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SCIENCE, AI, SOVEREIGNTY, AND STRATEGY: NAVIGATING GLOBAL TECH WARS THROUGH BRICS+

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Abstract

In an era defined by fierce technological rivalry and evolving geopolitical dynamics, science and technology particularly Artificial Intelligence have emerged as crucial arenas for asserting national sovereignty and shaping global influence. This paper analyses how the BRICS+ consortium comprising Brazil, Russia, India, China, South Africa, and more recent additions including Egypt, Iran, Ethiopia, and the UAE is navigating the current global tech war by strategically promoting scientific cooperation, digital sovereignty, and innovation-driven multilateralism. The analysis highlights the bloc's shared objective to establish epistemic and infrastructural autonomy by fostering alternative innovation ecosystems and governance frameworks, notably in artificial intelligence, space technology, cybersecurity, and data regulation.

The research examines the challenges and opportunities of BRICS+ science diplomacy drawing on theories of dependency and national innovation systems. It underscores internal asymmetries in research capabilities, regulatory misalignments, and geopolitical conflicts particularly between India and China as barriers to deeper integration. Simultaneously, initiatives such as the BRICS Technology Transfer Centre, AI Alliance, and the CBERS satellite programme demonstrate emerging models of South–South cooperation that seek to challenge Western hegemony in critical technologies.

The study contends that for BRICS+ to emerge as a transformational entity in global science and technology governance, it must institutionalise its efforts through harmonised policies, collaborative funding mechanisms, and inclusive research ecosystems. This necessitates a shift from symbolic declarations to robust science diplomacy grounded in the principles of multipolarity, equity, and digital self-determination. Ultimately, BRICS+ offers a unique platform for the Global South to reimagine scientific sovereignty and shape a more balanced global order grounded in plural epistemologies and collaborative innovation.

Keywords: Techno-sovereignty, AI, AI governance, BRICS+, Global South, Science diplomacy, Innovation systems, Digital sovereignty, Knowledge decolonisation, South–South cooperation, Strategic technologies

I. Introduction

In an era of growing geopolitical rivalry and the rapid evolution of strategic technologies, science and technology have become pivotal tools of national influence and global competitiveness. International relations have undergone a significant transformation due to the global race over critical technologies, such as artificial intelligence (AI), quantum computing, green energy, and advanced digital infrastructure. Consequently, this has led to what majority of analysts now refer to as a "global tech war," where innovation is not only an economic asset but also a strategic instrument of power (Simons, 2024).

At the heart of this transformation lies the growing significance of techno-sovereignty or the capacity of states to independently develop, regulate, and control their technological ecosystems. The concept of techno-sovereignty is most relevant to emerging economies as it entails both the material infrastructure of innovation and the epistemic power to shape global norms and standards. Several nations in the Global South have developed counter-models that prioritize digital autonomy and cooperation among Southern countries in response to the growing Western hegemony in digital infrastructure, data governance, and knowledge production (Belli, 2021 & Thumfart, 2024).

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The BRICS+ bloc consisting of Brazil, Russia, India, China, South Africa, and more recently, Egypt, Iran, Ethiopia, and the United Arab Emirates has emerged as an alternative center of science and innovation governance in this new paradigm. Through initiatives like the China-Brazil Earth Resources Satellite (CBERS) program, the BRICS Science, Technology, and Innovation (STI) Framework Program, and Russia-India partnerships in nuclear and space technologies, the bloc has started to institutionalize cooperation in high-tech sectors (Jiang & Belli, 2025). These efforts reflect a strategic move towards collaborative scientific development that not only serves domestic needs but also seeks to reduce dependency on Western technology ecosystems.

Digital sovereignty remains a central focus of this strategic shift. As documented by the CyberBRICS project, certain member countries including Russia, India, and China have developed alternative models of internet governance and cybersecurity frameworks that counters the hegemony of U.S. based platforms and surveillance regimes (Belli, 2021). The announcement of the BRICS AI Alliance by Russian President Vladimir Putin in 2024 indicates the alliance's ambition to shape global standards on ethical AI and data flows (Bryanski, 2024).

The pursuit of scientific sovereignty is not limited only to infrastructure or market hegemony. It involves the epistemic power, the authority to shape what counts as legitimate knowledge, whose expertise is valued, and how global science is governed. BRICS+ nations are progressively leveraging their economic and demographic presence to challenge existing knowledge hierarchies, challenge intellectual property frameworks, and advocate for inclusive, multipolar models of scientific collaboration (Batista Jr., 2021). The bloc's recent expansion is an integral component of a comprehensive strategy designed to legitimise diverse development models and decolonise the governance of global science and technology in the global order (*Tatsuya Kurosaka*, 2022 & Le Monde, 2024).

This paper critically analyses how BRICS+ is manoeuvring through the evolving landscape of global science and technology competition. It examines the bloc's strategic engagement in scientific cooperation as a strategy for seeking techno-sovereignty, creating alternative innovation infrastructures, and shaping global governance frameworks. In doing so, the report contributes to broader discussions and debates on techno-nationalism, knowledge decolonisation, and the future trajectory of scientific multilateralism in a multipolar world.

II. The Geopolitics of Science and Technology in the 21st Century

In the 21st century, science and technology have become strategic assets at the core of national sovereignty, economic competitiveness, and global influence. Historically, they were mostly viewed as a primarily tools for development, they are now pivotal instruments in the assertion of geopolitical power. The great powers are investing heavily in research and development (R&D), digital sovereignty, and innovation diplomacy to secure their positions in an increasingly contested technological landscape (European Commission, 2023).

The global technology race is most notably marked by U.S.–China rivalry. The United States has introduced policies like the CHIPS and Science Act to revitalise domestic semiconductor manufacturing base and reduce reliance on Chinese supply chains (U.S. Congress, 2021). In contrast, China continues to advance its techno-industrial strategy through initiatives such as *Made in China 2025*, while Chinese President Xi Jinping has called for greater self-sufficiency in AI development to shield China from Western technological dependencies (Pomfret & Zhen, 2025). This phenomenon where innovation is closely linked with national strategy has increasingly been described as "AI nationalism".

Within this context, Russia and India, as integral members of BRICS+, offer instructive cases of middle powers leveraging science and technology to assert strategic autonomy. Russia, historically a leader in nuclear energy, aerospace, and defence technologies, has sought to reposition itself in the post-Ukraine war context by deepening scientific cooperation with non-Western allies and pursuing digital sovereignty. Russian policymakers have increasingly prioritised the development of

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national digital platforms, cyber norms, and create AI standards independent of Western systems, a trend also noted in the country's participation in the proposed BRICS AI Alliance (Bryanski, 2024).

India, meanwhile, has emerged as a vocal advocate of technology-driven development within the Global South. Initiatives like *Atmanirbhar Bharat* (self-reliant India) and *Digital India* reflects the country's emphasis on indigenous innovation, public-private partnerships, and strategic technology collaborations (Mehta & Singh, 2022). India's semiconductor mission, space programme (ISRO), and leadership in global digital public goods (e.g., Aadhaar, UPI) have positioned it as a major player in the global technological order. Notably, India's cooperation with Russia in fields such as nuclear energy (Kudankulam project), defence R&D, and cybersecurity reflects a broader commitment towards bilateral scientific partnerships that resist Western monopoly over critical infrastructure.

Together, India and Russia exemplify the dual imperatives of scientific modernisation and strategic diversification, both seeking not only technological advancement but also autonomy in determining the terms of engagement with global systems. In the context of the BRICS+ coalition, their histories highlight the bloc's potential to act as a forum for non-Western science diplomacy and to challenge the epistemic and material dominance of transatlantic technology regimes.

The scientific aspirations of BRICS+ countries especially India and Russia highlight the dynamics between innovation, sovereignty, and power as the world moves toward a multipolar technological order,. Their initiatives to develop indigenous capabilities and strengthen South–South cooperation marks a shift in the global science and technology arena, with consequences for both global governance and national development trajectories.

III. BRICS+ Cooperation in Science and Technology: A Strategic Imperative

In the evolving landscape of global geopolitics, the BRICS+ nations consisting Brazil, Russia, India, China, South Africa, and more recent additions such as Egypt, Iran, Saudi Arabia, Ethiopia, and the United Arab Emirates has increasingly recognised the strategic importance of collaborative efforts in science, technology, and innovation (STI). This collaboration is not solely aimed at technological advancement but a conscious effort to assert sovereignty, promote economic development, and challenge hegemonic global power dynamics of Western nations (BRICS, 2015).

The roadmap for this collaborative work was established in 2015 with the signing of the *Memorandum of Understanding on Cooperation in Science, Technology, and Innovation*. This agreement created a strategic framework to foster intra-BRICS cooperation in order to address common social and economic challenges through knowledge co-generation and innovation (BRICS, 2015). Subsequently, the BRICS STI Framework Programme was launched to facilitate multilateral research collaborations among member states, focusing on climate change adaptation, renewable energy, and digital technologies (BRICS STI Framework Programme, n.d.).

One of the most prominent initiatives under this framework is the BRICS Technology Transfer Centre, proposed by China in 2018. The centre is located in Kunming, and serves as the first official mechanism for technology transfer among BRICS nations, with the aim of facilitating collaborative research and development (Ministry of Science and Technology of the PRC, 2022). Additionally, the establishment of the BRICS Cooperation Hub in 2025 has further fostered multilateral cooperation by integrating science, technology, innovation, education, and business sectors among member countries (IFIA, 2025).

Artificial intelligence (AI) has emerged as a focal point in BRICS+ STI cooperation. In December 2024, Russian President Vladimir Putin declared the formation of an AI Alliance Network, consisting of BRICS nations and other interested countries, to collaborate on AI development and regulation. This initiative seeks to challenge the dominance of the United

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States in AI technology and promote collaborative research and market opportunities among member countries (Bryanski, 2024).

Furthermore, collaborative space exploration projects have been initiated by the BRICS nations. The China–Brazil Earth Resources Satellite (CBERS) programme stands as a testament to successful South–South cooperation in space technology, where both nations have been jointly developing and operating Earth observation satellites since the late 1990s (Sausen, 2001). These initiatives not only enhance the technological capabilities of member states but also contribute significantly to global efforts to monitor the environment and disaster management.

These collaborative efforts underscores the strategic necessity of BRICS+ cooperation in science and technology. Through mutual sharing of resources, knowledge exchange, and promoting innovation, BRICS+ nations seek to build a multipolar world order that reflects the varied interests and ambitions of emerging economies in the world. This collective strategy not only strengthens the individual capacities of member states but also positions the BRICS+ nations as a formidable force in shaping the future of global science and technology governance.

IV. Scientific Sovereignty and Developmental Asymmetries

The BRICS+ consortium, signifies a substantial geopolitical alliance seek to reshape the global scientific and technological landscape. However, achieving this vision requires overcoming substantial **internal disparities** in research capacity, innovation infrastructure, and institutional development.

Internal Disparities in R&D and Scientific Output

Despite shared aspirations, BRICS+ countries exhibit sharp disparities in R&D investment and scientific output. China leads the bloc, investing over 2.4% of its GDP into R&D and producing a rapidly growing share of global scientific publications (UNESCO, 2022). In contrast, India spends less than 0.7% of its GDP on R&D, with significant variation across sectors and limited private sector participation (Mehta & Singh, 2022). South Africa and Brazil also face constraints in scaling their innovation systems. These disparities manifest in patent output, research infrastructure, and the ability to commercialise innovation (Rodrigues & Villaverde, 2024).

Institutional capacity also varies considerably. While countries like Russia and China have robust public research institutions and strategic state funding, others lack well-integrated national innovation systems. This unevenness affects the effectiveness of multilateral collaboration, especially on large-scale scientific missions.

Tensions Between National Sovereignty and Multilateral Harmonisation

The pursuit of **scientific sovereignty** having the ability to control critical technologies, data, and research agendas is a key driver behind BRICS+ cooperation. However, this often collides with the need for coordination in areas such as intellectual property (IP) rights and data governance. Legal and regulatory divergences across BRICS+ countries complicate the creation of unified frameworks for innovation (Belli, 2023).

For instance, differences in IP protection policies may discourage knowledge-sharing, while data localisation policies, especially in Russia, China, and India, can fragment the digital research ecosystem (Belli, 2023 & Sherman, 2024). These policies address legitimate concerns about cyber-sovereignty and surveillance but can deter cross-border R&D collaboration.

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Reducing Technological Dependency on the West

One of the strategic necessities of BRICS+ cooperation is reducing **dependence on Western-dominated technologies,** particularly in semiconductors, biotechnology, and internet governance. China's *Made in China 2025* policy specifically aims to localise the manufacture of critical technologies such as microchips, robotics, and high-end medical equipment (Kuo, 2023). Russia, facing post-Ukraine-war sanctions, has turned inward to create a sovereign internet infrastructure and national alternatives to Western platforms (Gronlund, 2024).

India's approach has focused on open-source digital public infrastructure and localising supply chains through its *Digital India* and *Atmanirbhar Bharat* initiatives (Mehta & Singh, 2022). These initiatives reflect a desire to control data flows, reduce external vulnerabilities, and foster domestic innovation ecosystems.

Theoretical Insights: Dependency and Innovation Systems

From a **dependency theory** perspective (Prebisch, 1950; Cardoso & Faletto, 1979), the push for technological sovereignty within BRICS+ reflects an effort to break the structural subordination of the Global South to the innovation centres of the Global North. The bloc's efforts to deepen intra-bloc R&D cooperation and develop shared infrastructure challenge the historic asymmetries that have relegated many of these countries to peripheral roles in the global knowledge economy.

At the same time, **innovation systems theory** (Lundvall, 1992) emphasises the need to build integrated, adaptive systems of institutions, firms, and state policies to support knowledge production. BRICS+ counties must enhance their national innovation systems while fostering collaborative platforms to achieve the promise of shared scientific sovereignty.

In conclusion, although BRICS+ offers a promising counterbalance to Western-dominated tech regimes, its success depends on resolving internal disparities, aligning regulatory frameworks, and investing in coordinated, sovereign scientific systems that are not merely parallel but also inter-operable.

V. Obstacles and Strategic Dilemmas

The BRICS+ consortium, comprising Brazil, Russia, India, China, South Africa, and recent members Egypt, Iran, Ethiopia, Saudi Arabia, and the United Arab Emirates, intends to reshape the global scientific and technological landscape. However, this ambition is restrained by internal and external challenges that complicate cohesive collaboration.

Internal Political Tensions

A significant internal challenge is the persistent geopolitical tension between India and China. Although recent diplomatic engagements aimed at de-escalation, such as the 2024 accord on border patrols, deep-seated mistrust persists, originated from historical border conflicts and strategic rivalries (Kugelman, 2024). This conflicts hampers cohesive decision-making within BRICS+, particularly in areas requiring close cooperation like technology and infrastructure development.

Lack of Standardised Regulation and Funding Mechanisms

The dearth of harmonised regulatory frameworks and funding mechanisms further restricts BRICS+ collaboration. Economic policies and diverse legal systems among member states impede seamless cooperation in science and technology initiatives. For instance, discrepancies in data governance laws and intellectual property rights can deter collaborative research and innovation efforts (Belli, 2023). Moreover, the absence of a cohesive funding strategy limits the sustainability and scalability of collaborative initiatives.

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External Pressures from the US and EU

BRICS+ encounters external pressures from established Western powers. The United States and the European Union have expressed concerns over the bloc's growing influence, especially in relation to its efforts to establish alternative financial systems and reduce dependence on the US dollar (Greene, 2023). These concerns have resulted in diplomatic and economic measures intended to restrict BRICS+ initiatives, thereby challenging the bloc's cohesion and strategic autonomy.

Internal Institutional Weaknesses and Fragmented Governance

Internally, BRICS+ grapples with institutional inadequacies and fragmented governance frameworks. Variations in administrative capacities, bureaucratic inefficiencies, and differing national priorities obstruct the development of unified policies and the implementation of collaborative efforts. Such fragmentation undermines the bloc's potential to present a cohesive front and effectively execute its strategic objectives (Azahalf & Tischler, 2013).

Critical Reflections on the Limits of South–South Alliances

The aforementioned challenges underscore the inherent limitations of South–South coalitions such as BRICS+. While the bloc offers a platform for emerging economies to advocate for their interests, internal disputes and external pressure may dilute its effectiveness. BRICS+ must resolve internal divisions, standardise regulatory frameworks to enhance its strategic coherence, and develop robust institutional mechanisms that can withstand external challenges.

VI. Strategic Futures: Pathways to Scientific Sovereignty in BRICS+

To achieve the objective of scientific sovereignty, BRICS+ must evolve from ad hoc collaboration to institutionalised, policy-oriented frameworks that leverage both symbolic and material forms of power. This shift involves creating mechanisms for innovative funding, digital autonomy, and shared governance of emerging technologies.

Creation of a BRICS+ Tech Transfer and Innovation Fund

A specialised BRICS+ Tech Transfer and Innovation Fund could serve as a transformative mechanism for financing joint R&D, particularly in advanced sectors such as biotechnology, green energy, and artificial intelligence. The fund could enhance the existing BRICS Technology Transfer Centre initiative, launched by China in Kunming, which already offers a formal platform for technology exchange among member states (Ministry of Science and Technology of the PRC, 2022). A multilateral funding mechanism would reduce reliance on Western sources, ensure sustained support for indigenous innovation, and facilitate South–South technology diffusion.

Establishing a BRICS AI Governance Charter

Given the escalating relevance of artificial intelligence, the development of a BRICS AI Governance Charter is imperative. This document would harmonise ethical guidelines, regulatory standards, and shared research principles among BRICS+ nations. It could serve as a Global South alternative to Western-led AI governance models, helping to shape the evolving international norms in AI regulation (Digital Policy Alert, 2025). A shared charter would also bolster the bloc’s legitimacy in multilateral negotiations on AI ethics and digital rights.

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Enhancing Data Localisation and Cyber-Sovereignty Cooperation

Data sovereignty is emerging as a cornerstone of digital scientific autonomy. Several BRICS+ nations such as Russia, India, and China have implemented or proposed data localisation laws and sovereign cloud infrastructure. Cooperative policymaking in this area could reduce vulnerabilities to foreign surveillance and external control over strategic data flows (Belli, 2023). Shared protocols on cybersecurity, cloud governance, and digital infrastructure standards would also improve interoperability and trust within the bloc.

Institutionalising Science Diplomacy and Inclusive Research Ecosystems

Long-term cooperation requires institutionalised science diplomacy, such as regular BRICS+ ministerial dialogues, joint academic funding schemes, and regional centres of excellence. Additionally, the creation of inclusive research ecosystems where mobility of scientists, equitable funding, and capacity-building are central can reduce internal disparities and expand the bloc's innovation base. Such efforts would not only deepen intra-bloc ties but also enhance BRICS+'s influence in global STI governance debates.

By implementing these forward-looking strategies, BRICS+ can enhance its collective scientific capacity, reinforce sovereignty, and contribute to the emergence of a more multipolar and equitable global technological order.

VII. Conclusion

In the 21st century, AI and science and technology have become key factors that determines power, sovereignty and international influence rather than being ancillary to global politics. From Artificial Intelligence and semiconductors to data governance and space exploration, the ability to develop, control, and apply knowledge has become a defining feature of geopolitical standing. In this context, the BRICS+ consortium has emerged as a significant actor in challenging the Western-centric architecture of scientific and technological dominance.

However, BRICS+ must move beyond reactive diplomacy and symbolic declarations in order to reach its full potential. It is essential to develop strategic institutions based on robust funding mechanisms, harmonised regulatory standards, and shared governance frameworks. The bloc's initiatives must be grounded in long-term vision, capable of addressing internal disparities while resisting external pressures that aim to fragment or marginalise its collective agency.

Importantly, BRICS+ has the opportunity to forge a new paradigm in global science and technology, one that is pluralistic, equitable, and rooted in the lived realities of the Global South. By promoting decolonised knowledge systems, supporting inclusive research ecosystems, and investing in South–South cooperation, the consortium can contribute to a more balanced and just global order. The road ahead will demand political will, institutional innovation, and epistemic humility, but the strategic dividends, scientific sovereignty, resilience, and shared progress are well worth the pursuit.

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