

	Science, Education and Innovations in the Context of Modern Problems Issue 12, Vol. 8, 2025
	Title of research article  Developing Human Capital and Building Future Skills in the Age of Digital Transformation: Lessons from the Korean Experience
Benounissa Leila	Doctor Mascara University Algeria E-mail: l.benounissa@univ-mascara.dz ORCID: 0009-0004-3661-5995
Benabou Djilali	Professor Mascara University Algeria Email: benabou@univ-mascara.dz ORCID: 0000-0002-7049-0821
Issue web link	https://imcra-az.org/archive/387-science-education-and-innovations-in-the-context-of-modern-problems-issue-12-vol-8-2025.html
Keywords	Human capital; Digital transformation; Future skills; Knowledge economy; Higher education; Technological innovation; Artificial intelligence; Korean model; Economic development; Sustainable growth.
Abstract This study explores the critical role of human capital development and future skills formation in addressing the challenges of contemporary technological transformations and promoting sustainable economic growth. Against the backdrop of the Fourth Industrial Revolution—characterized by artificial intelligence (AI), automation, blockchain, and digital connectivity—countries worldwide are compelled to reimagine their educational systems and workforce strategies. The research focuses on the South Korean model as a successful case of digital transformation and skill-based economic advancement, offering valuable insights for developing nations. Using a descriptive-analytical approach, the study investigates how Korea transitioned from a resource-scarce economy to a global leader in innovation and digital technology through strategic investment in human capital, education reform, and research-driven policies. The findings reveal that Korea's progress was achieved through continuous investment in science and technology education, university-industry partnerships, and the creation of a digital ecosystem that supports creativity, entrepreneurship, and lifelong learning. The study concludes that sustainable economic transformation depends on a nation's ability to adapt its human resource strategies to technological realities and to foster future-oriented skills that align with the evolving demands of the digital economy.	
Citation. Benounissa L., Benabou D. (2025). Developing Human Capital and Building Future Skills in the Age of Digital Transformation: Lessons from the Korean Experience. <i>Science, Education and Innovations in the Context of Modern Problems</i>, 8(12), 494–505. https://doi.org/10.56334/sei/8.12.41	
Licensed © 2025 The Author(s). Published by Science, Education and Innovations in the context of modern problems (SEI) by IMCRA - International Meetings and Journals Research Association (Azerbaijan). This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).	
Received: 25.07.2025	Accepted: 21.08.2025 Published: 06.10.2025 (available online)

Introduction:

494 - www.imcra.az.org | Issue 12, Vol. 8, 2025

Developing Human Capital and Building Future Skills in the Age of Digital Transformation: Lessons from the Korean Experience

Benounissa Leila; Benabou Djilali

The advancement of technology, along with the various manifestations of globalization, has led to the creation of a highly complex competitive economic environment. Consequently, the decision to establish a small enterprise has become an extremely difficult strategic decision that can only be made with sufficient guarantees for the success of the project, due to the complexities involved in the establishment and development of institutions resulting from technical and administrative problems and issues in the external environment. The important role that the field of information and communication technology plays in economic activity as well as in achieving economic development and providing job opportunities, as well as in fostering innovation and renewal, highlights the importance of training and developing human resources in equipping entrepreneurs with the knowledge, skills, and experiences necessary to enhance the spirit of innovation. To ensure the success of projects and their realization on the ground, innovation is considered one of the most important economic means that the state relies on to drive the economy forward, as it provides facilities for innovative project owners and university graduates to create their own institutions and to transform students from job seekers into entrepreneurs and founders of institutions that provide job opportunities. Thus, the interest in educational institutions and universities in particular has become an imperative necessity. From this standpoint, we will address human capital as it is primarily responsible for the production and dissemination of knowledge, creativity, and innovation. Therefore, the state seeks to transform university institutions into supportive entities for emerging entrepreneurial projects, by creating university business incubators that work on discovering new and innovative ideas within the academic environment and accompanying their owners to bring their projects to fruition on the ground. Through this, the outlines of the problem become clear: How can the development of human capital and the building of future skills contribute to facing the challenges of the technological revolution and achieving sustainable economic transformation?

The Importance of the Study:

Educational institutions have become one of the most essential sources for developing society in various areas of life and their reflections, due to the important, active, and distinguished role these institutions play in sustainable development. They provide one of the most conducive environments for preserving the values and ideas that society seeks to promote:- Attention to human capital, which has given great importance to the knowledge element.- Conducting a comparison in order to identify global institutions in the field of knowledge production, social and economic environments, and to benefit from international experiences in this area.- Encouraging investment in knowledge at the national, Arab, and global levels in collaboration with relevant local, regional, and international entities.

Research Method:

In order to cover the aspects of the subject, the descriptive analytical method was used to assess the digital transformation adopted by countries to encourage and create added values that foster creative institutions to assist in creativity and innovation, pushing them toward integration into the digital economy. We took a leading experience in the field of creativity and innovation, namely the Korean experience.

I. The theoretical framework for investing in human capital:

Economists such as Schultz (T.N), Mincer (J), and Becker (G.S) were interested in the subject of investment in human capital, considering education as a type of this investment.

- **Schultz's Theory:** The theory of investment in human capital did not crystallize until after the research conducted by economist Schultz, who provided more realistic explanations for the increase in income by explaining and interpreting the less tangible components of human capital formation. Schultz outlined his concept of human capital in three main points (Schultz, 1961):

- He considered that spending on education, health, training, and migration is not merely consumption, but an investment that increases an individual's productivity just as investment in machinery increases the productivity of physical capital.
- He affirmed that developing individuals' skills and knowledge yields tangible economic returns, both for the individual (through increased income) and for society (through the growth of production and national income).

- Schultz emphasized that education is the primary engine of economic development, especially in developing countries, as it enables individuals to interact with modern technology and enhances resource use efficiency.

Schultz focused in his research on emphasizing the education process as a necessary investment in human capital, and that spending on education is considered an investment rather than consumption expenses because education generates economic added value.

- **Mincer's Theory:** The aim of Mincer's theory is to measure the rate of return on human capital. Since then, economists such as Schultz in 1996 and Becker in 1993 have begun to explain and apply the theory. The goal of developing human capital theory is to understand the role that individual decisions play in explaining wage disparities. The model relies on a mathematical analysis of the relationship between income (wages) and the number of years of education and work experience of the individual, proposing a model known as Mincer's wage equation, along with the model's assumptions (Mincer, 1974):

1. Income increases with education, meaning that the length of training or education is the main source of income disparity among workers, and training raises worker productivity, so each additional year of education increases wages by a certain percentage.
2. The return from practical experience is important but decreases, meaning that an individual achieves significant wage increases at the beginning of their career, but this diminishes over time.
3. The equation is statistically estimable, which has made it popular in studies of the labor market, job discrimination, and analysis of educational returns.

Mincer addressed some difficulties in measuring cost return and training return in his analysis. He believes that age is a fundamental factor in the training process, as the younger the individual, the lower the training costs. He states that the possibility of death is one of the reasons for the lack of cost data, and in the event of death, the cost of training becomes greater than the return. Mincer reached conclusions from his model, which are (Bontis & Fitz-Enz, 2002):

- The higher an individual's educational levels, the greater the likelihood of receiving more on-the-job training (human capital development is positively influenced by employees' education level and their job satisfaction).
- The higher the turnover rate and unemployment rate, the greater the cost of investing in training.
- The more investment in training, especially specialized training, the greater the chances of an individual staying with the organization and the stability of the workforce.

- **Baker's Model:** All of Baker's (Becker, 1995) research on human capital development is presented in his famous book "Human Capital" published in 1964. He focused on studying all forms of investment in human capital through education, health, and migration, with a particular emphasis on training. Elements of Baker's Model (Becker G. S., 1964):

1. Investment in education and training: Individuals choose to invest their time and money in education if the future returns (income increase) exceed its costs (like fees and opportunity costs).
2. Cost-benefit analysis
 - Direct costs: such as tuition fees.
 - Indirect costs: such as lost wages during studies.
 - Returns: Higher lifetime income.
3. Comparison with physical capital: Both are subject to economic laws such as accumulation, obsolescence, and return on investment.
4. Return to Education: Becker mathematically proved that the return from education is higher as the skills required in the market increase and technology changes faster.

Difference between two types of training:- General training: It is training that increases the marginal productivity of the individual in the organization, so the skills acquired can be used in their own organization or the organization

they are training in.- Specialized training: It is training that increases the marginal productivity of the individual to a greater extent than the marginal productivity if they were trained in another organization.

II. Digital Economy:

The digital economy consists of two words: "economy" and "digital," which signifies a new type of transactions that utilize information and communication technologies.

This economy is characterized by internet transactions and the virtual space for all economic transactions. The digital economy is defined as that type of economy which relies on the use of information and communication technology, facilitating the flow of information, goods, services, and capital movements to and from anywhere in the world at any time (Al-Alimi, 2013).

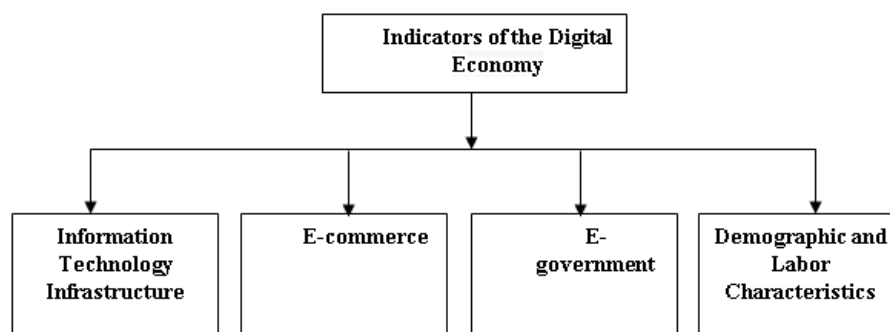
The digital economy is heavily characterized by the intensive use of all means of media, communication, software, products, and electronic industries, which has led to changes in lifestyle and the nature of economic transactions and activities.

The term digital economy refers to how modern procedures, experiences, and technologies are implemented to maintain competitiveness in the rapidly changing technology world. Among the most important characteristics of the digital economy are the following: (Jassim, 2008) Providing information to decision-makers through databases, especially blockchain

- Information is considered the basis of power and wealth in the digital economy
- Elimination of borders, restrictions, and traditional economic transactions
- The digital economy is based on the level of technological culture in society across all ages
- The main reliance on the internet in various daily operations and transactions.
- The emergence of e-commerce, e-marketing, electronic trade, and e-government
- Continuously affected by changes in the information technology and communications sector
- The emergence of digital globalization
- The emergence of digital institutions
- The emergence of the Internet of Things.

2.1 Indicators of the Digital Economy: To assess the extent of any country's progress in the transformation towards a knowledge economy, it is essential to measure this transformation using indicators that serve as benchmarks related to the level of engagement with information and communication technology, in addition to other indicators. The knowledge economy index indicates whether the environment supports the dissemination of knowledge that can be effectively utilized for economic growth. The World Bank has worked on establishing the key indicators that assist in the international classification of the knowledge economy, and the knowledge economy index relies on four indicators considered as the pillars of this economy. The following figure illustrates this:

Figure 01: Indicators of the Digital Economy



Source: https://ec.europa.eu/commission/presscorner/api/files/document/print/fr/memo_16_385/MEMO_16_385_EN.pdf, date dernier consultation le 18.02.2025

Information and Communication Technology (ICT) Infrastructure: This is a qualitative indicator that reflects the infrastructure of the network and access to information and communication technology, as well as the proportion of its use by individuals in society. It can also be measured through computers, telephone lines (both fixed and mobile), fiber optic lines, satellites, wired and wireless networks, in addition to measuring investments and software development, and basic information regarding the extent of the Internet and other network coverage and the level of congestion in these network systems.

- **E-commerce:** It is also considered one of the most important key indicators through which the digital economy can be measured, based on the volume of exchanges between the business and the consumer, as well as between businesses themselves.

- **E-Government:** E-government reflects the level of a country's progress and the extent to which it applies information and communication technology in its dealings, moving towards a digital economy. The most important areas of e-government are represented by the electronic public services provided by the government to citizens in order to improve various public services and accelerate them, such as health, education, culture, and others, and to eliminate bureaucracy by establishing digital platforms that are characterized by transparency. The work of e-government is not limited to providing services to individuals only; there are several types of e-government, including government-to-government, government-to-institutions and vice versa, and government-to-individuals and vice versa.

- **Worker and Demographic Characteristics:** By measuring individuals' demographic characteristics and labor market attributes to understand the extent of participation in the digital economy, such as measuring computer use at school, work, and home, and linking it to economic outcomes like wages and assets, as well as demographic characteristics such as education, employment, gender, race, age, and place of residence.

-

2.2 Strategies for Developing Human Capital to Keep Up with Digital Transformation:

Human capital development is defined as the processes and strategies that focus on the growth and development of human capital within the organization. It is considered essential because the initiative of starting a business creates the products and services that can innovate and expand in competitive markets. With the increasing and accelerating transformations currently, there is an urgent need to adopt a clear policy and strategy to keep up with these changes. Work now focuses on preparing human capital that can respond to these changes, which is referred to as digital human capital, enabling individuals to acquire the necessary skills and knowledge to adapt to emerging technologies. We cannot rely solely on providing digital infrastructure, but also on the readiness of individuals to adapt to the new wave (Somasundaram, Chandra, amilarasu, Kinagi, & Naveen, 2025). Through this element, we addressed the most important measures necessary to connect the human index with the digital index:

✚ **Investing in continuous learning and essential digital skills:** The Future of Jobs Report for (Di Battista, Grayling, Hasselaar, & Leopold, 2023) considered digital skills as a fundamental requirement to keep up with technological developments such as data analysis, using cloud computing tools, and programming, as they are essential for integrating into the digital economy. To achieve this, it is necessary to :

- Developing human capital through continuous training systems focused on skills.
- Launching national or institutional platforms for open e-learning.
- Adopting and training employees in short, intensive batches.
- Using artificial intelligence in designing personalized learning pathways.

✚ **Educational System Reform:** This can be achieved by reviewing educational curricula to keep pace with digital developments, with a focus on individual competencies such as critical thinking, innovation, (Miettinen, 2022) digital

communication, and teamwork. Educational institutions should also be linked to labor market requirements in order to prepare students according to the demands of the digital reality.

✚ **Institutional leadership:** Human capital development is not limited to individuals only; it also extends to institutions. Institutional leadership is considered one of the most important reflections of human capital development and of creating an institutional culture that supports digital transformation and the development of leaders capable of managing and converting initiatives into tangible technological projects. A study (ESCWA, 2022) confirmed that most Arab countries lack digitally qualified leadership frameworks that define the institution's digital vision, set strategic transformation goals, allocate necessary resources (financial and human), and overcome cultural and organizational obstacles. The study recommended developing digital leadership programs to enhance institutions' capacity for technological change (ESCWA, 2022).

III. South Korea's Experience: South Korea is considered one of the most important global experiences, making its transformation a significant leap, and presenting the Korean experience serves as a model for digital transformation that other countries can apply. Among the reasons for this are:

- Its small area, estimated at 99,392 km².
- The war between it and North Korea lasted for 3 years and was considered a comprehensive survey of the country.
- Lack of raw materials that aid in the development process.- The extreme poverty that prevailed in the region during the 1960s, where they used to manufacture wigs for export worldwide, followed by the production of textiles.

All these harsh conditions were strong and urgent motivators for Korea to adopt a policy aimed at getting out of this dire situation. The total number of patents increased from 71,114 in 1981 to 237,633 in 2025, in addition to the rise in the rate of creating new technological knowledge (Suh & Chen, 2007, p. 1)

A civil society movement was launched to save the country from bankruptcy, and the vast majority of the Korean people decided to donate their gold reserves to the banks. A harsh and painful economic restructuring program was implemented, which includes reforms in four sectors (Suh & Chen, 2007, p. 41)

1. Restructuring the financial sector
2. Restructuring the corporate sector
3. Restructuring the market
4. Restructuring the public sector and financial support.

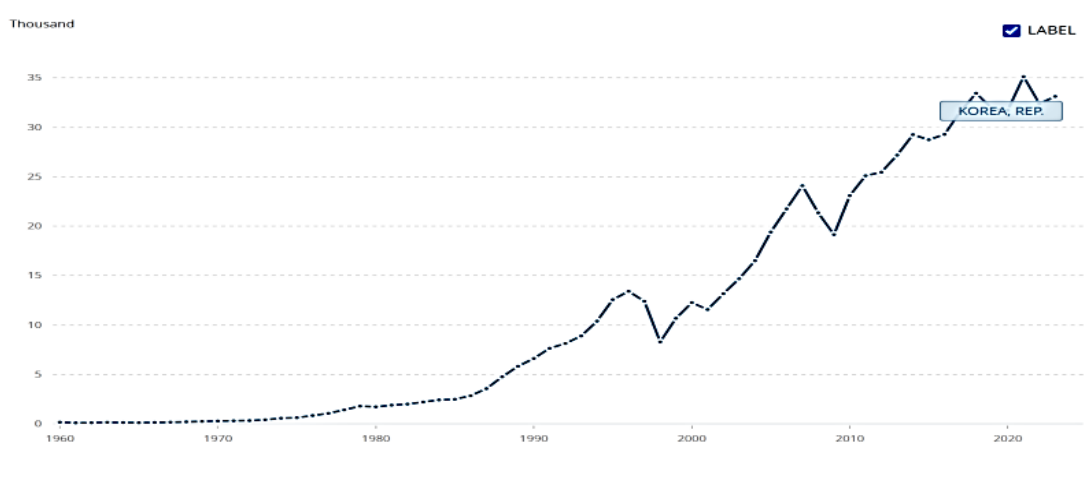
This was the starting point for the Korean economy, where the president and ministers worked on establishing the Korean Development Institute (KDI), which was considered an expertise hub, fully funded 100% by the South Korean government, yet operates as a legally independent entity rather than as a government department (Jong-ji, 2011). Expertise hubs are specialized centers established by a group of university faculty experts to evaluate investment, scientific, or research studies in their field of specialization to address any shortcomings. This benefits both society and academia by presenting their studies to the field, and to students, by developing their ideas and knowledge. For this reason, Korea developed the following strategy (George Younes, 2011) :

- Adopting an economic incentives system based on promoting research and development activities, knowledge creation processes, and patents.
- Reforming the education system to align with the needs of the digital economy transition.
- Developing infrastructure and information systems in a manner consistent with the requirements of the digital economy.

- Reforming the technological innovation system and making it more efficient by encouraging interaction levels between scientific institutions.
- Facilitating effective participation between the government, private sector, civil society organizations, and widespread public involvement.
- Implementing executive plans to achieve this strategy, focusing on developing infrastructure and information systems, improving the quality of technological innovation activities, and developing human capital to meet market needs.

The following figure illustrates the transformation of the Korean economy from 1960 up to 2023.

Figure 02: The Transformation in South Korea's Economy



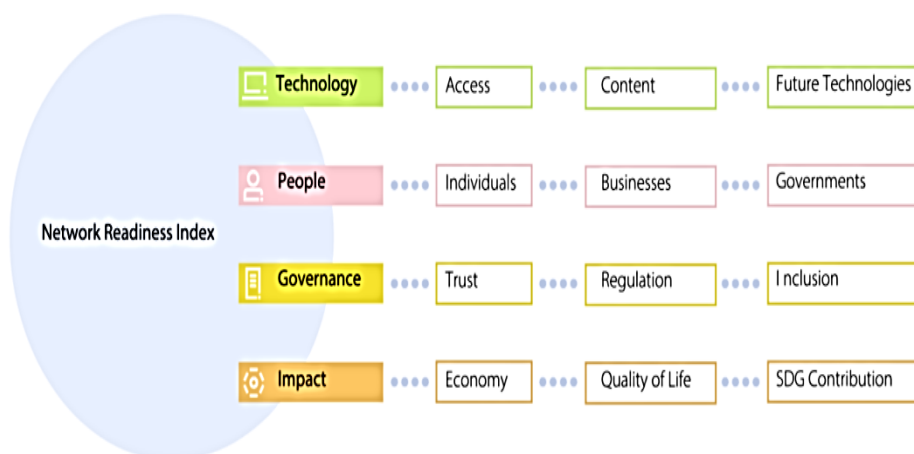
Source: <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=KR>

- This shift in the economy is due to the decision of the Korean president, who laid out development plans during his tenure in order to advance the economy, which, as noted in the previous figure, was almost in a state of stagnation until 1971, the year the Korea Development Institute (KDI) (Suh & Chen, 2007, p. 91) was established.
- In the years 1962 and 1966, the president implemented two development plans with the assistance of the United States, which supported the process in all material, scientific, and human aspects, all for the sake of these development plans. Afterward, and following the success of the two plans, Korea decided to take responsibility and follow its own plan in order to undergo the experience on its own (Suh & Chen, 2007, p. 29)
- It succeeded in elevating its economy to the highest ranks economically and took the lead in the transition to a digital economy. The Korean government launched initiatives such as the "Vision 2030 for Industrial Innovation," which aims to train one million young people in digital skills, artificial intelligence, and robotics. Private sector partnerships, especially with companies like Samsung and Hyundai, also play an important role in training students and professionals through cooperative training and dual education programs.
- In recent years, digital transformations have emerged as the most important issue in the Korean economy. During the COVID-19 pandemic, indirect economic activities suddenly became essential for daily life. Around the world, people began adapting to digital technologies that enabled remote communication and the ability to carry out daily tasks without the need for physical interaction with others. It was at this same time that governments turned to innovation through digital transformations to revive economies severely affected by the pandemic. Since the COVID

era, governments of major economies around the world have introduced a wide range of digital transformation policies.

We will address the Network Readiness Index (NRI), which is one of the leading global indicators on the application and impact of Information and Communication Technology (ICT) in economies around the world. In its latest 2024 edition, the NRI report maps the network readiness landscape for 133 economies based on their performance across four different pillars: technology, people, governance, and impact. The index consists of three pillars determined by a total of 54 variables.

Figure 2 : The NRI 2024 model



Source : <https://networkreadinessindex.org/country/republic-of-korea/>

Table 01: Ranking of Countries in the Network Readiness Index

Country	The proportion	ranking	technology	people	government	impact
United States of America	78.96	1	82.24	72.97	86.53	74.12
Singapore	76.94	2	71.20	69.98	86.95	79.61
Finland	75.76	3	66.63	62.58	89.37	84.44
Sweden	74.99	4	69.28	60.21	87.89	82.58
Korea	74.85	5	66.78	79.28	80.93	72.40
Yemen	20.24	133	14.96	13.96	18.86	33.17

Source: Prepared by the researchers based on <https://networkreadinessindex.org/country/republic-of-korea/>

We note from the table that South Korea ranked fifth globally out of 133 countries in the Network Readiness Index with a score of 74.85%. However, despite this ranking, it tops the People Index at 79.28%, which measures human capital, its readiness to use technology, and its flexibility for digital transformation. This reflects Korea's carefully crafted policies and national strategy in developing education and linking it to industrial development, allocating high percentages of its GDP to education, research, and development.

IV. The Reality of the Digital Economy in Korea

Due to Its Policy All major countries, including Korea, are increasingly moving towards digital investment. After several years of this transformation, all researchers are working on assessing how advanced Korea is in its digital transformation journey. Through this study, we tried to analyze the sub-indicators in Korea and similar countries. According to the Digital Government Index of the Organisation for Economic Co-operation and Development (OECD), Korea occupied top positions, as digital government is considered a key indicator for transforming government procedures and services in ways that enhance the responsiveness of the public sector. The OECD Digital Government Index measures digital government in countries by evaluating the comprehensiveness of existing strategies and initiatives for leveraging data and technology.

ICT Infrastructure:

- Fixed broadband subscriptions per 100 inhabitants in 2023 reached 46.6% among 38 countries, with an average of 35.8%.
- Intermediate consumption of information industry products as a percentage of total intermediate consumption in 2018 was 10.1% among 38 countries, compared to the country average of 7.11%.
- Active mobile broadband subscriptions per 100 inhabitants in 2023 were 121.9 among 38 countries, with an average of 117.9.
- Startups (established within a maximum of two years) in the information industry as a percentage of all companies in 2020, among 29 countries, Finland was 32.7%, with the country average being 28.2% among 31 countries in 2022.
- Average monthly mobile data usage per broadband subscriber in 2023 was 16.7 GB among 38 countries, with the average at 17.1 GB.
- Internet users as a percentage of individuals in 2024 reached 97.4% among 33 countries, with an average of 93.4%.

E-commerce:

- Digitally provided services as a percentage of total commercial services in 2020 were 21.2% among 38 countries, while the average of the countries was 30.3%.
- The value added of industrial exports with intensive use of digital services (% of total value of industrial exports) in 2018 was 19.9% among 38 countries, with the country average at 25.5%.
- Information and communication technology goods and services as a percentage of international trade in 2022: Korea achieved 18.5%, while the average among 37 countries was 7.67%.
- The percentage of companies with an online presence in 2023 was 70.2% among 31 countries, with an average of 77.5%.

- The percentage of companies purchasing cloud services in 2024: Korea was 69.5% among 30 countries, with the country average at 50.1%.
- The percentage of small enterprises engaged in e-commerce in 2023 was 22.2% among 30 countries, with the average at 26%.
- The percentage of internet users who made online purchases in Korea is 77.9% in 2024, among 33 countries, with an average purchase rate of 75.4%.

E-Government

- The Digital Government Index for 2023 reached 0.94% among 33 countries, while the average of countries was 0.6%.
- The Flexibility of Digital Services Regulation Index for 2023 was 0.1 among 38 countries, with the country average being 0.05.
- Health Data Sharing Density in 2020 was 51.5% compared to 22 countries, where the average of countries was 65.2%.
- Electronic waste in 2022 reached 9.37 kg among 37 countries, while the average was 9.149 kg.
- The proportion of innovations in the field of communications and information technology that were patented from 2017 to 2020 was 50.8% among 31 countries, with an average of 19.4%.
- The proportion of public spending on policies aimed at improving the active labor market (% of Gross Domestic Product) in Korea was 0.4% in 2022 among 35 countries, where the average spending ratio was 0.30%.

Demographic and labor characteristics:

- The proportion of labor in sectors with intensive use of digital services in 2018 was 48.4% among 38 countries, with the average being 48.4

The disparity in Internet use between men and women in 2023 among 35 countries was 1.36 PP, with the country average being 0.16 PP, noting that (PP means women < men).

- The percentage of the best students in science and mathematics aged 15-16 in science, mathematics, and reading was 29.7% in 2022 among 37 countries, with the country average being 13.7%.
- The percentage of recent university graduates in science, technology, engineering, and mathematics (STEM) fields of total recent graduates in 2021 was 30.2% among 37 countries, with the average being 23.7%.
- Women as a percentage of all individuals aged 16-24 capable of programming was 47.9% in 2023 among 30 countries, with the average being 32.7%.

Conclusion:

Most countries now aim to develop their human capital, especially in this era of transformation and the impact of information and communication technology on economic activity, by providing job opportunities as well as enhancing innovation and renewal rates. This highlights the importance of training and developing human resources to equip entrepreneurs with the necessary knowledge, skills, and experience to foster a spirit of innovation, ensuring the success of projects and their realization in practice. Innovation is considered one of the most important economic strategies that states rely on to drive the economy, as they provide support to innovative entrepreneurs and university graduates to establish their own businesses. This is achieved by implementing a set of policies and programs aimed at improving productivity to exceed population growth rates, as well as developing infrastructure

that facilitates integration into this economy by focusing on its key indicators. Consequently, education at all levels has become one of the most important objectives that every country seeks to elevate to the highest standards. Additionally, opening the field to foreign investments brings substantial modern technologies and paves the way for development, creativity, and innovation. All of this helps in integrating into the competitive environment that all countries experience in order to reach the top global ranks in adopting new modern technologies, keeping up with the progress of civilization, and achieving global leadership.

Methodology

The research adopts a descriptive-analytical approach, combining theoretical exploration with comparative analysis. Data were gathered from international reports, national education strategies, and digital economy frameworks, emphasizing the Korean experience as a case study model. The study examines the interaction between education policy, research and development (R&D), and labor market innovation, highlighting how South Korea's coordinated governance, investment in digital infrastructure, and university-industry collaboration have strengthened its human capital system. The analysis also utilizes historical and institutional perspectives to illustrate how sustained educational reforms can transform human potential into technological and economic value.

Novelty and Contribution

This research contributes to the academic and policy discourse by:

- Providing a systematic framework for linking human capital development to digital transformation policies.
- Presenting the Korean experience as a replicable model for developing economies seeking inclusive and sustainable growth through innovation.
- Identifying key drivers—education quality, R&D investment, and entrepreneurial culture—that enable digital readiness.
- Offering practical recommendations for policymakers on integrating technology-oriented skills into national education and training systems.

Ethical Considerations

This study was conducted in accordance with academic integrity and ethical research principles. All secondary data sources and theoretical models were properly cited and used exclusively for scholarly purposes. No human participants were directly involved, and no confidential or proprietary information was collected.

Acknowledgment

The authors express their gratitude to Mascara University (Algeria) for institutional support and to all researchers whose previous studies on human capital and digital transformation informed this work. Special appreciation is extended to colleagues in the Department of Economics and Management for their constructive feedback.

Funding Statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors declare no conflicts of interest regarding the publication of this study.

References

1. Becker, G. S. (1964). Human capital: A theoretical and empirical analysis, with special reference to education. New York, NY: Columbia University Press.
2. Becker, G. S. (1995). Human capital and poverty alleviation. Washington, DC: World Bank, Human Resources Development and Operations Policy.
3. Bontis, N., & Fitz-Enz, J. (2002). Intellectual capital ROI: A causal map of human capital antecedents and consequents. *Journal of Intellectual Capital*, 3(3), 223–247. <https://doi.org/10.1108/14691930210435589>

4. Dr. Suh, J. (2011). Case study of South Korea's experience in transitioning to a knowledge economy (Presentation summary). Jeddah, Kingdom of Saudi Arabia.
5. Economic and Social Commission for Western Asia (ESCWA). (2022). Digital skills and education in the Arab region. Beirut, Lebanon: United Nations ESCWA.
6. George, Y. (2011). Global experiences in transitioning to a knowledge economy. Economic and Social Commission for Western Asia (ESCWA), United Nations.
7. Hussein, A.-A. (2013). The role of investment in information and communication technology in achieving sustainable development (Master's thesis). University of Constantine, Algeria.
8. Jaafar, H. J. (2008). Introduction to digital economy (1st ed.). Amman, Jordan: Al-Bidaya Publishing.
9. Mincer, J. (1974). Schooling, experience, and earnings. New York, NY: Columbia University Press.
10. Organisation for Economic Co-operation and Development (OECD). (2020). Curriculum reform for 21st century skills. Paris, France: OECD Publishing.
11. Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1-17.
12. Somasundaram, R., Chandra, S., Tamilarasu, J., Kinagi, A. M., & Naveen, S. (2025). Human resource development (HRD) strategies for emerging entrepreneurship: Leveraging UX design for sustainable digital growth. In *Navigating usability and user experience in a multi-platform world* (pp. 221-248). IGI Global. <https://doi.org/10.4018/978-1-6684-9722-5.ch010>
13. Suh, J., & Chen, D. H. (Eds.). (2007). *Korea as a knowledge economy*. Washington, DC: World Bank Group.
14. World Economic Forum. (2023). *The future of jobs report 2023*. Geneva, Switzerland: WEF.