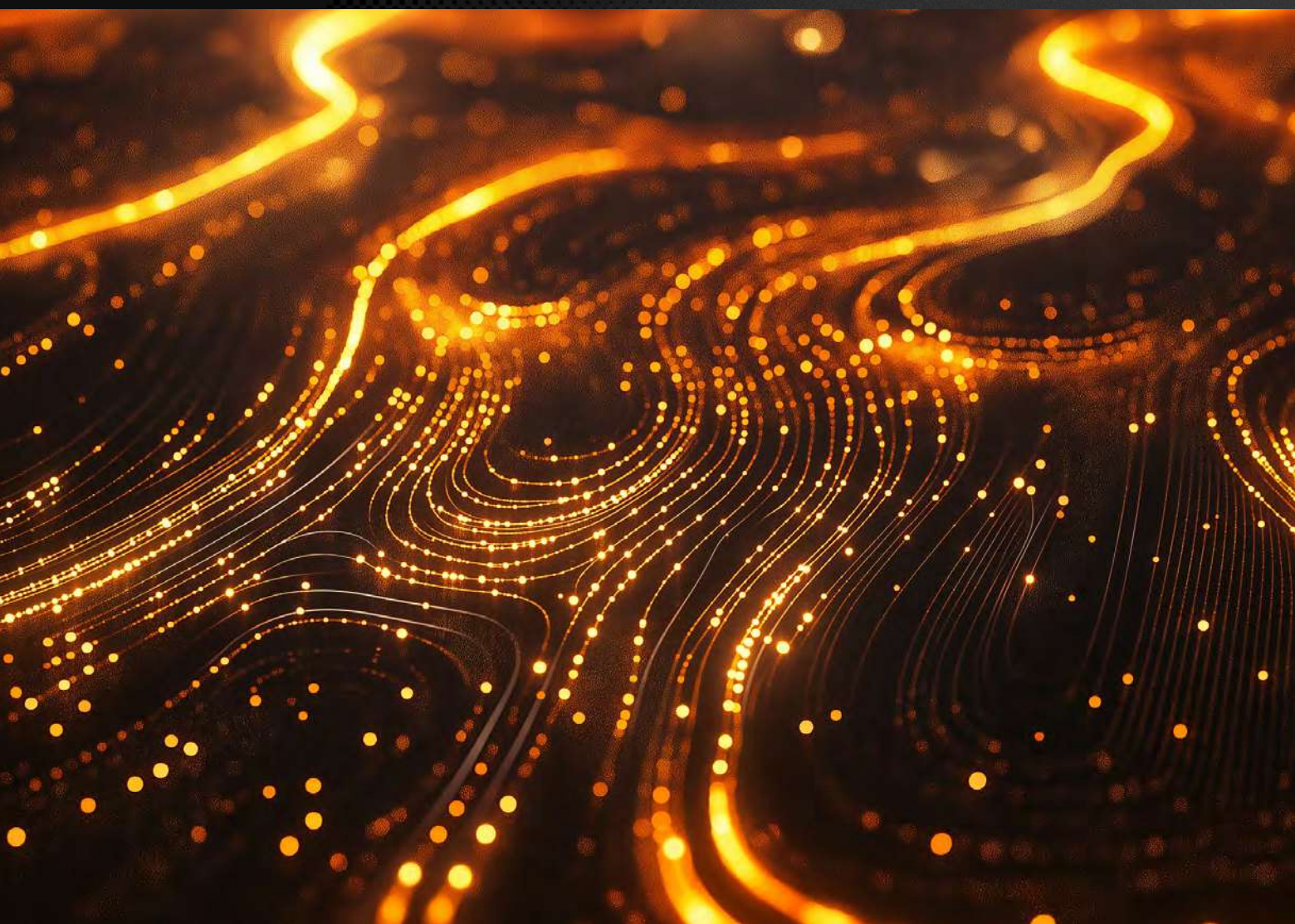


Yakov and Partners

# Generative AI in the BRICS+ Countries: Trends and Outlook

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Source: open sources,  
Yakov and Partners analysis



350–600  
billion US dollars

could be the economic impact from the adoption  
of generative AI technologies in the BRICS+ countries  
by 2030

# Executive summary

This study examines the status of generative AI development in the BRICS countries as of November 2024. The study's primary focus is on the situation in Brazil, Russia, India, China, and South Africa (the original BRICS members), the United Arab Emirates<sup>1</sup> (one of the new members joining in 2024), and Saudi Arabia,<sup>2</sup> which is in the process of integration into the grouping and has the closest economic ties with its current members, as well as a high potential for generative AI development. The statistics and other information in this report are based on research conducted for the seven countries included in the study. At the time of the study, detailed statistical and survey data for the other countries that joined BRICS in 2024 (Iran, Ethiopia, and Egypt)<sup>3</sup> were not available. These data will be included in the next version of the report.

In the two years since the launch of ChatGPT, generative AI (GenAI) technologies have made significant strides. Models are now capable of handling different modalities, combining various AI-enabled technologies (e.g., computer vision, RPA) into multi-agent systems, and are being actively deployed in business. A CTO survey conducted by Yakov and Partners involving 700 of the largest revenue-generating companies in the BRICS+ countries revealed that 57% of businesses in these economies are utilizing AI as a tool in their business processes.

The role of international cooperation in the development and implementation of technologies is expanding. For instance, the UAE is integrating solutions based on its model into Brazil's public services, scientists from China and Saudi Arabia have collaborated on the development of an LLM in Arabic, and EU countries are collaborating on regulatory issues. Such collaborations are easier to pursue within pre-existing country groupings. One such grouping is BRICS+, which aims to create conditions for strengthening the economies and technological capabilities of member countries. Cooperation on generative AI is likely to become a significant focus for the grouping. At the BRICS summit in Kazan in October 2024, Vladimir Putin proposed the creation of an artificial intelligence alliance for the grouping.<sup>4</sup> Xi Jinping, President of the People's Republic of China, stated that his country recently established a BRICS center for the development of artificial intelligence and emphasized the readiness of his country to deepen cooperation and strengthen AI capabilities within the grouping.<sup>5</sup>

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**The economic impact from the implementation of generative AI technologies in the BRICS+ countries could reach USD 350–600 billion by 2030**

Yakov and Partners estimates that the economic impact from the implementation of generative AI technologies in the BRICS+ countries (based on the data on China, Russia, the UAE, Saudi Arabia, India, Brazil, and South Africa) could reach USD 350–600 billion by 2030. Six key industries – banking, retail, engineering, energy, electronics, and IT – will account for almost 70% of the impact.

To ascertain the extent of generative AI advancement in BRICS+, we identified five key areas of focus to evaluate the countries, corroborating the analysis with interviews of national experts:

- Development of foundational models for generative AI;
- Adoption of generative AI-enabled solutions in business;
- Generative AI infrastructure (capacity and data for model training);
- Generative AI human resource system and specialized training;
- Support for technology development.

# 1

## Development of foundational models for generative AI

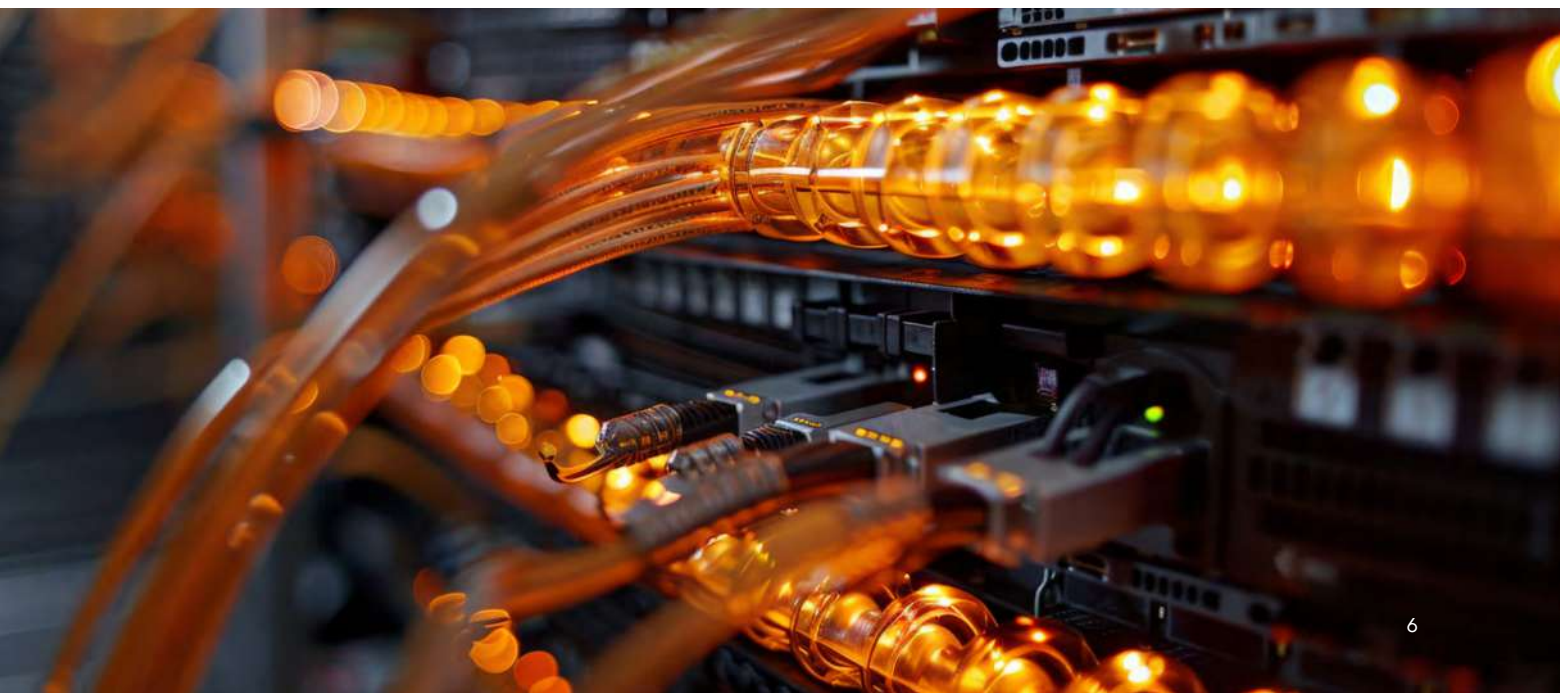
All countries analyzed have their own foundational models. China leads in both quantity and quality of developed models, with over 240 models currently in operation. One of the best LLMs, SenseNova 5.5, is on par with GPT-4o by OpenAI in most benchmarks. Russia, the UAE, Saudi Arabia, and India also each have several models that compete in local languages with the best Western solutions. These include Gigachat, YandexGPT from Russia, JAIS and Falcon from the UAE, ALLaM and Metabrain from KSA, and Hanooman from India. Brazil has only one significant indigenous model, Sabia, while models in South Africa either lag far behind global solutions or use Western open-source foundational models.

# 2

## Adoption of generative AI-enabled solutions in business

The CTO survey findings indicate that by the summer of 2024, 57% of companies in the grouping implemented at least one AI-based solution in their business. Additionally, 6% of these companies are scaling these solutions and selling them on the external market. The industries leading the way in adopting generative AI in the countries under review are IT and technology (72% of companies in the industry), telecommunications (63%), FMCG, and transportation (61% each). Solutions are most commonly deployed in IT (45% of companies), customer service (41%), marketing and sales (39%), and manufacturing (36%).

GenAI has been successfully implemented in various industries in China, Russia, India, and the UAE. In Saudi Arabia, it is primarily utilized in the oil and gas sector. However, its adoption is currently limited in South Africa and Brazil, with only isolated industries embracing its use.



# 3

## **Generative AI infrastructure (capacity and data for model training)**

The majority of countries under consideration, with the exception of South Africa, have the capacity to train large models, using thousands of graphics cards. In China, the number of graphics cards at individual companies (e.g., Tencent) is measured in hundreds of thousands. Due to import restrictions, the country has already started to produce its own graphics cards. The market leader is Huawei. In the UAE, Saudi Arabia, and India, the government has purchased graphics cards directly from NVIDIA in large batches, accumulating tens of thousands of cards. In Russia, there is a shortage of graphics cards due to restrictions on direct shipments from NVIDIA. Brazil has thousands of graphics cards only at research centers not focused on GenAI, and South Africa is not known to have a large stockpile of GPUs.

In terms of data, the UAE and Saudi Arabia have already created unified databases with datasets suitable for training generative AI models. China, India, and Russia are in the process of developing such databases, while Brazil and South Africa do not yet have centralized databases suitable for generative AI.

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# 4

## **Generative AI human resource system and specialized training**

The human resources balance in BRICS+ is currently negative due to the out-migration of professionals to Western countries, particularly the United States. The grouping has both talent development centers with robust educational systems (in China, Russia, and India), and regions with high appeal to foreign talent offering competitive conditions for foreign employees (Saudi Arabia and the UAE). South Africa and Brazil have less developed human resources systems than other BRICS+ countries, with a limited number of strong universities and quality programs to attract AI (and especially GenAI) professionals.

The BRICS+ countries are actively developing AI training programs. All countries surveyed, regardless of their degree of maturity, have at least one higher education program in the field of artificial intelligence.

# 5

## Support for technology development

All countries have a government strategy for artificial intelligence, but the level of detail in these documents varies. In terms of state support tools, China is the leader. The country issues public tenders for solutions, offers tax incentives to AI companies, and provides funding to research institutions. In addition to China, the governments of Russia, Saudi Arabia, and the UAE are actively supporting the development of the technology. Only China has legislation in the field of generative AI. The rest of the countries are still in the early stages of technology implementation and are relying on self-regulation and isolated regulations to avoid hindering its development.

Among the BRICS+ countries, only China, India, and the UAE have developed AI private investment markets and are in the top 15 globally. In other countries, the lack of a robust capital market is a significant constraint on their growth. At the same time, almost all countries are trying to develop mechanisms that encourage private investment, such as accelerators with a focus on AI and GenAI start-ups.

Self-regulatory organizations in most countries serve a supporting role, helping to attract investment, participating in the formulation of strategy and laws. Russia is a case in point, with a high level of self-regulation. Other countries with similar organizations include South Africa, China, Saudi Arabia, and India.

The analysis has identified both strengths in generative AI development and growth areas that require strengthening. The latter can be achieved through cooperation between the BRICS+ countries, where the strengths of some countries complement the growth areas of others, creating synergies for the development of technology for individual BRICS+ members and for the grouping as a whole. We have identified five areas for joint work with the greatest potential for realizing these synergies.



# 1

## **Collaborative development of generative AI-enabled models and products**

By leveraging the synergies of common datasets, shared product, industry, and R&D expertise, countries can collectively develop models with a common language specificity (e.g., the Arabic model from the UAE and Saudi Arabia, or the collaboration between South Africa and India to adapt models into over 10 national languages and dialects) and industry-specific models (e.g., agriculture, banking, retail). Furthermore, the development of products based on generative AI can be transferred to countries with a high availability of human resources, such as India.

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# 2

## **Cooperation in computing power**

It is feasible to offer streamlined cloud access to address uneven development cycles and a transition to supplying graphics cards from member countries (currently China), thereby enhancing the technological autonomy of BRICS+.

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# 3

## **Cooperation in the areas of human resources and education**

There are several ways in which countries can redirect out-migration of labor from Western countries to the BRICS+ countries. These include the introduction of preferential visa arrangements and the offering of additional benefits from the host country. Furthermore, joint training programs, such as dual degree programs, and university exchanges can be established to raise the average level of education in BRICS+.

# 4

## Self-regulatory organizations


There is an opportunity to form an alliance of BRICS+ companies in the field of AI, which would facilitate the exchange of expertise and expand opportunities for cooperation between BRICS+ technology leaders. Such an alliance could be established on the foundation of the existing BRICS+ AI development working group and organizations in individual countries, such as the Russian Alliance for Artificial Intelligence. The latter is already actively engaged in the advancement of the technology in Russia by participating in formulating the strategy and defining the regulatory system, compiling industry reports, preparing independent ratings, etc.

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# 5

## Regulatory system

One potential solution is for the countries to establish a working group to harmonize regulatory systems for generative AI. This could be modeled on the existing BRICS AI Study Group, which would facilitate the scaling of local solutions to all BRICS markets through unified licensing requirements for models and off-the-shelf GenAI solutions.



Source: a survey of the BRICS+ CTOs  
conducted by Yakov and Partners  
in the summer of 2024

54%

of Russian companies have implemented AI-powered  
solutions in at least one function in the organization

# Introduction.

## Evolution of generative AI

November marked the two-year anniversary of the first version of ChatGPT, the application that brought generative artificial intelligence technologies to the world's attention. Since then, there have been many technological breakthroughs in the field: large language models have rapidly evolved from chatbots capable of answering questions on general topics to a level where the model combines several traditional AI-based technologies (e.g., computer vision, RPA, etc.) into complete multi-agent systems. In addition, models capable of building complex chains of reasoning have emerged: for example, OpenAI's o1 model solves problems in physics, chemistry, and biology at the level of Ph.D. students, and solves complex problems in Olympiad programming, scoring in the 89th percentile of participants.<sup>6</sup> Significant progress has been made in the area of multimodality: OpenAI's GPT-4o can not only process text, but also recognize content in images and videos, and interact with the user in real time.<sup>7</sup>

One of the main applications of the technology has been in business. Last year was a transition year for companies from studying the technology and the first trials to the beginning of its full-scale use. A year ago, when the Yakov and Partners report *Artificial Intelligence in Russia – 2023: Trends and Outlook* was released, according to the CTO survey findings, none of the companies surveyed had yet fully implemented the technology in their business processes and only 40% were at the stages of prioritizing use cases and experimentation. The BRICS+ CTO survey conducted by Yakov and Partners in the summer of 2024 showed that 54% of Russian companies had implemented generative AI solutions in at least one function in the organization.

As the development of generative AI technologies progresses, the role of international cooperation between countries is gradually gaining ground in all areas related to these technologies: in the development of models, in the creation of infrastructure for their training, in the design of the regulatory system, etc. For example, the UAE is introducing the Falcon model in Brazil's public services,<sup>8</sup> scientists from China and Saudi Arabia have jointly developed AceGPT, an LLM in Arabic, while European countries have recently adopted common legislation in the field of AI (the EU Act).

The BRICS grouping, established in 2006, sets as its main goal "the creation of conditions for ... strengthening the economic and technological potential of the member countries",<sup>9</sup> therefore, cooperation in the field of generative AI development becomes one of the key items on the agenda of the grouping. Thus, the participants of the XVI BRICS Summit adopted and signed the Kazan Declaration aimed, in particular, at cooperation in the field of artificial intelligence regulation. The document aims to create a global system "to reduce the risks of malicious use, misinformation, leakage of personal data, bias and discrimination arising from the use of such technologies, as well as to support a people-centered approach aimed at development, inclusiveness, and sustainability to improve people's lives and bridge the digital divide, especially between developed and developing countries".<sup>10</sup>

The purpose of this study is to assess the current development of generative AI technologies in these countries and to look for synergies where collaboration can add the most value to the grouping and its members. As part of the study, we interviewed 100 CTOs from the top 300 companies in each of the focus countries. The CTOs were asked questions about the level of adoption of generative AI, the integration model of the technology, the use cases, and the solutions being used. In addition, we interviewed leading generative AI experts in each of the countries surveyed and assessed the country's level of development across five key factors: development of foundational models, adoption of generative AI solutions in the organization, availability of capacity and data for model training, readiness of the HR system, and the degree to which various stakeholders, i.e. the government, private investors, and self-regulatory organizations, support the development of the technology. These five factors form the basis of the first five sections of the study; in the sixth section, the synthesis of the analysis is used to formulate recommendations for areas of cooperation between BRICS+ countries in generative AI.

We hope that this study will help companies, researchers, and governments in the BRICS+ countries find ways to work together effectively to develop the technology to the benefit of both BRICS+ and other countries.

# Section 1.

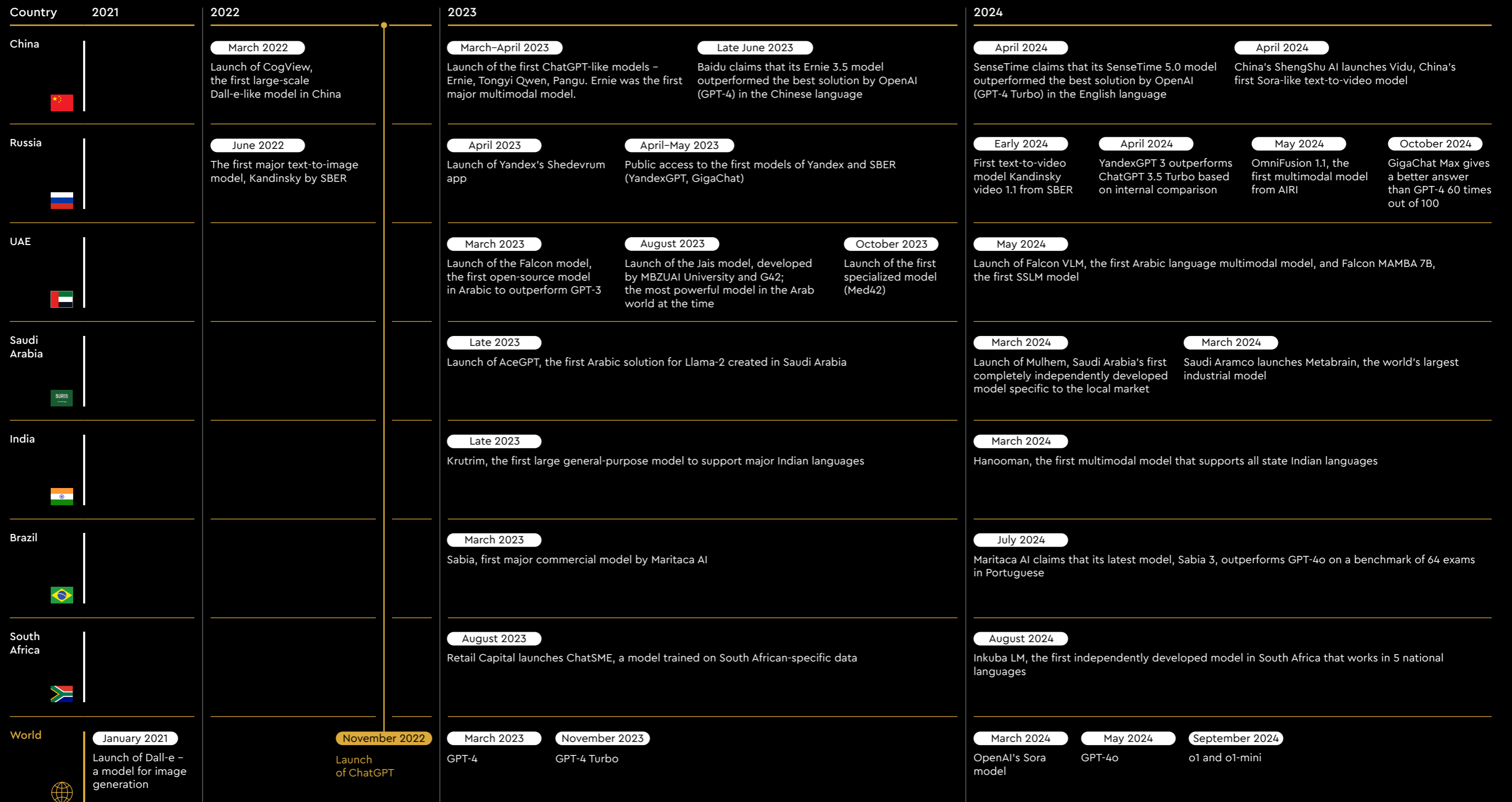
## Landscape of generative AI models. Comparative country analysis

### History of the emergence of models in the BRICS+ countries

The development of generative AI in the BRICS+ countries, which began in late 2022 and early 2023, was uneven: China immediately took the lead, releasing its own solutions three to four months after the launch of OpenAI, and by mid-2023 it had reached the level of the best Western models in Chinese.<sup>11</sup> Less than a year later, Chinese models were also on par with solutions from global companies in English.<sup>12</sup> Russia, where the first generative models based on LLMs appeared in 2019, launched its first domestic ChatGPT analogs in Q2-Q3 of 2023; similarly, since mid-2023, the UAE has been actively launching its own models in the public space. In other countries (South Africa, Saudi Arabia, and India), the development did not proceed as quickly or on the same scale (Brazil has only one model, albeit a successful one, according to its own quality assessments). By the end of 2024, the BRICS countries, largely driven by China, are on par with or slightly behind (less than half a year) the US, the leader in generative AI.

# Timeline of generative models in the BRICS+ countries

ONLY KEY MODELS, NOT EXHAUSTIVE







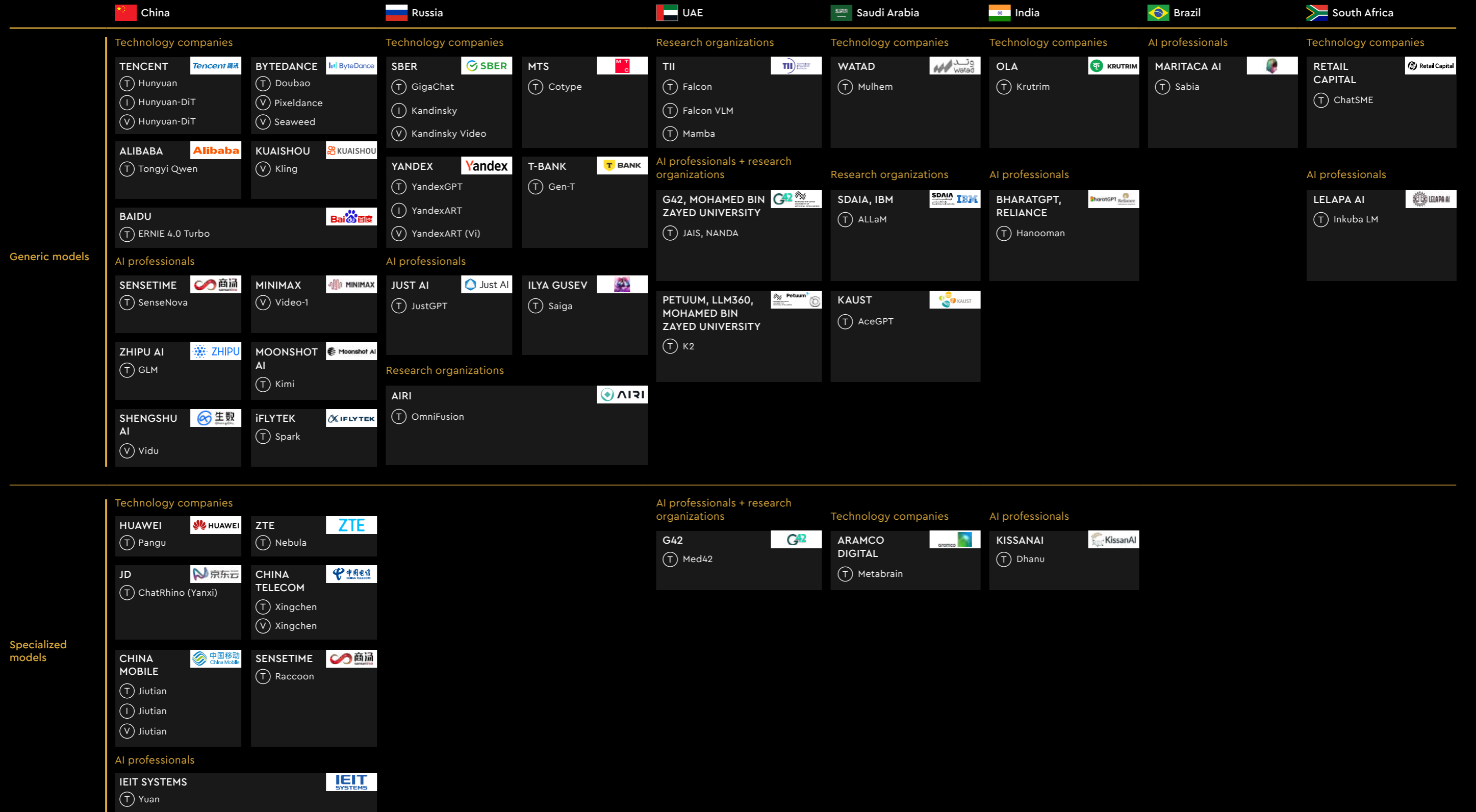
## Map of technology companies and their models by country

As part of the analysis, we identified 52 families of models<sup>13</sup> in the BRICS+ countries. A model was designated as a key one if it met one of the following criteria: it was developed by a leading AI company or research institute, it is actively used in the economy or by society at large, and it represents a significant technological advancement for the country in the field of generative AI. As expected, China leads in terms of the number of key models, with 25 both generic models (e.g., Tencent's Hunyuan) and specialized models (e.g., Huawei's Pangu). The market is highly competitive, with smaller players specializing in AI representing a significant competitive force. Russia is the next largest market with 11 models, with several large technology companies (Sber, Yandex, T-Bank, MTS) actively engaged in their development; start-ups and research organizations are also involved in model development, but to a lesser extent. In third place with six models is the UAE, where government research organizations and ministries play a pivotal role in the advancement of generative AI. With robust support from these entities, the country is currently at the forefront of regional development, with models such as JAIS and Falcon that rival many solutions from Western companies. Other countries have a limited number of solutions that are generally not as advanced as the leading Chinese and Western models. These include Hanooman in India, Sabia in Brazil, ALLaM in Saudi Arabia, and Inkuba LM in South Africa.

# Landscape of generative models in the BRICS+ countries

ONLY KEY MODELS, NOT EXHAUSTIVE

Primary modality in which the model generates data: (T) Text (I) Image (V) Video





## China

**China is the most advanced of the BRICS+ countries in terms of generative model development: in 2023, Chinese foundational models accounted for up to 40% of the global market (50% taken up by the US), and the country had 238 foundational models by the end of that year**

China is the most advanced of the BRICS+ countries in terms of generative model development: in 2023, Chinese foundational models accounted for up to 40% of the global market (50% of the market is taken up by the US), and the country had 238 foundational models by the end of that year.<sup>14</sup> In addition, China boasts the highest level of self-sufficiency in foundational models among the countries under review: according to the CTO survey, more than 75% of the models used by respondents from Chinese companies were developed in China. One of the reasons for this significant technology development is that industry leaders in China are looking for new growth and productivity drivers in the context of achieving a high level of development and a general slowdown in the national economy.<sup>15</sup> In addition, there are many companies in China that are developing generative AI models and actively competing for business customers after OpenAI<sup>16</sup> left the country. The government support for domestic technology development, aimed at achieving technological sovereignty in the strategically important field of generative AI, also plays an important role.

Currently, China is the only country in BRICS+ with models that claim to be on par with the best American solutions on international benchmarks. For example, in April 2024, SenseTime, a Chinese AI developer, claimed<sup>17</sup> that its SenseNova 5.0 model demonstrated superior performance to GPT-4 Turbo, OpenAI's most advanced solution at the time, across a range of diverse benchmarks (including English MMLU and the GSM8K math benchmark). The latest SenseNova 5.5, released in July 2024, also outperforms the OpenAI solution (GPT-4o) on many important benchmarks, including multimodal benchmarks (e.g., MMBench).

**The main category of models in China are general-purpose models for a wide range of applications. Several solutions offered by technology leaders stand out among the competition:**

### Hunyuan

In September 2023, IT giant Tencent developed a 100+ billion parameter model.<sup>18</sup> The model is claimed to outperform GPT-4 (the best US model at the time of Hunyuan's release) on all major benchmarks in Chinese.<sup>19</sup> The model is available to all companies through an API and has been integrated into more than 50 internal Tencent services, such as video call summarization solutions on the Tencent Meeting platform, text formatting in Tencent Docs, etc. At the end of 2024, Tencent released Hunyuan Video, a new family model capable of generating video, as well as models for generating images and 3D objects.<sup>20</sup>

## Tongyi Qianwen

In September 2024, Alibaba released an updated open-source model with 72 billion parameters – Tongyi Qianwen 2.5. The model is said to outperform GPT-4 on Chinese benchmarks. The company has also released a series of function-specific models in parallel with the core model. These include customer support, legal advice, healthcare, etc. These models have enhanced knowledge and capabilities in subjects like math and programming and can support over 29 languages.<sup>21</sup>

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## ERNIE

In June 2024, internet giant Baidu released a fundamental multimodal model ERINE 4.0 Turbo capable of not only receiving information but also producing a response in different domains<sup>22</sup> (text, images, or video). The model is available to businesses through an API in the Baidu AI Cloud service.

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## Hunyuan-DiT

A model developed by Tencent for image generation. The model uses a technology base similar to that of OpenAI's Sora, which can potentially generate high-quality video using the model.<sup>23</sup> In May 2024, after a round of improvements, the company decided to open-source the model, contributing to the development of the text-to-image model industry in China.

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## Doubao

A proprietary model developed by TikTok's parent company ByteDance. The model can both receive data in various modalities and generate text and images. It is available through a separate application, similar to ChatGPT, in the form of several assistants specialized for users' daily tasks, such as searching the Internet, learning English, helping to write texts, etc.<sup>24</sup> Configurations of the model are available to companies via an API.<sup>25</sup> In September 2024, ByteDance introduced new LLM models, Doubao-PixelDance and Doubao-Seaweed, designed for processing and generating video content. For example, the Doubao-PixelDance model, which is capable of processing complex and sequential movements, can generate 10-second videos, while the Doubao-Seaweed model can generate clips up to 30 seconds in length.<sup>26</sup> In December 2024, was released Doubao 3D generation model, a model capable of creating 3D objects.<sup>27</sup>

In addition to large technology companies, China boasts a thriving sector of companies that specialize in developing AI solutions, especially general-purpose foundational GenAI models. Among their solutions, the following are the most prominent:

#### SenseNova

SenseNova 5.5 is a multimodal by SenseTime, a company that produces AI solutions in various fields. As mentioned above, the family of models was the first to outperform advanced solutions offered by OpenAI. The model is available to companies via an API.<sup>28</sup>

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#### GLM

GLM-4 Plus is a foundational model from Zhipu AI, a startup specializing in AI solutions. Developers note the model's ability to interact with different types of agents, including browsers, other models, etc.<sup>29</sup> The company that developed the model is notable for being the first in China among generative AI developers to receive foreign investment<sup>30</sup> from Prosperity7 Ventures, an Arab fund owned by oil giant Saudi Aramco, at the end of May. The model is available to companies via an API.<sup>31</sup>

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#### Yuan

Yuan 2.0-M32 is an open-source model developed by IEIT Systems. The model is a comprehensive multi-agent system using 32 narrowly focused models, the selection of which for each task is made by the coordinator model. The company notes that training the model required 11 times less computational resources than comparable conventional models.

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#### Kimi

A model from the Moonshot AI start-up that features an impressive context window size of 2 million tokens, allowing it to tackle tasks with large amounts of input.<sup>32</sup> GPT-4o, in comparison, has a context window size of only 128 thousand tokens.<sup>33</sup> Companies can access the model via an API.<sup>34</sup>

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#### Vidu

ShengShu AI's video generation model Vidu 1.5 was introduced in September 2024. The family of models is the first in China to produce videos with a quality on par with OpenAI's Sora.<sup>35</sup>

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#### Spark

Spark 4.0 is the latest version of the language model developed by iFLYTEK. The model was introduced in September 2024 and is designed for a variety of tasks, including natural language processing, support system automation, and content creation. According to the company, the model outperforms GPT-4 Turbo in parameters such as language comprehension, logical reasoning, and mathematical ability.<sup>36</sup>

In addition to Vidu, several other text-to-video models with quality comparable to Sora have been released in China since the summer of 2024. These include Video-1 by Minimax<sup>37</sup> and Kling by Kuaishou.<sup>38</sup> Corporate access to these models is still limited in most cases.

**In addition to general-purpose models, China is a leader in the development of specialized LLMs that can handle different industry-specific tasks. These include:**

#### **Pangu**

Pangu 5.0 is a set of industrial models developed by Huawei for key sectors of Chinese economy.<sup>39</sup> Presented by 4 series of models, the smallest has only 1 billion parameters and the largest – more than a trillion. The model is notable for the fact that it can be adapted to various business tasks and can also take into account the laws of physics. Thanks to that it can be successfully used in construction, autonomous transport and other industries.<sup>40</sup>

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#### **ChatRhino (Yanxi)**

A family of industrial models developed by JD, a leading e-com player in China. It includes models customized for finance, logistics, urban planning, retail, and other key industries.

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#### **ZTE Nebula**

A foundational model developed by ZTE specifically for the telecommunications industry.<sup>41</sup> The model specializes in simplifying human-system interaction in the industry's business processes and plays the role of an agent.

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#### **Code Raccoon**

A highly specialized model developed by SenseTime<sup>42</sup> to improve programming productivity. The model is available to companies via an API, which allows it to be integrated into various business processes.

In addition to those listed above, large groups of industrial models include solutions by other telecommunications companies, such as China Telecom's Xingchen and China Mobile's Jiutian. Industrial models are mostly used by companies internally or provided to other companies as part of a partnership.

Finally, there are highly specialized models in China that are trained for a specific task. Typically, their value lies in their small size and thus low cost of use. Examples include the SageGPT model for searching information on an intranet portal, Skylark (Yun Que), a text-to-image chatbot for creative tasks, Vimi, which can generate short video clips with AI avatars based on a single photo, etc.

Currently, China is leading in the development of foundational models not only among the BRICS+ countries but also globally, and a serious rivalry between China and the US for technological supremacy is expected in the next few years.





## Russia

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**Russian models provide users and businesses with answers in Russian that are of higher quality than average foreign peers, e.g., GPT-3.5 Turbo**

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**More than a third of the GenAI-based models used by Russian companies are Russian**

In Russia, the first mass-access models were launched by Yandex and Sber in early to mid-2023, a little more than half a year after ChatGPT became available. Almost all models popular among users and businesses are proprietary and created mainly by large companies. Currently, Russian models provide users and businesses with answers in Russian that are of higher quality than average foreign equivalents, such as GPT-3.5 Turbo. As a result, more than a third of the GenAI-based models used by Russian companies are Russian. This estimate is based on the findings of the CTO survey.

Technology companies are actively incorporating models into their own services. For example, Sber is integrating its neural networks into SberMedAI medical solutions, SberBoom<sup>43</sup> smart speakers, and GigaLegal<sup>44</sup> legal assistant. Yandex uses YandexGPT to generate flypages on Yandex Market and provide generative search answers, as well as in Neuro question-answering services and Alice Pro smart assistant.

In addition, models in Russia are largely geared to business applications: vendors provide access to their models via APIs. The advantages of Russian models are good quality in the Russian language, possibility of additional training in own ML development services of technology companies, and easy access.



Almost all models in Russia are multipurpose and are not customized for a specific task. The most advanced foundational models are developed by large technology companies:

## Text-based models

### GigaChat

GigaChat MAX is a text-based model from Sber, which is the basis of the GigaChat chatbot – the Russian version of ChatGPT. The model is the latest in a series of generative language models (ruGPT-2, ruGPT-3, ruGPT-3.5, etc.) developed at Sber before ChatGPT was created. The model ranked first among all Russian AI models according to the MERA benchmark outperformed GPT-4 in 60 out of 100 cases<sup>45</sup>.

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### YandexGPT

Yandex's text-based generative AI models, launched in October 2024. The latest line of models includes two versions: YandexGPT 4 Pro for complex tasks and YandexGPT 4 Lite for simpler use cases. YandexGPT 4 Pro shows better results than YandexGPT 3 Pro in 70% of cases and comes close to OpenAI's GPT-4o.<sup>46</sup>

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### Cotype

An MTS model. It was launched in 2024 and is already available for on-premise installation. The model is available in several configurations. Cotype Plus focuses on tasks involving generation and memorization of large texts. Cotype Nano is optimized for work on low-power devices, including smartphones and laptops.<sup>47</sup>

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### Gen-T

A family of models by T-Bank was launched in mid-2024 and presented in two models: T-Lite and T-Pro. Both models were created as a result of additional training of Qwen-2.5 from the Alibaba Group.<sup>48</sup>

## Image and video creation models

### Kandinsky

A family of models for image and video processing. Kandinsky 4.0<sup>49</sup> is a model for image and animation generation, Kandinsky Video 1.1 is the first model in Russia capable of generating videos up to 12 seconds long.<sup>50</sup>

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### YandexART

A model for generating images and animations<sup>51</sup> launched in October 2023.<sup>52</sup> In addition to access via an API for companies, it is used in Yandex's Shedevrum application. In September 2024, the model was expanded to include functionality for generating short videos.<sup>53</sup> In October 2024 was released YandexART 2.0 – updated version of the model with a hybrid architecture.<sup>54</sup>

## Some of the models are developed by AI-focused start-ups and research organizations/alliances:

### JustGPT

A model from JustAI, a startup focused on conversational AI; it is a fine-tuned version of Llama 2 with 70 billion parameters.

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### OmniFusion

OmniFusion 1.1 is the first Russian multimodal model developed in Russia by AIRI,<sup>55</sup> an artificial intelligence institute. The model was created on the basis of Mistral's open-source solution and is also open-source.

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### Saiga

A family of Russian open-source models by Ilya Gusev, an independent developer, which is an adaptation of the international Llama and Mistral models that runs more effectively in Russian language.<sup>56</sup>

Despite the relatively large number of models, Russian models still lag behind the leading solutions of Chinese and Western companies in terms of quality. It is expected that in the future only those companies will remain on the market that can offer comparable quality, drastic price cuts, or willingness to customize products, for example, by offering the possibility of on-premise model installation into the customer's infrastructure.



## The United Arab Emirates

The country is actively developing its own models to take a leading position in the Middle East region and the global market as a whole. The models are mainly developed in collaboration between research institutes and companies specializing in the development of applied AI solutions. In terms of language, the developers focus on both Arabic and English, which allows the models to be used in many countries around the world: according to the CTO survey, Falcon models have been used by at least one local company in every country except China. The models are mostly based on existing solutions (usually from the Llama family) and are open-source.

**Two of the most advanced and popular non-specialized models are described below:**

### Falcon

A family of models developed by the Abu Dhabi Institute of Technology Innovation in 2024.<sup>57</sup> It is emphasized that the models are designed with a focus on Arabic and English, but are adapted to a range of languages that allow them to be used abroad. For example, the government of São Paulo, Brazil, is actively adapting the model to be used in its public services.<sup>58</sup> Among its pioneering configurations is Falcon Mamba 7B, which is based on the State Space Language Model (SSLM) architecture. Another outstanding model in the family is Falcon 2 VLM, which uses video as input. In December 2024, the company released the latest generation of models – Falcon 3. According to the company, models of this generation are compact (up to 10 billion parameters) while being among the best in their class.<sup>59</sup> All Falcon models are open-source.

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### JAIS

A family of open-source models offered by Inception (owned by G42), developed in collaboration with the Mohammed bin Zayed University of Artificial Intelligence and designed specifically for Arabic. The JAIS 70B model, released in August 2024,<sup>60</sup> is trained on 370 billion data tokens, of which 330 billion are in Arabic, the largest Arabic dataset of any open-source model trained to date. The company notes that models based on up to 30 billion parameters are trained from scratch, while those with more than 30 billion parameters are based on Llama 2.

In October 2024, G42 announced the upcoming launch of NANDA, an enhanced language model targeting primarily Hindi speakers in India.

In addition to general-purpose models, the UAE is developing specialized industry-specific models. For example, Med42, an open-source model developed by the G42 Group based on Llama 3, is designed to handle medical tasks such as research support, medical report analytics, and test result analysis.

As noted above, the UAE is committed to transparency and equal access to technology. A separate pioneering example is the K2-65B open-source model<sup>61</sup> developed by the Mohammed bin Zayed University of Artificial Intelligence in collaboration with Petuum and LLM360. An important feature of the development is the publication of all materials related to the training lifecycle of the model. This open-source approach is expected to enhance collaboration among independent model developers.

Going forward, the UAE is expected to be a major supplier of foundational models in Arabic for the Middle East region.



# India

India was relatively late in the game when it started developing generative AI technology in late 2023. At the same time, there are about 10 popular generative AI models in India today. Among them, there are two completely indigenous models developed by Indian companies:

## Krutrim

A proprietary model associated with Ola and launched in late 2023, it is the first LLM in India to support 10 major Indian languages.

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## Hanooman

India's first large-scale multimodal model developed by IT companies BharatGPT and Reliance. Apart from being able to receive and generate data from different modalities, the model supports 35 languages and is characterized by its enhanced ability to solve business problems in areas such as education, finance, management, healthcare, etc. The model is open-source.

In late October 2024, start-up Sarvam AI developed Sarvam-1, India's first proprietary multilingual LLM. Sarvam-1 is a 2-billion-parameter model trained on 4 trillion tokens using NVIDIA H100 GPUs. Its custom tokenizer is four times more efficient than leading models trained on English and Indian language texts. Sarvam-1 supports 11 languages.

The remaining models are mostly adaptations of foreign solutions (most of them are Llama-based).<sup>62</sup> They also include industrial models:

## Dhenu

Dhenu 2.0 is a model by Indian start-up KissanAI that has been specially trained to better understand agriculture and specific terms related to it.<sup>63</sup> It can be used by farmers in combination with verbal communication tools.

Most of the remaining models are general-purpose models. In the future, we can expect the quality of India's own models in local languages to improve as expertise in such a training architecture grows.



## Saudi Arabia

The country is playing catch-up when it comes to the development of generative AI models. The first models based on other solutions (Llama) appeared at the end of 2023, fully indigenous development – at the beginning of 2024. The most important general-purpose models are described below:

### Mulhem

A proprietary model developed by Watad, a developer of AI-based solutions, cybersecurity and process automation systems. The model was trained using data from Saudi Arabia, which may make it more attractive to local users than other Arabic models. The model is designed to work in both Arabic and English.

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### ALLaM

An open-source model of small size (13 billion parameters) created in collaboration between the Saudi Arabian Data and Artificial Intelligence Authority (SDAIA) and IBM<sup>64</sup> based on Llama 2. The model is available on the IBM Watsonx platform and is designed to be used in both Arabic and English.

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### AceGPT

A model developed in 2023 by KAUST University in Saudi Arabia in collaboration with two universities in China and designed for use in Arabic.<sup>65</sup> The model is also based on Llama 2.

Despite the lag in generic model development, Saudi Arabia has an advanced industrial solution, the proprietary Metabrain model of oil giant Saudi Aramco, which is designed to handle tasks in the oil and gas industry, such as predicting demand for refined products. At the time of the model's release (March 2024),<sup>66</sup> the company claimed that the model, with its 250 billion parameters, was the world's largest industrial LLM. The model was trained using, among other things, the company's internal data accumulated over more than 90 years of operation. According to experts interviewed by Yakov and Partners, the government is challenging the company to scale the model to other industries, which could help Saudi Arabia compete with other advanced solutions in the region and globally.



## Brazil

Companies in Brazil are not very keen on creating generative AI models. Currently, there is only one company in the country developing its own LLMs – Maritaca AI, the creator of the Sabia family of models. The first generation was released in early 2023, and in July 2024 the Sabia 3 model was released, which, according to the company's tests based on 64 exams, performs better in Portuguese than OpenAI's GPT-4o.<sup>67</sup> The model is proprietary and available via an API.

Other models developed in Brazil are mostly developed by universities (e.g., University of São Paulo)<sup>68</sup> and are adaptations of foreign open-source solutions.

Going forward, it would make the most sense for Brazil to strategically focus on developing its own models, or to move entirely to implementing solutions by purchasing models from partners within or outside BRICS+.



## South Africa

Language model development in South Africa is complicated by the fact that there are 11 official languages and a number of dialects. Currently, there is only one small-size indigenous model,<sup>69</sup> the Inkuba LM by the African company Lelapa AI, which has been adapted for five dialects. The model was released in August 2024.

South Africa also has a commercial model in English, ChatSME<sup>70</sup> by Retail Capital (a division of TymeBank), which is designed for SMEs and released in the second half of 2023. The model uses data collected in-house over 12 years in the South African market and specializes in information retrieval.

Businesses and technology companies in South Africa are expected to focus primarily on adapting advanced foreign solutions and adding translation layers.



# 350–600 billion US dollars

could be the expected impact of the technology  
by 2030

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Source: open sources,  
Yakov and Partners analysis



# Section 2.

## Application of generative AI models in business

### Economic impact from the adoption of generative AI-enabled solutions

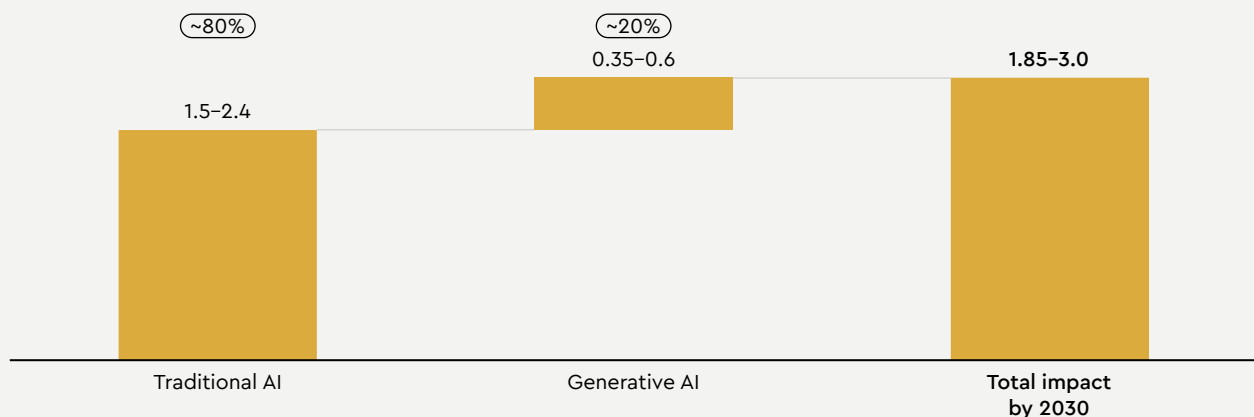
Yakov and Partners estimates that by 2030, the full economic potential of GenAI in the countries studied could reach USD 0.9–1.4 trillion in nominal prices, or 20% of the total AI impact in these countries.

The expected impact from the adoption of the technology could reach USD 350–600 billion by 2030.

In calculating the impact, Yakov and Partners took into account the sectoral structure of the economy, as well as the level of digitalization and the potential for generative AI development in each of the countries studied, which influences what portion of the possible AI use cases will be deployed in each of the industries in a given country.

#### Expected financial impact of AI adoption on BRICS+ economies by 2030, USD trillion

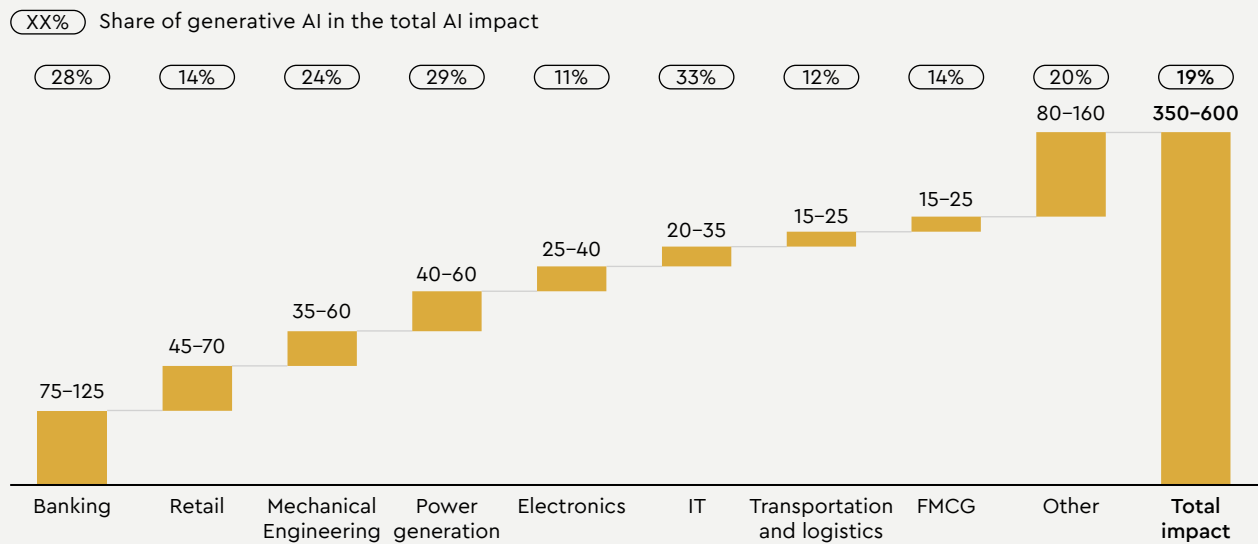
XX% Share of total impact by 2030



Source: Yakov and Partners analysis

The impact of generative AI adoption is estimated to be about 20% of the total AI impact, which includes traditional AI and advanced analytics – solutions based on computer vision, conventional predictive models, RPA, and other technologies. This share takes into account the current state of the technology and use cases that can be deployed today. In the long term, it may grow significantly as new types of models and use cases emerge.

### Expected financial impact of generative AI adoption for BRICS+ economies, by sector, by 2030, USD billion



Source: Yakov and Partners analysis

Six key industries account for nearly 70% of the potential impact of generative AI adoption in the countries studied: banking, retail, engineering, energy, electronics, and IT. The banking industry is the largest in terms of impact – it alone accounts for 20% of the impact on businesses. According to the CTO survey, the majority of companies in the banking sector that deploy generative AI are planning to achieve an EBITDA gain of at least 1%. Popular use cases for generative AI in banking include integrating the technology into customer support (in chatbots or as an operator assistant), personalizing marketing campaigns by analyzing customer data from multiple sources, and integrating with databases to simplify access to information.

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**IT has the largest share of the generative AI impact of AI solutions, with the technology accounting for nearly one-third of the impact in the industry**

The largest share of generative AI in the overall impact of deploying AI solutions is seen in the IT industry, with the technology accounting for nearly one-third of the impact in the industry. This high percentage is due in part to the fact that LLM models work well with code. This makes it possible for generative AI to fundamentally change the lifecycle of IT product development with use cases such as code completion for the developer, generation of entire program blocks, creation of tests, and code documentation. The next stage of technology development in this area is "virtual developers" able to independently understand and decompose the task, write and test code, and independently release the solution.

Geographically, China predictably accounts for more than 86% of the total impact; India, Brazil and Russia together account for 12%; and other countries contribute less than 2%. This distribution is mainly due to the size of the economies. In terms of specific impact (estimated per USD 1,000 of revenue in the country), China also ranks first, but the gap with other countries is not as significant. China is followed by India and the UAE with about half of China's specific impact; other countries have a specific impact that is about three times smaller. The differences in specific impact are explained by the degree of digitalization of the economy (countries with a higher degree of digitalization have a higher expected level of use case adoption in industries) and the industry mix (countries with a higher share of technologically advanced industries have a larger specific impact).

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**>86%**

of total BRICS+ impact predictably attributable to China in geographic terms

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**12%**

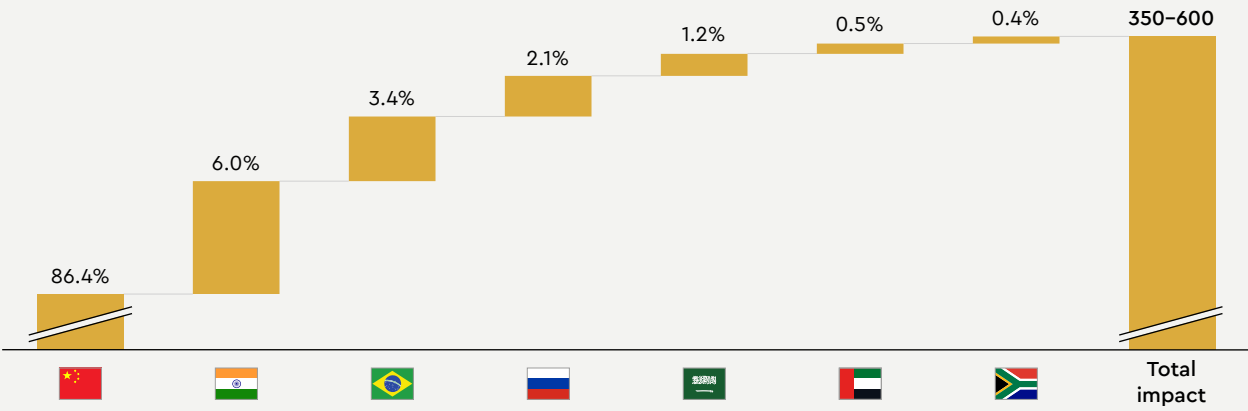
India, Brazil, and Russia combined

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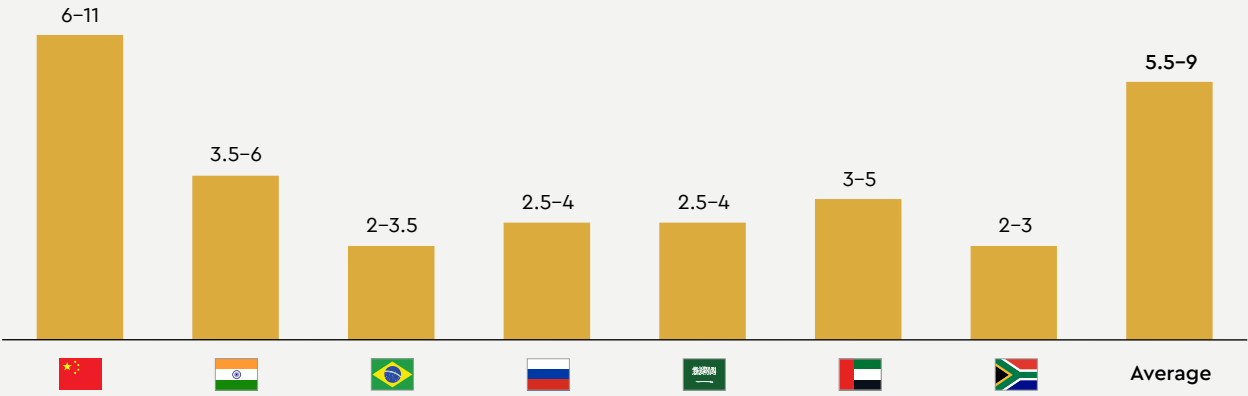
**<2%**

Other countries

**Expected financial impact of generative AI for BRICS+ economies by 2030, USD billion**



**Specific impact of generative AI adoption on BRICS+ economies by 2030, USD of impact per USD 1,000 of revenue**










Source: Yakov and Partners analysis

In terms of the impact distribution across industries by country, two groups of countries clearly stand out: countries where the impact is more evenly distributed (China, India, Brazil, Russia), and countries where there is a dominant industry that accounts for more than a third of the impact (the UAE, KSA, South Africa).

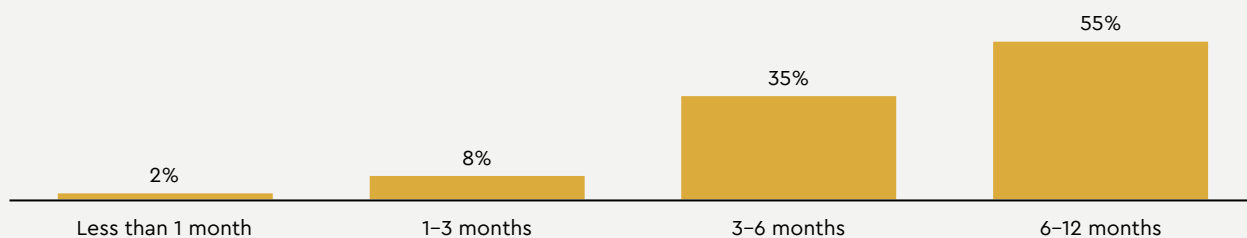
In the UAE and South Africa, banking accounts for 37% and 33% respectively, while in Saudi Arabia 54% of the impact is concentrated in the oil and gas industry. In other countries, the banking industry is the largest source of the impact at 18-23%, depending on the country.

## Breakdown of the impact of generative AI adoption by industry within a country, %

							
Retail	13%	5%	8%	12%	5%	1%	23%
Transportation and logistics	5%	2%	3%	6%	17%	0%	1%
FMCG	4%	8%	7%	8%	0%	2%	4%
Engineering	11%	11%	5%	8%	9%	0%	4%
Banking	21%	23%	18%	20%	37%	13%	33%
Electronics	7%	3%	1%	2%	0%	0%	0%
Metals and mining	4%	3%	3%	10%	0%	0%	8%
IT	6%	5%	4%	11%	0%	0%	1%
Power generation	10%	14%	12%	8%	12%	54%	2%
Telecommunications	2%	4%	10%	3%	7%	6%	10%

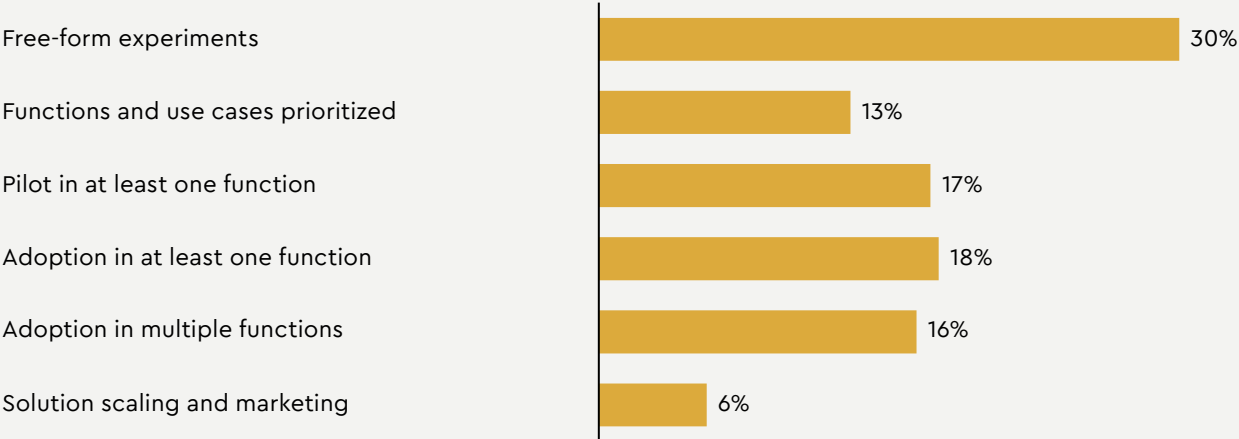
## Level of generative AI adoption in business. Analysis by BRICS+ countries

Companies by time since first deployment of generative AI, % of surveyed companies



Source: Yakov and Partners analysis

### Stages of generative AI deployment in BRICS+ companies using the technology, % of companies



Source: Yakov and Partners analysis

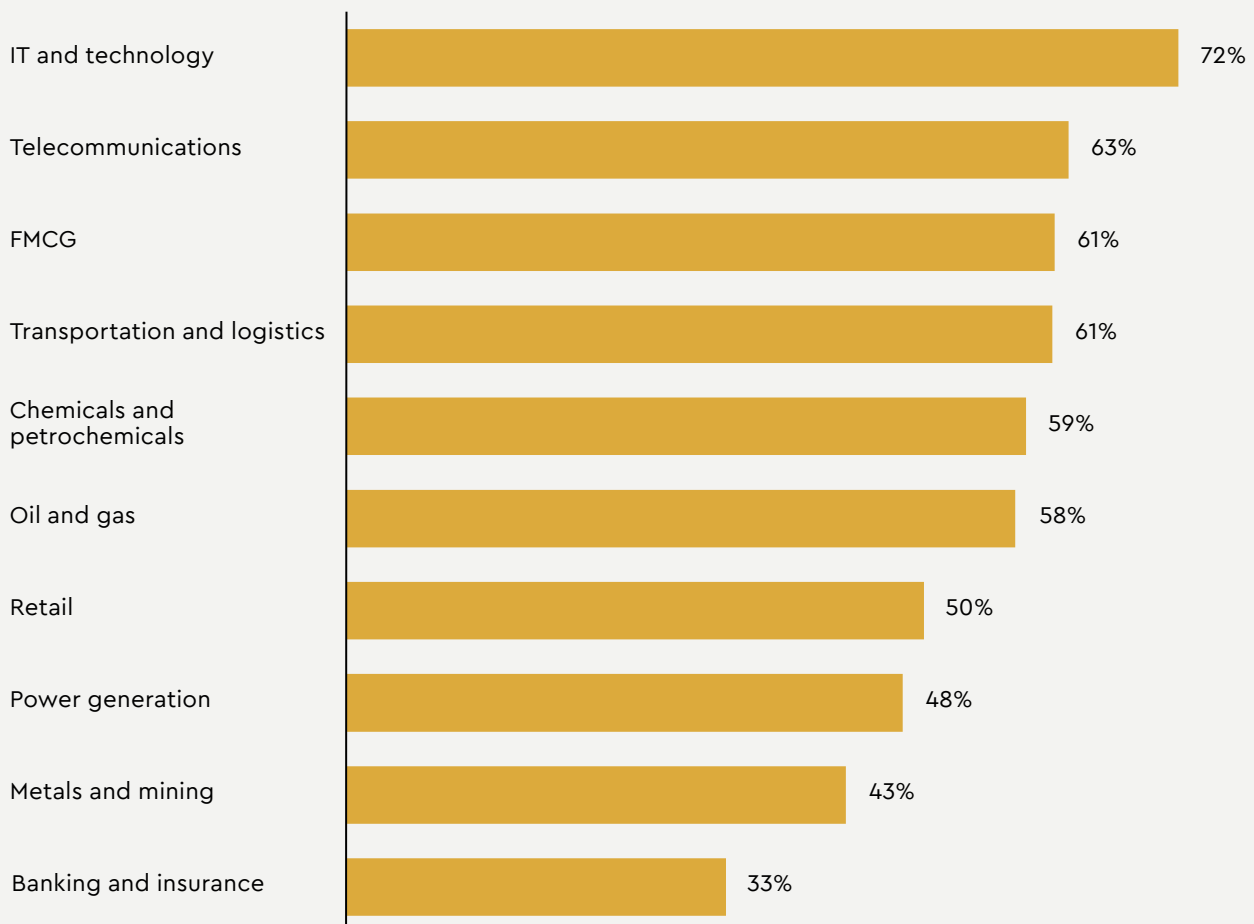
### The majority of companies using generative AI (55%) have at least six months of experience interacting with the technology

As part of the CTO survey among the BRICS+ countries conducted by Yakov and Partners in the summer of 2024, we interviewed 700 CTOs, 100 in each BRICS+ country, across 10+ industries in each country. The survey was conducted online with multiple choice and open-ended questions. The names of the companies participating in the survey are not disclosed. The majority of companies using generative AI (55%) have at least six months of experience with the technology: companies began adopting generative AI about a year after it started to gain popularity.

During this time, organizations have made significant progress in integrating the technology into business processes. For example, more than half of the companies using generative AI (57%) are currently in the active implementation phase (pilot or later stage). At the same time, 6% of companies report that they are scaling the solutions they have created by selling them to other organizations.

IT is by far the most advanced sector in terms generative AI adoption (72% of companies at the pilot or later stage), as technology companies integrate the solutions they create into their own business processes. Next in line are telecommunications companies (63% of companies), which traditionally appear on lists of the most technologically advanced industries, as well as FMCG and transportation (61% of companies each). In the banking sector, on the other hand, more than two-thirds of companies have not gone beyond the prioritization and experimentation phase, which is explained by the specific regulatory conditions of the sector. Among the exceptions are Russia's Sber and T-Bank, which are not only actively using GenAI in their operations, but also creating their own models and offering them to other companies. Among the least advanced sectors are metals and mining, and power generation (43% and 48%, respectively) – sectors with traditionally longer innovation cycles.

### Percentage of companies that have progressed to active deployment of generative AI (pilot and later stages), % of companies



Source: Yakov and Partners analysis

From a functional perspective, the following four areas were identified where generative AI solutions are most commonly embedded in organizations.

## **IT**

45% of companies are actively adopting GenAI solutions, such as a code-writing assistant, automatic code documentation, and the use of generative AI in platforms for managing an organization's IT processes and in IT support for employees. In the IT function, more than 7% of companies report that they sell solutions to other organizations: the best-known services in BRICS+ countries include the Russian products Kodify from MTS, Code Assistant from Yandex, Giga Code from Sber, and the Indian Markovate, which is active in the UAE market.

## **Customer service**

41% of companies are actively adopting GenAI solutions, such as prompts for support operators, chatbots, tools for training customer support staff, systems for collection and semantic analysis of feedback from open sources.

## **Marketing and sales**

39% of companies are actively adopting GenAI solutions, such as creating illustrations for marketing campaigns, sending targeted mailings to customers, translating advertisements into other languages, forecasting product demand, analyzing market trends. According to the CTO survey, Chinese companies are implementing solutions for this function in 9 of the 15 industries surveyed. This is the highest percentage among the BRICS+ countries.

## **Manufacturing**

36% of companies are actively adopting GenAI solutions, such as assessment of the criticality of changes in equipment parameters (e.g., part temperature) for the production process, predictive analytics, plant safety monitoring systems, process optimization and capacity planning systems.

The lagging areas include both functions where it is technically difficult to implement generative AI (e.g., finance or supply chain, where working with precise numerical data requires the use of multi-agent systems) and areas where the complexity of implementation is relatively low but the impact is limited or difficult to justify (HR, internal communications, strategy). Solutions in these functions are expected to be second tier, once the impact of the highest priority use cases has been confirmed.



## Companies by the extent to which generative AI is used in the organization's functions, % of companies

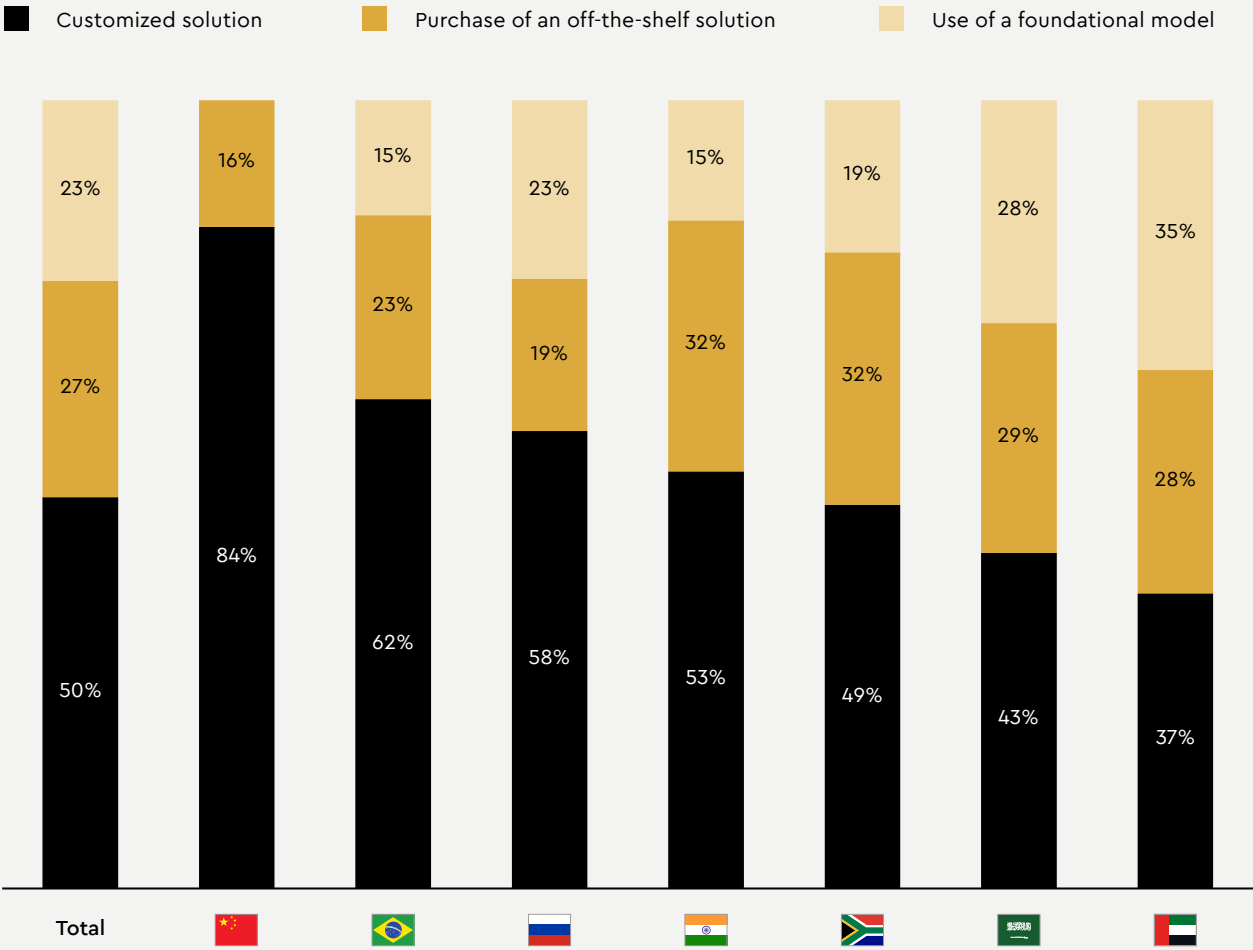
	Not used	Free-form experiments	Priority use case	Pilot	Implementation	Sales to external markets	Active adoption (pilot and beyond)
IT	20%	24%	11%	18%	20%	7%	45%
Customer service	23%	25%	11%	15%	21%	5%	41%
Marketing and sales	25%	24%	13%	16%	17%	5%	39%
Manufacturing	35%	18%	11%	16%	18%	2%	36%
R&D	33%	23%	10%	14%	15%	5%	34%
HR	34%	22%	11%	15%	16%	2%	33%
Supply chain	39%	19%	10%	15%	13%	4%	31%
Internal communications	40%	21%	10%	13%	13%	3%	29%
Finance	45%	18%	8%	14%	11%	3%	29%
Strategy	38%	23%	10%	12%	13%	3%	29%

Source: Yakov and Partners analysis

To understand and evaluate the effectiveness of generative AI solutions, a detailed interview was conducted for each of the 700 companies surveyed: up to five solutions at the intersection of different functions (manufacturing, marketing, etc.) and their implementation models were studied. In total, information was collected on approximately 7,000 generative AI-enabled solutions.

The study identified three most common adoption models. These include: using a foundational model without any modifications or integrations; purchasing an off-the-shelf solution from an external developer; and developing a custom solution that involves, for example, fine-tuning the foundational model for a specific task or deep integration with the company's systems.

## Structure of solutions by adoption model, % of companies



Source: Yakov and Partners analysis

Half of the companies have implemented custom solutions, which involve fine-tuning the model for a specific task or integrating the model with other IT solutions

The analysis showed that half of the companies have implemented custom solutions, which involve fine-tuning the model for a specific task or integrating the model with other IT solutions. This observation reflects the willingness of companies to devote resources to deeper integration of technology into their business. Custom solutions were particularly popular in Russia, China and Brazil, which in the case of Russia and China can be explained by strong in-house development capabilities that allow for more complex but potentially more effective solutions. In contrast, in the United Arab Emirates, nearly two-thirds of companies prefer an off-the-shelf solution or to use a foundational model as is, which may reflect companies' desire to use a simple tool for quick solutions to specific tasks.

Companies independently choose which foundational model to use – primarily in two situations: using the model as is and developing a custom solution using the model (as opposed to purchasing off-the-shelf solutions where the vendor often does not disclose the technical basis of the product). In this regard, companies that use a custom solution or a foundational model as is were additionally asked about the specific model they use.

Overall, OpenAI predictably ranks first among text-based models in the BRICS+ countries: half of the solutions use these models, and in the UAE the share of such solutions reaches 70%. China is the only country where the share of solutions based on OpenAI neural networks is less than a third – only 10%; this is explained by the official ban on access to the models imposed by the US company in July 2024, as well as strong indigenous solutions that are not inferior to the GPT-4 family of models in terms of quality, both in Chinese and foreign benchmarks.

OpenAI is followed by Google , META,<sup>71</sup> Yandex and GigaChat.

Dall-e traditionally dominates the text-to-image models: its share of solutions reaches 27%.

In general, each country in the grouping has its own unique profile of model usage: for example, in China, solutions from global companies are generally not popular, but local models from technology giants are actively used, most notably Baidu's ERNIE and Huawei's Pangu. It is worth noting that the model market in China is highly competitive due to the participation of smaller players. In addition to the models mentioned above, many companies use SenseNova, ZTE Nebula, Yuan, etc.








Saudi Arabia stands out with a high proportion of Huawei-based solutions (15%). This reflects the close technological ties between the company and the country, both at the government level (e.g., a memorandum of understanding signed at the end of 2022 between Huawei and the Ministry of Communications)<sup>72</sup> and at the level of commercial companies (cooperation with Saudia Airlines,<sup>73</sup> e-com company Zode,<sup>74</sup> telecom company Zain KSA,<sup>75</sup> etc.).

In the UAE, Russian solutions such YandexGPT (8%), GigaChat (6%), and Kandinsky (5%) are popular, which may be due to the large number of Russian-speaking start-ups in the country.

Finally, Brazil has a relatively high rate of adoption of the UAE's Falcon model, reflecting, among other things, agreements signed by municipalities (São Paulo) with the UAE to integrate the model into municipal services<sup>76</sup> – and potentially into the business processes of government and commercial organizations.

Interestingly, almost all of the key models have roughly the same level of representation in solutions across functional areas. This reflects, with rare exceptions, their versatility and lack of specialization for specific types of business tasks.

### Distribution of solutions by model used, % of solutions in the country

Model used	Total							
OpenAI (chatGPT, GPT-4o, GPT-4, GPT-3.5, etc.)	50%	9%	56%	44%	41%	70%	36%	31%
OpenAI (DALL-E 3)	27%	1%	32%	29%	29%	27%	23%	19%
Google (Gemini, Gemma)	34%	0%	37%	43%	38%	26%	39%	23%
Anthropic (Claude 3)	8%	1%	8%	8%	4%	8%	9%	5%
Stability AI (Stable LM 2)	7%	0%	7%	3%	6%	10%	8%	6%
Stability AI (Stable Diffusion)	7%	1%	8%	2%	7%	9%	9%	5%
META (Llama 3)	18%	2%	22%	24%	13%	17%	15%	7%
Mistral AI (Mixtral)	5%	0%	3%	2%	4%	7%	9%	8%
TII (Falcon)	6%	0%	4%	9%	5%	7%	7%	3%
Huawei (Pangu 3.0)	8%	11%	9%	5%	4%	9%	14%	7%
Baidu (ERNIE 4.0)	4%	31%	2%	2%	2%	5%	5%	4%
Alibaba (Tongyi Qianwen 2.0)	5%	2%	4%	7%	3%	6%	6%	1%
Tencent (Hunyuan)	4%	1%	2%	3%	1%	5%	7%	3%
Midjourney	4%	0%	3%	3%	3%	7%	4%	3%
Sber (Gigachat)	4%	0%	2%	1%	2%	6%	6%	14%
Sber (Kandinsky)	4%	0%	2%	1%	1%	5%	4%	12%
Yandex (YandexGPT)	10%	0%	8%	9%	2%	8%	7%	31%
Yandex (YandexART)	4%	0%	2%	2%	0%	5%	2%	12%
Other*	4%	43%	1%	6%	6%	0%	2%	6%

\* MTS, T-Bank, SenseNova, GLM-4, Yanxi (ChatRhino), Yuan 2.0, ZTE Nebula, etc.

Source: Yakov and Partners analysis

Companies using off-the-shelf solutions were asked about the type of solution provider. In general, BRICS+ countries prefer local solutions (45% of solutions), followed by solutions from non-BRICS+ companies (31%) and solutions from BRICS+ companies (24%). The most popular providers are local technology giants: their role is particularly prominent in China (72% of all solutions). In India, almost a third of companies use products from non-BRICS+ start-ups, while Russia has the lowest share of solutions from non-BRICS+ companies – only 5% (due to sanctions and complicated access to Western technologies).

In this context, Russian companies are the most active in using solutions from BRICS+ partner countries: according to the survey, 40% of solutions were purchased using this model. Russia also has the largest share of solutions purchased from local start-ups – almost a quarter, which reflects the high maturity level of the market of small and medium-sized AI developers in the country. JustAI, Conspectus, AI Referent<sup>77</sup> and others are among the notable companies in this sector.

Most solutions are still delivered directly by companies (50% on average, 60% in the UAE, 70% in Russia), with the remainder delivered through technology vendors or solution marketplaces.








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**For each generative AI use case, there are on average one or two additional technologies, the most popular of which are computer vision and predictive modeling**








Often, generative AI is not enough to perform highly specialized tasks that require high accuracy (e.g., identifying objects in a video or predicting market performance). In this case, it is integrated with other technologies (such as predictive models, computer vision, RPA, RAG) and plays the role of a universal agent in this system, delegating tasks to other types of AI or technology solutions. According to the survey results, for each generative AI use case,<sup>78</sup> there are on average one or two additional technologies, the most popular of which are computer vision and predictive modeling (both technologies are most often used in manufacturing: half of the companies using generative AI in this function utilize them).

In terms of the number of technologies used in conjunction with generative AI, China leads by a wide margin, with an average of three technologies used for each generative AI use case. In addition to the most popular solutions, Chinese companies also report the Internet of Things, self-driving drone technologies, and CRM systems. Other countries are also actively developing solutions based on generative AI along with other technologies. For example, in Russia, a joint team from AIRI and the MIPT Center for Cognitive Modeling<sup>79</sup> has developed a system for natural language control of mobile robots using generative AI. The system is currently in the experimental stage and may be used for various household and business tasks in the future.

## Distribution of solutions by provider type, % of solutions in the country

Type of provider	Total							
Local start-up	9%	11%	7%	10%	9%	7%	11%	24%
Local technology major	36%	72%	23%	35%	41%	42%	45%	31%
Start-up from the BRICS region	10%	0%	15%	5%	7%	9%	9%	9%
Technology major from the BRICS region	14%	0%	20%	8%	8%	11%	14%	31%
Global start-up	8%	0%	7%	9%	29%	4%	6%	4%
Global technology major	23%	17%	29%	33%	6%	26%	15%	1%

## Percentage of solutions where the technology is co-deployed with GenAI, by country, % of solutions in the country

Answer option	Total							
RAG	26%	66%	22%	16%	29%	30%	32%	20%
Computer vision	44%	77%	50%	40%	39%	41%	50%	23%
Predictive models	42%	78%	42%	32%	54%	43%	40%	42%
RPA	30%	78%	20%	16%	53%	36%	39%	16%
Other (specify)	2%	19%	1%	0%	3%	1%	0%	1%
Only generative AI models are used	24%	5%	20%	36%	4%	31%	20%	34%
Average number of technologies	1.4	3.2	1.3	1.0	1.8	1.5	1.6	1.0

Source: Yakov and Partners analysis

# Generative AI adoption dynamics, Russia's case

**While none of the respondents in 2023 reported full adoption of generative AI in their business processes, more than 50% of companies did so a year later**

In the Yakov and Partners study titled "Artificial Intelligence in Russia – 2023: Trends and Outlook," a CTO survey was conducted among 100 large companies, and the results can be compared with the current BRICS+ study.

In terms of the overall rate of technology adoption, companies have made significant progress over the past year: while none of the respondents in 2023 reported full adoption of generative AI in their business processes, more than 50% of companies did so a year later.

The functions where generative AI is used have also changed: whereas companies used to focus on simple solutions in marketing and customer support, the distribution of solutions across functions has now become more balanced, particularly with the addition of domains that require high-quality models due to the critical role of IT systems in business processes (manufacturing). The average number of deployments per company for those using generative AI has increased from 2.4 to 2.9.

## Comparison of the overall level of generative AI adoption in Russia, 2023 vs. 2024, % of companies using generative AI

Technology adoption level	2023	2024
Free-form experimentation with generative AI	67%	29%
Priority functions and use cases identified for generative AI implementation, no solution implemented	33%	17%
Generative AI solutions are fully adopted in at least one function of the organization	0%	54%

## Functions where generative AI-based solutions have been implemented, % of solutions

Functions	2023	2024
Manufacturing	9%	36%
HR	11%	37%
Marketing and sales	69%	38%
Customer service	57%	47%
IT	31%	40%
Strategy	6%	14%
Finance	3%	13%
Supply chain	3%	14%
R&D	49%	28%
Internal communications	6%	19%
<b>Average number of deployments (among organizations using GenAI)</b>	<b>2.4</b>	<b>2.9</b>

Source: Yakov and Partners analysis

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Source: open sources,  
Yakov and Partners analysis



From 2.4 to 2.9

increased the average number of deployments  
per company among those using generative AI  
over just one year



Changes have also occurred in the models that companies prioritize for deployment: solutions from OpenAI lost to domestic for the first time, the number of models per company decreased from three to two. Some companies have started to use new models that were not available on the Russian market before: among them are the French Mixtral, Falcon from the UAE, and a whole class of Chinese models (ERNIE, Pangu, etc.). In spite of these developments, domestic models by Sber and Yandex remain the most popular and frequently used solutions.

The observations made in the course of the comparison suggest the growing maturity of the Russian market and the transition to a new stage, where generative AI-based solutions begin to take a meaningful place in the business processes of organizations.

### Distribution of Russian companies by models used in solutions, % of companies

Model	2023	2024
OpenAI (chatGPT, GPT-4o, GPT-4, GPT-3.5 etc.)	100%	28%
OpenAI (DALL-E 3)	31%	20%
Google (Gemini, Gemma)	0%	19%
Anthropic (Claude 3)	6%	9%
StabilityAI (StableLM 2)	9%	9%
StabilityAI (Stable Diffusion)	17%	11%
META (Llama 3)	11%	11%
Sber (Gigachat)	11%	16%
Sber (Kandinsky)	46%	17%
Yandex (YandexGPT)	80%	32%
Yandex (YandexART)	6%	15%
Mistral AI (Mixtral)	0%	8%
TII (Falcon)	0%	7%
Huawei (Pangu 3.0)	0%	6%
Baidu (Ernie 4.0)	0%	5%
Alibaba (Tongyi Qianwen 2.0)	0%	3%
Tencent (Hunyuan)	0%	4%
Midjourney	0%	8%

**Source:** Yakov and Partners analysis

# Use cases for solution implementation in business by country



## China

Companies in China are actively deploying a wide range of generative AI solutions, from universal assistants embedded in messengers<sup>80</sup> to Huawei's generative AI systems<sup>81</sup> used in mines for unmanned equipment control. According to the CTO survey, generative AI in China is being adopted in all 15 industries included in the study. However, it is difficult to draw reliable conclusions about the benefits in individual industries due to the informational insularity of companies in most industries. Below are the most innovative use cases specific to the Chinese economy.

### Insilico Medicine accelerates development of molecules for drugs

Industry

Pharmaceuticals and biotechnology

Function

R&D

A drug development company uses a proprietary LLM to create the molecules needed for its new drugs: the input is a requirement for the molecule's potential effect on the body (e.g., diabetes treatment), and the model outputs the molecular structure, description of therapeutic action, and other parameters important to researchers. In addition, the model can interact with the original molecule development platform, Chemistry42, which is based on traditional AI, to accelerate the development process.

#### Impact of the solution



Reduced development time for drug molecules (revenue growth).



Accelerated scientific progress in the development of drugs for incurable diseases (non-financial impact).

#### Technology base

Nach0's proprietary LLM, developed in collaboration with NVIDIA and trained on data from medical sources.

## Geely enhances in-car multimedia with GenAI assistants

Industry

Automotive

Function

Product development

Geely is working with NVIDIA to deliver intelligent in-car experiences and accelerate the deployment of edge-to-cloud solutions. Specifically, Geely is using generative AI and LLM to deliver a smarter, more personalized and safer driving experience, leveraging natural language processing, dialog systems and predictive analytics for intelligent navigation and voice assistants.<sup>82</sup>

### Impact of the solution

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Increased attractiveness of vehicles to customers due to improved functionality (revenue growth).

### Technology base

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NVIDIA TensorRT-LLM. For more complex tasks or use cases that require big data support, Geely plans to deploy cloud-based large-scale models.

## Baidu makes maps easier to use with generative recommendations and route assistants

Industry

IT and technology

Function

Product development

The company is embedding an AI-based generative assistant into its own navigation service, Baidu Maps. The LLM-based assistant helps select destinations and build a route based on users' voice commands, proactively suggesting next steps and making recommendations.<sup>83</sup>

### Impact of the solution

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Increased advertising revenue as users spend more time in the Baidu ecosystem (revenue growth).

### Technology base

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Baidu's ERNIE Bot assistant.



## Russia

In Russia, a country with a large number of models, the adoption of generative AI in business is gradual: in most known cases, generative AI is implemented by the solution developers themselves. However, there are also clear innovators, such as SIBUR, which has implemented four solutions in different functions, or MAY, which is implementing a universal generative AI assistant for employees. Among the industries where use cases are being implemented, the most prominent are those with a high degree of digitalization: banks, e-commerce companies, and the petrochemical industry.

### Yandex Market simplifies the creation of product descriptions for merchants

Industry

E-commerce

Function

Marketing and sales

The company's LLM synthesizes the merchant's product information into a short and clear product description, and creates a "selling" title in the header that highlights key features that attract customer attention. In the three months since launch, 17,000 stores have saved more than 350,000 descriptions for use on the platform.

#### Purpose of implementation



GMV growth through better conversion to purchase (revenue growth).



Drawing merchants to the platform by increasing the attractiveness of the service (revenue growth).

#### Technology base

Company's own proprietary LLM – YandexGPT.

### T-Bank launches Assistant Universe in its own services

Industry

Banking

E-commerce

Transportation and logistics

Function

Marketing and sales

Product development

T-Bank has developed six specialized assistants to help users with its own services. The Financial Assistant is used to help with personal finances, such as analyzing monthly expenses and optimizing the budget, and is embedded in the T-Bank application. The Investment Assistant helps users analyze companies for investment, select news, and learn about investing, and is embedded in the T-Investment app. There are also Travel Assistant, Shopping Assistant, Junior Assistant (created to develop financial literacy in children) and a secretary in the Universe.

#### Purpose of implementation



Growing the bank's active customer base and customer LTV by adding new services to the value proposition (revenue growth).

#### Technology base

The assistants are created by fine-tuning T-Bank's foundational models from the Gen-T family.

## SIBUR streamlines business processes in several functions by implementing solutions from Sber and Speech Technology Center (STC)

### Industry

Petrochemicals

### Function

Marketing and sales

Procurement

Finance

R&D

Together with technology partners, the company has implemented several solutions based on generative AI,<sup>84</sup> including:

- Engineer's AI Assistant to help formulate the causes of equipment failures;
- Procurement Optimization AI Advisor to help standardize the format for storing materials and select acceptable substitutes with advantages in price, quality and availability;
- R&D AI Assistant to help conduct digital experiments by modeling the properties of new polymers;
- Finance AI Assistant to help with decision-making and forecasting.

### Impact of the solution



Increasing equipment availability by reducing downtime (revenue growth).



Reducing procurement costs by selecting better material and equipment alternatives (cost reduction).



Accelerating development of new polymers (revenue growth).



Savings on laboratory experiments through digitalization (cost reduction).

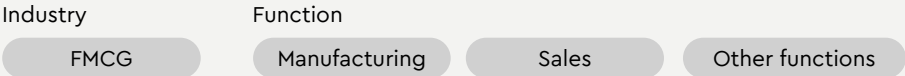


Improving forecasting accuracy, reducing risk of poor financial decisions (revenue growth, cost reduction).

### Technology base

The solutions are based on the integration of Sber's GigaChat with STC's suite of traditional AI technologies.

# MAY uses a digital assistant developed with DeepPavlov.ai to advise employees in various functions



Together with technology partner DeepPavlov.ai, the company has developed a "digital buddy" – a virtual advisor who answers employees' questions in various functional areas. In the current version, the advisor works in text format, with plans to develop a voice mode in the future. The advisor will be used by both white- and blue-collar employees.<sup>85</sup>

### Impact of the solution



Reducing the amount of time employees spend searching for information and solving problems (cost reduction).

### Technology base

DeepPavlov.ai's GenAI solutions, developed by the team at MIPT's Neural Systems and Deep Learning Laboratory, are fine-tuned to MAY's work tasks, knowledge base, and other data.



## United Arab Emirates

The key industries driving the adoption of generative AI in the UAE are those in which the country is traditionally strong, such as digital healthcare (PureHealth)<sup>86</sup> and passenger transportation (Emirates, Etihad Airways).<sup>87,88</sup> In addition, the technology is being actively adopted in public administration, as the government is at the forefront of developing generative AI. At the same time, according to the CTO survey, there are 10 industries in the UAE with working generative AI solutions, including telecommunications, IT, FMCG, etc.

### PureHealth improves healthcare services through the use of technology

Industry

Healthcare

Function

Product development

The company uses GenAI in combination with traditional AI in digital health solutions. Key use cases include early disease detection by analyzing a wide range of patient data (including textual data, which LLMs do well), considering all individual characteristics in the treatment plan based on the patient's profile, and predictive analytics for disease exacerbation.<sup>89</sup>

#### Purpose of implementation



Enhancing the company's value proposition – improving the quality of medical services through early detection of diseases and personalized approach to their treatment (revenue growth).

#### Technology base

The company has partnered with Dell Technologies, a vendor dedicated to implementing and fine-tuning open-source models (specifically Llama 3) to meet customer needs.

### The UAE Government improves access to information by introducing generative AI-based chatbot to government portals

Industry

Public administration

Function

Customer support

The government has created a generative AI-based chatbot to advise citizens, residents and tourists about public services and facilities. After a successful pilot, the service has now been rolled out to the portals of several government agencies.

#### Purpose of implementation



Improving user satisfaction with public services and facilities by expanding access to information (non-financial impact).

#### Technology base

The assistant is based on OpenAI's ChatGPT.



## India

Most of the generative AI use cases are in areas where technology adoption does not require complex solutions and where the benefits to the country are significant. These areas include agriculture, which employs 70% of India's population and accounts for one-sixth of its GDP,<sup>90</sup> and the IT development function, which plays a key role in the country (for example, India accounts for 55% of the global IT outsourcing market).<sup>91</sup> According to the CTO survey, companies in eight industries have implemented full-scale solutions in their IT functions.

### Indian farmers get access to expertise in a convenient format through AI assistants

Industry

Agriculture

Function

Manufacturing

Indian farmers use LLM-based chatbots to gain advanced knowledge about precision farming, proper pesticide application, and other advanced techniques in the industry. With agriculture employing 65% of the country's population and low levels of knowledge and expertise, educating farmers is critical to the economy. However, there are 22 official languages in India, making the task difficult. With access to chatbots, farmers can quickly receive information in a convenient format through their smartphones.<sup>92</sup>

#### Impact of the solution



Increasing yields with reduced resource use through the application of advanced agricultural techniques (revenue growth, cost reduction).

#### Technology base

Several solutions from different start-ups and technology companies. One of the most important is KissanAI, a chatbot from a start-up of the same name based on the Dhenu Llama 3 model, which has been fine-tuned to the specifics of the Indian agriculture industry. Other popular platforms using generative AI are solutions from Cropin and Fasal. Generative AI generates personalized recommendations by synthesizing data from various sources (satellite data, field sensors, reports, etc.).<sup>93,94</sup>



## Tech Mahindra accelerates development process by bringing generative AI to IT development

Industry

IT services and consulting

Function

IT development

A leader in IT consulting and professional services integrates generative AI into the development process. The technology helps developers write code, create tests, and generate documentation faster.<sup>95</sup>

### Impact of the solution



Reducing the need to hire additional developers and testers by increasing the productivity of current professionals (cost reduction).

### Technology base

Presumably models used by Dell Technologies (there are examples of corporate partnerships in generative AI),<sup>96</sup> such as OpenAI.



## Saudi Arabia

In Saudi Arabia, it is the oil and gas sector, a key industry for the country, that is driving the adoption of generative AI, accounting for more than 50% of the potential benefits from the technology's adoption across the country.

## Saudi Aramco improves production efficiency and market analytics using a proprietary model

Industry

Oil and gas

Function

Manufacturing

Marketing and sales

Saudi Digital, a division of Saudi Aramco, is integrating its proprietary Aramco Metabrain model into a number of business processes at the parent company. In Upstream, the model is used in drilling to select optimal well configurations: the LLM analyzes current drilling plans and geological data, historical data on drilling time and costs, and selects the optimal option. In Downstream, the model is used to produce analytical materials on refined products – price forecasts, market supply and demand reports, geopolitical insights.<sup>97</sup> In some solutions, Metabrain works in conjunction with other analytical tools or technologies.

### Impact of the solution



Reducing drilling operating costs by selecting a better trajectory (cost reduction).



Improving accuracy in forecasting market dynamics (revenue growth, cost reduction).

### Technology base

Aramco's proprietary Metabrain model is used, tailored to the oil and gas industry and trained on the company's 90 years of internal data. The model also has the ability to gather information from open sources as well as the company's internal analytical databases.<sup>98</sup>



## Brazil

In Brazil, the adoption of generative AI has been relatively slow, with only the banking sector known to have implemented the technology. Most solutions involve partnerships with Western vendors.

### PicPay makes it easier to get product information through generative AI in support chat

Industry

Fintech

Function

Customer service

The fintech service has integrated the technology into the channel for customer communication with other users and the support team – Direct Message. The LLM provides customers with more detailed answers tailored to the context of the question, such as the interest rate on a deposit or the process for obtaining a loan. In addition, the model can provide the user with direct links to service pages, simplifying navigation.<sup>99</sup>

#### Impact of the solution



Growing the active customer base by adding functionality and increasing customer LTV through higher conversions within the user acquisition funnel (revenue growth).

#### Technology base

LLM models from the Azure OpenAI service implemented in partnership with Microsoft.



## South Africa

Despite claims by South African companies that they are actively experimenting with generative AI in business processes,<sup>100</sup> only the banking industry<sup>101</sup> has made progress with use cases, and that is only visible in the integration of general-purpose assistants into office packages and IT system. Typically, such solutions are delivered to businesses by Western vendors.

### Absa boosts employee efficiency with generative AI-based office tools

#### Industry

Banking

#### Function

Marketing and sales

Internal communications

Legal

The company implements a common solution for integrating generative AI into the office suite and uses the technology for a variety of tasks: sales teams use summarization of materials before client meetings to speed up the preparation process, the legal department translates documents. Employees also use solutions to generate meeting invitations and summarize phone calls.<sup>102</sup>

#### Impact of the solution



Reducing hiring requirements and growing business by saving up to two hours of time per employee per day (cost savings).

#### Technology base

The company uses Microsoft's Copilot, which is based on the company's own models. The solution is embedded in the Office 365 suite.

# Section 3.

## Infrastructure for generative AI development

The data and capacity used for training are essential for creating and utilizing foundational models of generative AI. In his book *Artificial Intelligence Superpowers*, renowned Chinese AI scientist and businessman Kai-Fu Lee definitively states that the world is experiencing a "data age" in the area of deep learning. He asserts that the level of models will be primarily determined by the volume and quality of information used to create them. That is why leading countries are creating centralized repositories to facilitate access of model developers to this valuable resource.

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**The CTO survey identified cybersecurity and data privacy as the primary obstacles to the adoption of generative AI in BRICS+. These concerns were raised by 50% of respondents each**

It is also essential to have a significant amount of computing infrastructure, specifically graphics cards or GPUs, to rapidly and effectively train the model on a vast amount of data. These can be owned by the companies or institutions developing the model (on-premise format) or connected via cloud services (rental model). NVIDIA<sup>103</sup> dominated the global market for AI graphics cards by early 2024, with a share of over 80%. Large companies often make it a priority to have their own graphics cards, not only for model training, but also for the use of generative AI in business, particularly for information security reasons. The CTO survey identified cybersecurity and data privacy as the primary obstacles to the adoption of generative AI in BRICS+. These concerns were raised by 50% of respondents each.

In terms of capacity for training generative AI models, China is predictably the most advanced country among the BRICS+ countries, with technology companies building clusters of more than 100,000 graphics cards to train very large models. However, US import restrictions are hampering supplies of new NVIDIA graphics cards, making it essential for China to develop indigenous graphics cards, and Huawei, in particular, has already started to produce them.

The UAE, Saudi Arabia, and India also accumulate thousands of advanced graphics cards, which makes it possible to train large models. The government plays an important role in buying them for technology companies and research institutes. In Russia, sanctions have led to a shortage of graphics cards. Infrastructure cooperation with the BRICS+ countries is the solution to this problem. In Brazil, only research institutes have graphics cards in quantities needed to train relatively large models. In South Africa, there is no information about companies or other organizations purchasing large quantities of graphics cards.

In terms of data, the most convenient format for accessing data in a country is through a centralized database. Saudi Arabia and the UAE have such databases, and Russia, India, and China are developing them. China currently has data exchanges where datasets can be purchased on commercial terms. South Africa and Brazil lack a data collection and sharing ecosystem.



## China

### Computing power

Among the BRICS+ countries, Chinese technology companies have amassed the largest stockpiles of graphics cards, allowing them to train the world's best models. At the same time, the country is heavily dependent on supplies from the US, necessitating the production of indigenous cards.

To date, the number of graphics cards owned by the largest Chinese companies is measured in hundreds of thousands. For example, the Internet giant Tencent has created a computing network that allows it to cluster 100,000 graphics cards.<sup>104</sup> This is comparable to the largest clusters of Western companies, which also have hundreds of thousands of cards.<sup>105</sup> Further evidence of China's large infrastructure is the existence of high-quality models on par with the leading American developments (e.g., SenseNova 5.5, comparable to GPT-4o).<sup>106</sup>

Unlike other BRICS countries, for training China uses both foreign graphics cards (via the cloud and in its own data centers) and local cards made by Chinese companies. US-made cards are prevalent; however, given the import substitution drive in critical infrastructure, Chinese graphics cards are expected to replace imported cards in a few years. For example, Huawei, the leader in graphics card production among local manufacturers, plans to sell more than 600,000 graphics cards, while NVIDIA plans to supply 1 million units.<sup>107</sup> At the same time, the American company's cards for the Chinese market are inferior to Huawei's in terms of computing power.

Imported graphics cards, which have been the main source for building the country's infrastructure in recent years, cannot fully meet the needs of Chinese companies. This is due to the fact that NVIDIA, a monopolist in the global GPU market, supplies lower performance graphics cards to China due to the US government's ban on the export of its most advanced A100 and H100 graphics cards. NVIDIA's HGX H20,<sup>108</sup> adapted for the Chinese market, is estimated to be two to six times less powerful than H100.<sup>109</sup> This US policy of restricting the export of advanced technologies is driven by a desire to slow down the development of AI in China, which the US sees as a strategic threat, particularly in the weapons industry.<sup>110</sup>

Despite the restrictive measures, China still has several channels of access to NVIDIA's advanced graphics card models. For example, ByteDance, the owner of the TikTok service, leases graphics cards from Oracle, and Tencent and Alibaba are negotiating to build data centers in the US to circumvent the sanctions.<sup>111</sup> However, this method does not fully compensate for the ban on direct exports.

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**Currently, there are more than 10 companies in China that are developing their own GPUs in one way or another**

One possible solution to the problem of access to graphics cards is the development of indigenous GPUs, something that Chinese companies are actively engaged in. Currently, there are more than 10 companies in China that are developing their own graphics cards in one way or another. Four manufacturers are the most advanced in chip development:

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#### **Huawei**

The company is actively developing its own line of Ascend chips and is the main supplier among local companies. In 2024, the company expects to sell 550,000 Ascend 910B chips,<sup>112</sup> which have a model training performance that rivals NVIDIA's A100,<sup>113</sup> the second most powerful chip made by the US manufacturer. In addition, in October 2024, the company launched a new line of Ascend 910C chips, the performance of which is comparable to one of the most powerful chips, NVIDIA's H100.<sup>114</sup> Huawei is in negotiations with ByteDance, China Mobile, and Baidu; 70,000 chips are expected to be shipped, with a total value of over USD 2 billion. To date, Huawei chips have been used to train more than 35 Chinese LLMs.<sup>115</sup>

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#### **Biren Technology**

Established a technology partnership with China Telecom<sup>116</sup> to deploy 6.7 EFLOPS of total graphics processing power in the company's data center, the equivalent of approximately 3,500 NVIDIA H100 graphics cards.<sup>117</sup>

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#### **Enflame Technology**

The company, which is owned by Tencent Holdings, manufactures its own Cloudblazer T20 and T21 graphics cards. The company has the advantage of not being subject to US sanctions, which allows it to produce graphics cards in overseas factories. However, the company must limit the performance of the chips it produces in order to continue to have access to those factories, according to the broader sanctions package.<sup>118</sup>

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#### **Moore Treads**

Also develops its own graphics cards, the MTT S4000, which it claims are capable of training 60 to 100-billion-parameter models.<sup>119</sup>

The production of Chinese graphics cards is hampered by the lack of access to some foreign manufacturing facilities (e.g., Taiwan's TSMC, which produces about 90% of the world's advanced chips)<sup>120</sup> as a result of the sanctions imposed on Chinese IT companies.

The process of switching to local GPUs after using NVIDIA is not difficult for Chinese companies, as they find ways to use both Chinese and foreign cards. For example, the start-up Infinigence offers to lease computing power using a combination of NVIDIA and other, including Chinese, chips, promoting a combined model of infrastructure access.<sup>121</sup> Model training using clusters of graphics cards from different manufacturers has been announced by Baidu, among others.<sup>122</sup>

In addition to large companies that purchase their own GPUs, other smaller companies have access to capacity through cloud services. For example, GPUs are provided by Tencent<sup>123</sup> and Huawei,<sup>124</sup> as well as smaller providers.

Chinese infrastructure companies will be supported by the government: according to the guidelines of the 2017 National AI Strategy, China is building the National Unified Computing Power Network (NUCPN) to equalize access to graphics cards in different provinces. The unified network is expected to provide developers of generative AI models with easier and cheaper access to infrastructure.<sup>125</sup>

#### **Data access**

China plans to create a centralized data storage system, and there are commercial exchanges where datasets can be purchased. A unified database is being developed by the National Data Administration<sup>126</sup> and will be specifically designed for use in training generative AI models. In addition, there are more than 10 data exchanges where datasets for training generative AI models can be purchased on commercial terms: Beijing International Big Data Exchange, Shanghai Data Exchange Corporation, Chongqing Big Data Exchange, Northern Region Big Data Exchange, etc.<sup>127</sup> The partners of these exchanges are large state-owned companies (e.g., China Electric) and technology companies (JD, Tencent).





## Russia

### Computing power

In Russia, graphics cards are accumulated by large technology companies. Due to difficulties with imports, there is a lack of infrastructure. Large technology companies that develop generative AI models use their own facilities to train and deploy models. This is confirmed by the CTO survey, with Russia being the only country where the on-premise model dominates in the deployment of generative AI-based solutions (44% of solutions). Although companies do not disclose the quantity of graphics cards they own, the number is likely to be far behind the infrastructure of leading Chinese and Western companies, given the ban on direct shipments from NVIDIA<sup>128</sup> and statements by Yandex<sup>129</sup> and Sber,<sup>130</sup> major technology companies, about shortages in 2023.

Russian start-ups and individual developers, despite the difficulties of importing the necessary infrastructure, can freely rent cards from vendors in small quantities. These include both technology companies themselves and specialized companies that provide infrastructure.

For example, NVIDIA A100 can be rented from Yandex Cloud,<sup>131</sup> VK Cloud,<sup>132</sup> Cloud.ru,<sup>133</sup> Reg.ru,<sup>134</sup> while the more powerful NVIDIA H100 units are available from Selectel<sup>135</sup> and T1 Cloud.<sup>136</sup> An alternative to renting is the deployment of on-premise GenAI-based solutions using a small number of low-cost graphics cards (for example, T4, V100, etc.). Russian companies are helped by platforms such as Compressa, which provides a set of tools for efficient conversion of GenAI solutions to the local format.<sup>137</sup> The platform was developed by the MIPT Machine Intelligence Laboratory.<sup>138</sup>

The government plans to support companies in creating infrastructure for model training: at the end of 2023, ANO Digital Economy prepared a proposal to increase capacity to 10 supercomputers with 15,000 H100<sup>139</sup> GPUs by 2030. This capacity is comparable to the current capacities of individual technology companies in China and the US: by 2030, with such a goal, Russia will be far behind other countries developing foundational models, and therefore a major adjustment is necessary to remain competitive. At the same time, the lack of direct access to NVIDIA graphics cards makes it necessary to consider close cooperation with Chinese companies to bring graphics cards to the country.

Russian companies are still in the planning stage for the production of domestic graphics cards. For example, in 2023 the IT infrastructure manufacturer Baikal Electronics<sup>140</sup> planned to develop chips for AI, but experts estimated the project duration at three years. In 2025, Fplus plans to produce about 100 servers using neuro-accelerators by NTC Modul. Accelerators are applicable to models and can be used in generative AI-enabled solutions, but are not intended for AI training.<sup>141</sup> Despite the lack of proprietary GPUs, there are start-ups developing adapters to connect graphics cards, such as Delta Sprut by Delta Computers.<sup>142</sup>

### **Data access**

Currently, Russia lacks a unified state database suitable for training generative AI models, but work on such a database is underway as the Ministry of Digital Development has been pursuing the initiative since 2024.<sup>143</sup> The database is expected to aggregate data from a wide range of fields, but will not include restricted information such as personal data or medical records. In addition to a shared, centralized database, specialized data repositories are being actively developed, such as the project to create a cloud-based biomedical data platform by Yandex and Sechenov University.<sup>144</sup>

In addition, there are already a number of companies in Russia that provide commercial access to datasets for model training, such as LabelMe,<sup>145</sup> Sber,<sup>146</sup> and TrainingData.<sup>147</sup>



## The United Arab Emirates

### Computing power

In the UAE, the government purchases large quantities of graphics cards, enough to train some of the world's best models, directly from NVIDIA. Since the UAE's generative AI models are primarily developed by government agencies in partnership with G42, graphics cards to train key models are purchased at the government level. For example, in August 2023, the Emirates purchased "thousands" of graphics cards from NVIDIA.<sup>148</sup> Although the country does not disclose the current stock of graphics cards held by government companies and research centers, the size of the largest models (180 billion parameters in case of Falcon) suggests that the UAE has substantial computing resources.

In the UAE, infrastructure is also widely available to private companies. For example, G42 partnered with Cerebras to build a 16 EFLOPS Condor Galaxy supercomputer, which is equivalent to several thousand leading NVIDIA H100<sup>149</sup> GPUs. The market for renting graphics cards in smaller batches is also developing, with advanced H100 GPUs being offered by Hyperfusion<sup>150</sup> and others. According to the CTO survey, more than two-thirds of generative AI solutions in the UAE are deployed in the cloud.

### Data

The UAE has a government-owned data warehousing platform, Bayanat.ae, which provides datasets for businesses, government agencies, and academia in more than 10 areas, including healthcare, finance, and transportation, in particular for training generative AI models.<sup>151</sup> In addition to the central platform, there are also databases of individual emirates, such as Dubai Pulse, Abu Dhabi Data.



## Saudi Arabia

### Computing power

In Saudi Arabia, government institutions purchase large quantities of graphics cards directly from NVIDIA. As in the UAE, the government is actively involved in the development of generative AI models, and it also meets infrastructure needs. For example, in 2023, KAUST University<sup>152</sup> purchased more than 3,000 NVIDIA H100 chips directly from the manufacturer. In 2024, the country plans to purchase NVIDIA's most advanced H200 chips (the purchase is currently under discussion within the US government). A potential point of contention could be Saudi Arabia's active cooperation with China in AI, while the US is aggressively restricting China's access to advanced technologies.<sup>153</sup>

Private companies and start-ups in Saudi Arabia have direct access to graphics cards in the cloud through foreign services (Alibaba Cloud, Huawei Cloud, etc.). Although there are 29 official cloud infrastructure providers registered in the country, there is no information about local players providing graphics cards for training generative AI models.<sup>154</sup>

### Data

Saudi Arabia has a single source of data for training generative AI models, the National Data Bank (NDB), which contains more than 8,700 datasets from about 250 public and private organizations. There is also a special dataset with more than 500 billion data tokens in Arabic specifically for training foundational models in Arabic.



## India

### Computing power

Indian technology companies and infrastructure providers are actively purchasing large quantities of graphics cards directly from NVIDIA. These companies include Tata, Reliance, and Yotta. Yotta, one of the country's largest data center infrastructure providers, is also making large purchases of graphics cards: 4,000 NVIDIA H100 GPUs have already been shipped to the company, and Yotta plans to receive more than 30,000 GPUs by the end of 2025.

In addition to technology companies, the Indian government also buys GPUs. For example, in the fall of 2024, the Indian government considered a large purchase of GPUs directly from NVIDIA to support technology companies (selling cards to companies at subsidized prices). Such initiatives are part of India's AI Mission, formulated in March 2024, which includes the purchase of 10,000 GPUs through public-private partnerships.<sup>155</sup>

For businesses, GPUs are also available from cloud providers. These include Yotta's Shakti Cloud,<sup>156</sup> E2E Cloud,<sup>157</sup> Sify Technologies,<sup>158</sup> etc. India has the highest percentage of generative AI solutions deployed in the cloud at 82%, according to the CTO survey.

In the long term, India's Vedanta plans to start manufacturing its own chips in the country, but such a launch will take at least two and a half years.<sup>159</sup>

### Data access

The country is developing a data platform suitable for training generative AI models.<sup>160</sup> This is the responsibility of INDIAai, a government organization developing AI in the country. The focus of the platform will be to provide non-personalized data to Indian researchers and start-ups in order to equalize access to this resource.<sup>161</sup>

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**India has the highest percentage of generative AI solutions deployed in the cloud at 82%, according to the CTO survey**



## Brazil

### Computing power

Brazil's key infrastructure for generative AI models is concentrated in research centers and is inferior in terms of volume to the BRICS+ leaders. For example, the country has relatively powerful supercomputers at research centers, which include graphics cards: the Venado computer at the LANL laboratory has 2,500 NVIDIA GH200 GPUs.<sup>162</sup> Technology companies in the country do not buy graphics cards specifically for training and running generative AI models, but some industrial companies are building supercomputers for AI in general. Among them is the Tatu supercomputer of the oil and gas company Petrobras.<sup>163</sup> It is worth noting that the number of GPUs in the supercomputer is quite modest – only 224 NVIDIA A100 GPUs.

Access to GPUs is mainly provided by international companies as there are no major local players leasing GPUs in the country.

### Data access

There are no local databases designed for training generative AI models: there are standard statistical sources that collect basic quantitative indicators such as population, labor market indicators, etc., but they are insufficient for training large models.



## South Africa

### Computing power

South African companies working with generative AI have a small number of GPUs or use them through a foreign partner's cloud. There is currently no evidence of South African companies buying large quantities of GPUs. Supercomputers in South Africa, despite their often-impressive size, are not equipped to handle generative AI. Training such models requires large numbers of GPUs, and the CHPC<sup>164</sup> supercomputer, for example, has only 30 V100 (not the latest generation) GPUs. Cloud access to GPUs is mainly provided through partner services of Western companies; there is no information about large local cloud infrastructure providers in the country.

### Data access

South Africa lacks consistent data sources suitable for training generative AI models. Companies and research organizations have to collect data themselves or use international datasets when necessary.



# Section 4.

## Human resources and education

The availability of skilled talent is a key factor in the advancement of generative AI, both for the development of foundational models and for the creation of finished products based on the technology. Access to the talent pool is becoming the most acute issue given the general shortage of IT skills in the world. IDC<sup>165</sup> estimates that by 2026, 9 out of 10 organizations worldwide will face a shortage of IT professionals, including those specializing in AI. AI professionals are already the most in-demand of all IT disciplines, which is not surprising given the novelty of artificial intelligence in general and generative AI in particular. In order to ensure a sufficient balance of human resources for the development of AI in the BRICS countries, it is necessary to consider measures to ensure the availability of professionals by training a sufficient number of high-quality AI professionals, recruiting highly qualified talent from other countries, and providing better conditions for the retention of specialists.

In addition to training generative AI professionals, an important area of focus is building the skills to work with the technology across an organization's workforce, as the use of generative AI-enabled tools can significantly increase employee productivity. For example, McKinsey<sup>166</sup> estimates that the economic potential for overall employee productivity growth associated with the application of generative AI could be as much as USD 3.5 trillion per year over a multi-year horizon.

In general, the BRICS+ HR system has both centers of skill development and centers of gravity for foreign talent. However, the HR balance in the surveyed countries is rather negative due to the migration of talent from India and China to the West, mainly to the US. In this regard, more than 40% of the companies surveyed see difficulties in attracting talent with expertise in generative AI. This data was collected through the CTO survey. The countries in the grouping are actively fine-tuning their education systems to produce AI talent: AI training programs are available in all countries. Many countries are also introducing initiatives to extend generative AI training beyond universities, for example into schools or as separate courses for employees. However, according to the CTO survey, educating and informing employees about generative AI is a non-trivial challenge for 36% of companies.



Source: open sources,  
Yakov and Partners analysis



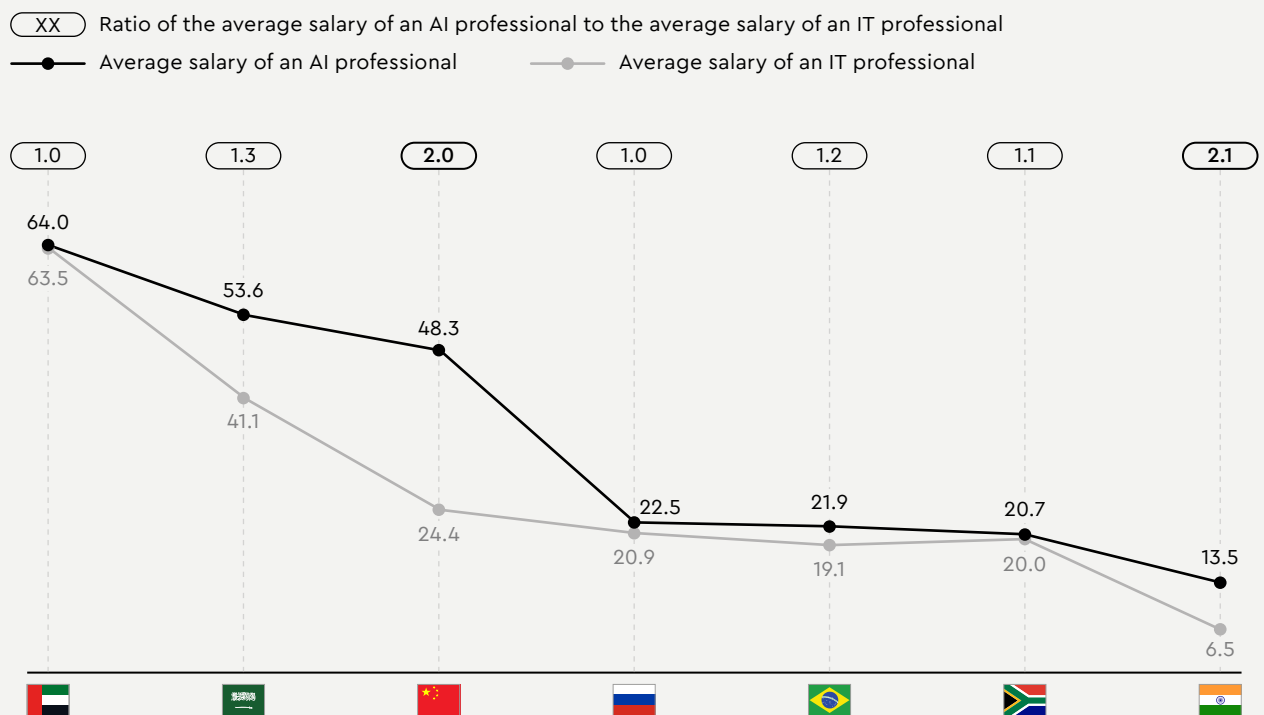
>40%

of the companies surveyed see difficulties  
in attracting talent with expertise in generative AI

The BRICS+ countries can be divided into three categories: countries that are exporters of human resources and have a strong education system that produces talent in high demand abroad (China, India, and Russia); importing countries that mainly invite foreign professionals to develop AI, but are actively investing in the development of their own education system (the UAE, Saudi Arabia); countries with an underdeveloped HR base that do not have a large number of strong educational institutions in the field of AI and do not attract a large number of professionals from abroad (Brazil, South Africa).

To assess the level of demand for human resources and the attractiveness of countries for AI professionals, the average salaries of employees at AI companies were analyzed. Data from industry reports, AI job aggregators, and interviews with generative AI experts were used to assess salary levels. The UAE and Saudi Arabia, countries that attract professionals from abroad and are characterized by a high standard of living, predictably reported higher salaries; China, where specialists are needed to develop generative AI, a strategic area for the country, offers salaries slightly lower than Saudi Arabia; in Russia, Brazil, South Africa, and India, salaries are several times lower, reflecting both the peculiarities of the labor market in these countries in general and the different level of purchasing power of salaries.

### Average salary of AI professionals by country, USD thousand/year



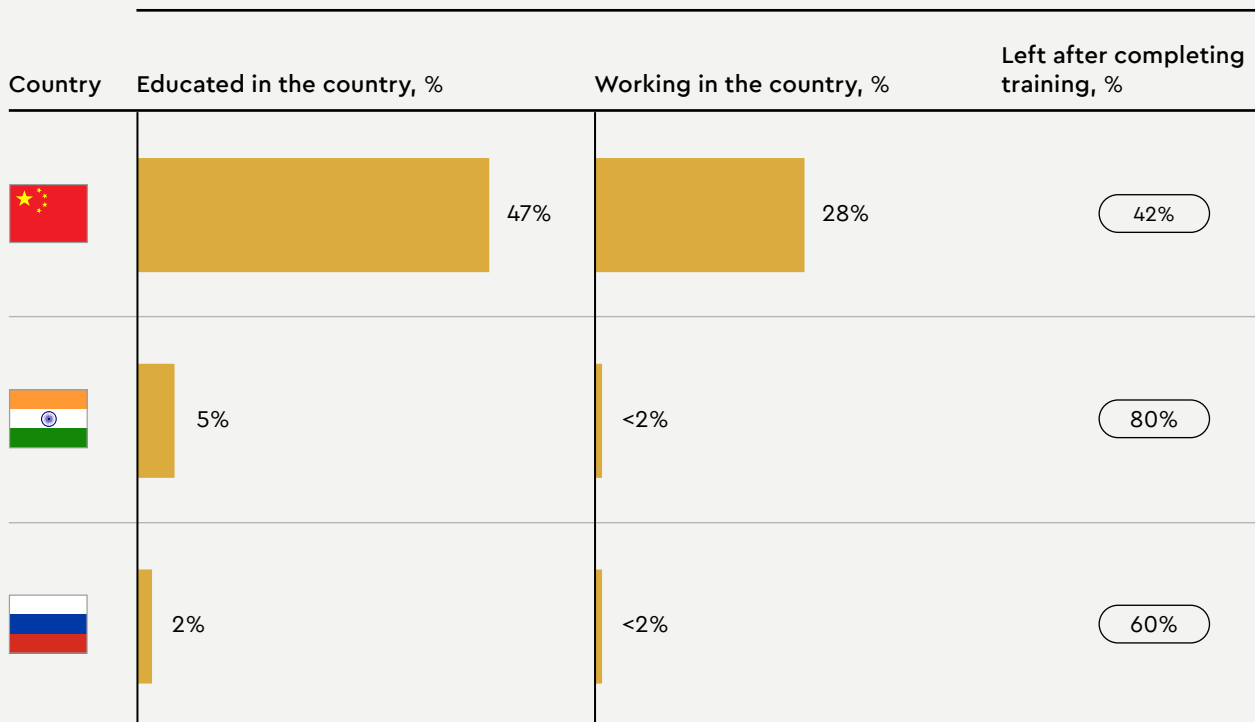
Source: Yakov and Partners analysis of industry reports and job aggregators, interviews with generative AI experts in the countries surveyed

Data on the distribution of the top 20% of the world's AI researchers by country of work and place of education, collected by the research organization MacroPolo.<sup>167</sup> The data are compiled from papers accepted for publication at the NeurIPS conference. This approach has some limitations: first, it reflects the situation with regard to researchers rather than AI practitioners; second, the results may be biased in favor of countries with easier access to publications and may distort the statistics, for example, for Russia. Nevertheless, in most cases these data allow us to generalize about the HR situation in the country.

According to MacroPolo, China has the strongest training system for researchers in BRICS+, both in terms of the proportion of graduates worldwide and their retention in the country.

## Key indicators of the leading education systems of the BRICS+ countries in the field of artificial intelligence

Share of researchers from the top 20%



Source: MacroPolo Global AI Talent Tracker 2.0 data for 2022



**China is currently the world's leading AI powerhouse: of the top 20% of AI researchers in 2022, 47% had completed their undergraduate studies in China**

## China

China has a mature AI training and retention system, and is among the world leaders in terms of the number of AI professionals. According to McKinsey,<sup>168</sup> in 2022, the country had about 700,000 technical specialists with skills in AI product development. According to a regular study by MacroPolo,<sup>169</sup> China ranks second in the world when it comes to the share of the top 20% of AI researchers: in 2022, the country employed 28% of such researchers, while the US, the global leader, employed 42%.

The education system is almost entirely responsible for the supply of new talent in China's human resources system. Currently, China is the world's most important talent pool for artificial intelligence: among the top 20% of AI researchers in 2022, 47% completed their bachelor's studies in China (up from 29% in 2019). These impressive numbers have largely been fueled by government initiatives to drive the growth of AI education in the country: since 2018, when the Ministry of Education designated AI as a separate field of study, more than 2,300 programs<sup>170</sup> have been established in the field. In addition to leading the way in educating researchers, China is placing a special emphasis on developing professionals for the economy. By 2022, nearly 70% of the programs focused on practical applications of AI, and among the fields of study, programs on the application of AI in manufacturing and robotics were the most popular.

Chinese educational institutions excel not only in quantity but also in quality: according to MacroPolo's methodology, five Chinese universities are among the world's top 25 organizations in terms of AI publications. These universities are Tsinghua University, in third place, outranking organizations such as the Massachusetts Institute of Technology (MIT) in the US or META,<sup>171</sup> as well as Peking University, the Chinese Academy of Sciences, Shanghai Jiao Tong University, and Zhejiang University. In education, there is a focus on generative AI, which is reflected in the establishment of specialized programs. For example, Hong Kong Polytechnic University has a Master of Sciences in Generative AI and Humanities program.<sup>172</sup>

The US is a major destination for AI talent leaving the country, attracting Chinese specialists with the prospect of working in the world's most prestigious companies and universities, as well as the country's formal leadership in the development of AI: of the 42% of top researchers leaving the country, more than half choose the US.

Meanwhile, China is actively working to retain talent: of the top 20% of researchers in 2022, 58% stayed in the country, compared to just over a third in 2019. A number of factors contribute to this, but one of the most important is the development of the academic and business communities in China, which serve as an alternative to Western countries. While the academic community is centered around universities and research centers, the centers of gravity in the business community are large companies, including both technology giants (Huawei, Tencent, Baidu) and high-potential start-ups (Zhipu AI, Moonshot AI). In the summer of 2024, the country had more than 5,700 AI companies,<sup>173</sup> or 16% of all global companies (only the US has more with about 13,000, or 36% globally). According to this indicator, China is still behind the US, but may close the gap in the future, which could become a decisive factor in the competition for GenAI talent.

In addition to building an ecosystem of companies and universities, there are a number of direct measures that China is taking to improve retention. These include financial incentives<sup>174</sup> offered by Chinese companies in the form of salaries competitive with the US, as well as the Thousand Talents Program<sup>175</sup> to bring back researchers who have left the country. This program offers returning AI professionals substantial one-time payments of up to 1 million yuan (more than USD 100,000), as well as start-up grants.

Despite the measures China has taken, the country's talent gap could worsen in the future. McKinsey estimates that the demand for high-end AI and technology professionals will increase from 1 million in 2022 to 6 million in 2030, while the actual number of professionals will increase from about 0.7 million to about 2 million. In such a situation, the talent shortage in this field will increase from 0.3 million to 4 million, which may become one of the major obstacles to the development of the industry in China. To close the gap, China needs to continue to expand AI training programs and focus on retention, especially through non-financial levers. Continuing to develop its own strong research centers and companies to lead the AI scene, creating demand for practical applications, and offering not only good salaries but also interesting challenges at the forefront of AI development will help retain or bring back professionals enriched by experience at international universities and companies. The government is also considering additional measures, such as accelerating the opening of AI programs at Chinese universities and introducing AI literacy courses into school curricula.<sup>176</sup>



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**Sber estimates the AI talent shortage to be around 10,000 specialists in 2024**

## Russia

Russia has a great talent pool trained through its own education system, but it is not yet among the global leaders in terms of the number of AI professionals. The country has a shortage of IT talent in general (up to 700,000 people, according to estimates of the Ministry of Digital Development)<sup>177</sup> which affects the field of artificial intelligence as well: for example, according to Sber's estimates, the shortage of AI talent in 2024 is about 10,000 people.<sup>178</sup> At the same time, Alexander Vedyakhin, First Deputy Chairman of the Sber Management Board, is certain that the AI talent gap in Russia will be closed in the future thanks to the growth in the number of AI graduates.

The education system is the source of almost all the country's talent. Russia has always been a global leader in IT and technical education, and AI is no exception. In 2022, Russia ranked eighth<sup>179</sup> in the world in producing highly qualified AI talent, with 2% of researchers in the top 20% of the world's best researchers graduating from its universities (1% in 2019, roughly a twofold increase). In Europe, Russia ranks fourth with 12% of graduates (up from 4.5% in 2019, a roughly threefold increase). It should be noted that these estimates are likely conservative due to the MacroPolo estimation methodology, which uses publications from the NeurIPS international conference, to which Russian researchers may have limited access. The total number of AI professionals trained in Russia, including both researchers and practitioners, exceeded 17,000 people in 2024, marking a twofold increase since 2022.<sup>180</sup>

Russian universities are actively developing AI programs. These include Moscow Institute of Physics and Technology (MIPT), National Research University Higher School of Economics (HSE), National Research University of Information Technologies (ITMO), Moscow State University (MSU), and Central University, which was founded in 2024 and is focused on STEM. Over 200 Russian universities are producing AI specialists. At the same time, only the leaders provide high-quality education: the Alliance for Artificial Intelligence rated 11 universities as B or above,<sup>181</sup> which is the acceptable quality threshold. These universities go above and beyond the basic training programs by running contests and Olympiads in AI. One example is the AI track of the I am a Professional Olympiad for undergraduate students, held by the Moscow Institute of Physics and Technology.<sup>182</sup>

Technology companies are instrumental in training professionals. A partnership between Yandex, Sber, MIPT, ITMO, HSE, and Innopolis University has created the AI360 bachelor's program. This program offers a unique opportunity to obtain fundamental knowledge about AI at four universities simultaneously while also engaging in practical projects in companies.<sup>183</sup>

The education system also pays considerable attention to generative AI. ITMO has a master's program in Deep Learning and Generative Artificial Intelligence,<sup>184</sup> and HSE has further training courses dedicated to generative AI, with MTS as a partner.<sup>185</sup>

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**MacroPolo's data for 2022 shows that 40% of the top 20% of the best researchers educated in Russia stayed in the country, up from 17% in 2019**

The brain drain represents a significant challenge for Russia, but the situation is improving as a result of growing opportunities for professionals in the local market. Sber, Yandex, MTS, and T-Bank are actively hiring and creating more attractive conditions for AI talent. The expansion of opportunities for AI specialists in Russia is also reflected in the surge in the number of companies developing AI solutions and receiving government support. This has nearly quadrupled from 2022 to 2024,<sup>186</sup> to about 850. As a result, positive changes are also evident on MacroPolo's global AI talent tracker.<sup>187</sup> For instance, according to MacroPolo's 2022 data, 40% of the top 20% of researchers educated in Russia remained in the country, up from 17% in 2019.<sup>188</sup>

Going forward, the demand for AI specialists in Russia will continue to grow. By 2030, the economy is projected to require at least 15,500 AI graduates annually.<sup>189</sup> To meet this demand, it is essential to increase the output of specialists within the higher education system. Additionally, the state, private companies, and academic institutions must collaborate to create a conducive environment for professionals to work and grow in Russia.

# At least 15,500

AI graduates per year will be required  
by 2030 to meet the needs  
of the economy

Source: open sources,  
Yakov and Partners analysis





## The United Arab Emirates

The UAE is a prominent regional hub for human resources. As stated by the country's Minister of Artificial Intelligence, Omar Al Olama,<sup>190</sup> the number of AI professionals in 2023 reached 120,000, marking a fourfold increase from two years prior. While this figure may not be directly comparable to other countries due to differences in estimation methodology, it can be argued that the concentration of AI professionals in the UAE is high. According to the UAE Minister of Economy Abdullah bin Touq Al Marri, the UAE ranks second only to the US in attracting top AI talent, and many of these experts now call the UAE their home.<sup>191</sup>

The primary source of new talent is the recruitment of professionals from other countries. As indicated in the AI Index Report 2024, the UAE is among the top three countries with the most optimal balance of newly-hired talent. In particular, government support measures to attract professionals, such as the Golden Visa program,<sup>192</sup> have been instrumental in this regard. Originally designed to attract IT professionals, the program has been actively promoted by the Ministry of Artificial Intelligence. Additionally, Yakov and Partners estimates that the country has the highest average salaries in the AI field, at approximately USD 64,000 per year. Conversely, there are challenges in attracting top-level professionals who are less driven by financial incentives. For instance, according to MacroPolo data, which focuses on researchers in the top 20% of the industry, the number of such professionals in the UAE remained unchanged from 2019 to 2022.<sup>193</sup>

Despite the high number of foreign specialists in the industry, the UAE is actively developing its own AI education system. According to the Ministry of Artificial Intelligence,<sup>194</sup> there are 22 universities in the country training AI professionals. Among them is the Mohammed bin Zayed University of Artificial Intelligence, a university dedicated to AI that offers over 10 programs in the field, from undergraduate to doctoral (PhD) level.

Furthermore, there are specialized courses in the country designed for non-technical professionals to gain hands-on experience with the technology. Coursera, for instance, has launched the Generative AI Academy<sup>195</sup> in the country, with the course targeted at senior executives and employees of companies in the Emirates.

The UAE is also engaged in active collaboration with foreign companies on training initiatives. For instance, Microsoft has formed a partnership with local UAE governments to announce the launch of the AI National Skills Initiative, a comprehensive 12-month AI training program with the objective of enhancing the skills of 100,000 government employees in local government offices in Abu Dhabi, Dubai, and Sharjah.<sup>196</sup>



## Saudi Arabia

Saudi Arabia has a similar model to the UAE, serving as a key regional talent hub. According to MacroPolo, Saudi Arabia has overtaken the UAE in terms of the share of the top 20% of AI researchers in the region. Saudi Arabia has 19% of them, with only Israel having a higher proportion in the Middle East. According to experts,<sup>197</sup> the country's pool of practitioners is second only to the UAE, but it is growing rapidly at an annual average of one and a half times over the past four years.<sup>198</sup>

Attracting foreign specialists is the primary method for expanding the talent pool in the country. While the country lacks dedicated initiatives to attract AI talent, it does offer a Premium Residency Permit (PRP)<sup>199</sup> program. One of the program's categories, the Special Talent Residency, is designed for researchers, science professionals, and other individuals with specialized skills, including AI specialists. Furthermore, according to Yakov and Partners, Saudi Arabia is the second-highest paying country in BRICS+, after the UAE, for AI professionals, with an average salary of approximately USD 53,000 per year.

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**SDAIA's own estimates indicate that 86% of universities in Saudi Arabia offer AI-related degree programs. Of these universities, 42% have comprehensive AI degree programs**

The country is also making significant investments in its own education sector. SDAIA's own estimates<sup>200</sup> indicate that 86% of the country's universities have AI-related degree programs (e.g., information technology, computer science, etc.), with AI courses integrated into the curriculum. Of these universities, 42% offer comprehensive AI degree programs. It should be noted that the total number of graduates of AI-related programs between 2019 and 2023 is approximately 38,000. It is likely that the number of graduates in specialized AI fields is considerably lower. Notable Saudi Arabian universities engaged in AI research include King Abdulaziz University, King Saud University, and King Abdullah University of Science and Technology which is developing generative AI models. According to industry experts,<sup>201</sup> the country is focused on developing local Saudi Arabian talent.

In collaboration with Oracle, Future Work, and the Saudi Ministry of Human Resources and Social Development, the Mostaqbali program was initiated with the objective of training and certifying 50,000 Saudi citizens in cloud technologies, artificial intelligence, machine learning, and the Internet of Things by 2027.<sup>202</sup>



## India

India is the second largest center of competence in the field of AI in BRICS+ after China. Its education system ensures a steady supply of human resources for the sector. According to Yakov and Partners,<sup>203</sup> the total number of AI specialists in India is several hundred thousand (300,000–600,000). Experts confirm<sup>204</sup> that there is no shortage of AI professionals in India.

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**Although there is no shortage of professionals in India, a significant number of them leave the country to work abroad. In 2022, only 20% of the top 20% of researchers educated in India remained in the country**

India's robust education system, particularly in technical disciplines and AI, serves as a key source for recruitment. MacroPolo's 2022 data indicates that India trains 5% of the top 20% of researchers, ranking fourth in the world. To this end, the country has over 100 universities offering specialized courses or full-fledged programs in AI.<sup>205</sup> India's commitment to AI is further evidenced by the establishment of the Universal AI University in Mumbai,<sup>206</sup> an institution fully dedicated to AI education. The university plans to expand its enrollment to 1,500 students from 2025 to 2027.<sup>207</sup> Additionally, several Indian universities offer courses in generative AI, including Generative AI and Prompt Engineering at the Indian Institute of Science.<sup>208</sup> In October 2024, INDIAai and META<sup>209</sup> announced the establishment of a Center for Generative AI and the launch of a skills and capabilities development initiative in collaboration with the All-India Council for Technical Education (AICTE) to advance AI in India.<sup>210</sup>

Although there is no shortage of professionals in India, a significant number of them leave the country to work abroad. In 2022, only 20% of the top 20% of researchers educated in India remained in the country (up from 6% in 2019). Additionally, among countries where the top 20% of researchers work, India does not rank in the top six, employing less than 2% of such professionals.



## Brazil

Brazil, the region's foremost employer of IT professionals,<sup>211</sup> has yet to cultivate a substantial talent pool in the field of AI. Consequently, the current shortage of IT talent is particularly acute in the AI sector.<sup>212</sup>

Brazil's national AI strategy is primarily focused on closing the gap through the internal development of AI talent within its own education system.<sup>213</sup> By the end of 2028, Brazil plans to invest up to USD 4 billion in AI education.<sup>214</sup> However, there are only a few universities in Brazil that offer training for AI talent. Among them are the Graduate School of Advertising and Marketing (ESPM), which offers a Master's in Digital Business Management, BI and Artificial Intelligence,<sup>215</sup> and the University of São Paulo, which offers an MBA in Artificial Intelligence and Big Data.<sup>216</sup>

The brain drain to other countries exceeds the number of professionals relocating to Brazil. According to the AI Index Report 2024, there was a slight net loss of AI talent in Brazil in 2023. Despite the country's general initiatives to attract foreign talent (e.g., the Digital Nomad Visa, which allows foreigners to work remotely from within Brazil)<sup>217</sup>, the lack of focus on AI prevents meaningful talent acquisition. One factor inhibiting inbound mobility, according to experts,<sup>218</sup> is the language barrier.



## South Africa

South Africa's AI talent pool is underdeveloped, according to the AI Index Report 2024. This report, which analyzed 30 countries, found that South Africa has one of the lowest concentrations of AI professionals.

The national education system produces only a limited number of AI professionals. As in Brazil, there are few universities in South Africa that offer training in AI. Among the most prominent are the University of Cape Town, the University of the Witwatersrand, and a few others.<sup>219</sup> In October 2024, Google pledged USD 5.8 million in funding to support AI and cybersecurity training initiatives in African countries, including South Africa, through Google.org.<sup>220</sup>

Like Brazil, South Africa has had a small net out-migration of AI professionals, according to the AI Index Report 2024. Of the tools to stimulate talent acquisition, there are only general programs to attract professionals to the country that are not focused on AI.<sup>221</sup>

# Section 5.

## Support for technology development

For the development of new technologies, it is necessary to create favorable conditions, i.e. to secure investment, develop research and create a regulatory climate. This section focuses on the various support measures provided by artificial intelligence stakeholders to companies and research institutions for the development of the technology in the BRICS+ countries. Five blocks are assessed for each country: government strategy, government support tools, regulatory system, private investment markets, and self-regulatory organizations as a set of support measures by governments, private investors, and business alliances.

### AI strategy

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**Every country surveyed has an AI strategy, with China, Russia, Saudi Arabia, and the UAE having the most elaborate and detailed strategies with quantitative targets, timelines, and action plans**

Every country surveyed has an AI strategy, with China, Russia, Saudi Arabia, and the UAE having the most elaborate and detailed strategies with quantitative targets, timelines, and action plans. In India, Brazil, and South Africa, strategies tend to be high-level documents with a general vision for the development of the technology, and detailed plans may be described in complementary documents, such as the Plan for the Development of AI (PBI A)<sup>222</sup> in Brazil. The planning horizon in strategies tends to be more than 10 years, while plans for initiatives, such as those in Brazil and India, tend to be shorter. The budget allocated to the strategy varies, but is typically in the billions of dollars (tens of billions in China).

### Tools for government support of technology development

Among the tools of government support for generative AI technologies, two groups can be clearly distinguished: 1) direct measures, which imply, for example, government participation in the development of models, government ordering of AI-based solutions, direct subsidies to developers; 2) indirect or infrastructural measures aimed at creating an ecosystem for the development of models and solutions, for example, special economic zones, tax incentives, creation of accelerators by the government. The most advanced country in terms of policies is China; in addition to China, the governments of Russia, Saudi Arabia, and the UAE are actively supporting technology development.

Unify

```
def _moment_generating_function(self, t):  
    return (1 - self.theta*t)**(-self.k)
```

```
def loms(name, k, theta):  
    """  
    Create a continuous random variable with  
    a loms distribution.  
    """
```

```
def _moment_generating_function(self, t):  
    raise NotImplementedError('Moment  
    generating function of the log-normal  
    distribution is not defined.')
```

```
def LogNormal(name, mean, std):  
    """  
    Create a continuous random variable with  
    a log-normal distribution.  
    """
```

```
    mean, std = self.mean, self.std  
    return mean + std * sqrt(2) * erfinv((t -
```

- 1)

3051



## **Regulation of generative AI**

To date, only China, which has the most developed generative AI ecosystem among the countries surveyed, has developed legislation for the technology. The rest of the countries rely on self-regulation and isolated regulations, often to avoid hindering the development of generative AI. Companies generally take a responsible attitude to the use of the technology and independently implement initiatives to mitigate risks (for example, Yandex labels AI advertising, although there is no such regulatory requirement). According to the CTO survey, 34% of companies see the use of generative AI as a risk associated with violation of regulatory and legislative requirements. A detailed analysis of countries' regulatory systems can be found in Yakov and Partners' report on the regulation of generative AI, published in June 2024.<sup>223</sup>

## **Markets for private investment in generative AI**

The development of private equity markets in AI and generative AI is largely driven by the development of capital markets in the country as a whole. For example, the most developed markets in the top 15 in terms of deal volume are China, India, and the UAE. At the same time, almost all countries are trying to develop mechanisms to stimulate private investment, such as AI and GenAI accelerators.

## **Self-regulatory organizations**

The role of self-regulatory organizations in the BRICS+ countries is currently relatively small; they are most involved in the development of AI in Russia – in the form of the Alliance for Artificial Intelligence, which, for example, participates in the formulation of strategic and regulatory frameworks, promotes investment for companies, and has created an AI ethics community around a national AI Code of Ethics. In addition to Russia, such organizations exist in China, South Africa, Saudi Arabia, and India.



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**The goal is to become a world leader in AI development by 2025 and a global leader in AI innovation by 2030**

## China

### Government strategy

China, a country with significant government involvement in the economy, relies heavily on a national strategy to develop artificial intelligence. In 2017, it adopted a national AI development strategy through 2030 – the Next Generation Artificial Intelligence Development Plan.<sup>224</sup> By 2030, China plans to become a leader in AI development, making the technology a key driver of the country's economic and technological development. The key principles of the strategy include the government's active expansion of AI development infrastructure; a focus on market-driven technology development, with businesses playing a key role in the development of applied solutions and their commercialization; and the promotion of open innovation sharing among businesses, the government, and research institutes. The strategy is to be implemented in three stages: by 2020, the country should be among the innovation leaders; by 2025, the goal is to become a world leader in AI development; and by 2030 it should become a global leader in AI innovation by integrating the technology into a wide range of functions in key industries. The strategy does not take into account the development of generative AI and is likely to be adjusted by the government based on innovations in this area.

Analysts at the European Parliament<sup>225</sup> estimate that China's annual spending to support AI research could reach tens of billions of dollars (comparable to the US),<sup>226</sup> making China the leader in technology investment among the BRICS+ countries.

### Government tools to help develop generative AI

China is a leader in the number and variety of tools used to support generative AI. The government is actively involved in the development of the technology, both directly, by engaging in research and development through its own institutions, and indirectly, by creating conditions for the advancement of companies developing the technology. More than 10 government agencies are responsible for supporting the development of AI in the country: the most important include the Ministry of Science and Technology,<sup>227</sup> which formulates and implements AI development programs; the Ministry of Industry and Information Technology, which is responsible for AI-related activities in the BRICS Working Group on Information and Communication Technology Security, including regulatory issues,<sup>228</sup> and the State Internet Information Office of the People's Republic of China.<sup>229</sup>



The direct support provided by the Chinese government covers all types of stakeholders and involves different levels of government in the development of models and solutions:

- Establishing research institutes to develop generative AI models, such as the Beijing Academy of Artificial Intelligence, which develops the foundational models of CogView, Aquila, and other open-source solutions. The institute reports directly to the Ministry of Science and Technology and includes scientists from leading Chinese universities (Tsinghua University, Peking University, etc.).<sup>230</sup>
- Sponsoring the joint development of applied solutions using generative AI technologies with businesses. For example, the Chinese government has established State Key Labs, public-private centers that receive grants to develop methods for the practical application of basic technologies in business – in some companies that are recognized as "national champions" in AI development.
- Government procurement from generative AI players. For example, to build a shared infrastructure network, it is estimated that about 50% of GPUs are procured from Chinese graphics card manufacturers.
- Transferring direct subsidies and grants to small and medium sized companies. The Chinese government identifies small companies in strategically important sectors (including AI), the so-called Little Giants, and awards them grants and subsidies for development. As of July 2023, there were more than 12,000 companies in the country in all sectors, including AI, eligible for the program, to which more than USD 1.4 billion was allocated.

In addition to direct support measures, there are also indirect or infrastructural measures aimed at creating conditions for the organic development of the technology under market conditions:

- Subsidies to companies involved in building infrastructure for training generative AI models. Cumulatively, in 2023, companies producing chips and chip parts, such as Hua Hong Semiconductor and SMIC, received more than USD 3 billion in subsidies.<sup>231</sup>
- Special tax zones for AI companies. There are at least six special zones (e.g., Lingang New Area of Shanghai Free Trade Zone, Fujian Pingtan Comprehensive Pilot Zone, etc.) and many regions that reduce corporate income tax from 25% to 15% for companies in technology industries, including AI companies.<sup>232</sup>

It is important to note that some of China's support tools focus specifically on generative AI, reflecting the country's focus on this particular technology despite its initial absence from the strategy.

### Regulation of generative AI

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**China has the most developed regulatory system for generative AI to date, with 31 risk groups described and content generation rules established for all models using the technology**

In line with the role of the state outlined in the strategy, the government has taken an active stance in regulating the AI ecosystem in the country. China currently has the most developed system of generative AI regulation: 31 risk groups have been described, and rules for content generation have been established for all models using the technology. These include a requirement for the legality of the origin of foundational models, no infringement of intellectual property rights, and a requirement to obtain consent to process personal data for their use. According to the 2024 Yakov and Partners report on the regulation of generative AI, the maturity of China's regulatory system can be assessed as high, and its degree of freedom as medium (low for foreign models).<sup>233</sup>

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**The total amount of private AI investment in China has been variously estimated at USD 7–8 billion in 2023<sup>225</sup>, down about 30% from the previous year**

## Markets for private investment in generative AI

Private investment in AI in general, and generative AI in particular, plays a smaller role in the development of the technology than government support, but has the potential to grow. The total amount of private AI investment in China has been variously estimated at USD 7–8 billion in 2023,<sup>234</sup> down about 30% from the previous year. By comparison, private investment in the US, where private markets play a more important role, grew by about 20% to over USD 67 billion. Investment in generative AI differs even more dramatically: in China, generative AI deals totaled USD 0.65 billion vs USD 22 billion in the US. At the same time, activity in China's private equity markets has begun to pick up in 2024.

Tech giants became more active in making deals in the first half of the year, and in just six months, the value of deals exceeded last year's figures severalfold. Alibaba invested USD 1 billion in startup Moonshot AI<sup>235</sup> and USD 300 million in Zhipu AI;<sup>236</sup> Tencent invested the same amount in the latter. In addition to domestic investment, foreign investors have also started to invest in Chinese companies. The example of Prosperity7 is illustrative, as the investment fund owned by Saudi Aramco invested USD 400 million in the startup Zhipu AI, much like Tencent and Alibaba.<sup>237</sup>

In parallel with the growth of investor activity in private markets, China is actively promoting the creation of infrastructure for these markets. Key support measures include:

- Creating co-investment funds: the Chinese government is setting up Governance Guidance Funds (GGFs) to invest with private investors in high-risk technology projects and companies, particularly in AI.<sup>238</sup>
- Developing technology exchanges: the government is actively supporting exchanges where technology companies (especially generative AI companies) can raise funds, and is simplifying their regulation to speed up IPOs.<sup>239</sup>

In addition, the government is playing the role of a "strategic vector" for Chinese venture capital funds by introducing direct support tools. The latter actively invest in companies supported by the Chinese government. For example, in five years (since 2018), private funds have allocated a total amount exceeding the government's investment in companies covered by the Little Giants program.<sup>240</sup>

## Self-regulatory organizations

China has several alliances of companies in the field of artificial intelligence. Among them are Artificial Intelligence Industry Alliance, Baidu Artificial Intelligence Innovation Alliance. At the same time, the role of self-regulation in the development of generative AI in China seems to be small at the moment.



## Russia

### Government strategy

In Russia, the strategy is a key document outlining the government's AI course and benchmarks to be achieved. The strategy, originally written in 2019, was updated in early 2024. The key objectives of the updated strategy are to ensure growth in the welfare and living standards of the population, ensure national security and law and order, and the competitiveness of the Russian economy. The objectives include increasing the accessibility of infrastructure for technology development, supporting AI developers, strengthening international cooperation in the field of AI, etc. The strategy sets clear, measurable goals to be achieved by the industry by 2030, such as achieving a cumulative GDP growth of RUB 11.2 trillion, as well as increasing the volume of AI services up to RUB 60 billion per year. Targets are also set for the total capacity of AI supercomputers, the number of publications in the field of AI, etc.<sup>241</sup> The strategy also underscores the pivotal role of generative AI in advancing AI technologies and the impact of their deployment. It outlines key measures to foster the advancement of generative AI, with a particular focus on technology regulation.

### Government tools to help develop generative AI

Russia uses a wide range of government support measures, with a focus on direct measures. A number of specialized ministries and agencies (e.g., Ministry of Economic Development, Ministry of Digital Development, Communications and Mass Media, etc.) are involved in AI support. Some of them have separate AI-focused bodies: the Department of AI and Big Data Development under the Ministry of Digital Development, etc.

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Source: open sources,  
Yakov and Partners analysis

# 11.2 trillion rubles

is the expected cumulative Russian GDP growth  
by 2030 achieved through AI technology adoption

Government support for AI includes both direct measures, such as grants, the establishment of technology development centers, and government procurement, and indirect measures, such as tax incentives:

- Grants for the implementation of AI projects. As an illustration, the Skolkovo Foundation, with the backing of the Ministry of Digital Development (until September 2024, the Ministry of Economic Development), is offering grants amounting to RUB 554 million in 2024 to businesses implementing AI to revamp their technological or business processes. The grant amount will range from RUB 20 million to RUB 100 million.<sup>242</sup> Plans are also in place to support developers of AI-based technologies, with grants of up to RUB 50 million available for start-ups and small companies in this field.<sup>243</sup>
- Support for the establishment of research centers dedicated to the advancement of AI technologies. For 2021–2024, the government allocated about RUB 7 billion under the first and second waves of the program to 12 research centers based at leading Russian universities. The first wave of the program included six flagship AI R&D centers (MIPT, ITMO, ISP RAS, HSE, Skoltech, Innopolis University) and six sectoral R&D centers (MEPHI, NSU, Blokhin Oncology Center, Lobachevsky NNGU, Samara University, StPSU).<sup>244</sup> Some of the technologies developed by the centers are already being implemented in business processes of tech companies, including Yandex, Gazprom Neft and other large companies.<sup>245</sup> In 2024, plans were announced to launch the third wave of the program, which aims to select six research centers (in particular among the current participating universities). Over the course of three years, the centers will focus on 11 research areas, including research in the field of generative AI.<sup>246</sup>
- Public procurement in the field of AI. KPIs of officials managing state and municipal institutions include the AI maturity indicator, which includes more than 30 metrics and incentivizes public procurement in the field of AI. Thanks to such measures, the volume of government purchases in the field of AI has grown sixfold – from about RUB 250 million in 2022 to about RUB 1.5 billion in 2023.<sup>247</sup>
- Financial benefits for companies implementing AI solutions. As of 2023, companies that implement AI-based products can claim relevant expenses as tax deductible costs with a factor of 1.5, thus reducing the base and the amount of tax.<sup>248</sup>

The amount of funds allocated to individual initiatives rarely exceeds USD 10–20 million, which is several times lower than the budgets for such programs in the leading countries of the world (for example, the US plans to invest tens of billions of dollars per year,<sup>249</sup> the EU, South Korea, and China provide support worth billions of dollars per year;<sup>250</sup> in Russia, the annual AI support budget for 2024 is USD 50 million).<sup>251</sup>

The listed measures are primarily focused on supporting AI in general, including generative AI. However, measures tailored specifically to this technology are being actively developed. For instance, in early 2024, the Russian President directed the Government to facilitate the creation of large generative models for use in the country's key economic sectors.<sup>252</sup>

### **Regulation of generative AI**

With regard to the regulation of generative AI, a comprehensive legal framework has yet to be established in the country. The current regulatory framework for AI use is comprised of a number of legal acts, including presidential directives, federal laws, the Concept for the Development of Relations in the Field of AI and Robotics Technologies through 2024, and the National Strategy. Russia also has in place self-regulatory mechanisms in the field of generative AI. For instance, in 2024, companies that are members of the Alliance for Artificial Intelligence signed the Declaration on Responsible Development and Use of Services Based on Generative AI, which sets out norms and recommendations that promote a responsible approach to AI.

Concurrently, the legislative bodies of the Russian Federation, particularly the Federation Council,<sup>253</sup> are actively engaged in discussions pertaining to the formulation of comprehensive AI legislation. Additionally, new laws are being drafted to regulate the use of generative AI, including a proposed law that would require the labeling of content generated by neural networks.<sup>254</sup> Some companies (e.g., Yandex)<sup>255</sup> are proactively implementing such measures even before the official release of the law by labeling advertising created by generative AI. This reflects the country's trend towards gradual formalization of requirements for GenAI-based models and products as the technology develops in the country.

## Markets for private investment in generative AI

The current state of the private capital market in Russia is a significant factor limiting private investment in generative AI. As of 2022, the market for investment in AI start-ups in Russia amounted to only USD 159 million. Since 2021, there has been a significant decline of about six times. This reflects the broader trend in the Russian venture capital market, which has contracted threefold, from USD 2.5 billion to approximately USD 800 million over the same period. Key investors in the market include large corporations and investment funds, such as MTS, Softline Ventures, USM Group, and others.<sup>256</sup>

The infrastructure for investment in Russia is in place and undergoing further development. For instance, there are numerous accelerators in Russia that focus on securing investment for AI start-ups. These include the Artificial Intelligence Accelerator,<sup>257</sup> GenerationS,<sup>258</sup> and Dotcom AI.<sup>259</sup> There are also accelerators from tech companies, such as MTS AI.<sup>260</sup> The latter has a track specifically for generative AI, which claims to be able to raise up to USD 10 million.<sup>261</sup>

## Self-regulatory organizations

The Alliance for Artificial Intelligence<sup>262</sup> is the primary AI self-regulatory body in Russia. It includes major technology and industry companies such as Yandex, Sber, MTS, T-Bank, and others. The Alliance brings together leading players in AI to collaborate on key issues, with a particular focus on generative AI. It plays an active role in shaping the regulatory system, contributing to industry reports, and performing other functions.





## The United Arab Emirates

### Government strategy and regulation of technology

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**The UAE's goal is to establish itself as a global leader in the field of artificial intelligence by 2031**

In the UAE, where technology development is largely managed by the government, the strategy serves as a key reference point. It provides a general vision and guidelines rather than a detailed list of initiatives. The National Strategy for Artificial Intelligence 2031 was released in 2017.<sup>263</sup> According to this strategy, the UAE's mission in the context of technology is to become a global leader in the field of artificial intelligence by 2031.

To achieve this mission, eight strategic goals have been set, including building the UAE's reputation as the most attractive country for AI companies and researchers, incorporating AI into customer service in all areas, and ensuring the availability of data and infrastructure to become the "proving ground" for AI innovation. In general, the focus of the strategy is shifted towards practical ways of using the technology in key sectors of the economy, while still maintaining a commitment to advancing the underlying technologies. It is important to note that the AI strategy is part of the country's long-term development plan, UAE Centennial 2071.

### Government tools to help develop generative AI

While the government plays a role in the development of technology, the UAE has a comprehensive set of both direct and indirect infrastructural measures in place to support its advancement. The country's first-of-a-kind Ministry of AI, established in 2017, facilitates the growth of AI in general and generative AI in particular.<sup>264</sup>

Among the direct support measures, several are specifically focused on generative AI:

- The country's leading technology university, the Institute of Technological Innovation, is spearheading the development of Falcon, one of the most advanced open-source models in Arabic. The institute is also engaged in a number of other cutting-edge technologies, including generative AI, autonomous robots, molecular biotechnology, and more.
- Establishment of funds and organizations for direct investment in the development of GenAI-enabled solutions. The Falcon Foundation is a notable entity among them. It was established as a fund to support open-source projects that utilize Falcon family models for adaptation to specific industries or tasks. The foundation has a capital of USD 300 million. It was set up by the Institute for Technology Innovation. Another organization involved is the investment firm MGX, which was established by the sovereign wealth fund Mubadala Investment Company in partnership with G42. The firm will invest in semiconductors and AI technologies and is aiming to have more than USD 100 billion under management in the next few years.

Meanwhile, the UAE is also using indirect support measures to attract and develop private companies – also with a focus on generative AI:

- Establishment of a special economic zone in Masdar City. Since 2023, it is possible for an AI company with 100% foreign capital to open an office in the special economic zone located in Abu Dhabi, and the cost of renting an office can be as low as USD 3,300 per year – many times lower than market rates. AI companies operating in the special zone are exempt from income tax.<sup>265</sup>
- Establishment of accelerators for GenAI companies. Among these is the Dubai Centre for AI's Accelerator Programs. In 2023, the accelerator offered two tracks: Future of Generative AI in Government Services and Future of Generative AI in Media and Communications. Over 600 start-ups from 55 countries applied for participation.<sup>266</sup> There is also the Artificial Intelligence Transformation Program, a corporate accelerator from DIFC designed to develop various areas of AI applications in Dubai corporations.<sup>267</sup> Additionally, there is the AI accelerator of Presight (part of G42), which focuses on AI start-ups at the early stages of development.<sup>268</sup>

## **Regulation of generative AI**

The UAE has yet to implement regulations governing the technology, in part due to the government's dominant role in developing generative AI models and its comprehensive oversight of business operations within the country.

## **Markets for private investment in generative AI**

The UAE is experiencing a surge in private investment in technology, thanks to government support. The total value of private investment in artificial intelligence in the UAE is estimated at around USD 400 million. In 2023, the country ranked 13th in the world on this indicator (in 2022, the country was not in the top 15). Some forecasts indicate that private AI investment in the UAE market could reach USD 90 billion by 2031, providing further impetus for generative AI development beyond government initiatives.<sup>269</sup> This is evidenced by the emergence of private companies specializing in AI investments in the country, such as Polynome Group, which has established a separate USD 100 million fund to invest in AI start-ups in the UAE.

## **Self-regulation**

Currently, independent AI alliances in the country do not play a significant role in the advancement of the technology.

However, governmental agencies are actively establishing work groups and organizing regular conferences in the field of AI. One notable event is the Dubai Assembly for Generative AI, hosted by Dubai Future Foundation. The 2023 conference attracted over 1,800 participants from corporations, academia, and government agencies and focused exclusively on generative AI.<sup>270</sup>



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**Saudi Arabia has set an ambitious goal for 2030: to become a top 15 country in terms of overall AI development**

## Saudi Arabia

### Government strategy and regulation of technology

In Saudi Arabia, similar to the UAE, the strategy is a key document that outlines the direction of technology development. The National Strategy for Data & AI was developed in 2018 and runs until 2030. It is designed to enhance the country's ability to compete in the international market as a leader in the use and export of AI-based business solutions.<sup>271</sup> However, the country has not set an objective of becoming a global leader in AI development by 2030. Saudi Arabia's objective for 2030 is to rank within the top 15 countries in terms of overall technology development. The country's primary focus is on applied solutions for business, which makes its ambition even more conservative: to be among the top 20 countries in terms of scientific contribution in the field of AI. The strategy also identifies priority industries for AI adoption: education, public administration, healthcare, energy, and transportation. The goal is to raise USD 20 billion in AI-related investments, including both private and public funds.

### Government tools to help develop generative AI

The country is pursuing its own technology development, with a limited set of indirect support measures in place. There are several government agencies involved in the country's generative AI development, with the National Center for Artificial Intelligence (NCAI) and the Saudi Data and Artificial Intelligence Authority (SDAIA), founded in 2019, playing a key role in strategizing and guiding its implementation.

The majority of government initiatives are designed to directly support the advancement of this technology. Among them are:

- Establishment of a government entity, the Saudi Company for Artificial Intelligence (SCAI), with the objective of spearheading AI development in key industries. SCAI's remit encompasses not only creating AI solutions but also investing in other companies that develop solutions.
- Model development by a government organization. For example, the ALLaM model, Saudi Arabia's leading LLM, was developed by SDAIA.<sup>272</sup>

**In addition, there is a limited set of indirect support measures focused on AI and technology in general, rather than on generative AI:**

- Creation and support of AI accelerators. For instance, SparkLabs Group, in collaboration with Saudi government entities, established the AIM-X<sup>273</sup> accelerator program. This initiative provides early-stage AI start-ups with the opportunity to secure up to USD 200,000 in investment in exchange for up to 6% ownership in the company. Additionally, GAIA (Generative AI Accelerator), established by state-run SDAIA in collaboration with New Native Inc., aimed to raise USD 160 million in 2023 to invest in 120 companies developing generative AI. In 2024, the government announced plans to expand the total available fund to USD 1 billion.<sup>274</sup>
- Establishment of a "cloud computing zone" in Riyadh offers technology companies favorable conditions for operation. The zone has no clear geographical boundaries<sup>275</sup> and welcomes companies with 100% foreign ownership. Benefits include 0% VAT on transactions within the zone, no customs duties, reduced corporate income tax, etc.<sup>276</sup> While the zone initiative does not focus on AI directly, AI companies can also benefit from the economic zone.

### **Regulation of generative AI**

A comprehensive legislative framework for AI has yet to be established in the country. Currently, there is a set of rules and principles governing artificial intelligence, and in particular generative AI.<sup>277</sup>

### **Markets for private investment in generative AI**

Private sector investment in artificial intelligence is not actively pursued in Saudi Arabia. According to the OECD, total investments in AI in the country amounted to USD 270 million by 2023<sup>278</sup> (the UAE – USD 400 million in the last year). Almost all investments are made by state-owned companies (for example, Aramco Digital's investments in Chinese startup Zhipu AI),<sup>279</sup> agencies or research centers.

### **Self-regulatory organizations**

The country lacks the infrastructure for independent alliances, including those between companies and research organizations. However, the government has taken the initiative to establish industry-specific alliances for the development of artificial intelligence. One such alliance is the Society of Artificial Intelligence in Healthcare.<sup>280</sup>



## India

### Government strategy

In India, the key document guiding the country's development in the field of generative AI is the Artificial Intelligence Mission. Released in 2024 by a number of government departments, including the Ministry of Science and Technology, the document outlines a set of initiatives across seven areas with a five-year implementation horizon. This mission places significant emphasis on generative AI and sets out specific initiatives with a clearly defined implementation plan.<sup>281</sup>

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**India's key focus areas for AI adoption include healthcare, agriculture, education, smart city infrastructure and technology, and the transportation sector**

The National Strategy for Artificial Intelligence report, released by India's National Institute of Transformation in 2018, remains the country's formal AI strategy. The report outlines the establishment of a framework for developing artificial intelligence in the country, encompassing both fundamental technologies and business applications. It identifies key sectors for AI integration, including healthcare, agriculture, education, infrastructure, smart city technologies, and transportation. However, the document lacks clearly defined goals and a long-term vision. Additionally, given its release date, there is no mention of generative AI.<sup>282</sup>

### Government tools to help develop generative AI

India is committed to supporting the advancement of generative AI across all sectors. While many initiatives are still in the planning phase, the implementation of those under the AI Development Mission falls under the purview of INDIAai. This entity reports to the Digital India Corporation, which in turn reports to the Ministry of Electronics and Information Technology. The program's total budget is USD 1.3 billion.

At present, all of the principal initiatives designed to facilitate the advancement of AI in the country, with the exception of those pertaining to education and infrastructure, have been formulated but have yet to be implemented. Among these initiatives are:

- Establishment of an AI marketplace where foundational models can be shared between large companies and start-ups.
- Establishment of IndiaAI Innovation Centre to develop multimodal foundational GenAI models for application in key industries.
- Support for the development of AI-based business applications in key industries (specific tools to be disclosed at a later date).

The programs planned as part of the Mission are primarily focused on generative AI. In addition to the programs listed above, there are programs aimed at developing a regulatory system, increasing the number of higher education AI programs, procuring infrastructure, etc., most of which are detailed in the relevant sections of the study.

### **Regulation of generative AI**

While comprehensive AI legislation is still in development in India, a set of guiding principles, recommendations, and guidelines have been established for use with AI-based systems.<sup>283</sup> These include the requirement to label content created by generative AI and to coordinate with the Ministry of Electronics and Technology for the deployment of generative AI in specific cases.

Source: open sources,  
Yakov and Partners analysis



1.4  
billion US dollars

was the total value of AI deals in India in 2023, making the country the 10th largest country in terms of the total value of AI deals



## Markets for private investment in generative AI

In India, private investment plays a significant role in the advancement of artificial intelligence, though it is constrained by macroeconomic considerations. In 2023, India's total value of AI deals reached USD 1.4 billion, according to the Stanford AI Index 2024,<sup>284</sup> ranking the country 10th in the world. Meanwhile, a year ago, India ranked 5th with a figure 2.5 times higher – USD 3.2 billion.<sup>285</sup> This slowdown may be attributed to a general downturn in private investment in India.<sup>286</sup>

The private investment ecosystem has yet to adapt to accommodate targeted investment in generative AI. Despite the presence of over 50 accelerators for start-ups in the country,<sup>287</sup> no prominent accelerators have yet emerged that focus exclusively on artificial intelligence, particularly generative AI. However, international accelerators are actively collaborating with Indian companies. For instance, Amazon's AWS Generative AI Accelerator selected seven Indian start-ups in the fall of 2024,<sup>288</sup> while 20 Indian start-ups were chosen for Google's AI First program.<sup>289</sup>

## Self-regulatory organizations

India plays host to a number of significant corporate partnerships dedicated to the advancement of generative AI within the country. Notable organizations include NASSCOM,<sup>290</sup> which sponsors the AI Gamechangers Award for significant achievements in AI, maintains an AI adoption index for Indian regions, and collaborates with global experts in generative AI (e.g., BCG) on industry reports. Additionally, there are several specialized organizations, such as the Indian Society for Artificial Intelligence and Law, that focus on collaborating with government entities and businesses to develop AI regulations.<sup>291</sup> Other notable AI regulatory organizations include the AI Knowledge Consortium, which is comprised of 12 research centers.<sup>292</sup>



## Brazil

### Government strategy and regulation of technology

The AI strategy in Brazil is a high-level roadmap for the technology sector. The AI development plan, a more detailed set of objectives and initiatives, is currently under review. The country's AI strategy document, EBIA, was adopted in 2021. It provides an overview of the key initiatives of leading countries in AI development, as well as general areas of focus within nine key areas, including AI regulation, AI education, and information security of technology applications.

In August 2024, the Ministry of Science, Technology and Innovation, the government body responsible for AI strategy, presented a proposal for an artificial intelligence development plan (PBIA)<sup>293</sup> for 2024–2028 with a cumulative budget of USD 4.1 billion. The plan comprises a series of initiatives with a detailed description, an implementation timeline, and an estimated budget. The primary objective of the plan is to facilitate the development, availability, and use of artificial intelligence to address challenges in key sectors of the country's economy and society, ensuring their sustainable growth. The plan is divided into two parts: immediate actions that can have a short-term impact (such as implementing an LLM-based legal assistant to accelerate information retrieval in the country's legal framework or introducing a bank teller assistant at Caixa Bank) and long-term structural measures designed to develop the country's AI ecosystem (such as reworking the Santos Dummont supercomputer or implementing a government salary supplement for AI employees). Furthermore, over 40% of the budget has been allocated to support significant AI initiatives within the country's corporate sector. The plan's funding is primarily sourced from the National Technology Development Fund (FNDCT). Additionally, over half of the funds will be provided as a loan, while the remaining investment will be non-refundable.

# 4.1 billion US dollars

is the total budget of the 2024–2028 Plan for the Development of Artificial Intelligence (PBIA) proposed in 2024 by the Brazilian Ministry of Science, Technology and Innovation

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Source: open sources,  
Yakov and Partners analysis

## **Government tools to help develop generative AI**

The government has not previously played an active role in supporting AI development in Brazil. However, the recently published AI development plan outlines a comprehensive set of initiatives designed to drive progress in this area. Since the release of the initial strategy, the only significant advancement in AI development has been the establishment of public-private AI competence centers. From 2021 to 2023, 11 such centers were established, including the Innovation Center on Artificial Intelligence for Health (CEREIA), the Center of Excellence in Artificial Intelligence for Renewable Energies, and others. The centers' mission is to facilitate collaboration between companies and research organizations. It is anticipated that companies will not only contribute to the centers' research budget but also determine their primary research areas, guiding scientific activity in an applied track.<sup>294</sup> The program is expected to receive a total investment of USD 43 million over 10 years.

The updated plan, if adopted, would implement a wider range of initiatives, including the creation of a private equity fund to support AI start-ups, the procurement of infrastructure to support model training, and other measures.

## **Regulation of generative AI**

At present, there is no AI legislation in Brazil. The only existing legislation is Bill No. 2338/2023,<sup>295</sup> which aims to regulate AI in general. However, this has yet to be passed. The creation of legislation to regulate the technology is part of the proposed AI development plan.

## **Markets for private investment in artificial intelligence**

Brazil lags behind other countries in the development of private investment in generative AI. For instance, in 2019, investment in AI start-ups in Brazil was only USD 1 million, which is 40 times less than in China and 200 times less than in the US over the same period.

## **Self-regulatory organizations**

Alliances of companies in the field of artificial intelligence are not yet a prominent feature of the Brazilian business landscape. However, the competence centers discussed above can play a role in facilitating interaction between companies and the scientific community.



## South Africa

### Government strategy and regulation of technology

In South Africa, the government strategy is a high-level vision outlining the principles of AI adoption in the country. The document was prepared in August 2024 and is called the South Africa National Artificial Intelligence Policy Framework.<sup>296</sup> It provides a rationale for the need to develop artificial intelligence in the country and outlines a set of 12 key areas for development, including the development of AI talent, launching processes to create innovations in the country through research centers and partnerships, introducing AI into public administration, etc.

### Government tools to help develop generative AI

Currently, there are few dedicated support measures for AI companies. However, there are a number of initiatives in place to support technology companies in general, including grants from the National Institute for Technology Innovation.<sup>297</sup>

### Regulation of generative AI

South Africa currently lacks a regulatory framework for artificial intelligence. In October 2023, the Ministry of Communications and Digital Technology published a working paper outlining the principles that should underpin AI regulation in South Africa. The paper also set out a timeline for the establishment of a regulatory framework, with the goal of having it in place by the end of 2027.<sup>298</sup>

### Markets for private investment in artificial intelligence

South Africa's market for private investment in AI is not yet fully developed. While precise information on investment is lacking, it is likely that their volume is insignificant. There are no large funds currently prioritizing investments in this industry in the local market. Additionally, South Africa does not yet have any local companies specializing in AI, with only international branches of Western companies, such as AI First,<sup>299</sup> present.

### Self-regulatory organizations

There are currently several associations in South Africa that include large companies and research organizations, such as the South African Artificial Intelligence Association, an internationally supported association, or the Alliance for AI. However, their role in developing the technology and its business applications is likely not to be a significant factor.

# Section 6.

## Prospects for cooperation between countries

Maturity assessment of countries across various factors within the framework of the study provides insight into the future development trajectory of the BRICS+ countries. China is expected to continue competing with the US for leadership in the development and industrial applications of its solutions. Russia, Saudi Arabia, the UAE, India, and Brazil will primarily focus on developing the domestic market, including local language models and business solutions. South Africa is likely to be a technology consumer, adapting solutions from international players for the domestic market.

Despite the varying approaches to AI development across the BRICS+ countries, there is considerable scope for all of them to derive substantial economic benefits from the technology. However, each country faces a number of challenges that may prevent it from unlocking its full potential. By establishing collaborative frameworks in the domain of generative AI, it is feasible to surmount these impediments, actualizing the capabilities of both individual nations and the whole grouping. At the XVI BRICS summit in Kazan, held in October 2024, Vladimir Putin proposed the creation of an alliance of BRICS countries in the field of AI. He stated, "I will draw attention to the Russian proposal to create a BRICS alliance in the field of artificial intelligence. The objective is to regulate artificial intelligence technologies, including to prevent their illegal use. Russia's business community has adopted a code of ethics in this area, which can be joined by our BRICS partners and other countries". The declaration signed at the summit calls for the creation of a global system of artificial intelligence regulation.<sup>300</sup>

The development of generative AI involves five key areas of collaboration, which are outlined below.

# 1

## Collaborative development of GenAI-enabled models and products

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**By pooling resources in data sharing, research, and development, as well as industry and product expertise, countries can leverage the potential of GenAI to achieve significant synergies in developing models and solutions**

By pooling resources in data sharing, research and development, and industry and product expertise, countries can leverage the potential of GenAI to achieve significant synergies in developing models and solutions. These synergies are particularly pronounced in the four main areas described below.

### Data

Joint development of specialized models will enhance quality through the consolidation of datasets. This is particularly relevant for industrial models, which require a vast amount of data for training. Saudi Aramco, for instance, used 7 trillion tokens<sup>301</sup> of data accumulated over 90 years of operations to train its Metabrain model for the oil and gas industry. Few companies possess such extensive datasets, making collaboration a valuable opportunity for many. This advantage also extends to training models in less widely used languages.

### Research and development expertise

Co-development is an effective method for leveraging cutting-edge techniques in model development. A notable example is the joint effort by researchers from three universities in China and Saudi Arabia, who employed a range of training approaches to co-create AceGPT, the first Arabic language model.<sup>302</sup>

### Industry expertise

Bringing together developers from countries with diverse expertise in specific functions and industries can facilitate the creation of the most effective model-based solutions.

### Product expertise and human resources availability

To develop a GenAI-based solution, it is essential to not only create a model but also to engage in product development, encompassing functionality, interface, and other product components. Countries with the most accessible human resources or specific competencies can effectively take the lead when it comes to this stage.

There are various models of international collaboration in the field of model development, each of which aims to achieve one or more synergies.

## Development of language-specific models and solutions (data / expertise in research and development)

The BRICS+ framework provides an opportunity for Saudi Arabia and the UAE to collaborate on Arabic language models, especially since both countries are predominantly engaged in open-source development (the leading Emirati models JAIS and Falcon fall within this category, as well as ALLaM from Saudi Arabia). Furthermore, there are countries with disparate languages but a shared challenge: the presence of multiple dialects. Examples include South Africa and India. South Africa has 11 official languages, while India has 22. One avenue for cooperation between countries is the sharing of approaches and expertise in adapting models to the complex linguistic landscape. Finally, countries can adapt the solutions they have developed in their domestic market to the markets of other member countries. To this end, it is possible to create common datasets in all BRICS+ languages. In the long term, all countries that have a centralized data repository for AI models will be able to participate in the creation of shared databases. Currently, Saudi Arabia, the UAE, and India are on board, with China and Russia set to join soon.

## Collaborative development of models and product solutions within the same industry or subject area (data, industry expertise)

Each country has industries that are significant to the economy and have a large amount of accumulated data and/or are digitally advanced. These advantages can be leveraged to strengthen co-development with other countries in the grouping. The key industries for the countries are identified below (non-exhaustive list):

- **China:** most industries, including manufacturing, technology, e-commerce;
- **Russia:** finance, energy, mining;
- **India:** technology sector, agriculture, as well as functional areas – IT development and customer service;
- **Saudi Arabia:** energy, construction (in particular smart cities), finance;
- **UAE:** energy, construction (in particular smart cities), tourism;
- **Brazil:** agriculture, mining;
- **South Africa:** mining, finance.



The practice of co-developing industrial models is a rapidly growing trend across the globe. A notable example is the Global Telco Alliance, a joint venture of leading telecommunications companies including Deutsche Telekom, e&, Singtel, SoftBank, and SK Telecom. The alliance is developing a multilingual model for the telecommunications industry.<sup>303</sup>

**Outsourcing solution development to centers of competence or countries with abundant human resources (product expertise and availability of human resources)**

Development of a large number of AI applications requires, among other things, IT developer resources, which are scarce in many countries. One potential solution to this problem could be outsourcing the product development function to India, which accounts for over half of the global IT outsourcing market.

It is important to note that the use of datasets from different countries does not necessarily imply data sharing: using the federated learning method, it is possible to train a model on different datasets and servers without sharing information. This method can be useful, for example, for joint training of models in industries with a high degree of data privacy (such as banking, energy, government, etc.).

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## 2

### Computing power and data

#### Simplified cloud access to partner country infrastructure

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**To enhance the accessibility of infrastructure for model training, BRICS+ could facilitate cloud access to other countries' GPUs**

To enhance the accessibility of infrastructure for model training, BRICS+ could facilitate cloud access to other countries' GPUs. This could be particularly beneficial for large technology companies, as foundational model development is often cyclical, resulting in uneven infrastructure loads. By transferring cloud access from countries with temporary surplus to countries with temporary deficit, it would be possible to more effectively manage peak loads. The initiative may also be applicable for small quantities of GPUs (clusters of up to 20 GPUs), given that in some countries, due to limited access to GPUs, their prices are significantly higher than market prices. According to Yakov and Partners' analysis, in the UAE and India, NVIDIA A100 cloud rental rates are 30–40% higher than in the US, while in Russia they are three times higher. Local companies in Saudi Arabia and South Africa also have limited options for cloud rentals.

The cloud sharing initiative involving large companies will have the greatest near-term impact in countries with the most computing power. These include China, India, Saudi Arabia, the UAE, and Russia. South Africa and Brazil will need to develop their cloud infrastructure to ensure mutually beneficial cooperation. The access exchange mechanism could be implemented in the form of an exchange – similar to the Australian startup GPU Exchange.<sup>304</sup>

### Gradual transition to BRICS+ GPUs

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**If China offers special conditions to BRICS+ partners, purchasing Chinese graphics cards could be more cost-effective while maintaining the quality of the infrastructure and meaningfully enhancing BRICS+ technological sovereignty**

Currently, all GPUs purchased by countries are manufactured by NVIDIA, which has a GPU market share for AI models of more than 80%.<sup>305</sup> At the same time, several players in China are working to develop their own GPU production. Huawei, one of the leading manufacturers, has already started to supply GPUs to the market. The base price of GPUs is comparable: for example, Ascend 910C, which is comparable to NVIDIA's H100, costs a little less than USD 29,000,<sup>306</sup> while India's Yotta paid just over USD 31,000 for GPUs purchased directly from NVIDIA,<sup>307</sup> and Saudi Arabia paid just over USD 40,000.<sup>308</sup> If China offers special terms to partners within the grouping, the purchase of Chinese GPUs may be more cost-effective while maintaining the quality of the infrastructure and meaningfully enhancing BRICS+ technological sovereignty.

This initiative applies to all countries surveyed, regardless of their current NVIDIA GPU usage or strategic partnerships with the US company. As noted earlier in the study, Chinese companies are successfully building clusters that run on multiple types of GPUs.

# 3

## Human resources and education

### Redirection of outbound labor mobility to the BRICS+ countries

**To mitigate the talent gap, out-migration of AI professionals can be redirected to other BRICS+ countries through government payments, employment in the best technology companies, visa facilitation, and other tools**

Retaining talent within the grouping and mitigating the gap in individual countries can be achieved by redirecting out-migration of AI professionals to other BRICS+ countries by increasing the attractiveness of these countries. A number of tools can be used for this purpose, including additional payments from the government, employment in the best technology companies, simplification of visa procedures, etc.

Thus, professionals moving to Western countries (mainly from India, China and Russia, which have strong education systems) may prefer the BRICS+ countries – UAE, Saudi Arabia, Brazil and South Africa. There is likely to be a migration of talent in line with salary differentials between countries. For example, professionals from China with an average AI salary of around USD 48,000/year are more likely to be interested in moving to Saudi Arabia (average salary of about USD 53,000/year) or the UAE (about USD 64,000/year); talent from Russia (about USD 23,000/year) and India (about USD 13,000/year) – to Brazil and South Africa (USD 21,000–22,000 per year in both countries),<sup>309</sup> as well as to China, the UAE, and Saudi Arabia.

### Joint education and exchange programs between universities

To enhance the diversity of expertise and elevate the average educational standard in the BRICS+ countries, it is feasible to establish collaborative academic mobility programs between AI programs at universities in these countries. Such programs can be of two types: joint programs between universities of comparable levels but different profiles, which are valuable for deepening students' knowledge in areas where the inviting university is fundamentally strong; and "upward" academic mobility programs, in which a strong university invites the best students from less advanced institutions for their further development. The program format may involve internships at universities or full-fledged double degrees.

This initiative is most applicable in countries that already have generative AI training programs. Currently, this includes China and Russia, where the University of Hong Kong and ITMO offer master's programs in this field. In addition, these countries, as well as Saudi Arabia, the UAE, and India, have programs focused on AI in general, where academic mobility is also possible.

# 4

## Self-regulatory organizations

Forming an alliance of companies and research organizations within the BRICS+ framework could markedly enhance the exchange of expertise and expand opportunities for collaboration. This is similar to the approach taken by the Alliance for Artificial Intelligence in Russia. In contrast to country-specific alliances such as GPAI,<sup>310</sup> which includes primarily Western countries and focuses on general regulatory issues and responsible use of AI, an alliance of BRICS+ companies could prioritize applied cooperation in the implementation and development of generative AI solutions among industry organizations.

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# 5

## Regulatory system

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**Aligning GenAI regulatory frameworks in the BRICS+ countries would facilitate the licensing of GenAI solutions across the entire grouping, ensuring scalability to all markets**

Further alignment of the regulatory frameworks for GenAI technologies in the BRICS+ countries would facilitate the establishment of consistent licensing standards for GenAI-based solutions. This could streamline the rollout of solutions across countries, replicating the approach taken by the EU in its Act on Artificial Intelligence.<sup>311</sup>

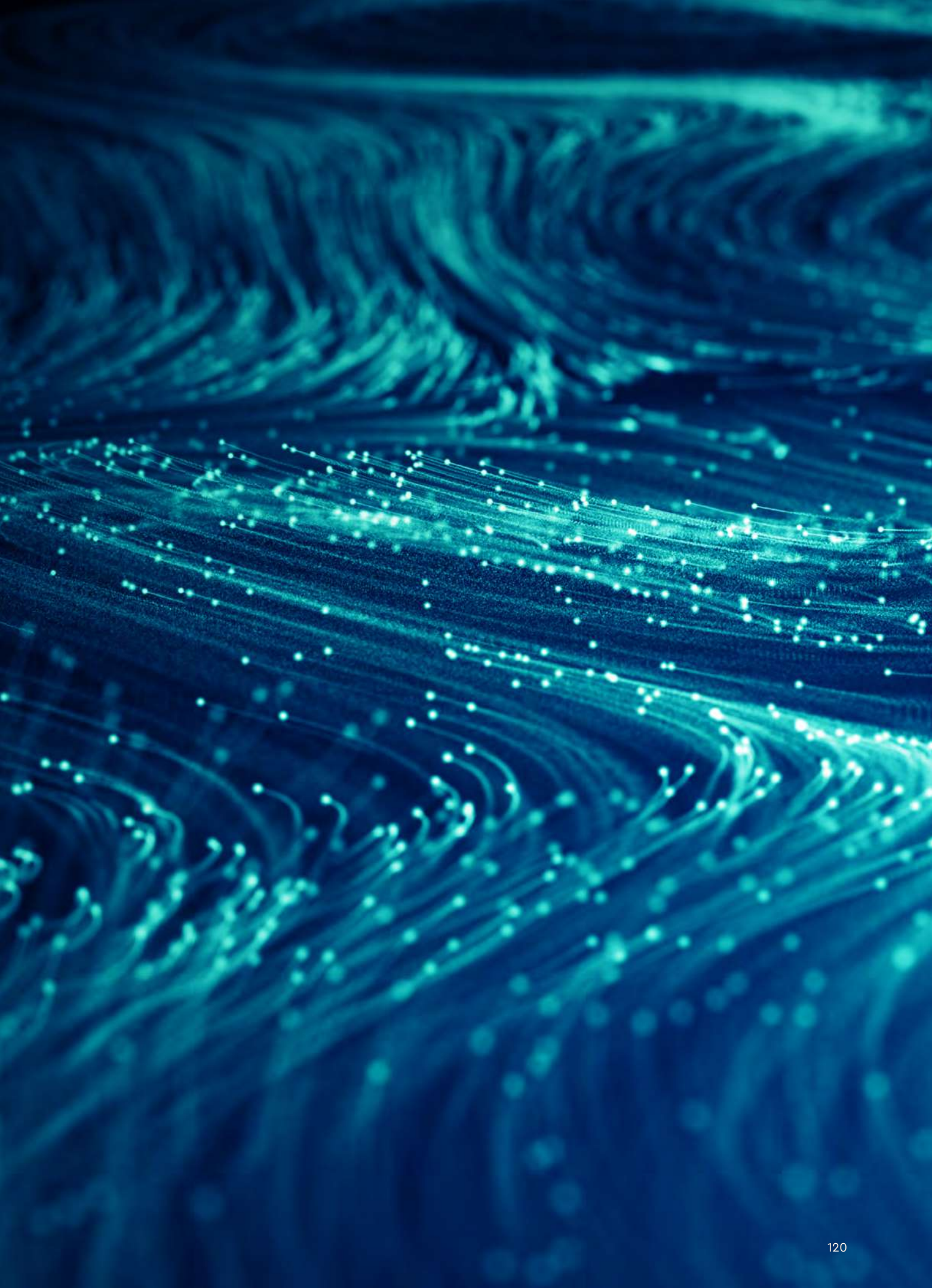
It is important to note that in most countries, the drafting of GenAI legislation is still in progress. Therefore, the current priority should be on aligning the regulatory frameworks of the BRICS+ countries. This approach will help streamline the process of adapting existing regulatory systems to accommodate new technologies.

One promising avenue for aligning regulatory efforts is the planned development in Russia of the world's first index of artificial intelligence regulations in different jurisdictions, including in the BRICS countries. This initiative will facilitate a comprehensive, balanced, and harmonized assessment of the relevant regulatory requirements.

# Conclusion

In the context of growing global competition in GenAI, the BRICS+ countries have a unique opportunity to join forces to create a powerful ecosystem capable of competing with the West in developing core technologies and implementing GenAI in business. The joint development of models and products, exchange of computing power, introduction of educational initiatives, and creation of self-regulatory organizations and regulatory systems will not only enhance the potential of the BRICS+ countries, but also establish a strategic alternative to US dominance in this critical area. The emergence of a robust competitive landscape will not only expedite the integration of AI in business operations but also enable countries to more efficiently tap into their vast economic potential, estimated to be in the trillions of dollars. It is also crucial to highlight that such collaboration will serve as the foundation for fortifying the digital and technological security of participating countries, ensuring their autonomy and resilience in the face of global challenges.

We believe that the insights gained from this study on the GenAI maturity of BRICS+ countries across all key parameters, along with the recommendations on priority areas for collaborative efforts, will prove valuable in streamlining cooperation.



# Generative AI maturity assessment of BRICS+ countries

Country maturity level by criterion: ■ High ■ Medium ■ Low

Block	Criterion	China	Russia	UAE	Saudi Arabia	India	Brazil	South Africa
Technology development and business applications	Foundational models 01	A total of more than 240 models; 17 key models, including multimodal and specialized models	11 key models, including multimodal and specialized models	6 key models, including multimodal models	4 key models, including specialized models	3 key models, including multimodal models	1 key model	2 key models
	Adoption in business 02	Specialized solutions in many areas: medical, automotive IT, etc.	Solutions are mainly adopted by GenAI developers (IT companies) or industries with high digitalization maturity – banks, metals & mining companies, etc.	Sectors with the greatest expertise – healthcare, passenger transportation, etc.	Mainly oil and gas industry	Sectors and functions with the greatest expertise – agriculture, IT, etc.	Mainly the banking sector	Mainly the banking sector, off-the-shelf solutions from Western vendors
Technology development infrastructure	Capacity 03	Hundreds of thousands of GPUs at tech companies	Tech companies have tens of thousands of GPUs. Difficulty importing GPUs	Tech companies/research institute have tens of thousands of GPUs	State research institutes have tens of thousands of GPUs	Tech companies have tens of thousands of GPUs	Research institutes have thousands of GPUs	Little infrastructure for training GenAI models
	Data 04	Plans to build a centralized database; there are several commercial data exchanges	Plans to build a centralized database, there are companies selling datasets	State data platform Bayanat.ae	National Data Bank	Development of a centralized platform in progress	Specialized GenAI databases are not developed	Specialized GenAI databases are not developed
Human resource system	Human resources 05	~700K AI professionals, 28% of researchers in AI from top 20% in the world; source of talent is education system; 58% of researchers* stay in the country	17K AI specialists trained; source of talent – education system ~40% of researchers remain in the country	~120K AI professionals according to AI minister; labor mobility is the main source of talent	A major concentration of AI talent in the region; labor mobility is the main source of talent	300–600K AI professionals; source of talent – education system ~20% of researchers remain in the country	Underdeveloped AI talent pool	Underdeveloped AI talent pool
	Education 06	One of the world's best education systems, trained 47% of the world's top-20% researchers	Strong education system, trained 2% of researchers from the top 20% in the world	An evolving education system; there are 22 universities with AI programs	An evolving education system; there are 10+ universities with AI programs	Second largest education system in BRICS, trained 5% of the world's top-20% researchers	Underdeveloped education system; few universities with AI programs	Underdeveloped education system; few universities with AI programs
Support tools	State strategy 07	New Generation AI Development Plan (2017–2030), high level of detail	National AI Development Strategy (2024–2030), high level of detail	UAE Strategy for AI (2021–2031), high level of detail	National Strategy for Data & AI (2020–2030), high level of detail of India AI Mission (2024–2028), a detailed plan of initiatives	National Strategy for AI (2018), low level of detail India AI Mission (2024–2028), detailed plan of initiatives	Brazilian AI strategy (2021), low level of detail Brazil AI Plan (2024–2028), detailed strategy – pending approval	South Africa's AI Planning (2024–2028), a preliminary document with a low level of detail
	State support tools 08	A wide range of direct and indirect support measures, including model development in cooperation with companies, government procurement, tax incentives, etc. There is a focus on GenAI. Support budget is tens of billions of dollars	Direct and indirect measures, including public procurement, grants, financial incentives for companies. Little focus on GenAI. Low amount of government investment (no more than USD 10–20 million per initiative)	Direct and indirect measures, including state accelerators, state private equity funds, etc. There is a focus on GenAI	Direct and indirect measures, including model development, special economic zones, etc. There is a focus on GenAI	Direct and indirect support measures developed, with a focus on GenAI, in the process of implementation	Plans include direct and indirect support measures with a focus on GenAI	Detailed AI or GenAI development initiatives are not actively pursued
	Regulation 09	There is a well-developed regulatory framework covering 40–60% of the key risks in GenAI	Agreements between companies on the principles of using AI and separate Federal Laws / Presidential Decrees	No regulatory framework	A set of isolated principles on the use of AI and GenAI	A set of isolated rules on the use of AI	No regulatory framework, only a draft law. Development is planned under the strategy	No regulatory framework, development is planned
	Private investment 10	AI in total – USD 7–8 billion in 2023 (GenAI – USD 0.65 billion), 2nd in the world. The government is actively developing infrastructure markets	AI in total – USD 160 million in 2022 Development of AI and GenAI accelerators	AI in total – USD 400 million in 2024, 13th in the world, forecast -up to USD 90 billion by 2030	AI in total – USD 280 million (less than USD 100 million in 2023)	AI in total – USD 1.4 billion in 2023, 10th in the world	Markets are undeveloped, investment of USD 1 million in 2019 (200 times less than the US)	Markets are undeveloped
	Self-regulatory organizations 11	Several alliances of businesses and other organization (AI Industry Alliance, Baidu AI Innovation Alliance, etc.)	AI alliance, actively involved in industry development	Independent alliances are not developed	Independent alliances are not developed	NASSCOM, is actively involved in the development of the sector	Independent alliances are not developed	Independent alliances are not developed

Potential impact by 2030, USD billion per year	300–500	8–14	2–3	4–7	21–35	12–20	1–2
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\* Here retention of researchers in a country means top 20% of the world's researchers educated in that country

Note: A model was designated as a key one if it met one of the following criteria: it is developed by a leading AI company or research institute, it is actively used in the economy or by society at large, and it represents a significant technological advancement for the country in the field of generative AI

Source: Yakov and Partners analysis

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## Generative AI in the BRICS+ Countries: Trends and Outlook

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