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# Artificial Intelligence in the Scientific and Technological Paradigm of Global Economy

## Sztuczna inteligencja w naukowym i technologicznym paradygmacie gospodarki światowej

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## Abstract
The article examines the impact of artificial intelligence (AI) technologies on global sustainable development. Artificial intelligence affects all three pillars of sustainable development: economic, social, and environmental. Based on the generalization of academic works and authoritative expert assessments, it is shown that this impact is ambiguous. By increasing technological capabilities and enhancing the efficiency of business, public administration, and the provision of administrative and social services, AI creates a number of socio-economic problems, primarily in the labor market, when hundreds of professions are discredited and may disappear. It has been confirmed that almost all sectors of the economy, including education and medicine, are subject to the large-scale impact of AI. AI is able to optimize the use of resources and increase energy efficiency, reducing waste, thus affecting the environmental pillar of sustainable development. The purpose of the article is a systematic study of the intellectual and technological landscape of the global economy with a cross-country analysis of its key indicators using the Kohonen algorithm. The author has positioned artificial intelligence in the technological paradigm of the twenty-first century. If scientific progress in materials science, energy, and mathematical computing led to the digital transformation with the emergence of Industry 4.0, then in synergy with bio- and quantum technologies, AI will form Industry 5.0, i.e., essentially a smart economy, through a technological explosion. To recreate the current global intellectual and technological landscape, the study used the Kohonen algorithm with the Deductor Studio package to analyze 128 countries by 5 indicators. The modeling allowed us to group them into 5 clusters, which makes a real comparative analysis possible. Similar modeling with the implementation of the AI indicator (number of robots per 10,000 population) for 18 countries allowed them to be grouped into 3 clusters according to the level of readiness of governments and society to interact with AI.

**Key words:** digital technologies, quantum technologies, biotechnology, artificial intelligence, Industry 5.0, smart economy, sustainable development

## Streszczenie
W artykule zbadano wpływ technologii sztucznej inteligencji (AI) na globalny zrównoważony rozwój. Sztuczna inteligencja wpływa na wszystkie trzy filary zrównoważonego rozwoju: gospodarczy, społeczny i środowiskowy. Na podstawie uogólnień prac naukowych i miarodajnych ocen ekspertów wykazano, że wpływ ten jest niejednoznaczny. Zwiększając możliwości technologiczne i zwiększając efektywność biznesu, administracji publicznej oraz świadczenia usług administracyjnych i społecznych, sztuczna inteligencja stwarza szereg problemów społeczno-gospodarczych, przede wszystkim na rynku pracy, gdzie setki zawodów ulegają dyskredytacji i mogą zniknąć. Potwierdzono, że niemal wszystkie sektory gospodarki, w tym edukacja i medycyna, podlegają wpływowi sztucznej inteligencji na szeroką skalę. AI jest w stanie zoptymalizować wykorzystanie zasobów i zwiększyć

efektywność energetyczną, redukując odpady, wpływając tym samym na środowiskowy filar zrównoważonego rozwoju. Celem artykułu jest systematyczne badanie krajobrazu intelektualnego i technologicznego gospodarki światowej wraz z przekrojową analizą jej kluczowych wskaźników z wykorzystaniem algorytmu Kohonena. Autor umieścił sztuczną inteligencję w paradygmacie technologicznym XXI wieku. Jeśli postęp naukowy w materiałoznawstwie, energetyce i informatyce matematycznej doprowadził do transformacji cyfrowej wraz z pojawieniem się Przemysłu 4.0, to w synergii z technologiami bio- i kwantowymi sztuczna inteligencja utworzy Przemysł 5.0, tj. zasadniczo inteligentną gospodarkę. Aby odtworzyć obecny globalny krajobraz intelektualny i technologiczny, w badaniu wykorzystano algorytm Kohonena z pakietem Deductor Studio do analizy 128 krajów według 5 wskaźników. Modelowanie pozwoliło na pogrupowanie ich w 5 skupień, co umożliwia realną analizę porównawczą. Podobne modelowanie z wdrożeniem wskaźnika AI (liczba robotów na 10 000 mieszkańców) dla 18 krajów pozwoliło na pogrupowanie ich w 3 klastry według poziomu gotowości rządów i społeczeństwa do interakcji z AI.

**Słowa kluczowe:** technologie cyfrowe, technologie kwantowe, biotechnologia, sztuczna inteligencja, Przemysł 5.0, inteligentna gospodarka, zrównoważony rozwój

## Introduction

Artificial intelligence (AI) is the ability of a machine (computer or robot) to imitate human intellectual activity. It has evolved from a technological phenomenon into a categorical imperative for the development of human civilization. The analysis of recent interdisciplinary research shows the ambiguity of its impact on all spheres of sustainable development.

The impact of artificial intelligence on sustainable development goals was studied by D. Jungwirth and D. Haluza (2023), who concluded that AI can have a positive impact on achieving sustainable development goals in the social aspect, but when studying a possible GPT-3 model, the scientists noted the likelihood of AI providing irrational answers, which is unacceptable for research.

H. Aly's research confirms the positive relationship between digital transformation as one of the aspects of the fourth revolution and AI trends, on the one hand, and economic development, productivity and employment, on the other. Additional research is needed on the impact of digital transformation on vulnerable workers in the economy (Aly, 2022).

The potential of AI for the labor market and economic growth was studied by J. Hatzius, J. Briggs, and others, who raised the issue of AI being able to generate content indistinguishable from human-made content, which will break down communication barriers between humans and machines, with significant macroeconomic implications. Using data on occupational tasks in the United States and Europe, the authors found that approximately two-thirds of current jobs are subject to some degree of automation, and that generative AI could replace up to a quarter of the existing workforce. Extrapolating the authors' estimates to the global level, it can be assumed that generative AI could automate the equivalent of 300 million full-time jobs. A positive effect will be the emergence of new professions (Hatzius, Briggs, Kodnani, Pierdomenico, 2023).

The impact of AI directly on the labor market was studied by A. Zarifhonarvar, who determined the impact of ChatGPT on its dynamics. The study showed that 32.8% of professions may be fully affected by ChatGPT, while 36.5% may be partially affected, and 30.7% are likely to remain unaffected (Zarifhonarvar, 2023).

G.-J. Hwang and S.-Y. Chien investigated the use of AI in the context of the potential of the educational metaspace. In the near future, it will be possible to report on new research related to meta-language education (Hwang, Chien, 2022). The impact of AI on education has been studied by L. Chen, P. Chen, and J. Lin, who emphasize that AI first took the form of computer technology, and then moved to intelligent educational systems based on the Internet and online, and, ultimately, the use of humanoid robots and web chatbots to perform the duties and functions of teachers independently or together with instructors. Using these platforms, teachers have been able to perform various administrative functions, such as checking and grading assignments, which has become more efficient and effective, and has improved the quality of educational services (L.Chen, P. Chen, Lin, 2020).

Researchers F. Federspiel, R. Mitchell, A. Asokan, C. Umana, D. McCoy and others have studied the use of AI in the healthcare system. Despite the obvious benefits, the authors argue that AI can harm human health due to its impact on social determinants: control and manipulation of people, use of lethal autonomous weapons, and impact on work and employment. In addition, the self-improvement of AI can threaten humanity itself, so effective regulation of its development and use is necessary (Federspiel, Mitchell, Asokan, Umana, McCoy, 2023).

There are also the most applied sectoral studies. For example, D. Mhlanda substantiates the potential of AI in the energy sector (turbine maintenance forecasting, energy consumption optimization, network management, energy price forecasting, energy demand assessment, and residential building efficiency), emphasizing that developing countries could take advantage of artificial intelligence and machine learning in the energy sector (Mhlanda, 2023).

Chris Skinner explores the impact of the digital revolution on the relationship between people and business, focusing on the growth of fundamental innovations in emerging markets (Skinner, 2018). Marc Goodman draws

attention to the downside of the latest technological innovations, explores the nature and methods of cybercrime by individuals, criminal corporations, terrorist organizations and countries (Goodman, 2015).
Among Ukrainian scholars, it is worth noting the monographic study by L. Antoniuk, D. Ilnytskyi, and A. Sevastiuk, which analyzes the digital economy in line with the latest technological trends and criteria for global competitiveness (Antoniuk et al., 2021). In the scientific works of A. Kolot and M. Gerasymenko (2023), the problems of digitalization and artificial intelligence are studied in the context of the ecosystem of human resources at the micro, macro, and global levels with a justification of the imperative of human development (Kolot et al., 2023, Kolot, 2024, Nyameshchuk, 2021, Simakhova, 2022). A team of authors under the scientific guidance of A. Shevchenko developed a strategy for the development of artificial intelligence in Ukraine (Schevchenko et al., 2023).
The scientific work of Kogut et al (2019) assesses the opportunities and risks of using new digital technologies in business in the context of organizing an effective cybersecurity system at the instrumental level.
It is noteworthy that despite unprecedented political instability, the topic of artificial intelligence, its development and ambiguous impact on the global economy and society became central to the World Economic Forum in Davos in 2024 (Pylypiv, 2024).
AI has a significant impact on sustainable development, which can be viewed from the perspective of sustainable development pillars:

1. Economic pillar is about increasing of production efficiency and labor productivity, optimization of production processes. The development of AI contributes to the creation of new industries and jobs related to the development, maintenance, and improvement of AI systems.
2. Social pillar. Promoting social sustainability and improving the welfare of the population by improving access to education and healthcare, as well as quality social services. AI can develop solutions that improve the quality of life of people with disabilities, for example, through the development of adaptive interfaces and assistive technologies, which has an impact on the development of an inclusive economy. Development of smart cities
3. Environmental pillar is about optimization of resource use, waste reduction, and energy saving (using smart grids). AI can manage waste, facilitate its more efficient sorting and recycling, as well as monitor the environment, predict natural disasters, and develop strategies to minimize their negative impact and promote the development of smart transportation.

The aim of the article is a systematic study of the intellectual and technological landscape of the global economy in the context of sustainable development with a cross-country analysis of its key indicators using the Kohonen algorithm.
To achieve this goal, the authors used general scientific methods of data synthesis and analysis, systematization, and Kohonen maps to group countries by their intellectual and technological potential.

**Results**

In line with modern scientific, technological and economic progress, the key role belongs to Industries 4.0 and 5.0 (Figure 1).
Until recently (Industry 4.0), it was about the dominance of breakthrough, mainly exponential technologies, mobile broadband Internet, additive and digital technologies, cloud computing, etc.
The combination of quantum technologies, biotechnology, and artificial intelligence with their critical scaling (Industry 5.0) will lead to a technological explosion in an already digitalized society.
And while climate tsunamis look predictable and localized compared to digital ones, what will happen after digitalization is a question similar to the question *Is there life after death* (Indset, 2021). Yuval Noah Harari suggests that we are probably one of the last generations of Homo sapiens in the context of bioengineering, the combination of organic and inorganic, and especially the creation of completely inorganic life forms (BBC, 2016).
Less categorical and pessimistic in their judgments, Ukrainian scientists do not exclude that the artificially intelligent technos will progress, separate from the natural, God-given basis of life, while noting that it cannot be stopped, banned, etc.
In this context, attention should be focused on the underestimation of the *destructive power* of existing artificial intelligence technologies, as was the case during all scientific and technological revolutions, with humanity's desire to postpone existing and new problems and the hope that artificial intelligence will not be able to replace the human brain in everything – experience, emotions, intuition, imagination. In general, according to Anatolii Kolot, it is a matter of conscious simplification, when a person cannot understand the world as it is (Kolot, 2024, p. 29). It is clear that systematic predictive assessments of the expansion of artificial intelligence are and will remain the domain of intellectuals and top experts. At the same time, there is currently a sufficient understanding of transformational changes with regard to its impact on the labor market and employment in the professional environment.

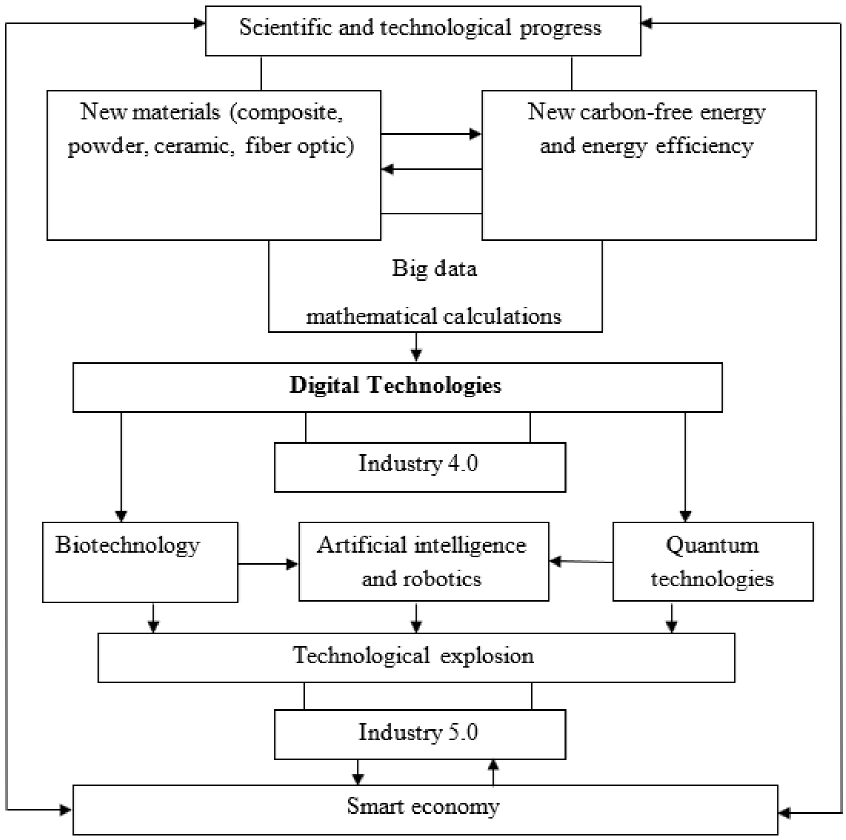


Figure 1. Artificial intelligence in the technological paradigm of the twenty-first century, source: authors' own work

For example, sociological studies by Ukrainian scientists have shown the following: among the studied categories of employees (academia, civil service, business, public sector), the benefits and negatives of digitalization, including AI technologies, are quite balanced at the level of *medium* impact (2-3 points out of 6). The greatest risks (6 points out of 6) are associated with the threat of job loss, which is neutralized by high expectations of new employment opportunities (5 points out of 6) (Antoniuk et al., 2021, p. 144).
At the same time, the results of grouping the latest technologies by the level of interest in their future use demonstrated the obvious leadership of smart cities, solutions using 5G communications, augmented and virtual reality, digital health, artificial intelligence and machine learning (Antoniuk et al., 2021, p. 160).
In our opinion, the emergence or creation of smart economy enclaves is already becoming a key trend in the structural transformation of the global economy. Today, we are talking about smart enterprises (smart manufacturing, smart things, smart marketing) that will form smart supply and smart demand (consumption) in the market, local smart cities and communities.
AI has the potential to positively influence the achievement of all 17 Sustainable Development Goals (SDGs) set by the UN (2024). In our opinion, AI has the most significant positive impact on the following SDGs:

- goal 3 (good health and well-being). AI can improve healthcare services through telemedicine, AI-based diagnostic tools, disease outbreak forecasting, and personalized medicine;
- goal 4 (quality education). AI can provide access to personalized learning, create adaptive learning platforms, support distance learning, and analyze student progress to provide individualized recommendations;
- goal 6 (clean water and sanitation). AI can be used to monitor and manage water resources, detect leaks in water supply systems, forecast water demand, and optimize water use in agriculture and industry;
- goal 7 (affordable and clean energy). AI promotes the development of renewable energy sources, optimizing energy consumption and increasing the efficiency of energy systems and reducing energy costs;
- goal 9 (industry, innovation and infrastructure). AI stimulates innovation, can be used to manage infrastructure, increase the efficiency of production processes and promote the development of new technologies;
- goal 11 (sustainable cities and communities). AI is used in urban transport management, environmental monitoring systems, waste management, and urban security; it creates smart cities;
- goal 15 (life on land). AI helps to monitor forests, fight poaching, preserve biodiversity, and manage natural resources.

AI development can pose challenges for sustainable development. For example, high energy costs for training AI models can increase the carbon footprint. There is also a risk of uneven distribution of benefits from AI, which could increase social inequality.

At the same time, it is important to study the intellectual and technological landscape of the global economy, for which the Kohonen network was used (Kohonen, 2001). The Kohonen network consists of nodes (neurons) organized in a two-dimensional grid. Each node is represented by a vector with weights, the number of which corresponds to the number of indicators that characterize the objects under study. During training, these weights are adapted so that the network can effectively reflect the structure of the input data (the objects under study are grouped into clusters according to their similarity to each other). After training, the network can be used to cluster new data, placing it in the appropriate clusters according to its similarity.

Kohonen networks are widely used for data analysis, visualization and clustering, as well as for pattern recognition and data management tasks. The methodology for building Kohonen maps is described in detail in the author's previous studies (Lukianenko, Matviychuk, Lukianenko, Dvornyk, 2023, Lukianenko, Strelchenko, 2021).

The Deductor Studio package was used to conduct a study of the global intellectual and technological landscape of the world's countries based on the Kohanen algorithm.

To build the Kohanen map, 128 countries were analyzed according to 5 indicators of the intellectual and technological landscape: Individuals using the Internet % of population (2021), High-technology exports (% of manufactured exports) (2022), Global Innovation Index 2023, Government AI Readiness Index 2023, Network Readiness Index, 2023 according to the latest publicly available data (Appendix 1).

As a result of the modeling, the countries were grouped into 5 clusters. Heat maps for all indicators are shown in Figure 2.

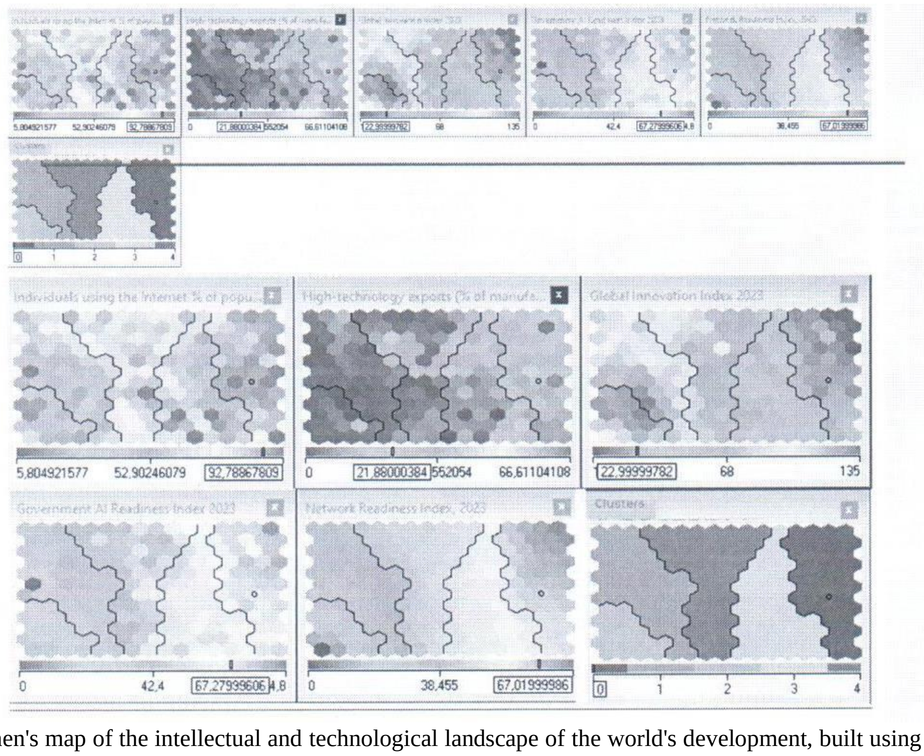


Figure 2. Kohonen's map of the intellectual and technological landscape of the world's development, built using the Deductor package Studio, source: authors` calculation

The specificity of the Kohonen neural network is that, as a result of its self-organization, the most and least efficient research objects according to the analyzed indicator are located in opposite corners of the map. As can be seen from the grouping of countries in Table 1, cluster 2 and cluster 0, as those located in opposite corners, are characterized by the lowest and highest levels of intellectual and technological potential.

To analyze the leading countries in terms of AI adoption, Kohonen maps were built based on 8 main indicators of the intellectual and technological landscape of individual countries from the report The AI Index Report Measuring trends in AI (Stanford University, 2023), which are shown in Table 2.

Table 1. Results of building the intellectual and technological landscape of the world's development, source: authors`calculation

| Clusters | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Countries | Australia, Austria, Belgium, Canada, China, Czechia, Denmark, Estonia, Finland, France, Germany, Hong Kong SAR, China, Iceland, Ireland, Israel, Italy, Japan, Kiribati, Korea, Rep., Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, United Arab Emirates, United Kingdom, United States | Benin, Bolivia, Bosnia and Herzegovina, Botswana, Cabo Verde, Cameroon, Cote d`Ivoire, El Salvador, Gambia, Guatemala, Guinea-Bissau, Honduras, Kyrgyz Republic, Lao PDR, Malawi, Namibia, Nepal, Nicaragua, Nigeria, Rwanda, Senegal, Tanzania, Uganda, Zambia, Zimbabwe | Angola, Brunei, Darussalam, Burkina Faso, Burundi, Congo, Dem. Rep., Eswatini, Ethiopia, Lesotho, Madagascar, Mali, Mauritania, Mozambique, Togo | Bahrain, Brazil, Bulgaria, Chile, Costa Rica, Croatia, Cyprus, Greece, Hungary, Kazakhstan, Latvia, Lithuania, Malaysia, Oman, Poland, Qatar, Romania, Saudi Arabia, Serbia, Slovak Republic, Thailand, Turkiye, Ukraine, Uruguay, Vietnam | Albania, Argentina, Armenia, Azerbaijan, Colombia, Dominican Republic, Ecuador, Egypt, Georgia, India, Indonesia, Iran, Jamaica, Jordan, Kenya, Kuwait, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, North Macedonia, Pakistan, Panama, Paraguay, Peru, Philippines, Sri Lanka, Tunisia, Uzbekistan |
| Level of intellectual and technological potential | High | Low | Low | Medium | Medium |

Table 2. Indicators of the intellectual and technological landscape of individual countries by AI implementation, source: Stanford University, 2023, Oxford insights, 2023, World bank, 2022, World bank, 2023, Portulans Institute, 2023, UNDP, 2021, CISCO, 2023, IMD, 2023

| **Countries** | **Robots per 10000 population** | **Government AI Readiness Index** | **Network Readiness Index** | **Digital Readiness Index Score** | **Global Knowledge Index** | **World Digital Competitiveness Index** | **Research and development expenditure, % of GDP** | **Individuals using the Internet % of population** |
|---|---|---|---|---|---|---|---|---|
| China | 1,90 | 70,94 | 67,31 | 55 | 57,4 | 84,41 | 2,43 | 76 |
| Japan | 3,80 | 75,08 | 71,06 | 18 | 66,2 | 75,43 | 3,3 | 83 |
| United States | 1,05 | 84,8 | 76,91 | 2 | 71,1 | 100 | 3,46 | 92 |
| Rep. of Korea | 6,00 | 75,65 | 74,48 | 7 | 64,4 | 94,8 | 4,93 | 97 |
| Germany | 2,80 | 75,26 | 74 | 19 | 66,2 | 80,86 | 3,14 | 92 |
| Italy | 2,40 | 67,63 | 62,2 | 37 | 56,6 | 64,39 | 1,45 | 85 |
| France | 0,86 | 76,07 | 70,17 | 25 | 64 | 78,65 | 2,22 | 85 |
| Mexico | 0,40 | 50,37 | 45,59 | 71 | 47,5 | 51,26 | 0,3 | 76 |
| India | 0,03 | 62,58 | 49,93 | 104 | 44,4 | 57,74 | 0,65 | 46 |
| Canada | 1,08 | 77,07 | 71,99 | 17 | 61,1 | 91,98 | 1,7 | 93 |
| Thailand | 0,56 | 63,03 | 55,73 | 51 | 48,3 | 70,53 | 1,33 | 88 |
| Singapore | 6,10 | 81,97 | 76,81 | 1 | 69,2 | 97,4 | 2,16 | 96 |
| Spain | 0,72 | 67,47 | 64,77 | 23 | 57,9 | 76,62 | 1,43 | 94 |
| Poland | 0,88 | 63,1 | 60,2 | 33 | 54,3 | 66,53 | 1,44 | 87 |
| United Kingdom | 3,41 | 78,57 | 72,75 | 10 | 68,1 | 83,12 | 2,91 | 97 |
| Finland | 0,37 | 77,37 | 76,19 | 15 | 70,8 | 94,05 | 2,99 | 93 |
| Netherlands | 0,24 | 74,47 | 76,04 | 12 | 69,7 | 98,1 | 2,31 | 93 |
| Israel | 1,07 | 65,46 | 71,82 | 20 | 63,7 | 87,7 | 5,56 | 90 |
| Denmark | 0,1 | 73,91 | 74,06 | 6 | 68,3 | 96,93 | 2,81 | 98 |

As a result of the modeling, heat maps were obtained for all indicators, and the countries were grouped into 3 clusters (see Figure 3).

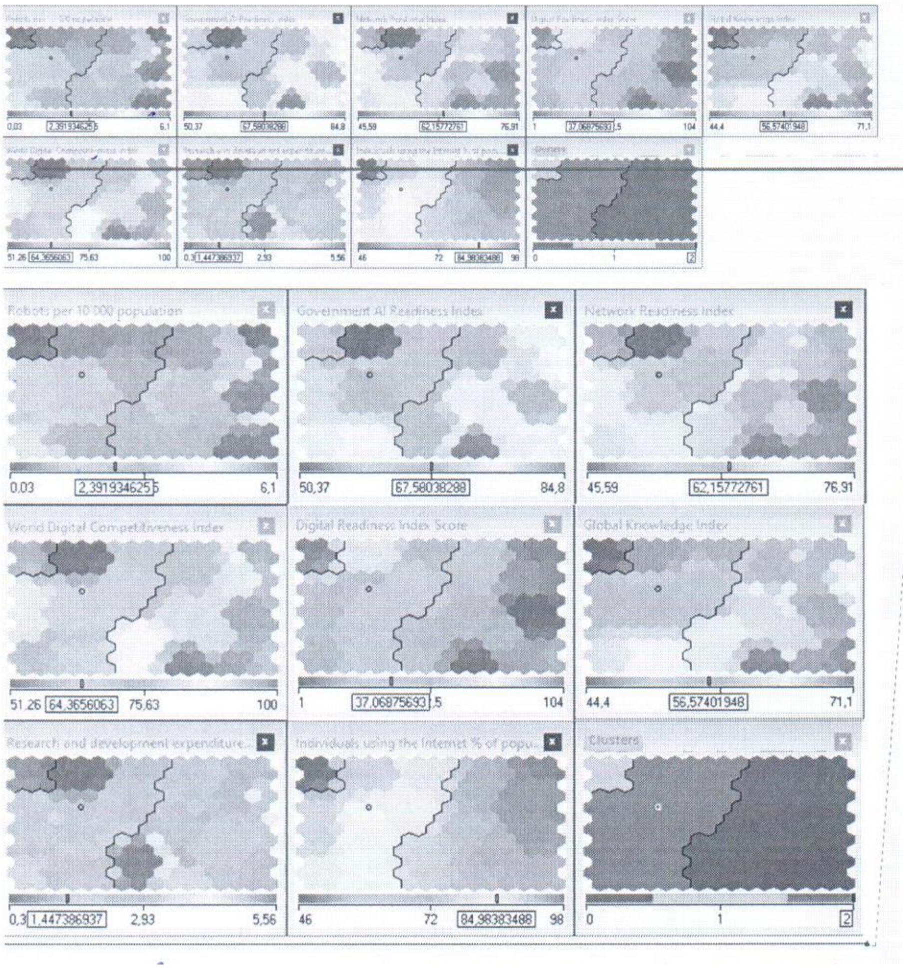


Figure 3. Kohonen map of the intellectual and technological landscape of the leading countries in AI development, built using the Deductor package Studio, source: authors` calculation.

Cluster 0 includes the United States, the Republic of Korea, Germany, Singapore, Canada, the Netherlands, the United Kingdom, Spain, Israel, Finland, and Denmark. These countries demonstrate the highest readiness of both the government and society to coexist, work, and interact with AI. At the opposite end is cluster 1, which includes only one country - India. This indicates that despite the active development of AI technologies, India lags behind highly developed countries in other indicators, such as the creation of appropriate infrastructure and access to high-quality Internet. Cluster 2 united China, Japan, Italy, France, Mexico, Thailand, and Poland. These countries lag behind Cluster 0 in terms of the number of robots per 10,000 people (less than 3.8) and the average government readiness to introduce AI (50-75).

## Conclusions

In the global development paradigm, the use of AI has both positive and negative aspects. AI will lead to transformations in the global labor market. The emergence or creation of smart economy enclaves is already becoming a key trend in the structural transformation of the global economy. This applies to smart businesses (smart manufacturing, smart things, smart marketing) that use AI and will form smart supply and smart demand (consumption) in the market, local smart cities and communities.

AI can be a powerful tool for achieving sustainable development goals, but its implementation must take into account environmental, economic, and social aspects to ensure a positive and equitable impact on countries around the world.

Kohonen's maps for 128 countries based on 5 indicators allowed us to analyze the intellectual and technological landscape of the global economy. Countries are grouped into 5 clusters according to their intellectual and technological potential (low, medium, high potential). To analyze the leading countries in terms of AI adoption, Kohonen maps were built based on 8 intellectual and technological indicators, which grouped countries into 3 groups in terms of the readiness of governments, society, and the economy for AI. The study is the basis for further recommendations on the policies of countries to introduce AI in all spheres of life.

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**Appendix**

Appendix 1. Indicators of the intellectual and technological landscape of the world's development, Source: WIPO, 2023, Oxford insights, 2023,World bank, 2022, World bank, 2023, Portulans Institute, 2023

| **Countries** | **Individuals using the Internet % of population** | **High-technology exports (% of manufactured exports)** | **Global Innovation Index** | **Government AI Readiness Index** | **Network Readiness Index** |
|---|---|---|---|---|---|
| Albania | 79,32 | 0,06 | 83,00 | 43,26 | 44,98 |
| Angola | 32,60 | 22,06 | 132,00 | 29,14 | 27,20 |
| Argentina | 87,15 | 4,75 | 73,00 | 57,72 | 49,78 |
| Armenia | 78,61 | 21,41 | 72,00 | 45,22 | 49,36 |
| Australia | 96,24 | 25,61 | 24,00 | 73,89 | 70,36 |
| Austria | 92,53 | 16,50 | 18,00 | 72,37 | 69,13 |
| Azerbaijan | 86,00 | 3,90 | 89,00 | 48,15 | 45,57 |
| Bahrain | 100,00 | 0,54 | 67,00 | 56,13 | 52,48 |
| Belgium | 92,79 | 21,88 | 23,00 | 67,28 | 67,02 |
| Benin | 33,97 | 4,28 | 120,00 | 41,37 | 33,87 |
| Bolivia | 65,98 | 5,52 | 97,00 | 35,25 | 39,35 |
| Bosnia and Herzegovina | 75,68 | 5,16 | 77,00 | 36,49 | 40,06 |
| Botswana | 73,50 | 0,50 | 85,00 | 38,84 | 34,38 |
| Brazil | 80,69 | 9,05 | 49,00 | 63,70 | 54,67 |
| Brunei Darussalam | 98,08 | 1,04 | 87,00 | 48,10 | |
| Bulgaria | 75,27 | 8,57 | 38,00 | 58,64 | 52,18 |
| Burkina Faso | 21,58 | 1,46 | 124,00 | 27,50 | 26,63 |
| Burundi | 5,80 | 1,11 | 130,00 | 20,87 | 20,62 |
| Cabo Verde | 69,76 | 0,24 | 91,00 | 36,30 | 39,70 |
| Cameroon | 45,60 | 2,15 | 123,00 | 30,27 | 31,09 |
| Canada | 92,83 | 13,67 | 15,00 | 77,07 | 71,99 |
| Chile | 90,19 | 6,52 | 52,00 | 61,95 | 53,18 |
| China | 73,05 | 23,12 | 12,00 | 70,94 | 67,31 |
| Colombia | 73,03 | 8,38 | 66,00 | 57,85 | 48,28 |
| Congo, Dem. Rep. | 22,90 | 0,72 | | 24,19 | 21,09 |
| Costa Rica | 82,75 | 20,43 | 74,00 | 49,12 | 50,90 |
| Cote d`Ivoire | 45,43 | 3,56 | 112,00 | 32,78 | 37,89 |
| Croatia | 81,25 | 11,98 | 44,00 | 49,34 | 52,75 |
| Cyprus | 90,76 | 17,59 | 28,00 | 60,84 | 58,43 |
| Czechia | 82,67 | 21,21 | 31,00 | 65,17 | 63,20 |
| Denmark | 98,87 | 15,81 | 9,00 | 73,91 | 74,06 |
| Dominican Republic | 85,24 | 6,02 | 94,00 | 50,71 | 43,49 |
| Ecuador | 76,20 | 6,71 | 104,00 | 40,84 | 43,05 |
| Egypt, Arab Rep. | 72,06 | 3,17 | 86,00 | 52,69 | 44,07 |
| El Salvador | 62,88 | 7,85 | 95,00 | 32,58 | 38,07 |
| Estonia | 90,98 | 17,68 | 16,00 | 70,86 | 66,11 |
| Eswatini | 58,91 | 0,33 | | 27,05 | 27,50 |
| Ethiopia | 16,70 | 3,21 | 125,00 | 32,59 | 27,36 |
| Finland | 92,81 | 8,13 | 6,00 | 77,37 | 76,19 |
| France | 86,10 | 20,76 | 11,00 | 76,07 | 70,17 |
| Gambia, The | 32,96 | 0,00 | | 30,25 | 29,76 |
| Georgia | 76,44 | 3,11 | 65,00 | 41,27 | 45,25 |
| Germany | 91,43 | 15,99 | 8,00 | 75,26 | 74,00 |
| Greece | 78,49 | 14,26 | 42,00 | 57,95 | 53,02 |
| Guatemala | 50,84 | 4,95 | 122,00 | 35,76 | 35,84 |
| Guinea-Bissau | 35,15 | 0,12 | 128,00 | 24,11 | 28,77 |
| Honduras | 48,08 | 1,45 | 116,00 | 32,63 | 35,70 |
| Hong Kong SAR, China | 93,09 | 34,82 | 17,00 | | 65,01 |
| Hungary | 88,64 | 17,72 | 35,00 | 60,66 | 58,21 |
| Iceland | 99,69 | 33,28 | 20,00 | 69,59 | 65,70 |
| India | 46,31 | 12,48 | 40,00 | 62,58 | 49,93 |
| Indonesia | 62,10 | 7,94 | 61,00 | 61,03 | 50,26 |

| | | | | | |
|---|---|---|---|---|---|
| Iran, Islamic Rep. | 78,60 | 0,38 | 62,00 | 42,07 | 42,83 |
| Ireland | 95,17 | 40,67 | 22,00 | 69,82 | 67,51 |
| Israel | 90,30 | 21,83 | 14,00 | 65,46 | 71,82 |
| Italy | 74,86 | 8,77 | 26,00 | 67,63 | 62,20 |
| Jamaica | 82,36 | 1,47 | 78,00 | 41,32 | 46,11 |
| Japan | 82,91 | 13,37 | 13,00 | 75,08 | 71,06 |
| Jordan | 86,00 | 1,45 | 71,00 | 56,85 | 47,29 |
| Kazakhstan | 90,92 | 32,16 | 81,00 | 48,56 | 50,97 |
| Kenya | 28,76 | 2,32 | 100,00 | 40,19 | 46,86 |
| Kiribati | 53,63 | 2,30 | | 27,40 | 74,48 |
| Korea, Rep. | 97,57 | 16,94 | 10,00 | 75,65 | 74,48 |
| Kuwait | 99,70 | 0,72 | 64,00 | 49,86 | 48,36 |
| Kyrgyz Republic | 77,92 | 10,50 | 106,00 | 34,10 | 39,80 |
| Lao PDR | 62,00 | 7,28 | 110,00 | 33,05 | 34,72 |
| Latvia | 91,18 | 16,39 | 37,00 | 60,30 | 57,77 |
| Lebanon | 86,59 | 15,13 | 92,00 | 47,62 | 39,70 |
| Lesotho | 47,98 | 0,09 | | 26,21 | 26,74 |
| Lithuania | 86,93 | 12,82 | 34,00 | 63,33 | 60,41 |
| Luxembourg | 98,66 | 5,87 | 21,00 | 69,41 | 67,84 |
| Madagascar | 19,73 | 0,66 | 107,00 | 28,47 | 27,64 |
| Malawi | 24,41 | 2,31 | | 24,87 | 29,39 |
| Malaysia | 96,75 | 28,20 | 36,00 | 68,71 | 56,72 |
| Mali | 34,49 | | 129,00 | 27,45 | 28,27 |
| Malta | 87,47 | 7,92 | 25,00 | 63,64 | 61,94 |
| Mauritania | 58,76 | 3,98 | 127,00 | 27,09 | 23,73 |
| Mauritius | 67,58 | 2,05 | 57,00 | 53,27 | 45,56 |
| Mexico | 75,63 | 19,35 | 58,00 | 50,37 | 49,59 |
| Moldova | 61,29 | 2,14 | 60,00 | 42,87 | 47,69 |
| Mongolia | 81,61 | 30,80 | 68,00 | 38,99 | 43,52 |
| Montenegro | 82,22 | 8,21 | 75,00 | 47,15 | 48,14 |
| Morocco | 88,13 | 4,10 | 70,00 | 43,34 | 45,43 |
| Mozambique | 17,37 | 3,37 | 126,00 | 25,62 | 25,07 |
| Namibia | 52,97 | 0,06 | 96,00 | 35,37 | 33,87 |
| Nepal | 51,63 | 0,54 | 108,00 | 30,77 | 33,73 |
| Netherlands | 92,05 | 20,55 | 7,00 | 74,47 | 76,04 |
| New Zealand | 95,91 | 11,96 | 27,00 | 60,18 | 65,96 |
| Nicaragua | 57,15 | 1,26 | 115,00 | 29,77 | 33,32 |
| Nigeria | 55,36 | 2,38 | 109,00 | 39,88 | 35,73 |
| North Macedonia | 83,02 | 3,99 | 54,00 | 45,40 | 46,26 |
| Norway | 99,00 | 23,61 | 19,00 | 72,71 | 69,70 |
| Oman | 96,38 | 7,62 | 69,00 | 58,94 | 52,10 |
| Pakistan | 21,04 | 1,43 | 88,00 | 42,20 | 41,26 |
| Panama | 67,51 | 0,23 | 84,00 | 43,91 | 43,03 |
| Paraguay | 77,02 | 10,56 | 98,00 | 36,85 | 41,91 |
| Peru | 71,11 | 4,58 | 76,00 | 54,87 | 45,89 |
| Philippines | 52,68 | 66,61 | 56,00 | 51,98 | 47,24 |
| Poland | 85,37 | 10,77 | 41,00 | 63,10 | 60,20 |
| Portugal | 82,31 | 6,15 | 30,00 | 68,28 | 63,08 |
| Qatar | 100,00 | 2,85 | 50,00 | 63,59 | 54,15 |
| Romania | 83,59 | 11,61 | 47,00 | 52,32 | 52,41 |
| Rwanda | 30,46 | 4,78 | 103,00 | 45,39 | 38,26 |
| Saudi Arabia | 100,00 | 0,31 | 48,00 | 67,04 | 56,14 |
| Senegal | 58,05 | 2,30 | 93,00 | 42,58 | 37,66 |
| Serbia | 81,17 | | 53,00 | 55,57 | 51,68 |
| Singapore | 96,92 | 25,01 | 5,00 | 81,97 | 76,81 |
| Slovak Republic | 88,93 | 8,39 | 45,00 | 60,30 | 57,08 |
| Slovenia | 89,00 | 8,47 | 33,00 | 62,63 | 62,57 |
| Spain | 93,90 | 12,41 | 29,00 | 67,47 | 64,77 |
| Sri Lanka | 44,45 | 1,09 | 90,00 | 41,89 | 44,14 |
| Sweden | 94,67 | 16,83 | 2,00 | 72,55 | 75,68 |
| Switzerland | 95,57 | 28,84 | 1,00 | 68,57 | 74,76 |
| Tanzania | 31,63 | 1,66 | 113,00 | 32,86 | 36,31 |
| Thailand | 85,27 | 21,79 | 43,00 | 63,03 | 55,73 |
| Togo | 34,98 | 0,30 | 114,00 | 29,69 | 0,00 |

| | | | | | |
|---|---|---|---|---|---|
| Tunisia | 78,99 | 7,19 | 79,00 | 46,07 | 42,25 |
| Turkiye | 81,41 | 3,62 | 39,00 | 60,51 | 53,22 |
| Uganda | 10,34 | 2,35 | 121,00 | 0,00 | 31,33 |
| Ukraine | 79,22 | 5,74 | 55,00 | 53,29 | 55,16 |
| United Arab Emirates | 100,00 | 9,29 | 32,00 | 70,42 | 62,43 |
| United Kingdom | 96,68 | 26,52 | 4,00 | 78,57 | 72,75 |
| United States | 91,75 | 17,85 | 3,00 | 84,80 | 76,91 |
| Uruguay | 90,07 | 9,59 | 63,00 | 60,57 | 54,50 |
| Uzbekistan | 76,59 | 1,41 | 82,00 | 43,79 | 43,94 |
| Viet Nam | 74,21 | 38,63 | 46,00 | 54,48 | 51,19 |
| Zambia | 21,23 | 0,76 | 118,00 | 32,36 | 32,11 |
| Zimbabwe | 34,81 | 1,48 | 117,00 | 30,71 | 30,05 |