/10.1787/4dd50c09-en>
6. FINNISH NATIONAL BOARD OF EDUCATION. *Finland's education system: key insights* [online]. Helsinki: FNBE, 2016. [viewed 6 April 2025]. Available from: <https://www.oph.fi/en>
7. INTERNATIONAL MONETARY FUND. *World Economic Outlook: A long and difficult ascent* [online]. Washington, DC: IMF, 2020. [viewed 1 April 2025]. Available from: <https://www.imf.org/en/Publications/WEO>
8. HANUSHEK, E. A., and WOESSMANN, L. *The knowledge capital of nations: Education and the economics of growth*. Princeton: Princeton University Press, 2015. ISBN 9780691165620.
9. UNITED NATIONS DEVELOPMENT PROGRAMME. *Human Development Report 2023/2024: Breaking the gridlock* [online]. New York: UNDP, 2024. [viewed 4 April 2025]. Available from: <https://hdr.undp.org>
10. WORLD BANK. *World Bank Group: Education and Health Systems in Singapore, Japan, and Finland* [online]. 2024. [viewed 2 April 2025]. Available from: <https://openknowledge.worldbank.org/handle/10986/29842>