COMMENTARY

Digital Geopolitics and U.S.-China Competition

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ABSTRACT *The wide range of digital technologies, coupled with their strategic indispensability, not only reshapes traditional international relations; it systematically institutionalizes digital geopolitics as an emergent field in which technological capabilities become the new currency of state power. The profound convergence of digital technologies, including information and communication technologies (ICTs), big data, and artificial intelligence (AI), with human society and daily life, consequently, further amplifies the influence of digital geopolitics on great power competition. The leading status of the technological landscape between the U.S. and China is set to solidify further, both in terms of material strength and the international community's recognition. Simultaneously, the profound impact of U.S.-China tech competition on the power architecture of the digital space demands scrutiny: What strategic assets and competitive advantages are these nations vying for within this contested domain? Will these two powers indeed converge toward a tech Cold War? The resolutions to this complex array of questions will prove instrumental in determining the trajectory of the future international order, with a focus on how U.S.-China competition over digital technologies redefines global strategic balance.*

Keywords: Digital Geopolitics, U.S.- China Competition, AI

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Digital Geopolitical Environment and Politics

Digital space, a virtual realm created by humanity, allows information to propagate at the speed of light, transcending conventional geographic limitations of time and space. For a considerable period, the notion of digital space as an independent entity gained widespread acceptance, largely due to the disruptive and unique nature of digital technologies, positing it as a global public domain unfettered by national borders. However, data does not flow in a vacuum. States retain significant control over information infrastructure, data, computing power, and algorithms. Consequently, while digital space may be liberated from the constraints of the geographical environment, it remains profoundly influenced by international politics. As the value of digital space in economic, security, and political domains continues to grow, concepts from traditional geopolitics, such as the critical position of land, maritime, and strategic chokepoints, are being mapped onto the digital realm. This demonstrates that the complex interplay between digital technology and politics has led to the birth of digital geopolitics. On one hand, digital technology reshapes the geopolitical environment, while on the other, states concurrently influence the course of digital technology.

The interaction between digital space and states gives rise to the digital geographic environment. Digital space constitutes a complex digital ecosystem, interconnected by data flows, powered by algorithms and computing capabilities for data collection, processing, and utilization, and underpinned by communication infrastructure as its material foundation. Data emerges as a new quality of productive force driving digital economic development while simultaneously representing a significant risk to national security. Algorithms serve as tools for data processing, capable of transforming raw data into strategically significant information, knowledge, or actions. Computing power dictates the speed, scale, complexity, and accuracy of data processing, thereby emerging as a crucial infrastructure supporting national economic and social development. Communication infrastructure acts as the conduit for data transmission, connecting data sources, destinations, and intermediate nodes; indeed, global submarine optical cables linking major continents and domestic 5G networks within a country constitute the primary channels for information communication. States view cables as infrastructures that can enable and enhance digital connectivity and thus support social and economic development outcomes.[1] The economic development, political order, national security, and social stability of a state are intimately linked to critical domains within the digital space, such as data, algorithms, computing power, and communication infrastructure, thereby highlighting the strategic value of these elements.

Concurrently, states' attempts to apply traditional geopolitical concepts,

objectives, and instruments within the digital geographic environment have given rise to digital geostrategy. As the pace of emerging technology advancement and application accelerates, the roles of data, algorithms, computing power, and communication infrastructure become increasingly critical, prompting states to formulate strategic initiatives across multiple dimensions, including security, development, and governance, targeting these key elements. To contend for data control, most nations have implemented data localization measures aimed at preventing their domestic data from being unilaterally acquired by other states. Data has become the new power in geopolitics.[2] Concurrently, some countries have also enacted long-arm jurisdiction mechanisms, attempting to procure extraterritorial data through legal means. Algorithms, in turn, have been successively listed on export control lists by multiple nations, prohibiting the proliferation of advanced algorithms. For example, the U.S. introduced the "Framework for Artificial Intelligence Diffusion (AI Diffusion Rule)" in February 2025, a three-tiered system designed to secure its AI leadership and curb advanced algorithm proliferation by strictly controlling the export of AI chips and high-computation model weights.[3] In addition, governments are investing in domestic computing capacity, controlling the flow of computing to competing countries.[4] The contention surrounding computing power has triggered comprehensive inter-state competition over semiconductors. This rivalry extends from controls on chip sales to the export restrictions on lithography machines and materials essential for chip fabrication. Meanwhile, collective action is being pursued through a mechanism called the 'Chip Four' alliance (the U.S., Japan, Korea, and the Taiwan region). In the realm of communication infrastructure, the U.S. has constructed a tight encirclement strategy against Huawei and ZTE, severing Huawei's ties with the U.S. on both supply chain and market fronts, and attempting to compel allied nations to choose sides.

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U.S.-China Digital Geopolitical Competition

Digital geopolitics offers a systemic perspective for explaining U.S.-China cooperation and competition across a range of domains, including technology, cybersecurity, big data, 5G, and artificial intelligence. More significantly, it facilitates a more macroscopic understanding of digital geopolitics' impact on U.S.-China relations and the broader global order. Historically, the U.S. and China have

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experienced a trajectory in the digital technology and market spheres ranging from cooperation to divergence, and from limited conflicts to comprehensive digital geopolitical competition. The U.S., as the birthplace of the internet, is home to the most leading technology companies. These American Big Tech companies are deeply embedded in people's daily lives, consequently reshaping the geopolitical landscape.[5] China, conversely, stands as the world's largest digital market in terms of users, globally leading in digital application innovation. For a considerable period, the close cooperation between the two nations in the digital domain collectively propelled the prosperity and development of the global digital space. Even amid challenges such as the blocking of *Twitter* (*X*) and *Facebook*, and Google's withdrawal from China, an overall cooperative dynamic largely persisted between them. In their collaboration, the U.S. and China propelled the development of the global digital space. In their 2024 study "China and the U.S. Produce More Impactful AI Research When Collaborating Together," Bedoor AlShebli, Shahan Ali Memon, James A. Evans, and Talal Rahwan analyze a dataset of over 350,000 AI scientists and 5 million AI papers. They find that the United States and China consistently produce more influential AI research when collaborating than when working independently.[6] China's immense market and vast talent pool contributed significantly to American profits and provided low-cost technological human resources. Concurrently, China, in this process, assimilated American knowledge transfer, management expertise, and benefited from the cultivation of top-tier talent. U.S. capital significantly invested in Chinese enterprises and actively facilitated the listing of Chinese tech companies in American stock markets. During this period, the U.S. and China constituted a community of shared interests. It was also during this time that China fostered the emergence of tech giants such as Huawei, ByteDance, Tencent, and Alibaba, capable of competing with their American counterparts.

The Snowden case in 2013 marked the genesis of the U.S.-China digital geopolitical competition. These revelations exposed the massive global cyber surveillance conducted by the U.S. National Security Agency (NSA), compromising the national security of various countries, including China. In response, the Chinese government intensified its focus on cyber sovereignty, advocating for the replacement of equipment from companies like Cisco and Oracle, implicated

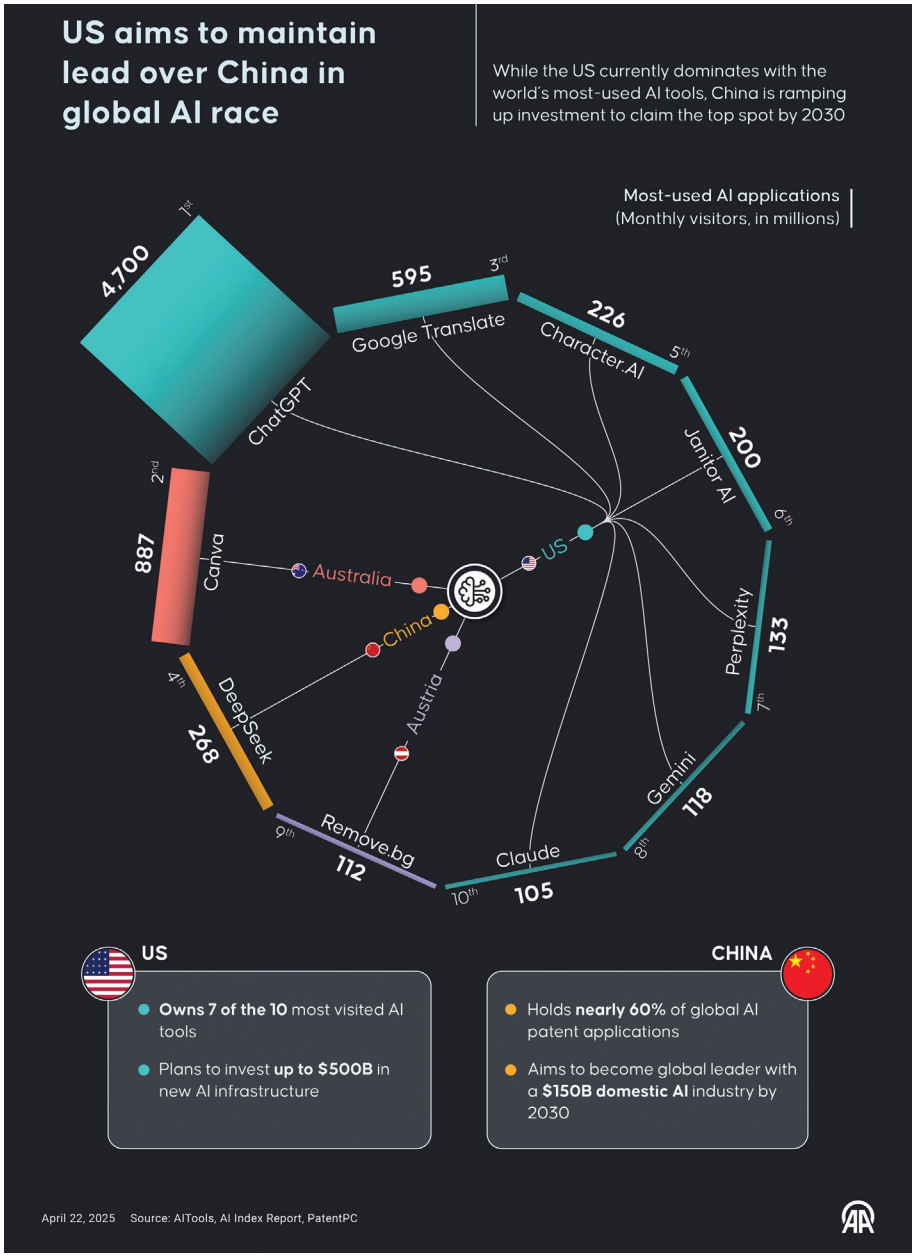
in cooperation with the NSA, with products and devices from domestic enterprises. At the same time, China mandated that Microsoft and Apple establish data centers within its borders, among other measures aimed at safeguarding cyber sovereignty.

Huawei's ascent in the 5G domain became a pivotal event accelerating the U.S. drive for decoupling from China. To impede Huawei's development in 5G, the U.S. implemented a series of sanctioning measures. However, the comprehensive eruption of geopolitical competition was truly ignited by breakthroughs in artificial intelligence technology. With the advent of generative AI, the very definition of security for both the U.S. and China has been redefined. While cybersecurity and data security remain crucial, falling behind in the strategic technology of artificial intelligence now constitutes the most fatal national security risk. To curb China's catch-up in the field of artificial intelligence, the U.S. adopted a "New Washington Consensus (NWC),"[7] extending the competition in communication infrastructure and data domains to the levels of computing power and algorithms, stopping short of escalating sanctioning measures into a full-scale blockade.

The U.S.-China competition in the digital geopolitical sphere, manifested in policies such as decoupling and "small yard, high fence," is essentially a continuation and evolution of traditional geostrategic logic within the digital space.[8] The control over critical resources (such as data), key elements (such as algorithms and computing power), and vital conduits (such as communication technology infrastructure) has become a crucial leverage point for both nations to achieve their respective geostrategic objectives. This competition is not merely a struggle for resources at the hardware and software levels, but more profoundly reflects a comprehensive rivalry in the digital age concerning technological dominance, cybersecurity, and discourse power within global supply chains.

Overall, the U.S.-China digital geopolitical competition is currently in a phase characterized by American offense and Chinese defense. On one hand, the U.S., acting as the offensive party in this digital geopolitical contest, consistently reinforces its "small yard, high fence" and "decoupling and supply chain disruption" policies, striving to curb China's technological ascent through technical barriers.[9] To this end, the U.S. government has enacted a series of strategically driven policy measures targeting critical areas such as data, algorithms, computing power, and communication infrastructure. In the data domain, the U.S. has restricted Chinese companies' data collection and user information processing activities in the U.S., citing national security concerns, and intensified scrutiny over Chinese tech firms' overseas investments and mergers and acquisitions.

In 2022, the U.S. Department of Commerce issued a full blockade policy on AI chip exports to China, strictly limiting companies like Nvidia and



An infographic illustrating the U.S.' efforts to sustain its leadership over China in the global artificial intelligence race.

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AMD from exporting high-end AI chips to the country.[10] In terms of algorithms, the United States enacted the "Export Control Reform Act (ECRA)," bringing advanced AI algorithms and design software under export control and restricting the participation of Chinese researchers in cutting-edge AI algorithm development. At the computing power level, the U.S. has sought to sever China's access to computing power for super-

computing and AI training by limiting the export of high-performance computing chips and electronic design automation (EDA) software.[11] In the domain of communication infrastructure, the U.S., in conjunction with its allies, has advanced the "Clean Network Initiative," aiming to exclude Chinese vendors such as Huawei and ZTE from participating in 5G and cloud computing infrastructure development. This effort also seeks to promote a global tech democratic alliance, intending to construct a digital ecosystem centered around the U.S.

Correspondingly, China is positioned defensively in the digital geopolitical competition, yet it has not adopted a simplistic tit-for-tat confrontational strategy. Instead, it demonstrates a response logic that prioritizes both "openness and autonomy." In terms of guiding principles, China emphasizes "cyber sovereignty," insisting on data security and the indigenous control of critical infrastructure, while simultaneously opposing external interference in its digital sovereignty. Regarding concrete countermeasures, China, on the one hand, continues to expand the opening up of its digital economy to the outside world. In recent years, China has optimized its negative list for foreign investment access, actively promoted high-quality joint construction of the "Digital Silk Road" under the Belt and Road Initiative (BRI), and issued the "Measures for the Standard Contract for Cross-border Transfer of Personal Information" to provide a compliance pathway for the lawful flow of foreign-invested enterprises' data. This strategy aims to attract global technology enterprises and capital cooperation through market scale and policy certainty, partially offsetting U.S. technological blockades.

The actual effect of the U.S.' digital blockade against China has been limited, failing to achieve a precision strike or long-term containment of China's high-tech industries

Concurrently, China is vigorously advancing indigenous innovation in key technologies. At the national level, China has established integrated circuit industry funds (the Big Fund), significantly increasing investment across the entire semiconductor industry chain –from design and manufacturing to materials and equipment– and actively attracting global high-end talent to return. Leading enterprises like Huawei and Alibaba are vigorously developing their own AI chips and cloud computing platforms, fostering autonomous and controllable algorithms and computing power. In the realm of AI applications, China emphasizes a scenario-driven development strategy, leveraging its vast application market and rich data resources to cultivate a diversified application ecosystem in areas such as smart manufacturing, smart health care, autonomous driving, and fintech. Unlike the U.S.,

Highly closed-off systems and intense confrontation will ultimately lead only to the fragmentation of the global digital ecosystem, a decline in innovation vitality, and an exacerbation of governance vacuums, resulting in a multi-loss scenario

which focuses on "large models-large computing power-big data" for general-purpose artificial intelligence (AGI), China continuously optimizes algorithms under "open source-small computing power-small data" scenarios, driving breakthroughs in AI technology within vertical domains. For instance, DeepSeek and Alibaba's Tongyi Qianwen demonstrate unique advantages in the Chinese linguistic context and localized scenarios. This differentiated strategy not only circumvents the U.S. blockade in high-end chips and computing power but also enables China to rapidly catch up, and even partially lead, in specific application areas.

The strategic approaches employed by the U.S. and China, which in traditional geopolitics are characterized by control, blockade, and monopoly, face significant constraints within the digital geopolitical environment. The actual effect of the U.S.' digital blockade against China has been limited, failing to achieve a precision strike or long-term containment of China's high-tech industries. American attempts to monopolize algorithms are constrained by the trend of technological open-sourcing. In the large language model (LLMs) domain, open-source models have gained prominence, achieving a comparable standing with proprietary models. At the computing power level, both the Biden and Trump Administrations have invested substantial policy resources, attempting to construct an export control network targeting China to suppress the development of China's semiconductor industry and delay the iteration speed of Chinese artificial intelligence. However, the U.S. government has not only been unable to control the flow of high-end chips but has also spurred China to accelerate the reshaping of its supply chain in the semiconductor sector. In the 5G domain, the U.S.' attempt to depart from existing technical routes and forcefully promote an alternative, OpenRAN, has also been counterbalanced by the global standardization trend in communication technology.[12] It is evident from this that states attempting to implement traditional geostrategies in the digital geopolitical environment will face dual constraints from both market and technological logic.

Fundamentally, the U.S.-China digital geopolitical competition is not a zero-sum game, but rather a complex interaction encompassing both competition and cooperation. On the one hand, the high degree of openness inherent in digital technology and the deep embedding of global supply

chains make a complete decoupling virtually impossible.[13] American enterprises remain highly dependent on the Chinese market and supply chains, while China, conversely, cannot dispense with global cutting-edge technologies and capital. Furthermore, in response to escalating U.S. restrictive measures, China has not opted for entirely reciprocal counter-sanctions. Instead, it has pursued a "dual-wheel drive" strategy of expanding openness and indigenous substitution, achieving technological self-reliance and systemic innovation under pressure, thereby demonstrating remarkable resilience and adaptability.

Moreover, significant cooperative needs persist between the U.S. and China in areas such as the digital economy, artificial intelligence, and cybersecurity. Transnational issues such as climate change, global governance, and the prevention and control of cybercrime necessitate joint rule-making and cooperation between the U.S. and China. The ultimate trajectory of digital geopolitical competition will depend on whether both sides can find a balance point for cooperation and win-win outcomes amid rivalry and confrontation.[14] Highly closed-off systems and intense confrontation will ultimately lead only to the fragmentation of the global digital ecosystem, a decline in innovation vitality, and an exacerbation of governance vacuums, resulting in a multi-loss scenario. In contrast, adhering to openness, promoting cooperation, and strengthening indigenous innovation are pivotal for the sustainable development of both the U.S. and China in digital geopolitical competition.

Impact of U.S.-China Digital Geopolitical Competition on the Global Technology Ecosystem

As core forces within the global technology innovation system, the interaction and competition between the U.S. and China in digital geopolitics are impacting and reshaping the global technological ecosystem at an unprecedented pace. This trend is not merely reflected in breakthroughs in critical technological domains such as artificial intelligence, but also in comprehensive contests and collaborations spanning supply chains, standard setting, talent mobility, and data governance.

Firstly, the increasingly strengthened "dual-leadership dynamic" between the U.S. and China in digital technology is evident, with AI emerging as the primary arena of competition. AI development is highly contingent upon investment in three fundamental areas: data, algorithms, and computing power. The United States, leveraging companies like Google, Amazon, and Meta, has accumulated globally leading data resources and governance systems. China, conversely, capitalizes on its vast domestic market and high mobile internet penetration, demonstrating prominent advantages in data acquisition and application. In terms of algorithm innovation, the U.S. continues to lead in foundational algorithms and deep

learning frameworks, boasting world-class universities and research institutions. Meanwhile, China, through the integration of industry, academia, and research, has achieved internationally leading positions in both AI theoretical and applied research. At the computing power level, the U.S. possesses semiconductor giants such as NVIDIA and cloud service providers like AWS and Azure, forming the world's largest computing power network. China, in turn, is vigorously developing autonomous and controllable supercomputing centers and AI chips, actively promoting the East Data West Computing project. Furthermore, the U.S. continuously increases investment in frontier technologies, while China has elevated AI development to a national strategy, centralizing multi-dimensional resources toward the AI domain. These concerted efforts collectively solidify the dominant positions of both the U.S. and China within the global digital technology system.[15]

Secondly, despite intensifying U.S.-China competition, the likelihood of a zero-sum fragmentation of the global digital space remains exceedingly low. On the one hand, the inherent openness of digital technologies and the fluidity of knowledge ensure that technological blockades are unlikely to prove effective in the long term. Open-source ecosystems, such as GitHub, Hugging Face, and PyTorch, provide platforms for global innovation, enabling Chinese tech enterprises to achieve breakthroughs even amid chip restrictions. Concurrently, companies' natural inclination toward globalized strategies to secure market share has led to repeated opposition from entities like the U.S. Semiconductor Industry Association against extreme export control measures, arguing that such actions weaken their own competitiveness.[16] *TikTok*'s global operations and innovative capacity illustrate how corporate market rationality and global user demand inherently oppose long-term decoupling. Furthermore, in 2023, the activity of Chinese developers in the global open-source community ranked second only to South Korea, significantly surpassing that of the United States.[17] The collaboration between U.S. and Chinese scholars in AI papers and open-source projects further demonstrates the difficulty of unilaterally severing technology and knowledge.[18] The highly collaborative nature of the global technology supply chain dictates that any form of 'digital iron curtain' is unsustainable in the long term, and open collaboration remains the core imperative of the global digital technology ecosystem.

Thirdly, as U.S.-China competition intensifies, the security risks within the global digital environment have significantly elevated. Geopolitical rivalry often marginalizes attention to the inherent security risks of digital technology itself. Both the United States and China have shown slow progress in AI safety governance legislation, and this governance lag has led to a frequent occurrence of security incidents such as misinformation, deepfakes, and privacy breaches.[19] Global critical infrastruc-

ture faces increasingly complex security threats, while the divergence between the U.S. and China on data and cyber governance models impedes the formation of unified global security standards and response mechanisms. The United States advocates for "free data flow," whereas China emphasizes "data sovereignty," leading to frequent stalemates in multilateral governance platforms such as the Internet Governance Forum (IGF) due to major power disagreements.[20] U.S. sanctions against high-tech Chinese enterprises directly impact the security and stability of global supply chains. Companies such as Huawei and drone manufacturers being listed on export control lists weaken global technological cooperation and innovation vitality. This technological fragmentation and supply chain disruption render the global technology system more vulnerable.[21] Academics commonly employ the term "tech Cold War" to characterize this emerging landscape.

Fourthly, a critical variable determining the trajectory of U.S.-China digital geopolitical competition lies in their ability to align with the diffusive nature of digital technology and the globalized trend of the economic network. The high replicability of digital technology and the fluidity of knowledge make open collaboration the core driving force for innovation. Concurrently, the highly networked structure of the digital economy also fosters the integration of global supply chains.[22] History and contemporary reality both indicate that technological fragmentation and supply chain separation often lead to a lose-lose predicament. Taking the U.S. high-tech export controls on China and China's indigenous control strategy as examples, while these measures may offer short-term protection for domestic industries, in the long run, they weaken the synergistic effects of the global innovation system, resulting in standard divergence and decreased innovation efficiency. An open and inclusive innovation ecosystem is crucial for maximizing resource allocation efficiency, facilitating the free flow of global talent and technology, and enhancing standard compatibility and global influence. The joint participation of U.S. and Chinese enterprises in setting international standards for 5G and the Internet of Things (IoT) exemplifies the ongoing integration of global technology standards.

History and contemporary reality both indicate that technological fragmentation and supply chain separation often lead to a lose-lose predicament

Conclusion

U.S.-China digital geopolitical competition has emerged as a central variable in the evolution of the global technology system. Nevertheless, the interconnectedness, collaborative in-

novation, and open sharing of the global technological ecosystem will continue to shape the future landscape. The deep technological, market, and knowledge linkages between the U.S. and China are difficult to sever amid competition. While competition introduces security risks, it should, more importantly, compel both parties to address global challenges with greater openness and inclusivity. Only by adhering to global collaboration and inclusive governance can long-term competitive advantages and global win-win outcomes be achieved in the digital era. Conversely, insularity and fragmentation will inevitably lead to a lose-lose scenario, undermining the sustainable development of both their own and the global digital ecosystems. ■

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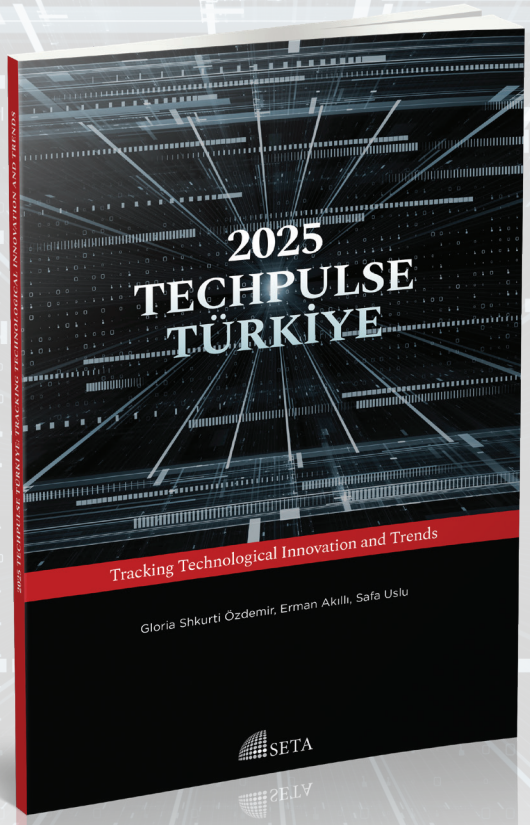

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