Changing Global Order: Rise of Techno-Nationalism and Pakistan

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Abstract

The global order is undergoing a significant transformation, with technological advancements playing a critical role in reshaping international dynamics. This paper does not delve into the established role of technology in driving global change; rather, it examines how states are leveraging technology within the evolving global order to advance their national interests and strategic objectives. It argues that techno-nationalism (the strategic pursuit of technological supremacy for national sovereignty, security, and economic growth) has become a primary tool employed by major powers amidst intensifying geopolitical competition. Due to techno-nationalism rapid technological innovation, coupled with the resurgence of great power rivalry, is transitioning the world toward a new 'zero-sum' order, where competitive rather than cooperative dynamics dominate. Understanding the interplay between evolving economic and technological dynamics is, therefore, crucial. Thus, at the heart of this global shift lies techno-nationalism, which marks a defining transformation of this century by disrupting global supply chains and intensifying strategic rivalries. Through case studies such as the 'Chip War' between the U.S. and China, this paper explores the multifaceted impacts of techno-nationalism on the changing global order and examines its implications for developing countries.

Keywords: Techno-Nationalism, Nationalism, AI, Critical Technologies, Globalisation, Chip War.

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Introduction

The transitory nature of global order is evident throughout history in the rise and fall of great powers.[1] Many factors such as economic, environmental, demographic, political, military, social and technological have played their role in the gradual and abrupt shifts of these dominant powers.[2] However, one of the key factors at the heart of prosperity, security and social well-being is how well these powers have harnessed technology because technological change is often extremely rapid than exponential.[3] In today's digitalised and data-driven world of intangibles, the role of technology in the rise and fall of great powers has become more significant. The countries that successfully harness emerging technologies will rise relative to their peers in terms of the economy, national security, climate adaptation, and social cohesion.[4] The nexus between technological innovation and the quest for global domination has a long history, dating back centuries.[5] As a result, technology has been incentivising competition between major powers, where the world is transitioning towards a "zero-sum order."

In this regard, the rivalry between the United States (U.S.) and China, has intensified in recent years, with each seeking to gain a competitive edge through technological leadership, leading to geopolitical instability. According to Goldman Sachs, since the Cold War, the present times are the most geo-strategically uncertain due to massive technological developments. This instability is manifesting in the intensifying competition between China and the U.S. conflicts in Europe and the Middle East, and shifting global alliances. Also, this geopolitical and strategic instability contributed to "multipolarity" due to power distribution across multiple states, companies

[1] Paul Kennedy, *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000* (New York: Random House, 1987), 1989 paperback edition, https://cheirif.wordpress.com/wp-content/uploads/2015/08/paul-kennedy-the-rise-and-fall-of-the-great-powers-19891.pdf

[2] Paul Samson et al., *Scenarios of Evolving Global Order* (Waterloo, ON: Centre for International Governance Innovation, 2024), https://www.cigionline.org/documents/2800/Scenarios_of_Evolving_Global_Order.pdf.?

[3] Samson et al., *Scenarios of Evolving Global Order.*

[4] Samson et al., *Scenarios of Evolving Global Order.*

[5] European Parliamentary Research Service, *EU Chips Act: Strengthening the Semiconductor Ecosystem* (Brussels: European Parliament, 2024), https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/762384/EPRS_BRI(2024)762384_EN.pdf

and non-state actors in military, economic, political and technological spheres. Highlight of this emerging multipolar world is the power tussle between the U.S. and China across many sectors. According to the former U.S. Secretary of State Antony Blinken, the biggest geopolitical test of the 21st century is this intertwined competition between the U.S. and China.[6] This competition is also evident in the technological sphere, where varying norms and divergent standards and protocols are emerging as competing forces and have disrupted global supply chains, heightened strategic rivalries, and challenged the principles of multilateral governance.

However, current technological developments such as 5G, Artificial Intelligence (AI), Nanotechnology and Robotics have made geopolitical, trade, economic and national interests more intertwined and complex. Therefore, competition in the technological sphere is a complex phenomenon that requires a deeper understanding of its root causes. According to a report by Chatham House, technologies are used by the world powers "to exert power and influence and to shape geopolitics." States are developing technologies such as high-tech weapons systems that enhance military capability; simultaneously these new platforms and the standards that govern them increase economic leverage while advantageous positions in cutting-edge research and innovation amplify global impact.[7]

Mark Leonard from the European Council on Foreign Relations suggests that there is now "a new map of power in the modern world that is no longer defined by geography, by control of territory or oceans but rather by control over flows of people, goods, money, data and by exploiting the connections technology creates."[8] Resultantly, in the contemporary times technological imports, exports and its flow to other parts of world is used as a geopolitical tool by states. It is important to understand here is technology as a tool itself is not political or bad in nature, but rather how it is used by the global powers is

[6] "Blinken Says China Presents Top Challenge to U.S. Foreign Policy," *Al Jazeera,* March 3, 2021, https://www.aljazeera.com/news/2021/3/3/blinken-says-china-presents-top-challenge-to-us-foreign-policy,

[7] Chatham House, *How New Technology Is Driving Geopolitical Relations* (London: Chatham House, 2024), https://www.chathamhouse.org/events/all/research-event/how-new-technology-driving-geopolitical-relations,

[8] Mark Leonard, Director, European Council on Foreign Relations, "We Need to Agree on Norms and Rules," *World Economic Forum*, April 7, 2021 (updated June 3, 2025), https://www.weforum.org/stories/2021/04/seven-business-leaders-on-how-technology-will-shape-geopolitics/

making this tool an agent of competition. Moreover, states are moving towards "nationalising" the technological spheres through notions like 'digital sovereignty,' 'strategic autonomy,' and 'data sovereignty.' Most states like Russia and China, have started to claim sovereignty over their 'national info sphere.'[9] European nations and China are pursuing digital autonomy with the larger idea of "strategic autonomy," which is intended to protect vital technology, maintain digital sovereignty, and influence the regulatory landscape in Europe. China, on the other hand, sees digital autonomy as crucial to maintaining its internal security and ideological control, strengthening its position as a worldwide leader in developing technologies, and fending off external technical pressure and sanctions. Both believe that negotiating the changing geopolitical and technical order requires digital independence.

These explanations clarify how states seek technological influence and the modern power structures are built around technological supremacy, but do not fully address what motivates them to do so. While the core realist argument of 'power' remains valid, can we assume that the pursuit of power is the sole driver, without considering other complementary factors? In this context, the central argument of this paper is that the ongoing and intensifying technological competition between China and the U.S. is driven by 'techno-nationalism.' Thus, in the current evolving global order, where two major technological hubs are in strategic competition requires critical study focusing not only on the mechanism but also the motivating drivers behind the tug of war between between the gobal powers.

Building on this argument, this research explores the complexities of technological and political competition between global powers, shaped by 'techno-nationalism.' To explain techno-nationalism, a case study of the U.S.-China Chip war is taken as an example, and how both nations are multiplying their areas of influence. Most importantly, this paper explores the impact of techno-geopolitics and techno-nationalism on developing countries like Pakistan. Mostly, techno-nationalism is studied as a phenomenon of competition between the developed countries like AI was

[9] Summar Iqbal Babar and Syeda Tabeer Zahra, "Digital Strategic Autonomy in South Asia: Artificial Intelligence and Cyberspace," *Journal of Security and Strategic Analyses* 10, no. 1 (2024): https://thesvi.org/ojs/index.php/ojs/article/view/300/158

between the U.S. and China, Trade War between the U.S. and Japan. In addition to it, such competition or developments, too, impact middle powers like Pakistan. Therefore, in this paper the concept of techno-nationalism, its various strains, and how its current wave is driven by factors such as dominance, protectionism, and national security is examined. Utilising qualitative research based secondary data, this paper analyses the evolving dynamics of technological competition between global powers and explores Pakistan's position within this landscape.

Evolving Global Order and Techno-Nationalism

Today world is moving ahead from the Pax Americana, and the rules-based international order is no more prevalent. On the top of it, world has been transitioning from unipolarity to multipolarity, consequently "great power competition" has been emerged. The U.S. believes that its adversaries are contesting for geopolitical goals "and trying to change the international order in their favour."[10] Resultantly, the U.S. has put in its national security documents that inter-state security and strategic competition have become vital for the U.S. to "stay ahead of them." But before explaining the "weapon of choice" to stay ahead, there is a need to explain the changing nature of "world order."

After the fall of Berlin Wall in 1989, and almost a year before the Soviet Union collapsed in late 1991, the U.S. President George H.W. Bush proclaimed a 'new world order.' Just after two months into Donald Trump's second presidency, Kaja Kallas, the European Union's top diplomat, has declared that 'the international order is undergoing changes of a magnitude not seen since 1945.' But what is 'world order', and how is it maintained or disrupted?[11]

Georg Sorensen defines it as "governing arrangement among states meeting the current demand for order."[12] But this definition leaves two

[10] Stacie E. Goddard, "The Rise and Fall of Great-Power Competition," *Foreign Affairs*, April 15, 2024, https://www.foreignaffairs.com/united-states/rise-and-fall-great-power-competition?

[11] Joseph S. Nye, "How World Order Changes," *The Strategist*, Australian Strategic Policy Institute (ASPI), April 25, 2024, https://www.aspistrategist.org.au/how-world-order-changes/

[12] Georg Sørensen, "What Kind of World Order? The International System in the New Millennium," *Cooperation and Conflict* 41, no. 4 (2006): 343-63.

essential questions open for debate that how states come to such an arrangement and what is "demand for order"? Certain scholars define it as "rules-based relations enshrined in institutions and norms."[13] But these two definitions left many questions unanswered than being able to explain the "world order." Joesph Nye by comparing the world order with domestic order said that while states had governments that maintain stability, the international system was fundamentally anarchic which means lacking a central authority. But he added that anarchy does not mean chaos rather global order exists in varying degrees. World order, the Nye said, was shaped by three key factors: i. the distribution of power and resources, ii. adherence to norms that define legitimacy, iii. and the level of violent conflict.[14] Although institutions like the UN and international courts exist, they have limited enforcement power due to political constraints, particularly the veto power of the UN Security Council's permanent members, which serves as a safeguard against major war.

Finally, Nye notes that changes in technology, domestic politics, and tansnational ideologies can all shift the strength and structure of the world order.[15] The world order is transforming multipolarity, shaped by power, legitimacy, and perception. Major powers now leverage technological capabilities and nationalist ideologies to consolidate influence in this shifting landscape.

The Rise of Techno-Nationalism: Technology as a Tool for National Security and Geopolitics

Broadly, techno-nationalism is the linkage of technology with the nation and nationalism. Scholars who have worked on techno-nationalism believe that while the general concept of nationalism remains the same,

[13] Usman Shahid and Rabia Akhtar, "Navigating the Emerging Tech-Order: Techno-Nationalism, Strategic Autonomy, and the Future of Multilateralism," *Margalla Papers* 26, no. 2 (2022): 24-37, https://margallapapers.ndu.edu.pk/site/article/view/107/83

[14] Joseph S. Nye, "How World Order Changes," *The Strategist*, Australian Strategic Policy Institute (ASPI), April 25, 2024, https://www.aspistrategist.org.au/how-world-order-changes/

[15] Ibid.

certain distinctions emerge when it is linked with technology.[16] Scholars while comparing nationalism and techno-nationalism argues that techno-nationalism aligns with nationalism because it also believes in the protection of national interests but it is slightly different form nationalism because of its over emphasis on the power of government or states to achieve mercantilist objectives.[17]

Techno-nationalistic doctrine has its roots in political realism, because in an anarchic world, states focus on maximising their power vis-à-vis others to increase their own chances of survival. Thus, the basic argument of the study is reiterated that technology is a tool of power. The U.S. actions towards China exhibit this phenomenon, i.e., cooperation in technology transfer damages the U.S.'s national security interest and goes beyond commercial merits.[18]

Drivers of Techno-Nationalism

There are three core drivers of the third strain of techno-nationalism; i. national security, ii. geopolitical motivations and iii. economic concerns. National security and foreign policy considerations are paramount in technology policymaking. Given the digital technologies and their spread all around the globe, it is generally believed by the states such as Russia and China, which exercise "digital sovereignty" because of national security considerations. The U.S. is also no different, it has raised concerns about the social media platforms like *TikTok*, and even attempted to ban it through Congress which is an act that contradicted the long-held principles of an open internet traditionally championed by the U.S. legislators and policymakers, thereby openly acknowledging national security as a justification. This focus also raises questions about who is involved in policymaking. Techno-nationalists propose that national security organisations and the intelligence community should lead technology policy decisions, often to the exclusion of

[16] Yadong Luo, "Illusions of Techno-Nationalism," *Journal of International Business Studies* 53 (2022): 550-567.
[17] A. D. Smith, *Nationalism: Theory, Ideology and History*, 2nd ed. (Hoboken, NJ: Wiley, 2013).
[18] White House 2018: How China's economic aggression threatens the technologies and intellectual property of the United States and the World, https://www.whitehouse.gov/wp-content/ uploads/2018/06/FINAL-China-Technology-Report-6.18.18 PDF.pdf

others. Pax Americana once enabled globalised technological exchange but today's shifting geopolitical landscape exposes its fault lines. Control over technology has become a key factor in great power competition, aligning with the Fourth Industrial Revolution. As technological supremacy translates into economic and military power, states implement export controls, investment restrictions, and supply chain protections to secure their strategic assets. Moreover, technology has become a strategic tool in geopolitics, with global connections amplified by energy flows, standards, and more. Most worrying aspect is the danger of this technological competition escalating out of control and threatening global security.[19] The biggest impact that technology will have on geopolitics for 2021 (and beyond) will not primarily come from the technology itself, but rather from the system that surrounds it. In this regard the pursuit of self-sufficiency, risks harming private firms, as seen in the U.S. restrictions on companies like *Qualcomm* and *Intel* over their dealings with *Huawei*.[20] Therefore, the battleground for geopolitical influence will be centered on who has the ownership of tech companies, how much market share they have, who governs and how their supply chains are maintained and integrated. Techno-nationalism prioritises national security over free trade, where it replaces global cooperation with a zero-sum mindset and objectives because technologies are believed to provide a crucial edge not only to militaries in a potential conflict but also in unlocking economic growth crucial to success.[21]

Three Phases of Techno-Nationalism

First phase of Techno-nationalism, is about the capability of a nation to innovate, diffuse and harness technology, develop national Research and Development (R&D) and secure foreign direct investments for the purpose of growth, sustainability and prosperity.[22] The term "techno-

[19] "Seven Business Leaders on How Technology Will Shape Geopolitics," *World Economic Forum*, April 2021, https://www.weforum.org/stories/2021/04/seven-business-leaders-on-how-technology-will-shape-geopolitics/. accessed January 07, 2025
[20] "Seven Business Leaders on How Technology Will Shape Geopolitics."
[21] "China and U.S. Tech Nationalism," *New America*, https://www.newamerica.org/the-thread/china-us-tech-nationalism/
[22] Yadong Luo, "Illusions of Techno-Nationalism," *Journal of International Business Studies* 53 (2022): 550-567.

nationalism" was coined by the economist Robert Reich in the 1980s.[23] Term was used by the American government to protect the exploitation of future American technologies from the hands of foreign states and entities, in 1980s focus was especially on Japanese entities.[24] Techno-nationalism is also related to promoting connectedness and stronger national identity through the use of technology to advance nationalistic agendas. [25]

Second phase of techno-nationalism starting from mid to late 1990s mostly focused on developing and harnessing national technological base. Nation states understand the importance of Foreign Direct Investment (FDI) for improvements in technological and industrial sectors to attain economic development. Resultantly, a new mixture of liberal economic and trade policies was witnessed around the world to pursue the agenda of national technological goals, commonly referred as "techno-nationalism under open door policy."[26] Consequently, more technologies became industrially and geographically available across the national boundaries, which made it possible for states to access them from multiple sources rather than inventing themselves.[27] During this phase, states adopted techno-nationalistic policies to pursue a broader agenda of geopolitical and strategic autonomy in the defence sector rather than just ensuring supply chains or using economic protectionism.

The third phase of the techno-nationalism starting at the end of the first decade of 21st century is the emergence of geopolitical thought and actions that link technological capabilities directly to a country's national security and geopolitical benefits. It involves legal and regulatory restrictions or sanctions against selected foreign investors or foreign companies of certain

[23] Robert B. Reich, "The Rise of Techno-Nationalism," *The Atlantic*, May 1987, https://www.theatlantic.com/magazine/archive/1987/05/the-rise-of-techno-nationalism/665772/

[24] James L. Schoff, "U.S.-Japan Technology Policy Coordination: Balancing Technonationalism with a Globalized World," Carnegie Endowment for International Peace, June 29, 2020, https://carnegieendowment.org/research/2020/06/us-japan-technology-policy-coordination-balancing-technonationalism-with-a-globalized-world?lang=en. accessed July 2, 2025

[25] Schoff, "U.S.-Japan Technology Policy Coordination."

[26] Yadong Luo, "Illusions of Techno-Nationalism," *Journal of International Business Studies* 53 (2022): 550-567.

[27] Michael E. Porter, *The Competitive Advantage of Nations* (New York: Free Press, 1990).

states such as the U.S. sanctioned Huawei company for national security, foreign policy and economic interests[28], simultaneously China ministry of Commerce added 10 U.S. defense companies to its "unreliable entities list" for stricter sanctions.[29] New techno-nationalism mingles deeply and intricately with geopolitics, boosting de-globalisation and decoupling with structural changes. Thus, this new strain integrates a state's geopolitical outlook and its national security considerations into its technological policies, aligning them with a nationalist agenda.

Scholars argue that the 21st-century techno-nationalism is shaped by geopolitics, as states perceive the world as divided into power blocs based on 'technology-enabled mechanisms' that define varying standards in areas such as data privacy, censorship, transparency, crypto currency, and intellectual property.[30] This strain of techno-nationalism links national security and geopolitical benefits with the nationalisation of a state's technological sector through protectionist policies that support domestic tech giants.[31] States pursue this approach because they view these technologies as critical to their national security, given their predominantly dual-use nature, allowing adversaries to acquire them could undermine a nation's survival.

Furthermore, as private sector firms increasingly dominate advanced technological development, their level of access to sensitive data and infrastructure — evident in cases like *Meta* and *TikTok* — highlights the strategic importance of private tech giants. Thus, the current strand of

[28] Congressional Research Service, *U.S. Export Control Policy and 5G Technology*, accessed July 15, 2025, https://www.congress.gov/crs-product/R47012#:~:text=In%202019%2C%20the%20Department%20of,security%20threat%2C%20which%20include%20Huawei

[29] VOA News, "China Targets US Defense Companies with New Sanctions," *Voice of America*, July 1, 2024, https://www.voanews.com/a/china-targets-us-defense-companies-with-new-sanctions-/7922841.html.

[30] Alex Capri, Techno-Nationalism: The U.S.-China Tech Innovation Race (Hinrich Foundation, 2020), https://www.hinrichfoundation.com/research/wp/us-china-tech-innovation-race and Philippe Legrain, "Will the Coronavirus Kill Globalisation? The Pandemic Is Legitimizing Nationalists and Turning Their Xenophobia into Policy," *Foreign Policy*, Spring 2020, 23-25.

[31] "The Geopolitics of Techno-Nationalism in the Asia-Pacific," School of Public Policy and Global Affairs, University of British Columbia, June 2020, https://sppga.cms.arts.ubc.ca/wp-content/uploads/sites/5/2020/08/eap.tech-univ.june20.pdf

techno-nationalism can be illustrated through the case-study of the U.S.-China 'Chip War,' and how both countries have adopted techno-nationalistic policies in this regard to adopt techno nationalism as an action-reaction mechanism. However, it is equally important to examine the driving forces behind the current strand of techno-nationalism. The next section of this paper delves into these driving factors before analysing the U.S.-China chip war as a case study and assessing its broader implications along with what middle powers like Pakistan could do in this intense competition fuelled by national security concerns of the U.S. and China.

Case Study of the U.S.-China Techno-Nationalism

The U.S. foreign policy approach to technology has changed amid escalating tensions with China. It now prioritises national security, adopts a zero-sum competitive mindset, and abandons its commitment to openness and globalisation. Former President Joe Biden has mainly upheld this strategic change, which started during the second term of President Barack Obama and was strengthened and vigorously carried out under President Donald Trump in his first tenure. With President Trump back in office, the U.S. is again accelerating its techno-nationalist policies. Techno-nationalism is currently shaping the U.S. efforts to lead in advanced technologies, with terms like "decoupling" signalling the deliberate separation from China's tech ecosystem, with both the U.S. and China actively contributing to the process. However, the U.S. has been the primary driver, expanding its use of technological restrictions such as export controls, divestment orders, license rejections, visa bans, penalties, and tariffs. Notably, there is bipartisan support for tightening the U.S. regulations, particularly on strategic technologies where Chinese advancements could threaten American economic interests and national security. [32] Moreover, as the current strand of Techno-nationalism presumes that the main arena of this struggle will be a conflict between various U.S. and Chinese models for creating and deploying advanced technology. In August 2022, the Biden Administration banned the U.S. venture capital investments in China's major technology industries. Following actions putting export bans on advanced semiconductors earlier in

[32] Jon Bateman, "U.S.-China Technological 'Decoupling': A Strategy and Policy Framework," *Carnegie Endowment for International Peace*, April 25, 2022, https://carnegieendowment.org/2022/04/25/u.s.-china-technological-decoupling-strategy-and-policy-framework-pub-86897

2022, the limitations are part of a larger, planned endeavour to slow down China's pursuit of technical superiority, even though they are meant to target military purposes.[33] The U.S. is actively adopting techno-nationalism as a policy to restrict American investments in China while preventing Chinese companies from investing in the U.S. through various mechanisms. Global technological supply chains were initially built on the concept of interdependence and globalisation. However, Washington is now working to dismantle this reliance, on the grounds of national security imperative. The core argument is that the U.S. and China have fundamentally different approaches in developing and deploying technology, where the U.S. perceives its system as superior, while China's technological advancements are viewed as a direct threat. This perspective aligns with the broader U.S. geopolitical outlook, as reflected in its national security documents, which categorise China's rise as a strategic and security challenge.

Techno-nationalism in China is widely recognised. Its historical foundations are based on the belief that China's technological inferiority to the West was the basis for its century of humiliation, and the more recent belief, made during the Hu Jintao and Xi Jinping administrations, that science and technology are crucial to China's ability to rise above its current position in the global division of labour and break free from the middle-income status. Thus, other than historical nationalistic sentiments, China's techno-nationalism has elements of harnessing technological prowess for national prosperity and economic gains.

Research is increasingly being directed toward high-value production and domestic development of goods and technology that China wants to control for economic gain (like rare earth metals) or that it can no longer acquire from outside sources (like certain types of computer chips). They are integral parts of the Chinese state-led developmental system. In its 2020 National People's Congress, Beijing announced it would spend US$1.4 trillion on digital infrastructure.[34] One study frames this as part of "de-Americanisation" of

[33] "White House to Detail Plans for Restricting Some U.S. Investments in China - Source," *Reuters*, August 9, 2023, https://www.reuters.com/world/white-houe-detail-plans-restricting-some-us-investments-china-source-2023-08-09/

[34] Coco Feng**,** "China Has a New US$1.4 Trillion Plan to Seize the World's Tech Crown from the US," *South China Morning Post*, May 21, 2020, https://www.scmp.com/tech/policy/article/3085362/china-has-new-us14-trillion-plan-seize-worlds-tech-crown-us

supply chains.[35] Another outlines the objectives and development of Xi Jinping's long-term efforts to reduce the vulnerabilities produced by "interdependence" with the U.S.in an era of intensifying competition.[36] Moreover, due to persistent U.S. pressure on Chinese tech initiatives and supply chain vulnerabilities, China's techno-nationalism, though initially reactionary, is now focused on overcoming its weaknesses. However, Chinese techno-nationalism aligns more closely with the second phase of techno-nationalism, characterised by strategic tech collaborations to gain access to foreign technologies, except in the defence sector. As a result, China's approach leans toward an "open-door techno-nationalism" model.

U.S.-China Semiconductor Industries: Battleground for Techno-Nationalist Ambitions

The U.S.-China tech war, centered on semiconductors, has intensified global geopolitical and economic tensions. As critical components of military and consumer technologies, chips are now central to both strategic rivalry and national security and are at the centre of the fight. Being pioneer in semiconductor technology, the U.S. took steps to keep its advantage by limiting the transfer of cutting-edge chip technology to China, protecting intellectual property, and investing in domestic production because of the concerns about economic competitiveness, technical leadership and national security. In comparison, China stepped up its efforts to become self-sufficient and has made significant investments in R&D to lessen its reliance on foreign chip technology with the aim to establish a fully domestic semiconductor supply chain, strengthening its position in the global tech landscape.

In this technological conflict, the U.S. has a leading position in R&D and designing high-end semiconductors, because of the *Intel* and *Apple,* which design some of the most advanced chips in the world but lags in

[35] Alex Capri, *Techno-Nationalism: The US-China Tech Innovation Race* (Hinrich Foundation, 2020), https://www.hinrichfoundation.com/research/wp/us-china-tech-innovation-race

[36] Julian Giwurtz, "The Chinese Reassessment of Interdependence," *China Leadership Monitor*, June 1, 2020, https://www.prcleader.org/post/the-chinese-reassessment-of-interdependence

manufacturing and fabrication.[37] Nonetheless, the U.S. semiconductor industry is not alone but is deeply reliant on other countries. In this regard, two components are of significant importance; firstly, 75 per cent of the production process of these semiconductors designed by the U.S. takes place in Taiwan and China.[38] Secondly, the rare earth materials needed for the production of these semiconductors are imported from various countries and the top one is China.[39] Furthermore, since the rise of this wave of techno-nationalism, China since 2017, has also been working on expanding its 'legacy chips' (chips that are 28 nm or larger)[40] production accounting for 31 per cent of the global market in 2023.[41] As a result, even if the U.S. may be leading the world in advanced semiconductors, a wider supply chain is required for the labour force, raw materials, and assembly required to produce the finished product.

Growing economic and military power of the China has unsettled the U.S., leading to a series of protectionist policies designed to isolate China. The objective in semiconductor sector is to bring semiconductor fabrication plants back to the U.S. and denying China any edge. Thus, President Trump's assault on Chinese companies and President Biden's signing of the Chips and Science Act in 2022 exemplifies this approach.[42]

With firms like *Intel* and *Advanced Micro Devices* (AMD), the U.S. tries to control the semiconductor market. However, during the last 20 years,

[37] *Critical and Emerging Technologies Index*, Belfer Center for Science and International Affairs, https://www.belfercenter.org/critical-emerging-tech-index#in-this-section-nav-6,

[38] Antonio Varas, "Strengthening the Global Semiconductor Supply Chain in an Uncertain Era—Semiconductor Industry Association," *Semiconductor Industry Association*, https://www.semiconductors.org/strengthening-the-global-semiconductor-supply-chain-in-an-uncertain-era/

[39] Varas, "Strengthening the Global Semiconductor Supply Chain in an Uncertain Era—Semiconductor Industry Association."

[40] S. Shivakumar, C. Wessner, and T. Howell, "The Strategic Importance of Legacy Chips," 2023, *Center for Strategic and International Studies*, https://www.csis.org/analysis/strategic-importance-legacy-chips

[41] RKJ-PGL Goujon, "Thin Ice: U.S. Pathways to Regulating China-Sourced Legacy Chips — Rhodium Group," https://rhg.com/research/thin-ice-us-pathways-to-regulating-china-sourced-legacy-chips/

[42] Hamdani, M., Belfencha, "Strategic implications of the U.S.-China Semiconductor Rivalry," *Discov glob soc* 2, 67 (2024), https://doi.org/10.1007/s44282-024-00081-5

Taiwanese companies particularly Taiwan Semiconductor Manufacturing Company (TSMC) have achieved notable development. Because of its quick progress, TSMC is now the most advanced semiconductor manufacturer, producing over 90 per cent of the world's cutting-edge semiconductors (5nm and smaller). Therefore, given the political tension that exists between the U.S., Taiwan and China, there is a risk that China will take an unexpected military or political action that could shut off the U.S. supply of these chips.[43]

Rise of techno-nationalism in the U.S. is linked with economic and political issues that have accompanied the rising rate of unemployment especially during COVID-19. Consequently, in the U.S. rise of the populist leaders and policies and is observed, which gave rise to policies of protectionism, securitisation, and de-globalisation. This was made evident by the fact that some of Trump's slogans like "Make America Great Again" (MAGA) and "Bringing Back American Jobs."[44] The protectionist policies that have resulted from this put the U.S. in direct confrontation with China. Moreover, in the same vein, China's rise on global stage, with debates of era of multi-polarity and declining U.S. world power has shaped the U.S. policy on dealing with China, on issues of technology and trade. Naturally, China is facing difficulties in gaining entry to the U.S. market. This includes getting technology components crucial to the Chinese economy. Both China and the U.S. were affected by these restrictions. China succeeded in securing a significant position in the open market of post-Cold War period. The international system has begun to close and this is detrimental to China, because of decline in its main exporters of machinery and semiconductors. This prompted it to enforce its own limitations on exports of critical earth minerals. China is the world's largest importer of these, which include silicon, gallium, and germanium.[45]

The EU and the U.S. are highly dependent on China when it comes to rare earth metals because it has the largest reserve of rare earth materials,

[43] Belfencha, "Strategic Implications of the U.S.-China Semiconductor Rivalry."
[44] M O'Brien, "Donald Trump's Plan to Bring Jobs Back to America Comes with One Giant Asterisk, " *Washington Post*, January 30 , 2017, https://www.washingtonpost.com/news/wonk/wp/2017/01/30/donald-trumps-big-plan-to-bring-jobs-back-to-america-has-one-giant-astericks/
[45] Center for European Policy Analysis, "China, Gallium, and Germanium: The Minerals Inflaming the Global Chip War," *Center for European Policy Analysis (CEPA)*, July 18, 2023, https://cepa.org/article/china-gallium-and-germanium-the-minerals-inflaming-the-global-chip-war/

and it is the highest exporting country of those materials in the world.[46] The alternatives are the Democratic Republic of Congo (DRC) and Russia, but the former suffers from domestic political unrest and the latter has been heavily sanctioned by Western countries after its attack on Ukraine.

Furthermore, there is the problem of processing capacity in addition to the political problems that beset the nations that could serve as a substitute for the Germanium and Gallium imported from China. Nearly 90 per cent of rare earth elements are refined in China. This is carried out both domestically and abroad by state-owned Chinese businesses that have operations in Australia, the Democratic Republic of the Congo (DRC), and Myanmar.[47] These businesses, which combined in 2022 to give China more control over the price of rare earth materials, are China Rare Earth Group Co. Ltd., China Southern Rare Earth Group Co., Ltd., and China Xiamen Tungsten Co., Ltd.[48]

Brandon Tracy's 2020 congressional report emphasised China's hegemony in rare earth resources, pointing out that the U.S. imports 80 percent of its requirements from China, which at the time produced 85 per cent of the world's supply. China still refines 77 per cent of the world's supply, despite its mining share having since fallen to 54 per cent.[49] Australia and Myanmar are also becoming significant players, both of which are greatly impacted by Chinese businesses. China has started employing rare earth elements as a defence against trade restrictions after realising its strategic advantage. It signalled its intention to react against the U.S. and allied restrictions in September 2023 by imposing export license requirements on essential materials such as gallium and germanium.

[46] Dewardric L. McNeal, "U.S.-China Rare Earth Minerals Battle Is About Geopolitics and Power," *CNBC*, June 29, 2025, https://www.cnbc.com/2025/06/29/us-china-rare-earth-minerals-metals-geopolitics-power.html

[47] "China, Gallium, and Germanium: The Minerals Inflaming the Global Chip War," *Center for European Policy Analysis (CEPA),* https://cepa.org/article/china-gallium-and-germanium-the-minerals-inflaming-the-global-chip-war/

[48] "China, Gallium, and Germanium: The Minerals Inflaming the Global Chip War," *Center for European Policy Analysis (CEPA),* https://cepa.org/article/china-gallium-and-germanium-the-minerals-inflaming-the-global-chip-war/

[49] "China, Gallium, and Germanium: The Minerals Inflaming the Global Chip War," *Center for European Policy Analysis (CEPA).*

China has made significant investments in the production of semiconductors, up to US$40 billion, including setting up fabrication facilities and purchasing outdated patents to reverse engineer cutting-edge devices.[50] China recently shocked the industry by revealing a 7nm chip, which was previously thought to be unachievable without Dutch-manufactured technology, despite continuous difficulties in making cutting-edge semiconductors.[51]

China has stepped up its efforts to lessen its reliance on foreign technology in response to growing semiconductor restrictions imposed by the U.S. and its allies. Under President Xi Jinping's "Made in China" policy, which began in 2015, the nation has placed a high priority on technical self-sufficiency. Its initial goal was to increase domestic semiconductor output from 10-70 per cent by 2025. China's larger ambition to overcome the Western constraints and fortify its position in the global innovation competition is reflected in these initiatives. However, due to challenges in achieving this goal, the target has been adjusted to 75 per cent by 2030. To support this ambition, China has invested approximately US$150 billion into its semiconductor industry, focusing on research and development initiatives.[52] Chinese companies, such as Semiconductor Manufacturing International Corporation (SMIC) and Huawei Technologies, have accelerated efforts to advance indigenous chip-making technologies. Despite facing restrictions on access to advanced manufacturing equipment from abroad, they have successfully developed 7-nanometer (7nm) chips using existing technologies.[53]

[50] China Launches US$40 Billion Fund to Boost Semiconductor Industry, *Digital Watch Observatory*, September 5, 2023, https://wp.dig.watch/updates/china-launches-40-billion-fund-to-boost-semiconductor-industry

[51] Aaron Friedberg and Ryan Hass, "The Chip Race: China Gives Huawei the Steering Wheel—Huawei's New Smartphone and the Future," *Center for Strategic and International Studies*, May 16, 2024, https://www.csis.org/analysis/chip-race-china-gives-huawei-steering-wheel-huaweis-new-smartphone-and-future

[52] "China's Semiconductor Investment Defies Economics but Makes Perfect Strategic Sense," *Sino Southeast Initiative***,** July 26, 2025, https://sinosoutheastinitiative.com/2025/07/26/chinas-semiconductor-investment-defies-economics-but-makes-perfect-strategic-sense/

[53] Frank Umbach, "Escalating Chip War," GIS Reports Online, April 29, 2024, https://www.gisreportsonline.com/r/escalating-chip-war/

As a response to American techno-nationalistic policies and tech-war China has also imposed export restrictions on essential minerals like gallium and germanium, which are crucial for semiconductor manufacturing and other high-tech applications[54].

Through these measures, China is seeking to exert its influence and gain leverage over countries that have imposed restrictions against it. Regulatory actions have also been taken; in what is thought to be a reaction to the U.S. sanctions, Chinese authorities have opened antitrust probes into international technology companies, notably American chipmaker *Nvidia*.[55] The purpose of these measures is to examine and perhaps restrict the activities of foreign businesses in China. Techno-nationalism has emerged as a distinguishing characteristic of the U.S.-China relations, as seen by this struggle in the semiconductor industry. Both nations have taken strong measures to maintain their technological superiority; China responds with state-backed investments and export bans on vital minerals, while the U.S. imposes trade barriers and attempts to bring chip manufacturing in-house. Complete decoupling is limited by the interdependencies of global supply chains, notwithstanding their attempts to attain self-sufficiency. Thus, the semiconductor industry provides an example of how techno-nationalism fuels geopolitical rivalry, altering trade ties, economic policies, and technological developments. In this context, the most affected entities will be developing countries, which lack the technological infrastructure to compete in this evolving landscape. Consequently, the final and most critical segment of this paper examines how the global technological landscape is being reshaped by the competition between major powers. The interplay of national security-driven policies, strategic beliefs, and ideological values will have significant implications for states that remain dependent on developed nations for their technological needs.

[54] China Bans Export of Critical Minerals to US as Trade Tensions Escalate," *Reuters*, December 3, 2024, accessed July 15, 2025, quoting the Chinese Commerce Ministry's directive to prohibit exports of gallium, germanium, and antimony to the United States.
[55] David Goldman, "China Is Probing Nvidia in a Major Escalation of Its Chip War with the US," *CNN*, December 9, 2024, updated December 9, 2024, https://edition.cnn.com/2024/12/09/tech/nvidia-china-investigation/index.html.

The Evolving Landscape of Techno-Nationalist Competition: Implications for Developing Countries

The growing economic rivalry between the U.S. and China is reshaping global governance, often creating an environment shaped by techno-nationalist policies adopted by both states, thus creating an environment that developing countries will have to navigate carefully.

Here it is fair to mention that the techno-nationalist competition between the U.S. and China is being intensified because technological development by one side is being considered a threat to even the national identity or national values of other party. So, the umbrella or cushion that is provided to this competition is of "conflicting values and identities." Consequently the situation of uncertainty is also rising because of the competition which scholars are regarding as "techno-geopolitical uncertainty."[56]

In such a situation, powerful countries are more likely to cause disruptions through major policy changes aimed at gaining both technological and geopolitical advantages over their rivals. As far as the implications for developing countries are concerned, they are heavily dependent on technology transfers from the core to the periphery. In this context, rising technological nationalism is likely to pose significant challenges for these countries, deepening existing technological divides and restricting access to critical innovations. Populist movements have gained traction across various nations, driven by nationalist and protectionist sentiments. These movements often attribute rising inequality and job insecurity to both technological advancements and international trade, leading to calls for policies that prioritise domestic interests and shield local industries.

a. Labour Markets in Developing Countries

The most significant effect is on labour markets in developing nations. Higher-level and more complex analytical, technical, and managerial abilities are becoming more in demand as a result of automation and

[56] Luo, Y., Van Assche, A. The Rise of Techno-Geopolitical Uncertainty: Implications of the United States CHIPS and Science Act. *J Int Bus Stud* 54, 1423-1440 (2023), https://doi.org/10.1057/s41267-023-00620-3

digital advancements, replacing routine low-to middle-level talents.[57] However, on the supply side, workers have not been given the skills they need to use the new technologies, which has slowed the spread of innovation throughout economies. When it comes to technology, education and training have been falling behind.

b. Inequality

Another important factor in this regard is the "inequality." The benefits of new technologies are unevenly distributed, potentially widening the gap between rich and poor nations and within individual countries. The interaction of techno-nationalism and techno-geopolitics contribute to inequality on multiple levels. Domestically, techno-nationalist policies may favour certain industries or skilled workers over others, leading to income disparities and unequal access to opportunities within a country.[58] Internationally, techno-geopolitical competition will exacerbate global inequalities by limiting the diffusion of technology and knowledge to less developed regions.

Role of Mega Techs

Techno-nationalist policies may create barriers to entry for foreign firms and restrict access to certain markets or technologies, making it more challenging for Multi National Enterprises (MNEs) to operate globally. Techno-nationalism is fuelling competition between countries and MNEs for technological dominance. As governments implement policies to promote domestic innovation and protect strategic industries, MNEs may find themselves in competition with state-backed enterprises or domestic champions supported by government subsidies and incentives.

[57] Zia Quershi, Technology and the future of growth: Challenges of change, Brookings, February 25, 2020, https://www.brookings.edu/articles/technology-and-the-future-of-growth-challenges-of-change/

[58] Zia Qureshi, "Technology, Change, and a New Growth Agenda," in *Growth in a Time of Change: Global and Country Perspectives on a New Agenda*, ed. Homi Kharas, Brahima S. Coulibaly, and Izumi Ohno (Washington, D.C.: Brookings Institution Press, 2019), 3–31, https://www.brookings.edu/wp-content/uploads/2019/04/9780815737759_CH1.pdf

The strategic responses of small and middle powers amid the intensifying U.S.-China rivalry have emerged as a critical but under-explored area of study.[59] For Pakistan, this geopolitical competition presents complex challenges in balancing its strategic partnerships. Navigating between deepening economic and security ties with China and sustaining cooperative engagements with the U.S. and broader international community places Pakistan in a delicate position. However, to manage and contain the impacts of such competition what options for middle-powers like Pakistan have lie in the strategy of hedging.

Pakistan's Response through Hedging

The escalating rivalry between the U.S. and China has created a complex and often constraining international landscape for many small and middle powers, which compels them to recalibrate their foreign policies to safeguard and advance their national interests. As a result, how these states navigate the U.S.-China competition has become an increasingly important yet still relatively underexplored area of study.

To analyse these responses, the balancing-bandwagoning continuum, as conceptualised by Alan Bloomfield, offers a useful theoretical framework, where between balancing and bandwagoning lies in the act of Hedging.[60]

Hedging has emerged as a viable middle-ground strategy for middle-powers like Pakistan in this complex technological competition between China and the U.S. Hedging is a calibrated approach where elements of both cooperation and confrontation are combined together, which enable states to avoid exclusive or specific alignment with any single great power. Strategy of hedging takes its roots from ambiguity, flexibility, and the

[59] Hoang Hien Thuong, Review of *China-U.S. Competition: Impact on Small and Middle Powers' Strategic Choices*, edited by Simona A. Grano and David Wei Feng Huang, *Journal of Indo-Pacific Affairs*, August 8, 2024, https://www.airuniversity.af.edu/JIPA/Display/Article/3865957/book-review-chinaus-competition-impact-on-small-and-middle-powers-strategic-cho/

[60] Alan Bloomfield 2015, "To Balance or to Bandwagon? Adjusting to China's Rise during Australia's Rudd-Gillard Era," *The Pacific Review* 29 (2): 259-82. doi:10.1080/09512748.2015.1013497

pursuit of diversified relationships which could ensure minimisation of risks and maximisation of benefits.[61] Pakistan's hedging posture is shaped by its geopolitical dependencies and economic and technological vulnerabilities and especially by its national security considerations.

India is the most significant factor in Pakistan's national security considerations and threat perceptions. India has, already started a number of programmes and policies to access the semiconductor chip supply chain. In order to encourage semiconductor production, the Indian government announced in 2020 that it will invest US$963 million through the Production Linked Incentive (PLI) Scheme.[62] India's strong domestic demand, skilled workforce, favourable government policies, strategic location, and low labour costs are all factors that can help the country become a major player in the global semiconductor supply chain. In a similar vein, it launched the Semiconductor Fabless Accelerator Lab (SFAL) initiative in 2021 with the goal of promoting domestic design and development of semiconductor chips.[63]

Pakistan has yet to enter the global AI market in a meaningful capacity, especially when it comes to semiconductor supply chain and access to large-scale data resources. Pakistan remains heavily dependent on semiconductor imports and lacks an indigenous fabrication (FAB) facility. However, the launch of the Pakistan National Semiconductor Plan (PNSP) in January 2022 signals an initial step toward building domestic capacity in chip design and light fabrication.[64]While Pakistan's progress is hindered by a shortage of highly skilled professionals and intellectual infrastructure, its hedging strategy also stems from structural dependencies and limited technological capacity. By cooperating with both Chinese and American firms, it can leverage it's over 25,000 engineering graduates entering the workforce to

[61] Simona A. Grano and David Wei Feng Huang, eds., *China-U.S. Competition: Impact on Small and Middle Powers' Strategic Choices* (Cham: Palgrave Macmillan, 2023), https://doi.org/10.1007/978-3-031-15389-1

[62] Muhammad Faizan Fakhar, "South Asia and the US-China Tech Competition," *South Asia @ LSE (London School of Economics and Political Science)*, April 17, 2023, accessed July 15, 2025, https://blogs.lse.ac.uk/southasia/2023/04/17/south-asia-and-the-us-china-tech-competition/

[63] Syed Ali Zafar, "South Asia and the U.S.-China Tech Competition," *Islamabad Policy Research Institute (IPRI),* August 21, 2023, https://ipripak.org/south-asia-and-the-us-china-tech-competition/

[64] Zafar, "South Asia and the U.S.-China Tech Competition."

enter global chip design ecosystems.[65] This approach enhances national capabilities, supports economic growth, and addresses global workforce gaps. It also allows Pakistan to avoid over commitment with any single power. Such balanced engagement aligns with Islamabad's goal of maximising returns while minimising strategic risk.

Hedging enables Pakistan to mitigate these vulnerabilities by maintaining strategic ties with both powers. Deepening military and economic cooperation with China offers Pakistan a buffer against regional instability, especially in light of India's aggressive posturing under a Hindutva-driven regime and the growing Indo-U.S. strategic partnership. Moreover, Pakistan's deepening ties with China are evident through initiatives like the China-Pakistan Economic Corridor (CPEC), which includes significant investments in digital infrastructure. This partnership has facilitated the development of Pakistan's technological capabilities, aligning with China's broader Belt and Road Initiative goals. Furthermore, Pakistan-China military cooperation, especially in defence technology transfers, joint exercises, and arms sales, has deepened in recent years, forming a strategic buffer against regional security threat.

From Pakistan's perspective, the continuation of Major Non-NATO Ally status with the U.S. is a key component of its hedging strategy amid intensifying U.S.-China tech competition. While Washington strengthens ties with India, MNNA status offers Islamabad vital access to defence cooperation and strategic flexibility.[66] Pakistan's continued engagement with the U.S. remains crucial, not only for economic and diplomatic support but also for conflict de-escalation, as demonstrated by Washington's intermediary role during the post-Pahalgam military conflict between India and Pakistan.

[65] Pakistan Engineering Foundation, "Overview," accessed July 15, 2025, https://pef.com.pk/overview#:~:text=As%20per%20a%20recent%20survey,registered%20with%20Pakistan%20Engineering%20Council.

[66] Srujan Palkar and Mrittika Guha Sarkar, "Amid India-Pakistan Tensions, the U.S. Must Rebalance Its Security Priorities in South Asia," *Atlantic Council*, May 19, 2025, https://www.atlanticcouncil.org/blogs/new-atlanticist/amid-india-pakistan-tensions-the-us-must-rebalance-its-security-priorities-in-south-asia/

Conclusion

The evolving global order is increasingly shaped by technological advancements, with techno-nationalism driving a shift from cooperative globalisation to strategic competition. As major powers prioritise national security and economic interests, technological leadership has become central to global influence. The intensifying U.S.-China rivalry highlights how national security imperatives now underpin technology policy, disrupting global supply chains and challenging multilateral norms.

A key battleground is the semiconductor industry, where both countries seek dominance, China through state-led investments and export controls, and the U.S. via trade restrictions and reshoring initiatives. However, despite efforts toward self-sufficiency, mutual interdependencies in chip production limit full decoupling. This makes semiconductors a critical lens through which to view techno-nationalism's impact on economic policy and geopolitical strategy. As both powers weaponise technology in pursuit of strategic advantage, their rivalry not only reshapes bilateral relations but also transforms the global technological landscape. In this context, the most affected entities will be developing countries, which lack the technological infrastructure to compete in this evolving landscape. For developing countries, the ramifications of this shifting landscape are profound. Many of these states rely heavily on technological imports and globalised supply chains, making them particularly vulnerable to the disruptions caused by techno-nationalist policies. For Middle Powers like Pakistan, hedging as a viable response to the U.S.-China techno-nationalism seeks balanced engagement with both powers to safeguard national interests without strategic over commitment. By leveraging its human capital and aligning selectively, Pakistan aims to navigate the chip war pragmatically while enhancing its technological standing.

Ultimately, techno-nationalism is reshaping global interactions, reinforcing power hierarchies, and redefining how nations engage with emerging technologies. While it fosters innovation and self-reliance, it also accelerates de-globalisation, increases geopolitical instability, and widens economic disparities.