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# THIS DIGITAL WORLD

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## THE AI-ECOSYSTEM OF THE BRICS COUNTRIES: CHALLENGES AND OPPORTUNITIES FOR CREATION

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*The article is devoted to the problem of the development of the artificial intelligence (AI) in BRICS countries. Basing on the analyses of the level of technological development in different BRICS countries, the author comes to a conclusion that there are still many challenges on the way to the development of AI in those countries, the main one being directly linked to the possibility of conducting research and developing AI-technologies with the overall socio-economic level in the country. This means that if the BRICS countries want to achieve technological leadership, they should think about joining their efforts and creating a common AI-ecosystem, which the author proposes to understand as establishing common standards and a regulatory framework in the field of AI throughout the BRICS space and conducting comprehensive and large-scale joint scientific research. Thus an assessment of the prospects for the formation of such an ecosystem throughout the BRICS space has been undertaken in this article.*

**Keywords:** BRICS, artificial intelligence, information technologies, AI-ecosystem, technological leadership.

### **Artificial Intelligence: New Opportunities or New Challenges**

Despite the fact that artificial intelligence (AI) has a long history that goes back to the end of the 1940s (Grinin L., Grinin A., and Grinin I. *et al.* 2024), only recent great successes in this field (Grinin L., Grinin A., and Korotayev 2024: 435) caused its deep penetration into peoples' daily lives. All these achievements are mainly related to the development of two areas – computer vision and natural language processing.

In the field of computer vision, since the early 2010s, there have been undertaken a lot of efforts in order to try to find the architecture of a neural network that would be able to distinguish images with almost no errors. However, for a long time they will hardly be able to find a solution to this problem. The appearance of the AlexNet neural network called in 2012 was a breakthrough in computer vision as this network solved a complex classification task that required classifying 1 million images belonging to 1,000 classes with only 16.4 % error. In the following years, other neural networks appeared that showed even better results. And finally, in 2015, the ResNet network there was

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released with an error rate of 3.6 % when solving the same classification task. Thus, for the first time, neural networks outperformed the human brain, whose error rate is around 5 % (Kang *et al.* 2020: 151).

In parallel, there have been carried out researches in the field of natural language processing that were aimed at making machines better understand context.

The breakthrough successes in both fields have significantly increased the AI capabilities and enabled the creation of bots that can draw pictures, generate stories, and communicate with people. Finally, all those technological innovations brought to a life large language models (LLMs), which nowadays are producing amazing results and are improving so their ability to understand various nuances of speech and give more accurate responses to users' prompts.

Such breakthrough technological innovations have caused the emergence of forecasts that in nearest future (within 5–15 years) LLMs (*e.g.*, GPT) will begin to actively replace humans in intellectual work, in particular in writing text in various areas (Grinin *et al.* 2023: 11). Even now, AI-technologies have become indispensable assistants when solving a wide range of tasks, from machine translation to medical diagnostics, and there is an explosive growth in the number of companies starting to use AI-technologies in their business processes. Governmental agencies also begin to implement these technologies in their activities in order to improve administrative effectiveness and efficiency.

Thus, AI is now becoming the basic technology used in all sectors of the economy, and it is the main driving force for the global economy that helps solve a wide range of economic and industrial tasks. That is why many countries pay increasing attention to the development of AI in their national policies.

Russian President Vladimir Putin regularly highlights the necessity of the development of breakthrough technologies. For example, back in 2017 when delivering a speech in Yaroslavl he pointed out that AI is the future not only for Russia, but for the entire world. And whoever becomes a leader in this field will rule the world (Metzel 2017).

This approach can be explained by the fact that effective management of a large company, region, or entire state requires the use of large amounts of data. First of all, this means that decision-making is largely based on experience and qualitative processing of structured data and their deep analysis. And AI-technologies can provide such data processing.

However, at the same time, it is necessary to keep in mind that, besides their huge capabilities, all technological innovations which should simplify our lives carry with them difficult-to-predict risks and threats, and can be used for malicious purposes in order to get something valuable from individuals or, which is much worse, to damage the critical infrastructure of a country.

This is the main challenge of the digital age. All advanced technologies that have been released in recent years are supposed to make our lives easier, but the lack of effective control mechanisms and proper regulatory frameworks dramatically increases the risk of malicious use of these technologies.

We suggest dividing all risks related to the use of AI into two categories. The first category should include various types of errors, both occurring at the stage of setting the machine learning (ML) task, and the training process itself (*e.g.*, incorrect selection of

hyperparameters) and interpretation of the algorithm results. The second group should include the deliberate actions by malicious users.

The risks of the first category, in their turn, can also be divided into the following two groups:

1. Mistakes of the AI. Taking into account the fact that AI represents technology capable of simulating the cognitive function of humans, it can be assumed that it can make mistakes, like humans. And one cannot find an artificial neural network that would process the input data with 100 % accuracy. The only thing that the developers can do is to try to minimize network errors. That means we should not rely too much on AI's capabilities and simply trust it in making important decisions. We should consider it only as an assistant or advisor for decision-making process, but not a decision-maker itself.

2. Bad formulation of ML-tasks, poor quality of data on which corresponding algorithms are trained, errors made by operators when interpreting results of functioning of a particular hybrid intelligent system. Risks of this kind are primarily related to the fact that AI technologies require proper fine tuning, correct formulation of the ML-task, and completeness of data used to train algorithms. Only then it is possible to ensure their correct operation.

Risks related to malicious use of AI can be divided into the following categories:

1. Attacks on critical infrastructure of a country. Taking into account that almost all spheres of human activity today are computerized, and AI is deeply integrated into people's daily lives, it seems obvious that in the foreseeable future there will be observed a rapid growth in the number of cyber-attacks on critical infrastructure objects using AI, which gives an opportunity to bypass almost any cyber defense.

2. The malicious use of the generative AI, which is able to create highly realistic fake videos and audio (deepfakes), generate text, and communicate with people. Chinese company Tencent Cloud, for example, has developed a special platform called Deepfakes-as-a-Service (DFaaS) that can help create deepfakes by creating a digital clone of a person in 24 hours. And it needs only 3-minute videos, 100 sentences of speech, and costs only \$145 (Dobberstein 2023)!

The low cost and accessibility of this technology for a wide range of people opens up the opportunity for an active use of deepfakes in pursuit of different political goals. As an example we would like to show the recent presidential elections in Indonesia that were held in February 2024. Just before the elections, there appeared videos of outgoing President Joko Widodo speaking in Mandarin, and the presidential candidates Prabowo Subianto and Anis Baswedan delivering their speeches in Arabic (The Conversation Weekly podcast... 2024).

After the emergence of these videos, discussions began in Indonesia about the legality of using AI during election campaigns. And despite the fact that all the cases shown above are not examples of real malicious use of AI, they demonstrate the potential for manipulation and, on the one hand, enable candidates to target specific groups of voters and speak their language, and on the other hand, open up a wide opportunity for manipulating political agendas.

This means that it is necessary to carefully study the possible malicious use of AI-technologies before their large-scale implementation in peoples' daily life and the elaboration of effective regulatory frameworks. This is a complicated process that requires

the cooperation of all stakeholders – AI-developers, potential consumers of AI-based technological solutions, scientific organizations, regulatory bodies, governments, and civil society. This collaboration can become the basis for both the wider implementation of AI technologies and development of standards and control mechanisms for a safe use of AI.

### **AI-technologies in the BRICS Countries**

The BRICS countries consider the development of AI-technologies as one of the key priority in their national policies. However, it is premature to speak about the close creation of a common AI-ecosystem within the BRICS space, as each member-state has actually separate ICT markets with different approaches to legislative control, market openness to investors, and sectoral distribution of investment volumes. This should be taken into account, along with the different levels of technological development among the BRICS countries.

Thus, China, for example, according to the World Ranking for AI development, ranks 2<sup>nd</sup>, India – 14<sup>th</sup>, Russia – 30<sup>th</sup>, Brazil – 35<sup>th</sup>, South Africa – 54<sup>th</sup> (Pitukhina *et al.* 2024: 122). The UAE also occupies one of the leading positions in the world ranking in terms of the level of AI-technology development. Thus, according to the ranking that evaluates the most significant machine learning (ML) models which is issued by Stanford University, China is second, the UAE is ninth, and Egypt closes the top 10 countries (The AI Index 2024 Annual Report: 47). This last point gives us an opportunity to conclude that Egypt also pays increased attention to AI development. Ethiopia, on the other hand, occupies the bottom position in such world rankings not only among the BRICS countries, but also among all African states, being ahead of only the Democratic Republic of Congo and Botswana (Teleanu and Kurbalija 2022).

However, there are still many challenges on the path to AI development in the BRICS countries. The main problem is directly linked to the opportunity to conduct research and development on AI-technologies which depends on the overall level of socio-economic development of the country. This can be explained by the fact that very expensive equipment is required to implement contemporary hybrid intelligent systems. As an example we would like to take the large language model GPT-4, whose training costs OpenAI \$100 million (The AI Index 2024 Annual Report: 63).

Taking into account this fact, only large corporations are capable of conducting profound research and development in this area. At the same time, according to the Stanford Report for the year 2023, which measures the level of development of AI technologies in different countries, only one Chinese company, the Shanghai Artificial Intelligence Laboratory, ranked 10<sup>th</sup> the top 14 world leaders engaged in developing AI technologies. The BRICS countries are no longer represented in this ranking, while the leading positions are taken by four American IT giants – Google, Meta, Microsoft, and OpenAI. This ‘Great 4’ has developed the vast majority of basic AI-models that are well-known all over the world (The AI Index 2024 Annual Report: 59).

In another ranking, which shows the best startups in the world in the field of AI in terms of investment, BRICS countries are not represented at all. Only US corporations appear in this ranking. According to this report, OpenAI has become the undisputed leader with an investment volume of \$14 billion. The second place belongs to the Anthropic, which is developing an AI-powered chatbot called Claude. Its investment vol-

ume amounts to \$4.1 billion. And Databricks, which has developed a cloud-based data management platform that provides access to generative AI-models, closes the top three with an investment volume of about \$4 billion (Begin 2024).

This means that if BRICS countries want to achieve technological leadership in the contemporary world, they should think about joining their efforts and creating a common AI-ecosystem. By common AI ecosystem, this author proposes to understand the establishment of common standards and regulatory frameworks for AI in the BRICS space and conducting comprehensive joint large-scale scientific researches. In his opinion, this will create favorable conditions for the developers of AI-technological solutions from various BRICS countries to conduct joint researches in the field of the development of basic AI-models that require huge computational power throughout the BRICS space. For best understanding it is necessary to analyze the main trends of the development of AI in different BRICS-countries.

### *China*

Among all BRICS countries, AI-technologies have received the greatest development in China, which is one of the world leaders in this indicator. The Chinese ICT market 'is characterized by a steady and stable rise in investments and investment value of AI companies, a growing market for AI technologies, and a strong core of transnational companies originating in China that are developing and promoting the use of these technologies among consumers' (Bazarkina *et al.* 2023: 338).

In 2016, China adopted the 'Three-Year Guidance for the Internet Plus Artificial Intelligence Plan (2016–2018)', according to which the government promised to 'focus on funding and developing AI for improving its economy' (Faggella 2019a).

And in the year 2017, the State Council of China released The New Generation Artificial Intelligence Development Plan that represents a strategy for the technological development of the country until 2030, and sets the goal of restoring China's lost position as a technological leader. According to the Chinese government, the country occupied this position for most of its history. Beijing considers the global digital space as a battlefield where well developed countries try to dominate in a new round of international technological competition, and China is trying to seize the strategic initiative in this new stage of international competition in the field of AI (Koziulin 2021: 14).

Than a state-owned Blockchain Infrastructure Platform (BSN) was established in China in 2020, and in March 2021, the Chinese government presented a five-year plan aimed at accelerating the development of advanced technologies. China is placing special emphasis on the creation of national laboratories in the field of AI and development of targeted government programs aimed at the creation of favorable conditions for further research and development in this area (Lin 2021).

This policy has led to the fact that, by formal indicators such as the number of published scientific papers and patent applications, China has been able not only to match the United States but also to become a world leader (China has become a leader in cited scientific articles 2022). However, the emergence of LLMs and their rapid development turned out to be unexpected for China, and Chinese developers were not prepared for the competence in this field, as they had focused on other data science streams such as computer vision, unmanned vehicles, smart cities, and voice recognition. Nevertheless, they were able to quickly reorient themselves and produce a great number of LLMs in a short period. One of these models, called GLM-4-9B-Chat, developed by the Chinese

startup Zhipu AI, demonstrates better quality than GPT-4 (Hughes, Bae and Li 2023). This example shows that Chinese companies are able to quickly adjust to changing trends and solve complex tasks.

Besides, in addition to the elaboration of national strategies aimed at further development of AI, the Chinese government pays great attention to the development of ethical requirements and legal frameworks for advanced information technologies. In particular, in September 2021, China adopted a Code of Ethics, which, among other things, stipulates the use of AI only for improving human welfare and ensuring privacy and security. The country has also adopted a law on personal data protection in the Internet, which has strengthened government regulation of the collection and use of personal information (Calvi 2021).

However, despite all these successes at the field of the development of AI-technologies, China is often criticized, mainly by Western human rights organizations and the US government (Birnbaum 2019), because of its policy aimed at establishing full control over content that is distributing via the Internet and blocking resources that have been recognized by Beijing as undesirable. Recently, they have started criticizing the global video surveillance camera system with facial recognition function, which, according to its opponents, will become an effective tool for global tracking of people (Bergman 2019). And Alex Capri, a senior researcher at the Business School of the National University of Singapore, states in this regard that 'leadership in artificial intelligence and computing allows China to extract huge benefits from hybrid wars' (Kaminskii 2021).

However, despite all this criticism, which is mostly caused by the fear of countries of the collective West to lose their technological leadership, everyone recognizes China's success in the research and development of AI-technologies.

### *Russia*

Russia also pays increased attention to the development of AI in its national policy. In 2019, the 'National Strategy for the development of Artificial Intelligence for the period up to 2030' was adopted. Taking into account the fact that the development of basic AI-models requires huge computing power a special Artificial Intelligence Alliance has been created in Russia in 2019. The primary task of this Alliance is to combine efforts of leading domestic developers in the field of AI in order to ensure Russia's leading positions in the global technology market. The founders of the Alliance were Sber, Gazprom Neft, Yandex, VK and the Russian Direct Investment Fund.

Also, a system of grant support for AI developers has been launched in Russia that has already supported over 600 AI projects. Russian higher education institutions open new master's and bachelor's degree programs related to the study of AI technologies and data science, and a significant number of Russian companies are already implementing AI-based technological solutions into their business processes (Kapranov 2023).

The beginning of the Special Military Operation, which turned into a hybrid war with countries of the collective West, caused the massive imposition of all kinds of restrictions and economic sanctions on Russia, and the withdrawal of leading world developers in the field of AI from the Russian ICT market. This has presented new challenges for Russia's technological development.

From one perspective, this has opened a unique opportunity for Russian developers to occupy a vacant niche; however, on the other hand, the desire to develop an AI solu-

tion that would be competitive in the world ICT market faces the lack of computing power, highly qualified specialists and innovative developments in this area. To this should be added the limited access to AI-technologies due to unfair competition from unfriendly states (Kazakov 2024). Thus, the cooperation on this issue with partners from the BRICS countries could be the most effective way for Russian IT companies from to overcome this difficult situation.

#### *India*

India also pays great attention to the development of AI technologies. ‘This development comes on the heels of the launch of a Task Force on Artificial Intelligence for India’s Economic Transformation by the Commerce and Industry Department of the Government of India in 2017’ (Faggella 2019b).

Nowadays, AI is used in India mainly in agriculture, healthcare, banking, and education (Chakraborty 2021). However, the most evident and significant breakthrough has been made by Indian intelligent chatbots and voice assistants. The main challenge faced by developers of these technological solutions is the need to create an assistant that would be able to understand a large number of dialects, since India is known to be an extremely multinational country. Currently, there are chatbots in India that support 22 different Indian languages (Faggella 2019b).

#### *Brazil*

Brazil is also actively developing AI technologies. In 2019, Marcos Pontes, the Minister of Science, Technology, Innovation, and Communications, announced the creation of a network of eight research centers in this field. The priority sectors where AI technologies are planned to be used include healthcare, agriculture, and industry. Special attention is paid to technological developments in the field of the Internet of Things and creation of smart cities (Bazarkina and Pashentsev 2023: 299).

However, it should be noted that Brazil is actively developing cooperation not so much within the framework of BRICS, but with US corporations. For example, the Sao Paulo Research Foundation signed an agreement with IBM on the establishment of the first IBM AI Horizons Network in Latin America. This center, managed by IBM, specializes in natural language processing and deep learning. Amazon Web Services has also announced plans to expand its infrastructure in Sao Paulo and invest 1 billion Brazilian reais over the next two years in the development of AI-based technologies (Brazil AI... 2021).

#### *United Arab Emirates*

The United Arab Emirates (UAE) are one of the leaders in technology development in the Middle East. Firstly, it is necessary to point out that there is a position of Minister of State for Artificial Intelligence in the country. And in 2018, the National Strategy for AI until 2031 was adopted. This Strategy includes:

- development of a favorable AI ecosystem;
- promotion of widespread use of AI in industry, in people's daily lives and in governmental bodies;
- training of highly qualified personnel;
- attracting world leaders in the field of AI to the country (UAE Strategy for Artificial Intelligence 2031).

Thus, the attraction of foreign investment and the creation a favorable environment for the activities of foreign, mainly Western, IT corporations should be considered as a key task for the UAE. For example, in the period from 2015 to 2018, Dubai attracted over \$21 billion in foreign investments in the fields of AI and robotics (AI 2024: prospects and risks 2024).

With the help of AI, the UAE is striving to become one of the most technologically advanced countries in the world. In particular, back in 2020, ADNOC began using AI in drilling wells, which allowed it to save about \$2 billion. And the emergence of the LLM Falcon 40B, trained on a trillion tokens, has become the latest remarkable technological innovation. This model, developed in Abu Dhabi by the Institute of Technological Innovation, was recognized as the best among all open-source LLMs by the US company Hugging Face (Falcon 40B from the UAE... 2023).

#### *Saudi Arabia*

Saudi Arabia is another country in the Middle East that claims to be a world leader in the development of AI technologies. Firstly, we would like to remind that it became the first country in the world to give citizenship to a robot and it established the specialized Mohamed Bin Zayed University for Artificial Intelligence. The main document regulating the country's development is the Saudi Vision 2030, and 75 % of its goals are somehow related to the use of AI (Saudi Vision 2030). And Saudi Arabia aims to enter the top 15 countries in the world in the field of AI.

Nowadays, AI penetrates all spheres in Saudi Arabia, but the greatest development has been observed in healthcare and the oil industry. At the same time, the government is paying increased attention to training highly qualified personnel and stimulating the development of AI startups. As of today, there are about 70 AI startups in the country, and they are going to increase their number up to 300 (How artificial intelligence is being developed... 2023).

#### *Iran*

Iran is also involved in the development of the AI. At the end of 2022, it adopted a Roadmap aimed at developing breakthrough technologies. The main objective of the Strategy is to create a regulatory framework for the development of AI and provide government support for AI-based products in all key industries, such as agriculture, healthcare, transport, energy, education, defense, and security. At the same time, special attention in the Strategy is paid to the development of robotics.

To achieve the goal stated in the Strategy, the Government plans to invest \$8 billion in AI research and development by 80 %, increase the share of AI in industry by 45 % and in GDP – by 12 % (Kaminskii 2022).

In order to stimulate the development of AI, a National Steering Committee and a National Artificial Intelligence Center have been established in Iran.

#### *South Africa*

South Africa, despite the number of socio-economic problems that are typical for most African countries, is set to become the largest AI hub in Africa (Nagaraj 2021). Currently, the country is developing a National Strategy for the development of AI technologies, and for now, the South African government is guided by the Report of the Presidential Commission on the Fourth Industrial Revolution, which was adopted in 2020.

This Report considers AI as one of the key factors in the sustainable socio-economic development of the country.

This Report, in particular, proposes the establishment of an Artificial Intelligence Institute, which would be responsible for conducting research and development in the fields of artificial neural networks, natural language processing, and computer vision. It is assumed that the Institute would cooperate with TensorFlow and participate in all significant initiatives in the field of AI. The Report recognizes the production of unmanned vehicles, drone manufacturing, and robotics as the key areas for implementing AI-technologies (Summary Report & Recommendations 2020: 163–164).

### *Egypt*

Egypt is also actively engaged in the implementation of AI technologies. In November 2019, the government approved the creation of the National Council for Artificial Intelligence, and in 2021 the National Strategy in the field of AI was adopted. This Strategy identifies four key priorities: the implementation of AI technologies into the functioning of governmental bodies, the use of AI for development, capacity building and international cooperation. The implementation of these four streams, according to the authors of the Strategy, is based on four components:

1. Legislation (adoption of laws that would be aimed at stimulating the development of breakthrough technologies in the country);
2. Data (creation of necessary databases, data storages, as well as elaboration of data collection and management strategies);
3. Ecosystem (stimulation of private business activities, conducting large-scale scientific research, participation of civil society);
4. Infrastructure (providing access to computing power, data storages, networks and other assets) (NCAI 2021: 5).

Nowadays, Egypt rank 3<sup>rd</sup> in Africa in terms of the number of companies that use AI, after South Africa and Nigeria. There are currently 246 such companies in the country. For comparison, there are 726 in South Africa, and 456 in Nigeria (Teleanu and Kurbalija 2022: 5).

### *Ethiopia*

Ethiopia is slightly behind other BRICS countries in the field of AI. But nevertheless, the government is going to stimulate further development of breakthrough technologies. In particular, in 2023, when delivering a speech to students, Ethiopian Prime Minister A. Abiy pointed out that AI-technologies are being used in all sectors of the economy, and called on young people to ‘unleash their potential and skills in the field of artificial intelligence (AI) and other new technologies’ (Palmer 2023).

The last statement shows the attitude of the Ethiopian government to AI, which is considered as a key driver for the country's socio-economic growth. Ethiopian universities and research institutes have started to create specialized centers for AI technologies. Ethiopia is also elaborating a comprehensive National AI Strategy, which would define the official vision for the further development of AI in the country.

### **BRICS Countries on the Way to the Creation of a Joint AI ecosystem**

There is actively developing cooperation between big high-tech companies that are ready to share their achievements in the field of AI from different member states. In particular, Skoltech and the University of Sharjah, UAE established a joint AI laboratory in October 2023 aimed at applying AI technologies to biomedicine (AI 2024: prospects and risks 2024). Sber, which developed a special manuscript recognition technology, called Digital Peter, because it was used to decrypt the records of the Russian Emperor Peter I, proposed its assistance to Egypt to decipher ancient manuscripts at the end of 2023 ('Sber' will decipher ancient Egyptian manuscripts 2023).

However, unfortunately, there are also examples of unfair use of the jurisdiction of different BRICS countries by foreign companies that do business there, which is prohibited in their country of origin. For example, in early 2024, the government of Ethiopia, through its investment division, Ethiopian Investment Holdings, signed a memorandum of understanding with Data Center Service, which is a subsidiary of the Hong Kong-based West Data Group. This partnership was evaluated at around \$250 million, and, at first glance, it seemed to be aimed at creating sophisticated AI training centers in Ethiopia. However, there are all reasons to think that in fact, this joint venture would be engaged in bitcoin mining. And this is despite the fact that the Ethiopian government officially opposes cryptocurrency trading (Ethiopia is Launching... 2024).

In our opinion, this is due to the fact that Ethiopia considers advanced technologies only as an extremely effective tool that can help solve many of the socio-economic problems faced by the country. As a result, in the desire to attract a large number of AI-developers with their technologies and computing powers, the Ethiopian government is focusing on the creation of favorable conditions for foreign companies, mainly Chinese ones, some of which turn out to be not conscientious enough and consider this country as a convenient place where they can safely conduct cryptocurrency mining activities, which are prohibited in China.

This means that BRICS countries need to think about developing common standards, rules, and regulations for the use of AI technologies throughout the BRICS space. However, until recently, the topic directly related to the development of AI throughout the BRICS space did not become an independent subject of discussion at forums held under the auspices of this Association, despite the fact that issues related to the development of ICT have been often raised at BRICS summits.

Thus, for example, in November 2016, the BRICS members adopted a 'Joint Development Program and Action Plan on ICT.' But AI did not figure in the Plan as an independent stream. And only in 2019, was it announced that the BRICS countries were going to create an Alliance for the Development of AI that with the aim of elaborating common standards for AI technologies. However, this idea did not receive further development at that time.

And only at the BRICS Summit, held in Johannesburg, South Africa from August 22 to 24, 2023, the Chinese leader Xi Jinping proclaimed the need to expand cooperation in the field of AI, including the prevention of risks from malicious use of these technologies. In this regard, he proposed to elaborate a common approach to the use and control of AI, as well as create a joint regulatory body that would be responsible for managing AI technologies.

At the BRICS summit in Johannesburg, a specialized research committee in the field of AI was established; with its help, the member countries will increase access to technological capacities required for the creation and implementation of AI. This initiative is expected to stimulate the development of AI innovations throughout the BRICS space. In particular, this Committee ‘will be able to evaluate AI-based developments and give an opinion on which industries and which consumers an AI-based solution can be used’ (BRICS will establish a joint management structure for AI ... 2023)

In order to intensify the further negotiation process aimed at forming a joint BRICS AI ecosystem, Russia made a proposal in December 2023 to include the issue of the implementation of AI technologies in the BRICS space in the agenda of the BRICS Business Council (Uvarchev 2023).

Taking into the account the importance of this issue, Russia has already begun discussing the prospects for developing joint approaches to legal regulation and standardization of AI technologies with different BRICS countries at the bilateral level. In particular, in autumn of 2023, a Memorandum was signed between Russia and India on the creation of an inter-state Russian-Indian system for assessing the compliance of AI technologies. Subsequently, a ‘White Paper’ was adopted that presented joint approaches towards standardization and ethical regulation of AI technologies in healthcare and agriculture (White Paper on Artificial Intelligence Conformity Assessment... 2024). On February 28, 2024, a Memorandum of Understanding was signed between Iran and Russia regarding ethics of artificial intelligence (Memorandum of Understanding between Russia and Iran... 2024).

The next round of discussions took place at the BRICS Academic Forum, which was held in Moscow from May 22 to 24, 2024. The further development of AI technologies was one of the main topics of the Forum. The discussion mainly focused on the development of common standards and ethical frameworks for AI, as well as directions of further research in this field (They have discussed the possibilities and threats of artificial intelligence... 2024). Further discussion of these issues has been undertaken at the BRICS Summit in Kazan held on October 22–24, 2024 where President Vladimir Putin invited the BRICS countries to join forces against the malicious use of AI. In particular, he proposed to set up regulatory frameworks of AI-technologies throughout the BRICS space and expressed the idea of creating a BRICS Alliance in the field of AI.

## **Conclusion**

The present study has shown that the BRICS countries have good potential for developing AI technologies. However, it is premature to talk about creating a common market for advanced information technologies throughout the BRICS space. This is due to the fact that member states have different levels of technological development and different views on the problem of standardization and regulation of these technologies.

Thus, China that should be considered as the undisputed leader among all BRICS countries in the field of the development of AI, is committed to strict regulation of any technological innovations. To avoid being left in the periphery of the Fourth Industrial Revolution, Russia should intensify the development of its own AI solutions and try to fill the gap that left by the withdrawal of world IT-giants from the Russian ICT market. Brazil, on the contrary, seeks cooperation with Western IT-giants, which can negatively affect the country's technological sovereignty. The UAE has set a goal to become a

global AI hub. In this regard, the Emirates are trying to create favorable conditions for the operation of foreign companies and, generally, to attract a large number of foreign investments aimed at the development of AI technologies from all over the world: the USA, the EU, China, Russia, and other countries. Ethiopia is currently elaborating its own policies in the field of AI, and, given the overall low level of socio-economic development of this country, we cannot say that AI is a top priority, despite the relevant statements of government representatives.

Nevertheless, the need for the establishment of a common AI-ecosystem throughout the BRICS space is becoming a subject of discussion at the BRICS Summits. However, based on the analysis above, it should be noted that due to different approaches of BRICS countries on how AI-technologies should develop in the foreseeable future, the development of such joint vision may require additional rounds of discussions.

In this regard, we believe that it would be more promising at the first stage to intensify bilateral interstate cooperation between the BRICS countries to sign memorandums of understanding on the most painful and controversial issues in AI technology development.

After conducting such large-scale discussions at the bilateral level, it will be possible, at the next stage, to develop a joint AI strategy for the BRICS countries. On the basis of this strategy, at the final stage it will be possible to develop common approaches to standardization and regulation of AI technologies throughout the BRICS space, which, finally, will lead to the creation of a common BRICS AI ecosystem.

Only in this way can the BRICS countries have the opportunity to conduct large-scale scientific research aimed at developing fundamental AI models that will allow them to take a leading position in the global ICT market.

Unfortunately, as has been shown in the paper, nowadays there is fragmentary cooperation between some IT-companies from different BRICS countries, whereas only the joining efforts of leading AI developers from all member states can ensure the emergence of real breakthrough technologies in the field of AI. Therefore, we recommend taking into account Russia's experience and considering the establishment of the BRICS AI Alliance, which would promote joint research and development in the field of AI.

At the same time, among the main areas of technological cooperation between BRICS countries, we would like to point out the need for the development of a joint LLM trained on texts created in BRICS countries. This is a complex task, as it requires LLMs to understand at least seven languages: Russian, Chinese, English, Arabic, Hindi, Amharic and Portuguese. But only in that case it would become possible to create an LLM focused on the needs of the local population throughout the BRICS space, their worldview, and cultural code.

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