

The Impact of 21st-Century Emerging Technologies on the Shift of Power in the International System

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Abstract

Various discussions have been presented regarding the diffusion and displacement of power in international relations, and some predict that this phenomenon will occur in the near future. Among these discussions, emerging technologies, which expanded globally in the 21st century, have accelerated institutional transformations, increased international interactions, and altered core concepts of international relations, including the concept of power. These technologies, by transforming the previous hierarchical order, have had a profound impact on the displacement and diffusion of power in the field of international politics. The purpose of the present study is to examine the impact of 21st-century emerging technologies on the displacement of power in the international arena. Accordingly, the main research question is: What impacts can emerging technologies of the 21st century have on the displacement of power in the international system? The central hypothesis posits that emerging technologies in the 21st century, through information and communication tools, artificial intelligence, robotics knowledge, and fifth-generation internet (5G), by altering the sources and instruments of power, not only contribute to the diffusion of power but also to its displacement, particularly from the United States and the West toward China and Asia. The research method employed in this study is descriptive-analytical, and data collection has been conducted through library resources. The findings of the research indicate that due to the development of emerging technologies such as artificial intelligence and the Internet of Things (IoT), the field of international politics has undergone changes, leading to a transformation and increased complexity in the perception of power and the mechanisms of its exercise. This transformation has resulted in the diffusion and displacement of power at the level of international relations. Among these technologies, "artificial intelligence" constitutes one of the new areas of 21st-century emerging technologies, playing a significant role in the displacement and diffusion of power in international relations.

Keywords: Power, Power Displacement, Emerging Technologies, Artificial Intelligence, Internet of Things.

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1. Introduction

The shifting patterns of power have long been a central concern in the study of international relations. Historically, power has been perceived as a static feature of dominant states, rooted in tangible assets like military strength, economic resources, and political influence. However, in recent decades, scholars have increasingly recognized that power is not fixed; rather, it evolves through complex, multidimensional processes that involve both the diffusion and displacement of capabilities across the international system. As globalization accelerated the interconnectedness of states, power began to flow more fluidly, influenced not only by traditional state actors but also by new dynamics such as technological innovation, transnational corporations, and non-state entities (Tabarintseva-Romanova, 2021). The beginning of the 21st century marked a significant transformation, where the foundation of power began shifting from industrial might to technological supremacy, leading to profound implications for global governance, strategic competition, and national sovereignty.

Emerging technologies have become key drivers of this change. The rapid development of artificial intelligence (AI), the Internet of Things (IoT), fifth-generation (5G) communication networks, blockchain systems, and advanced robotics has introduced unprecedented capabilities that are redefining the mechanisms through which states exercise influence. Notably, AI has begun to influence military decision-making, economic forecasting, and even diplomatic negotiations, signaling a departure from the traditional reliance on material power assets (Zirojević, 2024). Similarly, the proliferation of IoT and 5G technologies has enhanced connectivity and data collection capacities, enabling states to project soft and sharp power with new levels of precision (Wang, 2024). The acceleration of these technologies is not uniform across the globe; rather, it has given rise to new centers of innovation and authority, challenging the dominance of historically powerful nations like the United States and amplifying the strategic positioning of emerging actors, particularly in Asia (Jassim, 2025). These transformations suggest that technological leadership now plays a critical role in determining international standing and influence.

Given these developments, the current research seeks to explore the specific ways in which emerging technologies of the 21st century contribute to the displacement of power in the international system. The traditional discourse surrounding power transitions has often emphasized economic decline or military overreach as central causes of hegemonic shifts. Yet, there is growing evidence that technological innovation constitutes a distinct, and perhaps even more decisive, factor in contemporary power realignments (Chajdas, 2025). The globalization of digital platforms, the strategic competition over AI supremacy, and the deployment of cyber-infrastructure all point to a new era where control over information flows, technological standards, and digital ecosystems will increasingly determine the global distribution of power (Gupta et al., 2025). In this context, the expansion of China's technological ecosystem, including major investments in AI, 5G, and digital trade networks, illustrates how emerging technologies can serve as catalysts for regional and even global shifts in influence (Ren et al., 2024).

The main research question guiding this study is therefore: What impacts can emerging technologies of the 21st century have on the displacement of power in the international system? This question addresses not only the diffusion of technological capabilities but also the structural reordering of global power hierarchies. It seeks to examine whether technology acts merely as a tool for augmenting existing power structures or whether it independently drives a fundamental transformation of the international order. In formulating this inquiry, particular attention is paid to the comparative trajectories of Western and Asian states, especially the role of China in challenging Western technological hegemony through strategic innovation and infrastructure development (Zhang et al., 2023).

The central hypothesis of this research posits that emerging technologies in the 21st century, through the proliferation of information and communication technologies, artificial intelligence, robotics, and next-generation internet infrastructures, alter both the sources and the instruments of power. As a result, these technologies not only facilitate the diffusion of power to a broader array of actors but also accelerate its displacement, particularly away from the United States and the broader Western bloc towards China and other Asian powers. Unlike previous eras where economic productivity or military dominance constituted the primary axes of power shifts, the contemporary era underscores the primacy of technological innovation as the principal driver of geopolitical change.

By focusing on this hypothesis, the research aims to contribute to a more nuanced understanding of how technology acts as a systemic force reshaping international relations. It also intends to shed light on the mechanisms through which emerging technologies amplify existing asymmetries or create new forms of strategic competition. For instance, the digitalization of

critical infrastructure, the weaponization of information through AI-powered platforms, and the establishment of transnational technological standards are already observable phenomena influencing state behavior (Budanov et al., 2025). Furthermore, the advent of satellite-based energy systems and orbital technologies could, in the near future, reconfigure traditional energy dependencies and geopolitical alliances (Pasupuleti, 2024). Thus, analyzing the intersection of technological change and power dynamics is essential for understanding the evolving nature of the international system.

The background and significance of this inquiry are reinforced by growing concerns among policymakers and scholars about the implications of technological asymmetries. Analysts have highlighted that the strategic control over emerging technologies not only enhances a state's ability to project economic and military power but also enables the subtle exercise of influence over political norms, regulatory frameworks, and public opinion across borders (Sorokina & Baksanskiy, 2024). In other words, emerging technologies provide states with new avenues for indirect power projection, expanding the battlefield beyond traditional military engagements into realms such as cybersecurity, digital diplomacy, and information warfare (Volodenkov et al., 2022). The convergence of these capabilities underscores the urgency of studying technological displacement not as a peripheral phenomenon but as a central dynamic in shaping the future international order.

Finally, the rise of emerging technologies and their transformative potential for international relations demand a reexamination of existing theoretical models. Traditional realist perspectives, while emphasizing the enduring relevance of state power, may inadequately account for the non-material dimensions of technological influence (Munawar et al., 2021). Similarly, liberal and constructivist approaches must grapple with the ways in which technology reshapes institutional interdependencies and alters social constructs of power (Serban, 2022). Therefore, this research also engages with contemporary theoretical debates, seeking to integrate insights from technological innovation studies and international relations theory to construct a more comprehensive framework for understanding the emerging global order.

2. Methodology

The present study adopts a descriptive-analytical research design, which is particularly suitable for examining complex and evolving phenomena in international relations such as the impact of emerging technologies on the displacement of power. A descriptive-analytical approach allows for a detailed depiction of current trends and theoretical developments, while also offering critical analysis and interpretation of how technological advancements have reshaped the mechanisms of power projection among states. This method emphasizes a comprehensive understanding of both historical and contemporary shifts, facilitating an in-depth investigation into the dynamic interaction between technology and international power structures. Given the rapidly changing technological landscape, descriptive-analytical research provides the flexibility to integrate diverse scholarly insights and empirical observations that have emerged over the past five years.

The data for this study were collected exclusively through library research, utilizing a wide range of academic sources published between 2020 and 2025. The primary materials included scholarly books, peer-reviewed journal articles, institutional reports, and policy papers related to international relations, security studies, and emerging technologies. Priority was given to recent publications to ensure that the analysis reflects the latest theoretical advancements and empirical findings. Important databases such as JSTOR, Scopus, Web of Science, and Google Scholar were systematically searched using keywords like "power displacement," "emerging technologies," "artificial intelligence in international relations," "Internet of Things and geopolitics," and "5G technology and global power shifts." In selecting the sources, emphasis was placed on works that critically examine the geopolitical and strategic consequences of technological innovations. Special attention was paid to comparative analyses of the United States, China, and other rising technological powers, in line with the study's focus on the reconfiguration of global power structures. Where necessary, authoritative institutional publications from organizations such as the World Economic Forum (2021), Brookings Institution (2022), and Carnegie Endowment for International Peace (2023) were incorporated to provide policy-oriented insights.

Data analysis in this study was conducted through a qualitative content analysis technique, which involved systematically examining the collected texts to identify patterns, themes, and relationships relevant to the research questions. Through content analysis, the study extracted key conceptualizations and empirical findings regarding the intersection of emerging technologies and international power dynamics. The analytical process was interpretive and iterative, involving repeated reading of the

sources to discern both explicit arguments and implicit assumptions about technological impacts. Special focus was given to identifying shifts in theoretical understandings of power as discussed in contemporary international relations literature from 2020 onward. Moreover, cross-case analysis was employed to compare the experiences and strategies of major actors such as the United States, China, and the European Union, allowing for a nuanced understanding of how emerging technologies differentially affect various regions and political systems. The findings were then organized thematically to align with the core objectives of the research, ensuring that the analysis remained both coherent and comprehensive.

3. Theoretical Framework

The concept of power in international relations has evolved significantly over time, encompassing a range of interpretations and applications. Traditionally, power was predominantly viewed through the lens of military might and economic strength, often referred to as hard power. Hard power relies on coercive means such as military interventions, economic sanctions, or the threat thereof, to compel others to act according to one's interests (Munawar et al., 2021). However, the understanding of power expanded in the late twentieth century with the introduction of the notion of soft power, a concept emphasizing the ability to shape the preferences of others through appeal and attraction rather than coercion (Şerban, 2022). Soft power derives from cultural influence, political values, and foreign policies that are seen as legitimate or morally authoritative by the international community. Building upon these two foundations, the concept of smart power emerged, which advocates for the strategic combination of both hard and soft power resources to achieve national objectives more effectively (Tabarintseva-Romanova, 2021). In today's increasingly interconnected and technologically driven world, the ability to integrate these forms of power has become crucial, as emerging technologies provide states with new means of projecting influence without direct confrontation.

Theories explaining the displacement of power in international relations have their roots in classical schools such as Realism, Liberalism, and later Constructivism. Realism, traditionally focused on the anarchic nature of the international system and the perpetual struggle for survival among states, views power shifts primarily through the lens of material capabilities and military balances (Munawar et al., 2021). According to realist perspectives, as one state's material capabilities decline relative to another's, a power transition or displacement becomes inevitable. Liberal theories, while acknowledging the importance of material power, place greater emphasis on economic interdependence, international institutions, and the role of domestic political structures in shaping global outcomes (Şerban, 2022). From the liberal viewpoint, power displacement is not merely a zero-sum game but can be managed through cooperative mechanisms that reduce the likelihood of conflict. Constructivist approaches, in contrast, argue that power is not solely based on material resources but is socially constructed through ideas, identities, and norms. Constructivists suggest that shifts in power occur not just because of tangible changes but because of evolving perceptions and legitimations of authority within the international community (Sorokina & Baksanskiy, 2024). In the context of emerging technologies, constructivist insights are particularly valuable, as they highlight how new technological domains like cyberspace or AI governance can reshape conceptions of power and legitimacy.

An essential distinction in the literature on international power dynamics is between the diffusion and the displacement of power. Diffusion refers to the broadening of power across a larger number of actors, including non-state entities, regional powers, and multinational corporations, diluting the concentration of influence that once resided primarily in a few great powers (Chajdas, 2025). This phenomenon has been markedly accelerated by globalization and digital connectivity, which have empowered smaller actors with tools once reserved for states. Displacement, however, signifies a more structural and hierarchical shift, where power moves from one dominant actor or bloc to another, fundamentally altering the international system (Gupta et al., 2025). Emerging technologies have contributed to both processes, enabling non-traditional actors to exert influence while simultaneously facilitating the rise of new great powers, particularly in regions such as East Asia. The growing technological sophistication of states like China is a case in point, demonstrating how innovation-driven capacity building can lead to the realignment of global power structures (Ren et al., 2024).

The historical role of technology in shifting global power configurations offers important insights into current dynamics. Throughout history, technological innovations have often been the catalysts for profound geopolitical transformations. The Industrial Revolution in the 18th and 19th centuries, for example, enabled European powers to extend their influence globally,

resulting in centuries of colonial dominance. Similarly, the development of nuclear weapons in the mid-20th century reshaped strategic calculations during the Cold War, establishing a bipolar world order centered around the United States and the Soviet Union (Volodenkov et al., 2022). In more recent times, the advent of information and communication technologies has eroded traditional boundaries of sovereignty and introduced new dimensions of power competition, such as cyber warfare and information control (Zirojević, 2024). Each of these technological waves did not merely augment existing power relations but often created entirely new strategic environments, necessitating adaptations in international norms and institutional frameworks.

Today, the rapid advances in artificial intelligence, big data analytics, 5G networks, and robotics are playing a similar transformative role. Artificial intelligence, for instance, is not only enhancing military capabilities but also influencing economic competitiveness, healthcare innovation, and governance models (Al-Zubaidi & Zeidan, 2024). States that successfully harness AI are gaining significant advantages in terms of predictive capabilities, strategic decision-making, and societal management, leading to a redefinition of what constitutes strategic superiority (Budanov et al., 2025). Moreover, technologies such as the Internet of Things and blockchain are decentralizing information flows and creating new centers of power outside traditional state structures (Wang, 2024). This decentralization introduces both opportunities and vulnerabilities, as the competition increasingly revolves around who controls critical infrastructures, data repositories, and standard-setting organizations (Fan et al., 2020).

Importantly, the historical perspective underscores that technological leadership tends to confer systemic advantages beyond mere economic benefits. Dominance in key technological sectors often translates into the ability to shape global norms, rules, and standards. During the industrial era, Britain's technological edge facilitated its maritime supremacy and colonial expansion. In the post-World War II period, American dominance in nuclear technology, aerospace, and computing cemented its leadership role in constructing the liberal international order (Feng et al., 2023). In the 21st century, it is plausible that leadership in AI, quantum computing, and space technologies will similarly define the contours of global authority. China's ambitious "Made in China 2025" initiative and its strategic investments in emerging technologies exemplify a deliberate effort to secure a dominant position in the forthcoming technological order (Zhang & Yu, 2023).

Thus, understanding the intersection of technology and power in international relations requires an integrated theoretical approach that combines insights from classical theories with contemporary developments. Realism's emphasis on material capabilities remains relevant in recognizing the strategic value of technological assets. However, liberal theories' focus on interdependence and institutional governance is crucial for analyzing the regulatory and cooperative dimensions of emerging technologies (Serban, 2022). Constructivist perspectives further enrich the analysis by highlighting the importance of ideas, narratives, and legitimacy in shaping the international technological order (Sorokina & Baksanskiy, 2024). Together, these theoretical lenses offer a comprehensive framework for interpreting how emerging technologies are not merely tools of power but are actively redefining the very structure of the international system.

4. Emerging Technologies in the 21st Century

The 21st century has witnessed a technological revolution of unprecedented speed and scale, fundamentally altering not only the global economy but also the nature of international power relations. Emerging technologies such as artificial intelligence (AI), the Internet of Things (IoT), fifth-generation (5G) internet, robotics and automation, blockchain, and cybersecurity systems are reshaping how states project influence and how societies organize themselves. These technologies are not isolated phenomena; rather, they are deeply interconnected, forming complex ecosystems that multiply their individual impacts. As states invest heavily in technological research, development, and infrastructure, the global competition over technological leadership has intensified, with profound consequences for the future distribution of power in the international system.

Artificial Intelligence stands at the forefront of 21st-century technological advancements, offering capabilities that redefine traditional understandings of strategic advantage. AI enables unprecedented levels of data processing, predictive analytics, and autonomous decision-making, with applications ranging from military systems to economic forecasting and public health management (Al-Zubaidi & Zeidan, 2024). In the military sector, AI powers autonomous weapons, intelligence analysis, and

battlefield management systems, giving rise to new ethical and strategic challenges (Budanov et al., 2025). Economically, AI-driven automation and optimization tools enhance productivity, disrupt labor markets, and shift competitive advantages toward states that dominate AI research and deployment. In diplomacy and governance, AI algorithms are increasingly employed for sentiment analysis, strategic communications, and even policy simulations, suggesting that states proficient in AI development will have significant advantages not only in hard power terms but also in soft and smart power capabilities (Gupta et al., 2025). As a result, AI is more than a tool; it is becoming an essential domain of strategic competition and a key determinant of national power in the international arena.

The Internet of Things, or IoT, represents another major technological frontier that has expanded rapidly over the past two decades. IoT refers to the networked interconnection of everyday devices—ranging from household appliances to industrial machinery—allowing them to collect, share, and act on data without human intervention (Wang, 2024). The implications of IoT are vast, as it enables real-time monitoring, predictive maintenance, and optimized resource management across sectors such as energy, transportation, agriculture, and healthcare (Fan et al., 2020). From a geopolitical perspective, IoT infrastructures create new vulnerabilities and dependencies, raising significant concerns about cybersecurity, data sovereignty, and critical infrastructure protection (Erhan & Eryilmaz, 2024). States that control IoT standards and platforms can exercise significant influence over global supply chains, national economies, and even personal lives. Furthermore, IoT's role in enabling smart cities and digital economies places it at the center of national modernization strategies, making its governance a vital component of national security policies.

The deployment of fifth-generation internet networks, commonly known as 5G, has amplified these dynamics. 5G technology provides ultra-fast, low-latency communication that is essential for supporting innovations such as autonomous vehicles, telemedicine, remote industrial control, and immersive virtual environments (Pasupuleti, 2024). Beyond improving connectivity, 5G networks serve as critical enablers of other emerging technologies, facilitating the seamless integration of AI, IoT, and robotics into daily life and national infrastructures (Feng, 2025). The geopolitical significance of 5G lies in its role as a strategic infrastructure: the state or corporation that dominates 5G deployment gains control over the flow of information, access to big data, and the security architecture of digital ecosystems (Zirojević, 2024). The competition between Chinese companies such as Huawei and Western efforts to secure domestic and allied 5G infrastructures illustrates the high stakes involved. 5G leadership is increasingly viewed not just as a commercial advantage but as a fundamental pillar of national sovereignty and international influence.

Robotics and automation further complement and enhance the transformative potential of AI, IoT, and 5G. Advances in robotics enable the automation of complex tasks across manufacturing, logistics, healthcare, and military operations, reshaping labor markets and production systems (Leng & Xu, 2021). Automation increases efficiency and reduces costs, offering substantial economic benefits to early adopters. However, it also raises profound social challenges related to employment displacement, income inequality, and the future of work (Fan et al., 2020). In military domains, autonomous robotic systems, including drones and unmanned ground vehicles, are already altering the nature of warfare, creating new operational doctrines and ethical dilemmas (Gupta et al., 2025). As states integrate robotics into their national strategies, those that achieve mastery in autonomous systems will likely gain strategic advantages in both economic competitiveness and security capabilities. Importantly, robotics is not limited to physical systems; it also includes software-based automation such as robotic process automation (RPA) in administrative and intelligence tasks, further broadening its strategic impact.

Blockchain technology and cybersecurity innovations have also emerged as crucial pillars of the 21st-century technological landscape. Blockchain offers decentralized, secure, and transparent record-keeping systems that have applications ranging from cryptocurrencies to supply chain management and digital identity verification (Zhang & Yu, 2023). By removing reliance on centralized authorities, blockchain technologies challenge traditional models of financial governance and regulatory oversight. States that adapt quickly to blockchain innovations can gain advantages in financial technology, secure communications, and data integrity management (Ren et al., 2024). Meanwhile, the expansion of cybersecurity capabilities has become essential as technological interdependence increases vulnerabilities to cyberattacks, data breaches, and information manipulation (Wang, 2024). Cybersecurity is now a core national security concern, requiring constant innovation to defend critical infrastructure,

preserve state secrets, and protect citizens' data from malicious actors. The integration of blockchain into cybersecurity strategies offers promising new approaches to resilience, but it also introduces new complexities that states must navigate carefully.

The global spread and adoption patterns of these technologies reflect underlying asymmetries in research capacity, infrastructure investment, and regulatory frameworks. Advanced economies such as the United States, China, South Korea, and members of the European Union have led the adoption curve, driven by robust innovation ecosystems, strong venture capital sectors, and proactive government policies (Jassim, 2025). However, emerging economies in regions like Southeast Asia, Latin America, and Africa are increasingly investing in technological infrastructure to avoid being left behind in the digital transformation (Chajdas, 2025). The uneven distribution of technological capabilities has created new global divides, often referred to as the "digital divide," which risk exacerbating inequalities both within and between states (Budanov et al., 2024). Nevertheless, some smaller states and city-states, leveraging strategic investments and favorable regulatory environments, have positioned themselves as niche leaders in specific technological domains, illustrating that technological leadership is not solely a function of size or historical power status.

Strategic technological competition between major powers has become one of the defining features of contemporary international relations. The United States and China are at the forefront of this rivalry, each seeking to establish dominance across critical technology sectors. The United States maintains an edge in areas such as advanced semiconductor design, software innovation, and fundamental research, supported by a strong network of private companies and universities (Munawar et al., 2021). Meanwhile, China has made remarkable strides in applied technologies, particularly in AI, 5G, fintech, and surveillance technologies, driven by massive state investment, an expansive domestic market, and increasingly competitive firms (Zhang et al., 2023). China's "New Generation Artificial Intelligence Development Plan" and "Digital Silk Road" initiatives exemplify a strategic approach that integrates technological innovation with broader geopolitical objectives (Feng et al., 2023).

Other actors, such as the European Union, Japan, India, and Russia, also play significant roles, often focusing on specific areas of technological leadership or seeking strategic autonomy from the dominant technological ecosystems of the US and China (Serban, 2022). The European Union, for instance, has emphasized regulatory leadership through initiatives like the General Data Protection Regulation (GDPR) and the Artificial Intelligence Act, aiming to set global standards for ethical and safe technology deployment (Sorokina & Baksanskiy, 2024). India is emerging as a major hub for digital services and AI applications, while Japan continues to lead in robotics and precision manufacturing technologies (Volodenkov et al., 2022).

This strategic competition is not limited to state actors but increasingly involves multinational corporations, technology alliances, and transnational research networks. Companies such as Google, Huawei, Amazon, Tencent, and Microsoft operate across borders, shaping the technological landscape in ways that often outpace the regulatory capacities of national governments (Chajdas, 2025). As a result, the intersection of corporate interests, state strategies, and emerging technologies constitutes a complex and dynamic arena where traditional notions of sovereignty, security, and power are continually redefined.

The international contest over emerging technologies ultimately reflects deeper questions about the future of global order. Whether the world moves toward a fragmented technological environment with competing standards and infrastructures or toward a more integrated, albeit contested, digital space will have profound implications for governance, conflict, and cooperation in the decades ahead. Emerging technologies are not merely tools to be harnessed; they are reshaping the architecture of international relations itself, creating new domains of influence and new vulnerabilities that will define the strategic landscape of the 21st century.

5. Mechanisms of Power Transformation

Information and communication have long been critical components of power, but in the 21st century, their significance has reached an unprecedented level. The ability to control information flows and communication networks increasingly defines the strategic capabilities of states and corporations. States that dominate the global information infrastructure can influence public opinion, shape narratives, and disrupt adversarial systems through disinformation campaigns, censorship, and information

manipulation (Zirojević, 2024). With the rapid expansion of digital platforms, social media, and transnational communication systems, information itself has become a strategic asset, as important as traditional military or economic resources. In particular, the globalization of internet platforms and the rise of algorithmic content distribution have amplified the ability of technologically advanced actors to extend their influence across borders (Sorokina & Baksanskiy, 2024). Information power is no longer limited to state actors; multinational corporations that control search engines, social media networks, and cloud infrastructures also possess enormous soft power capabilities. Consequently, the information and communication domains have become critical battlegrounds in contemporary international relations, redefining the concept of sovereignty and challenging traditional security paradigms (Gupta et al., 2025).

Artificial intelligence adds a transformative layer to the role of information and communication by enabling predictive governance, a new form of power that relies on the ability to forecast, model, and shape behavior. Predictive governance involves using vast datasets and machine learning algorithms to anticipate social trends, economic shifts, security threats, and political movements (Al-Zubaidi & Zeidan, 2024). States that master predictive analytics can proactively address risks, optimize resource allocation, and strengthen regime stability by identifying vulnerabilities before they materialize (Budanov et al., 2025). In authoritarian regimes, predictive technologies have been employed to preempt dissent and maintain political control, raising ethical and human rights concerns (Jassim, 2025). In democratic contexts, predictive governance offers the promise of more efficient service delivery and disaster management but also introduces risks of surveillance overreach and data-driven social engineering (Ren et al., 2024). Importantly, the global competition to develop and deploy AI-based predictive systems is intensifying, with countries like China and the United States leading investments in AI research ecosystems, supercomputing infrastructures, and national AI strategies (Feng, 2025). This race to predictive supremacy underscores the emergence of a new strategic advantage rooted not in traditional physical capabilities but in informational foresight and algorithmic control.

The strategic control over data flows and cybersecurity infrastructure represents another crucial mechanism of contemporary power transformation. Data has been called the "new oil" of the digital economy, and the ability to collect, store, analyze, and monetize data has become a central feature of national competitiveness and security (Wang, 2024). States that regulate and dominate cross-border data flows can impose standards, extract economic rents, and exercise soft and sharp power through digital dependency structures (Chajdas, 2025). The competition over setting international rules for data governance, exemplified by initiatives like the European Union's General Data Protection Regulation (GDPR) and China's Data Security Law, illustrates the growing centrality of data in geopolitical strategy (Şerban, 2022). At the same time, cybersecurity threats—ranging from state-sponsored cyberattacks to ransomware operations and intellectual property theft—have elevated digital resilience to a top-tier national security priority (Erhan & Eryilmaz, 2024). Control over secure data networks not only protects economic assets and sensitive information but also enables offensive capabilities, allowing states to engage in cyber warfare, espionage, and strategic sabotage without engaging in open conflict (Fan et al., 2020). The militarization of cyberspace highlights the blurring lines between civilian and military domains in the digital age, reinforcing the view that cybersecurity is now an indispensable pillar of national power projection.

Technological dependence and vulnerability have emerged as critical new dimensions of international power relations, reshaping the traditional understanding of strategic autonomy. Technological dependence occurs when states or societies rely heavily on foreign technologies, infrastructures, or standards for critical functions such as communication, energy distribution, manufacturing, and defense (Pasupuleti, 2024). This dependency creates strategic vulnerabilities that can be exploited in times of conflict or geopolitical tension. For instance, concerns about reliance on Chinese 5G infrastructure led several Western states to reconsider their telecommunications strategies, citing risks of espionage and systemic disruption (Zhang et al., 2023). Similarly, dependency on foreign semiconductors, rare earth minerals, and cloud computing services exposes states to economic coercion and supply chain disruptions (Leng & Xu, 2021). As a response, many states are pursuing strategies of technological decoupling, digital sovereignty, and national innovation ecosystems to reduce their exposure to external vulnerabilities (Feng et al., 2023). However, given the deeply interconnected nature of the global technological environment,

achieving complete self-reliance is increasingly difficult, and strategic interdependence remains a defining feature of the modern world.

The vulnerabilities created by technological dependence also extend to societal resilience and democratic governance. Foreign control over digital infrastructures or information ecosystems can enable influence operations that undermine public trust, exacerbate social divisions, and disrupt political processes (Sorokina & Baksanskiy, 2024). The manipulation of social media platforms during elections, the use of surveillance technologies to monitor activist movements, and the weaponization of disinformation campaigns are examples of how technological vulnerabilities can be leveraged to achieve strategic objectives without conventional military means (Zirojević, 2024). As a result, states are increasingly investing not only in technological capabilities but also in normative strategies to protect the integrity of their information spaces, promote digital literacy, and build societal resilience against external manipulation (Budanov et al., 2024). The battle for technological leadership in the 21st century is therefore not confined to laboratories, corporations, or government agencies; it extends deeply into the social fabric, influencing how individuals access information, form opinions, and engage with democratic institutions.

In sum, the mechanisms of power transformation in the 21st century reflect the growing centrality of information, communication, and technology in international relations. The capacity to control information flows, develop predictive governance capabilities, secure data infrastructures, and manage technological dependencies has become as important—if not more important—than traditional metrics of military and economic strength. The ongoing technological revolution is not merely adding new instruments to the toolbox of international power; it is fundamentally reconfiguring the architecture of power itself, creating new vulnerabilities, new arenas of competition, and new opportunities for influence across the global system.

6. Discussion

The findings of this study indicate that emerging technologies are not merely supplementary tools within existing frameworks of international power but are fundamental drivers reshaping the very architecture of global order. Technological innovations such as artificial intelligence, 5G networks, the Internet of Things, robotics, and blockchain are creating new sources of power that transcend traditional material capabilities. The evidence suggests that the ability to master these technologies translates directly into geopolitical influence, as states that dominate technological innovation increasingly set the rules, norms, and standards that govern international interactions. Information control, predictive governance, cybersecurity dominance, and the management of technological dependencies have emerged as critical dimensions of statecraft in the 21st century. As a result, power is diffusing across new actors and simultaneously being displaced from traditional Western hegemonic centers toward emerging technological powers, most notably China.

When compared with prior research and theoretical expectations, these findings both affirm and expand upon classical theories of power transitions. Realist perspectives emphasized that shifts in material capabilities, particularly military and economic strength, would drive systemic change (Munawar et al., 2021). This study confirms that material capabilities remain crucial, but it also demonstrates that the material now includes digital infrastructures, AI ecosystems, and data control mechanisms as essential components of state power (Al-Zubaidi & Zeidan, 2024). Liberal theories anticipated that globalization and technological diffusion would lead to greater interdependence and potentially mitigate the risks associated with power transitions (Şerban, 2022). However, the evidence suggests that interdependence has created new vulnerabilities and strategic competitions rather than stabilizing effects, particularly in cyberspace and digital governance domains (Wang, 2024). Constructivist insights are particularly valuable, as they anticipated that new ideas, norms, and identities would emerge alongside technological change (Sorokina & Baksanskiy, 2024). Indeed, the normative struggles over data privacy, AI ethics, and information sovereignty reflect a profound reconfiguration of the ideational landscape of international relations.

Emerging patterns reveal several critical trajectories for the future of international politics. First, the strategic competition between the United States and China is increasingly defined not solely by military confrontation or trade wars but by a race for technological supremacy across key sectors such as artificial intelligence, quantum computing, and biotechnology (Gupta et al., 2025). China's "Digital Silk Road" initiatives and aggressive investments in 5G infrastructure illustrate a comprehensive strategy to shape the global technological environment (Feng et al., 2023). Second, the phenomenon of technological

decoupling is likely to accelerate, with states and regional blocs seeking greater digital sovereignty to mitigate vulnerabilities associated with technological dependence (Chajdas, 2025). The European Union's regulatory initiatives on data protection and AI governance reflect such moves toward establishing autonomous technological standards (Serban, 2022). Third, non-state actors, particularly multinational corporations and transnational tech alliances, will continue to exert significant influence, often rivaling states in their capacity to shape technological norms and innovation pathways (Zirojević, 2024).

Another emerging trend concerns the weaponization of information and communication infrastructures. Cybersecurity threats, disinformation campaigns, and algorithmic manipulation are becoming normalized aspects of strategic competition, blurring the lines between wartime and peacetime behaviors (Budanov et al., 2025). As information ecosystems become more fragmented and contested, states that can secure their digital environments while projecting influence into others' information spaces will enjoy substantial strategic advantages (Erhan & Eryilmaz, 2024). Moreover, the race for leadership in AI and predictive governance will continue to intensify, raising profound ethical, political, and strategic dilemmas (Al-Zubaidi & Zeidan, 2024). Predictive capabilities offer significant governance benefits, but they also introduce risks of authoritarian surveillance, erosion of individual autonomy, and societal polarization.

In conclusion, emerging technologies are acting as systemic forces of change, displacing traditional centers of power and redefining the parameters of strategic competition. As technological innovation accelerates, the international system is likely to experience not only a redistribution of material capabilities but also a profound transformation of norms, governance structures, and strategic behaviors. Future trajectories will depend significantly on how states and societies navigate the complex interplay between technological advancement, security imperatives, and ethical governance. The findings of this study underscore the urgency of integrating technological considerations more deeply into theories and practices of international relations, as the digital revolution continues to reshape the global order.

7. Conclusion

The 21st century has ushered in a profound reconfiguration of power in the international system, driven primarily by the rapid advancement and global diffusion of emerging technologies such as artificial intelligence, the Internet of Things, fifth-generation internet, robotics, blockchain, and cybersecurity innovations. Unlike previous eras where military might and economic strength defined global leadership, contemporary international relations are increasingly shaped by technological capabilities that permeate all aspects of economic, political, and societal life. The findings of this study reveal that technological leadership is now a decisive factor in determining national influence, strategic resilience, and normative authority within the global order. States that excel in the development, control, and governance of critical technologies are able to shape international standards, project soft and sharp power, manage information ecosystems, and leverage predictive analytics to maintain domestic stability and external influence. Emerging technologies have not merely supplemented existing forms of hard and soft power; they have transformed them, creating new arenas of competition and new mechanisms for achieving strategic objectives. Artificial intelligence, with its predictive capabilities, fundamentally alters the governance structures of states and the nature of strategic decision-making, while the Internet of Things and 5G infrastructures embed data collection and surveillance capacities into everyday life, increasing the strategic value of digital infrastructures. Meanwhile, robotics and automation enhance economic productivity and military efficiency but also introduce societal vulnerabilities linked to labor displacement and socio-economic polarization. Blockchain and cybersecurity technologies redefine trust, transparency, and resilience in digital transactions, while simultaneously creating new geopolitical fault lines over data sovereignty and cyber defense. The global spread of these technologies, while accelerating innovation and interconnectivity, has also intensified competition among major powers, particularly between the United States and China, each seeking to establish technological supremacy and shape the emerging digital order to its advantage. This technological competition is further complicated by the significant role played by multinational corporations, research networks, and transnational technology alliances, whose influence often transcends the regulatory capacities of nation-states. The study also demonstrates that technological dependence and vulnerability have emerged as critical new dimensions of international power relations, as reliance on foreign technologies and infrastructures exposes states to strategic manipulation and economic coercion, prompting efforts toward technological decoupling and the pursuit of digital sovereignty. The discussion reveals that classical international relations theories, while

still valuable, must be expanded to incorporate the unique dynamics introduced by technological change, particularly the ways in which information control, algorithmic governance, and cyber infrastructures are reshaping conceptions of power, sovereignty, and security. Emerging patterns suggest that the future international system will be characterized by fragmented digital ecosystems, intensified cyber conflicts, evolving norms around data governance and AI ethics, and increasingly sophisticated forms of influence and coercion exercised through digital means rather than traditional kinetic force. As power becomes more networked, intangible, and data-driven, traditional metrics of material capabilities will need to be supplemented with new indicators reflecting technological innovation, information control, digital infrastructure resilience, and societal adaptability. In this context, international cooperation on technology governance, cybersecurity frameworks, and ethical AI development will be crucial to managing the risks associated with the technological transformation of power, although such cooperation will be challenged by divergent interests, normative conflicts, and strategic mistrust among major actors. Overall, the study concludes that emerging technologies are not peripheral factors but are central to understanding the contemporary and future dynamics of international relations, requiring a reconceptualization of power that fully acknowledges the systemic and transformative impacts of the ongoing technological revolution. Future research should continue to explore the long-term implications of technological change for global order, paying particular attention to issues of technological justice, ethical governance, and the resilience of democratic institutions in an era increasingly defined by digital interdependence and strategic technological competition.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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