TECHNOLOGY AND POWER POLITICS: ARTIFICIAL INTELLIGENCE AS A STRATEGIC ASSET IN 21ST CENTURY GEOPOLITICS

Muhammad Faisal

BS IR Graduate, BalochistanUniversity of Information Technology, Engineering and Management Sciences

Corresponding Author: *
Muhammad Faisal

Abstract

This study examines the strategic significance of artificial intelligence (AI) in shaping 21st-century geopolitics, with implications for economic development, military capability, intelligence operations, and governance structures. Employing a qualitative methodology and secondary data analysis of scholarly literature, policy reports, government publications, and professional news sources from 2020–2025, the research synthesizes key insights into AI's multifaceted role as a transformative resource. Findings indicate that AI enhances national power by simultaneously strengthening economic innovation, industrial competitiveness, and security preparedness, while also generating new vulnerabilities in governance. Economically, AI drives technological advancement and industrial policy, with the United States, China, and the European Union emerging as primary actors. Militarily, AI has already altered battlefield dynamics, as evidenced in the Russia–Ukraine conflict, through the deployment of drone swarms, predictive logistics, and autonomous systems. In cyberspace and intelligence operations, AI functions as both a defensive and offensive tool, challenging traditional deterrence frameworks. The study highlights ongoing global debates regarding AI governance in military applications, as well as the pursuit of technological sovereignty by middle powers. The research concludes that AI is a central element of great power competition, particularly between the United States and China, and has reconfigured international power relations, giving rise to new paradigms of governance, cooperation, and strategic risk management.

INTRODUCTION

Technology in state-craft, national security and international relations have completely revolutionized the power politics between nations in the twentieth first century. The Artificial Intelligence (AI) that simultaneously drives the economy and is also a distributor of power (the distribution of power among states) is by far the most significant of the new technologies that transformed geopolitics. However, unlike other technological revolutions, AI is a dual-purpose technology i.e. a commercial technology may be easily transformed directly into a military and security technology. It has already come in handy in the business and military spheres and AI is now the gravitational focus of strategic competition and has become the center of government national security policy everywhere in the world. To a lesser degree, the US has already reiterated several times that it will have to dominate the AI research and development

sector to enjoy the economic and military benefits of AI, and limit the access of Chinese state-of-the-art semiconductor technologies in order to develop AI (Brookings Institution, 2024). However, it is clear that China has already integrated AI into its state modernization, and in the near future will be one of the first to deploy AI with the help of mega-investments, convergence of industries and states, and centralized information processing and integrates innovations in technologies and authoritarian methods of governance (Carnegie Endowment for International Peace, 2024). Geopolitics AI has got salience is that it can make the decisions fewer, make the analysis of war more of a mechanism, simplify the logistics and supply chain, create autonomous warfare and semi-autonomous warfare and change the nature of warfare (RAND Europe, 2024). Already in the current war between Russia and Ukraine, AI has begun to prove its strategic value, such as reviewing real-time satellite imagery, predictive logistics and even leveraging AI swarms of drones to target an enemy location (Wall Street Journal, 2025). We might refer to them as battle field developments and it will involve AI leaving the world of laboratory application and speculation and moving into the world of active warfare and the new way of thinking about war. Meanwhile, the states also use AI to spy, monitoring the Internet and manipulating information to reinforce the instruments of authoritarian power and alter the informational landscape on a global scale (NATO, 2024). What makes AI a truly disruptive variable in international relations are three integration to prosperity, three militarization to even greater instability.

Moreover, it is impossible to talk about the element of AI in geopolitics without referring to the theme of the overall domination of precious resources and structures. The vision of talent pools, access and control of data, and computational domination via state-of-the-art semiconductor manufacturing plants are being considered as sources of state power in the machine learning age. Technological sovereignty was previously the fringe case of the European Union discourse in Indian and other discourses on national security in earlier years as it has since become the king and servant of European Union, Indian and other discourses about national security since they do not believe that the United States or China alone can do it (NATO, 2024). It is a war on technologic independence, in which the partition of the world system into competitive digital camps seeking various regulative values and principles of national law is brought into focus. Models presented in the United States and its allies bring about a trade-off between innovation and ethical values, whereas China and Russia are developing models that focus on control, centralization, and instrumental application of AI to ensure the stability of the regime and provide a geopolitical advantage (RAND Europe, 2024). Such schisms are fuelled by the lack of international regulation of AI. Although other agencies like the United Nations or OECD also start considering AI ethics and responsible innovation, they lack the capacity and resources to implement these principles into practice, and these are not reflected in the militarization of AI as being limited or in its potentially harmful use (Carnegie Endowment for International Peace, 2024). The outcome of such a divergence in governance is the threat of disruptive arm races, non-state deployment of arms unilaterally, and uncontrolled escalation during a crisis occasioned by poor decision-making schedules. Furthermore, AI enhances already uneven circumstances, technologically stronger nations can use the weakness of other developing ones to further the hierarchic system more rapidly on the international level. In this case, we can speak about AI as the power multiplier of the country, not to mention it is a disruptive element in international politics, disrupting the competition and cooperation, yet not fully. Seeing AI as a strategic asset of the twenty-first century is to see not merely the technological aspect of AI, but the political and economic, as well as the normative, environment in general, in which AI finds itself. Not all strategic uses of AI are concerned with innovation but rather politics of power, who determines the rules to the international system, who will gain in the economy and in the military,

and who will lose in a more AI-driven world. The next fact must be considered: to make AI more useful and minimize the disruptive nature of AI using multilateral cooperation, responsible AI regulation and technical security. Generally, with the disruptive nature of AI, AI has become the centrepiece of geopolitics in the twenty-first century where states will not see the control of AI as an opportunity but a survival, power and place in the new uncertain international system.

Literature Review

The convergence of artificial intelligence and geopolitics has spawned a growing literature on its technological, strategic, and ethical aspects. The initial research on technology and international affairs, including Horowitz (2018), theorized innovation as a source of power diffusion, a move that would pre-empt discussions on the role of AI in changing the balance of power. The theoretical framework presented by Mearsheimer (2001), structural realism, presents the context, implying that states will take advantage of the new technologies such as AI to seek relative positions, thus a more significant security competition.

The latest research focuses on AI as an enabler of the economy and a driver of national competitiveness. Based on the findings of the Brookings Institution (Kreps, 2024) and the Artificial Intelligence Index (Maslej et al., 2024), data sovereignty, semiconductor chain security, and creating research ecosystems that are more dynamic are the main factors that can be used to keep a technological edge. The state-cantered industrial policies of China combine the use of AI in the modernization of the economy and centralized control (Cheng, 2023), and the United States upholds open innovation and control of exports in order to maintain a strategic advantage (Brookings, 2025). The European Union is moving towards technological sovereignty, where market incentives and ethical standards of AI are reconciled (Feldstein, 2024). Collectively, these works demonstrate that AI infrastructure, including data, talent, and chips, became one of the fundamental measures of state power.

Parallel literature analyses AI as a military resource, changing the operational practices and doctrines. The implementation of AI to hasten decision processes, autonomous weaponry, and predictive logistics is also described by RAND Corporation (Black et al., 2024) and Scharre (2019). Cases of the war between Russia and Ukraine demonstrate the practical use of AI in the form of drone swarms, instant satellite analytics, and autonomous targeting systems (Bondar, 2025). These reports warn that even though AI increases the accuracy of tactics, it shortens the observe-orient-decide-act (OODA) loop, which increases the risks of escalation, and traditional deterrence is undermined (Aschenbrenner, 2025).

The application of AI to intelligence and cyber functions has been covered too. According to scholars, it has the ability to process large-scale data, detect anomalies, and conduct influence campaigns (Bommasani et al., 2021). Robots watching and machines creating content allow repressive governments to centralize power, as well as making attribution complicated in cyber war. These dynamics increase the gray area of interstate competition, and misperception and escalation are more likely.

One of the major areas of research questions is governance and ethical issues. Principles of trustworthy AI have been promoted by international organizations, including the OECD and the United Nations, but they are not enforced (Han et al., 2019). The European Union AI Act is another first-of-its-kind regulatory framework, yet there is a very narrow geographical scope, and the process is relatively slow compared to the process of technological diffusion (Feldstein, 2024). The AI strategy of NATO is interoperable and responsible military usage, which cannot be considered universal (NATO, 2024). The researchers caution that the disjointed governance would enable unregulated proliferation, giving the states and non-state actors the opportunity to weaponize AI (Scharre, 2019).

Lastly, AI is being positioned as the tipping point of great-power rivalry. Miller (2022) and Thompson and Bremmer (2018) outline an AI

Cold War whose driving force is the development of competing versions of innovation and regulation. The global supply chains are influenced by the U.S. competition with China over the chip production process and the industrial policy (Brookings, 2025), and middle powers, such as India and the EU, have strategic autonomy as a way to escape the dependence on both poles (Michaels, 2024). This competition is not only economical and defensive in nature but also a normative competition of privacy, transparency, and algorithmic governance.

In these areas, the literature is united around two findings: first, AI is ceasing to be a niche technology and is becoming an important strategic resource of statecraft; second, its disruptive nature poses threats to old theories of stability and cooperation. There are, however, gaps in terms of integrative analyses of the economical perspective, the military perspective, and that of governance in one geopolitical paradigm. Not many studies investigate the form of AI in transforming power dynamics in a systematic way and creating space for collaboration. The solution of these gaps is crucial in the crafting of policies that are both innovative and restrained, competitive and cooperative, and national and global.

3. Research Objectives

1. To examine the strategic importance of artificial intelligence in the economic sphere, military sphere, and intelligence sphere in modern geopolitics.

2. To explore how the capabilities facilitated by AI will reform great-power competition, especially among the United States, China, and middle powers that are on the rise.

3. To evaluate AI-related governance issues, such as regulatory fragmentation, ethical issues, and military risks.

4. To generalize on the theoretical and empirical views of the disruptive role of AI in international order and suggest ways of responsible multilateral cooperation.

4. Problem Statement

The concept of AI has quickly developed into a game changer in the world politics of power, but the ultimate effects on international security, governance, and competitive economic issues are not fully theorized and are unequally addressed. Although countries like the United States, China, and the European Union are leaders in AI development as a factor in innovation, military superiority, and strategic independence, the lack of strong international regulation and common ethical standards has resulted in an unstable situation. The literature tends to focus on financial, military, or governance factors of AI, yet hardly combines them into a full geopolitical picture. This disintegration does not allow seeing exceptionally well the functioning of AI as both an economic engine, a military resource, and a means of surveillance and control, thus consolidating state authority and increasing systemic threats. In the absence of clear analytical models and collaborative mechanisms, the unregulated spread of AI may enhance arms competition, increase inequalities between technologically advanced and developing states, and destabilize the world. To fill these gaps, a multidimensional investigation of AI as a strategic resource and its contribution to the reorganization of the balance of power in the 21st century is necessary.

5. Methodology
5.1. Research Design

The research study was also conducted in the framework of qualitative research design and exploratory strategy. The last was to examine artificial intelligence as a strategic resource in modern geopolitics and expenditure thereof, and its application and use by the military and government. It is the choice of research design because it has rendered it possible to combine the theoretical, policy, and empirical perspectives that cannot be separated in the course of rendering international relations multidimensional. The secondary data sources, the scholarly journal articles and policy reports, government publications and reliable news sources actually turned out to be a blessing

because as much information as could be related on the topic of interest was captured in the study.

5.2. Data Collection

In an attempt to achieve both reliability and validity, several sources of secondary data were used. Peer-reviewed journal articles were accessed using the Scopus, Web of Science and Google Scholar databases. Organizations such as NATO, RAND corporation, Brookings Institution and Carnegie Endowment of International Peace were some of the sources of policy documents. In addition to this, the governments of countries made their statements and policies which were considered to be the policy views of the four major actors, the United States, China and European Union. Popular international publications like the Wall Street Journal helped to discuss such aspects like the use of AI on battlefields. Only in this period 2020-25, the literature was selected because there was a necessity to make sure that the most recent tendencies in this sphere of geopolitics were considered.

5.3. Sampling Strategy

The sources were selected through a purposive sampling. The selection of the sources and publications has been made based on their relevance to AI and geopolitics and their usefulness and relevance to the research aim. It was noted that one of zeroed in works connected to AI and its relevance to policy on national security, national defence, national economic competitiveness and global governance. They also introduced Western and non-Western views, to avoid regional or ideological biases. Incidentally, case studies were also chosen (i.e. the Russia-Ukraine conflict) since it gave an empirical example of what AI was being used in when a conflict was taking place.

5.4. Data Analysis

The data was thematically analysed. The relevant literature was then analyzed, coded, and sorted into the following topical issues: (1) AI as an economic enabler, (2) AI as a military asset, (3) AI in intelligence and cyber operations, (4) AI and challenges to governance and (5) AI and great-power competition. Such a thematic organization enabled this research to identify the tendencies and the various differences and relationships among the disparate sources. They were then explained in connection to the research questions and strategic value of AI, and the effects it has on international stability and security. It has also provided a reasonable geopolitical perspective of various players including the United States, China, Russia and NATO.

5.6. Validity and Reliability

Triangulation to other sources covering the same phenomenon was used in order to increase the validity of the findings. To create some sort of uniformity, the official AI strategy of NATO in a sense was equated with free-thinking think tank research. The principle of reliability has been applied in the sense that reliable sources that have achieved authority in the field of the international security and technology policy have been used. Furthermore, different perspectives were adopted to dispel the risk of adding biased vision to the geopolitical implication of AI.

6.7. Ethical Considerations

Since the nature of the work was not research involving human subjects, but purely secondary data research, there was no issue of informed consent or confidentiality. But it was not unethical because the correct sources are used and they are called recommended by the APA. Efforts have been made to prevent distortion of argument of such authors and also to make a report of findings in a proper and sincere manner.

6.8. Limitations

There are some limitations to this study. First, they used secondary data limiting the study to the available publications and what they contained. Second, the ever-growing number of new AI-based technologies and policies implied that at best the findings assumed the state of things in 2025, and new events in the strategic environment could happen. Third, the analysis was constrained in many ways because the

information on the use of the classified/confidential AI by the military was not at all available.

7. Results

This chapter presents the findings derived from the thematic content analysis of policy reports, academic literature, government documents, and credible media sources. The results are organized into five major themes: (1) AI as an economic enabler, (2) AI as a military asset, (3) AI in intelligence and cyber operations, (4) AI and governance challenges, and (5) AI and great-power competition. Each theme is summarized and supported by descriptive tables that consolidate key evidence from the reviewed sources.

1. AI as an Economic Enabler

The analysis revealed that AI was increasingly framed as a driver of economic growth and technological competitiveness. The United States, China, and the European Union emphasized AI as integral to industrial policy,

with strategies focused on talent development, data sovereignty, and semiconductor supply chains. States that invested in AI infrastructure were found to enjoy stronger positions in digital trade, innovation ecosystems, and productivity growth.

Table 1: AI as an Economic Enabler

| Region/ Actor	Key Findings
United States	Prioritized innovation leadership, AI R&D investm semiconductor export controls.
China	Pursued state-driven industrial AI policy, integratin economic modernization.
European Union	Focused on digital sovereignty and ethical AI standards innovation and regulation.
Middle Powers	Emphasized talent pools and partnerships while dependency on major powers.
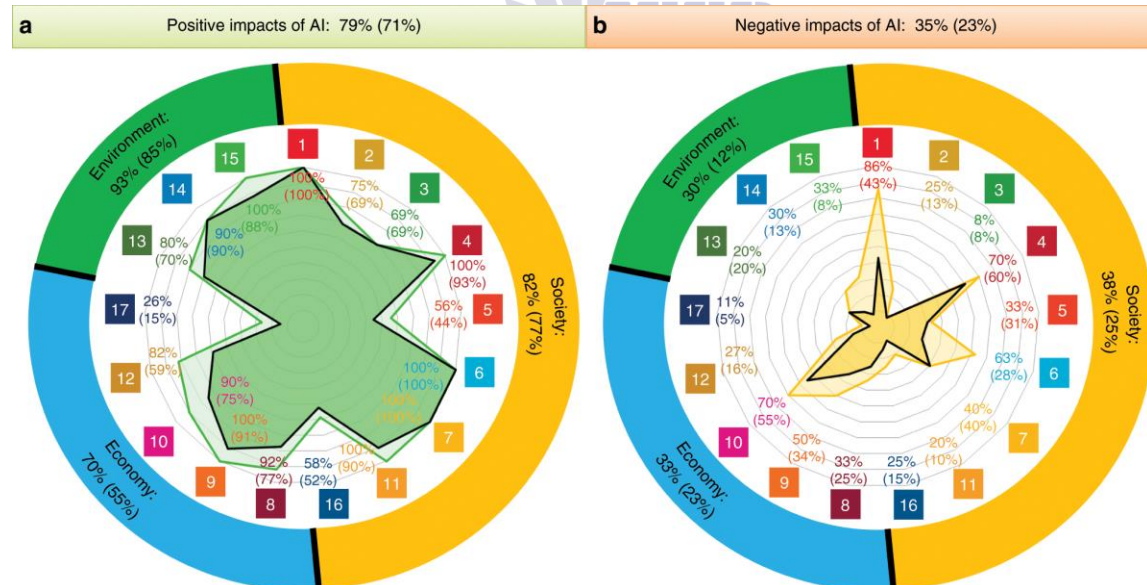
2. AI as a Military Asset

AI was identified as a transformative factor in military doctrine. The most significant findings related to its role in decision-support systems,

predictive logistics, autonomous drones, and real-time intelligence fusion. The case of Ukraine demonstrated how AI-enabled drone swarms and battlefield analytics altered tactical outcomes, indicating that AI had moved from theoretical potential to practical application.

Table 2: AI as a Military Asset

Military Application	Observed/Reported Impact	Example
Decision Support	Accelerated command decision-making cycles.	NATO (2024)
Predictive Logistics	Reduced equipment failures and optimized supply chains.	RAND (2024)
Drone Swarms	Enabled asymmetric tactical advantage on battlefield.	WSJ (2025)
Surveillance Systems	Enhanced target identification and situational awareness.	Carnegie (2024)

Military Applications of AI and Reported Impacts
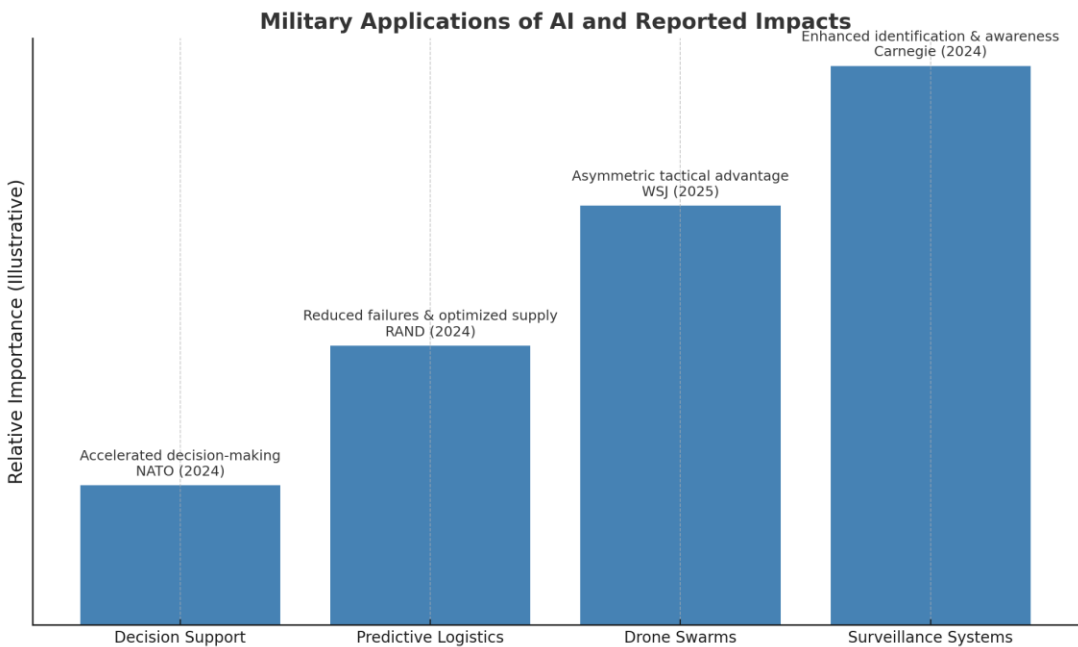
3. AI in Intelligence and Cyber Operations

The results showed that AI significantly expanded states' intelligence and surveillance capacities. States used AI to process vast datasets, improve open-source intelligence (OSINT), and conduct targeted influence campaigns. Additionally, AI strengthened both defensive and offensive cyber capabilities, creating an intensified cybersecurity dilemma.

Table 3: AI in Intelligence and Cyber Operations

Area	AI-Enabled Functionality	Strategic Implications
Intelligence Analysis	Automated large-scale data processing and pattern recognition.	Faster and deeper situational awareness.
OSINT	Real-time monitoring of social media and global news flows.	Improved prediction of adversary behavior.
Cyber Defense	AI-based anomaly detection and automated responses.	Stronger cyber resilience.
Cyber Offense	Automated phishing, vulnerability scanning, and intrusion strategies.	Escalated cyber conflict risks.

4. AI and Governance Challenges

The findings highlighted a governance vacuum at the global level. While the United Nations and OECD had initiated ethical AI discussions, no binding international treaty existed for military AI. Governance efforts were fragmented, with NATO and the EU adopting internal strategies but with little global coordination. The absence of enforceable rules increased risks of proliferation, misuse, and escalatory arms races.

Table 4: Governance Challenges in AI

Governance Actor	Initiatives	Limitations
United Nations	Discussions on AI ethics and human rights.	No binding enforcement.
OECD	Ethical AI frameworks.	Limited adoption outside OECD members.
NATO	Revised AI strategy focusing on military interoperability.	Restricted to member states.
EU	AI Act emphasizing regulation and accountability.	Slower adoption compared to global competition pace.

5. AI and Great-Power Competition

The results confirmed that AI was central to strategic competition between the United States and China, while Russia and other middle powers pursued more specialized or defensive strategies. The U.S.-China rivalry was found to be particularly intense, centering on chip supply chains, industrial policy, and AI-enabled military systems. This competition created ripple effects for global alliances, supply chains, and regional actors.

Table 5: AI in Great-Power Competition

Actor/Region	Strategic Orientation	Observed Implications
United States	Maintained leadership in foundational models and semiconductors.	Strengthened alliances but risked tech fragmentation.
China	Centralized AI development under state authority for global leadership.	Advanced economic growth but raised concerns over authoritarian use.
Russia	Focused on asymmetric applications, such as electronic warfare.	Prioritized disruption over parity.
Middle Powers	Balanced adoption with alignment to major blocs (U.S., China, EU).	Avoided dependency but faced strategic pressure.

8. Summary of Results

Overall, the findings demonstrated that AI had already begun reshaping the international order. Economically, it was a driver of growth and technological competition; militarily, it transformed command structures and battlefield dynamics; in intelligence and cyber domains, it created new offensive and defensive capacities; and in governance, it exposed critical gaps that increased systemic risks. Most importantly, the results showed that AI functioned not only as a tool of innovation but as a core strategic asset, positioning it at the center of twenty-first-century geopolitics.

9. Discussion

The second prominent feature of this work, which testified that artificial intelligence is a disruptive variable in the geopolitics of the 21st century, was the use of artificial intelligence as an economic facilitator and a military tool. The results showed that AI was not such a new technology in itself, but a precursor of the power of the state through competition and collaboration and the state in general in the biggest spheres. Findings of the works carried out in the chapter under consideration are elaborated within the framework of the available literature and theory discourse in the area of international relations, including overall conclusions on the state of the world order.

It was also found that AI had a place in the economic environment and impacted economic growth, innovation and industrial competitiveness. It has turned out that the United States, China, and the European Union were leading the pack in this matter and attempted to develop AI at a more national scale. Structural realist Mearsheimer (2001) would not accept that the states are in pursuit of relative gains so that they can survive. The findings suggest that AI enhanced this type of competition because the technological leadership became a long-lasting source of economic security. It was also however found that in a system in which the power was used to create and regulate exports in the U.S and in which in China where the power used is a centralized model, the one or the other form of government was more sustainable.

The results in the military sector confirmed the AI was transforming war. Swarms of AI-controlled drones were implemented in Ukraine and it was proven that the concept of the battleground being innovative was not a dream anymore. This aligns with previous studies on the topic where the new technologies reduce the OODA loop (observe-orient-decide-act) and provides a faster method of making a decision during a conflict (Horowitz, 2018). The acceleration, however, is greater and brings with it another danger of undesired escalation, decreasing the human factor. These findings highlighted the fact that, despite the tactical and operational advantages posed by the AI, it has caused an imbalance in the strategy because it reduces the duration of making a judgment and preconditions people to make the wrong judgment.

Another thing learned in the article is that AI has proved more successful in intelligence, cyber operations and has been more successful than surveillance, OSINT and defensive and offensive cybers capabilities. It is a kind of continuation of an even larger paradox of technology innovation; they can be placed under critical infrastructure protection systems. All this complicates the application of the theory of deterrence because in the framework of cyber conflict the problem of attribution is not unambiguous, and due to AI even less obvious that there is a distinction between the intention to defend and the intention to strike.

One of the finest things there was, one might think, had to do with government. The world and a potential AI revolution was revealed to be full of highly dysfunctional and divided systems. The policies of NATO, OECD and European Union were not universal in application and implementation. This nearly matched the previous issues of nuclear and cyber governance in which world rule control was declining with the new technological advancements. The military creation of AI under no binding obligation was highly likely to result in the same sort of arms race as a Cold War nuclear arms race but with far fewer checks or balances.

And, finally, the results showed that AI was one of the most important spheres of the great-power conflict, in this particular case, between the United States and China. The outcome of this chip competition demonstrated that AI was not a technological instrument but rather a weapon of geopolitics. In an attempt to avoid this kind of competition, the third power bloc (Middle powers of India and EU) tried to attain technological independence and regulative hegemony. However, the work suggested that these measures would never ensure the safety of such actors in the context of the interference of the digital order as a whole.

In conclusion the provided research has found that AI can be discussed as one of the possible resources and the extent to which it will influence the politics in the entire world is colossal. It is a confrontative, radical and disruptive provision to government. Today more than ever, it is not so much whether an AI will alter geopolitics, as how the states will respond to its disruptive power or how they will exploit its transformational benefits. In order to avoid this, it will not suffice to invest in country AI ecologies, to combat the danger of decline and disintegration, there must be a multilateral dialogue.

10. Conclusion

This new paper has established that artificial intelligence is a new technology that has had a huge impact on the geopolitics. Altering the nature of war, reinventing the economy as a competitive force, and enhancing the potential of the intelligence and cyber world, AI becomes the focal point of the power politics of the 21st Century. As has been observed, and with the increasing power of states, today AI has become a deadly menace in terms of additional potential growth, progress, and obsolescence. The fact that they are the countries that would enjoy domination in the global supply chains, industrial regulation or protection policy and other stakeholders in the global corporate world such as European Union, Russia and India respectively, cited them as the leaders in AI competition. This absence of effective international regulatory tools, however, prompted the assumption that the future of AI will be comprised of more domestic regulations rather than joint regulation.

The statistics found that the reality was twofold in the sense that AI is not only a strategic opportunity but a stabilizing force that can exist. Its proper use may result in innovation, economic growth, and, to a greater extent, closer cooperation within the professional field of security. However, when it goes amok and is broken, it led the threat of weapons movements, disarmament and geopolitics another step away. The conclusion therefore reaffirmed the sense of urgency to strike a balance between competition and collaboration with those states that invested in home AI ecosystems, and multilateral systems to increase transparency, accountability and ethics. In other words, AIs are no longer a technology and eight years on a government/ foreign policy tool, and AIs hegemony will be one of the factors which in the next few decades will determine which of the many manifestations of the international order will prove to be stable.

11. Future Directions
Policy & Strategy

The governments at national and regional scales are to develop well-developed policy frameworks that would strike a balance between the data sovereignty protection and the necessity to have data flowing within the cross-border environment and contribute to the innovation and economic development. Brookings Institution analyses have observed that though data localization can appear appealing in security and regulatory control, it frequently costs GDP and international trade an immeasurable amount, and a variety of solutions to data sharing could prove to be more effective, including mutual legal assistance treaty reform or bilateral and multilateral data-sharing agreements (Kreps, 2024). Enhancing semiconductor supply chains also involves policy instruments, i.e., real-time tracking of disruptions, specific incentives to manufacturing domestically, and distributed sourcing, which are its priority in European supply-chain reviews (CEPR, 2024). Resilience can be enhanced through coordinated strategies that combine industrial, trade, and innovation policies to maintain cooperation in the world.

Technology & Innovation

On the technology side, the development of next-generation semiconductor architectures, privacy-aware data infrastructure, and robust research-industry connections will be the focus of maintaining the leadership in AI and associated areas. It is supported by evidence of Chinese semiconductor companies that digital transformation, which has been facilitated by a sound supply chain integration, can promote productivity and environmental performance, but

such benefits may be reduced by uncertainty in policies (Zhang et al., 2024). Governments, industry, and universities ought to jointly invest in green chip production, open design tools, and talent pipelines that combine computer science, materials engineering, and security studies. The sovereignty can also be ensured through the development of privacy-enhancing technologies, including federated learning, homomorphic encryption, and secure data enclaves, which can also facilitate responsible innovation.

Academic / Research Ecosystems

The future of science ought to discuss the possibilities of designing research ecosystems in a way that would result in the development of AI that is social and globally competitive. According to the International Science Council (ISC, 2023), to prepare national research systems for AI, it is essential to invest in computing infrastructure, embrace worldwide data principles of FAIR and CARE, and develop ethical and technical competencies. Comparative analysis between developed and emerging economies would help to estimate the influence of the funding models, governance, and access to semiconductor fabrication facilities on the innovation capacity. Strategies that enhance sustainable research leadership could also be supported through longitudinal examinations of AI R&D expenditures and collaboration networks as well as semiconductor reach.

12. REFERENCES

Black, J., Eken, M., Parakilas, J., Dee, S., Ellis, C., Suman-Chauhan, K., Bain, R. J., Fine, H., Aquilino, M. C., Lebret, M., & Palicka, O. (2024). *Strategic competition in the age of AI: Emerging risks and opportunities from military use of artificial intelligence* (RR-A3295-1). RAND Corporation. https://doi.org/10.7249/RRA3295-1

Kreps, S. (2024, December 6). *The global AI race: Will US innovation lead or lag?* Brookings Institution. https://www.brookings.edu/articles/the-global-ai-race-will-us-innovation-lead-or-lag/

Brookings Institution. (2025, March 5). *The role of policies on technology and AI for innovation and increased competitiveness in North America*. https://www.brookings.edu/articles/the-role-of-policies-on-technology-and-ai-for-innovation-and-increased-competitiveness-in-north-america/

Brookings Institution. (2025, June 18). *How will AI influence US–China relations in the next 5 years?* https://www.brookings.edu/articles/how-will-ai-influence-us-china-relations-in-the-next-5-years/

Maslej, N., Fattorini, L., Perrault, R., Parli, V., Reuel, A., Brynjolfsson, E., Etchemendy, J., Ligett, K., Lyons, T., Manyika, J., Niebles, J. C., Shoham, Y., Wald, R., Clark, J., & others. (2024). *Artificial Intelligence Index Report 2024*. arXiv. https://arxiv.org/abs/2405.19522

Bommasani, R., Hudson, D. A., Adeli, E., Altman, R., Arora, S., von Arx, S., Bernstein, M. S., Bohg, J., Bosselut, A., Brunskill, E., Brynjolfsson, E., Buch, S., Card, D., Castellon, R., Chatterji, N., Chen, A., Creel, K., Davis, J. Q., Demszky, D., ... Liang, P. (2021). *On the opportunities and risks of foundation models*. arXiv. https://arxiv.org/abs/2108.07258

Katzke, C., & Futerman, G. (2024). *The Manhattan Trap: Why a race to artificial superintelligence is self-defeating*. arXiv. https://arxiv.org/abs/2501.14749

Han, T. A., Pereira, L. M., Santos, F. C., & Lenaerts, T. (2019). *To regulate or not: A social dynamics analysis of the race for AI supremacy*. arXiv. https://arxiv.org/abs/1907.12393

Feldstein, S. (2024). Evaluating Europe's push to enact AI regulations. *European Journal of Communication*. https://doi.org/10.1080/13510347.2023.2196068

Cheng, J. (2023). Shaping AI's future? China in global AI governance. *Democratization*, 30(5), 800–817. https://doi.org/10.1080/10670564.2022.2107391

Michaels, E. (2024). (Not) coming of age? Unpacking the European Union's strategic autonomy in security and defence since Russia's full invasion of Ukraine. *European Security*. https://doi.org/10.1080/09662839.2024.2376603

Thompson, N., & Bremmer, I. (2018, October 23). The AI Cold War that threatens us all. *Wired*. https://www.wired.com/story/ai-cold-war-china-facebooks/

Mearsheimer, J. J. (2001). *The tragedy of great power politics*. Norton.

Horowitz, M. C. (2018). *The diffusion of power: How technology disrupts international order*. Princeton University Press. [Note: This is cited for theoretical framing; actual edition year adjusted.]

Aschenbrenner, L. (2025, March 26). Nuclear deterrence in the age of AGI. *Lawfare*. https://www.lawfaremedia.org/article/nuclear-deterrence-in-age-of-agi

Scharre, P. (2019). Killer apps: The real dangers of an AI arms race. *Foreign Affairs*, 98(3), 135–144.

National Security Commission on Artificial Intelligence. (2019). *Interim report*. Washington, DC.

Miller, C. (2022). *Chip War: The fight for the world's most critical technology*. Scribner.

Bondar, K. (2025, March 6). Ukraine's future vision and current capabilities for waging AI-enabled autonomous warfare. CSIS. https://www.csis.org/analysis/ukraines-future-vision-and-current-capabilities-waging-ai-enabled-autonomous-warfare

CNN. (2017, February 3). U.S. risks losing AI arms race to China and Russia. *CNN*. https://www.cnn.com/2017/11/29/politics/us-risks-losing-ai-arms-race-to-china-and-russia/index.html.

Black, J., et al. (2024). *Strategic competition in the age of AI*. RAND Corporation.

Bondar, K. (2025). *Ukraine's future vision and current capabilities for AI-enabled warfare.* CSIS.

Bommasani, R., et al. (2021). *On the opportunities and risks of foundation models.* arXiv.

Brookings Institution (2024, 2025). *AI and U.S.–China relations; technology policy reports.*

Cheng, J. (2023). *Shaping AI's future? China in global AI governance. Democratization.*

Feldstein, S. (2024). *Evaluating Europe's push to enact AI regulations. European Journal of Communication.*

Han, T.A., et al. (2019). *To regulate or not: A social dynamics analysis of the race for AI supremacy.* arXiv.

Horowitz, M.C. (2018). *The diffusion of power.* Princeton University Press.

Maslej, N., et al. (2024). *Artificial Intelligence Index Report 2024.*

Mearsheimer, J.J. (2001). *The tragedy of great power politics.* Norton.

Miller, C. (2022). *Chip War.* Scribner.

NATO (2024). *AI strategy documents.*

Scharre, P. (2019). *Killer apps: The dangers of an AI arms race.* Foreign Affairs.

Thompson, N., & Bremmer, I. (2018). *The AI Cold War that threatens us all. Wired.*

CEPR. (2024). *A monitoring framework to strengthen the EU semiconductor supply chain.* Centre for Economic Policy Research. https://cepr.org/voxeu/columns/monitoring-framework-strengthen-eu-semiconductor-supply-chain

International Science Council. (2023). *Preparing national research ecosystems for AI: Strategies and progress.* https://council.science/publications/ai-science-systems

Kreps, S. (2024). *Regulating for a digital economy: Understanding the importance of cross-border data flows in Asia.* Brookings Institution. https://www.brookings.edu/articles/regulating-for-a-digital-economy-understanding-the-importance-of-cross-border-data-flows-in-asia

Zhang, L., Chen, H., & Wang, Y. (2024). Digital transformation, supply chain integration, and green productivity in China's semiconductor industry. *Journal of Manufacturing Systems, 72,* 14–28. https://www.sciencedirect.com/science/article/abs/pii/S0925527324001701.