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The U.S. and China Rivalry in Artificial Intelligence and Its Impact on Pakistan's Tech Sector

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Abstract: *This research examines the increasing rivalry between the United States and China in the Domain of Artificial Intelligence (AI) through a lens of international relationship principles, with a specific attention to the implications of Pakistan's technical field. Paper explained how the two superpowers have included AI in their national strategies and international ambitions, and how this mobility affects developing countries as Pakistan. The study enforces realism, addiction theory, innovation system theory and technical-nationalism to understand how Pakistan navigates this geopolitical and technical competition. By assessing national interests, technology transfer and AI-operated management model, Paper provides a comprehensive analysis of Pakistan's strategic status and capacity for technological development. This concludes that Pakistan will use a balanced, diverse and autonomous strategy to protect its sovereignty and adapt its technological development among global AI rivals.*
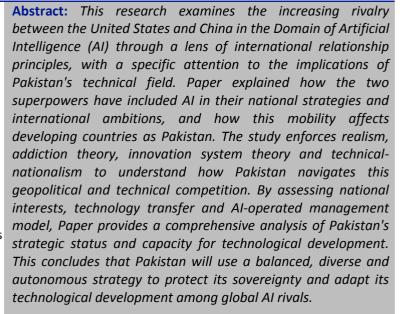
Introduction

Artificial Intelligence (AI) emerges as more than a mere progressive technological development because it establishes a global confrontational front between China and the United States involving strategic power positions and economic leadership while safeguarding national safety interests. (Breammer, 2020; Alan, 2019). Nations utilize AI to transform their competitive abilities as well as their development strategies and diplomatic power in international politics. (Shin, 2021)

This AI technology competition between America and China impacts both their national policy development and it remolds worldwide markets and technology developments (Smith & Wang, 2019)

➢ Our example shows this influence effect in Pakistan since the tech sector feels direct and indirect impacts from the continuous strain between America and China (Kshetri, 2020).

➢ The author divides the article in three sections to explain the ongoing AI-based power struggle between the United States and China and shows how Pakistan becomes affected by this global conflict

➢ The twenty-first century has seen Artificial Intelligence develop into a critical strategic technology that influences civilian aspects and defence operations (Alan, 2019; Chance, 2017).

➢ A leadership position in artificial intelligence technology will give nations substantial ability to influence global governance systems and economic activities and information exchanges. (Shin, 2021)

In the worldwide competition both the United States and China establish themselves as top competitors. A primary aspect of their technological competition features substantial funding for AI research along with differing management systems for technology development and simultaneous efforts to gain control over international AI regulations and foundational elements. (Feldstein, 2019; Lynn, 2020). The individual roles of each nation play a crucial part for comprehending the broader influence of this competitive dynamic. The United States maintains top position in AI innovation through its prominent technology companies including Google, Microsoft, Amazon and IBM that are based in Silicon Valley.(Alan, 2019; US Department of Defence, 2020). These enterprises have created potent computational algorithms together with linguistic systems and data handling instruments which affect multiple regions worldwide. The research frontiers of AI are led by American universities together with research institutions. (Breammer, 2020). National Security demands have led the U.S. government to enforce multiple protecting measures that include banning exports and restricting investments while forbidding working partnerships between specific Chinese businesses. (Smith and Wang, 2019).Through national AI strategies and public-private partnership support the United States structures AI integration into its global political objectives. (US Department of Defence, 2020).

China has become one of the leading competitors in AI development very quickly. As a result of active government backing China accelerates its AI advancement with support from both the public and the private sectors. (Cheng and Zhang, 2021). Major Chinese corporations Alibaba, Tencent and Baidu demonstrate superior capabilities in facial recognition and smart city technology as well as data analytics fields. (Feldstein, 2019). The "Next Generation Artificial Intelligence Development Plan" the Chinese government aims to lead the worldwide AI sector before 2030. (Cheng and Zhang, 2021). China benefits from its large population and its minimal enforcement of data privacy regulations since both factors enhance the availability of extensive training data. (Muller, 2020). Due to its massive data capabilities China can run comprehensive testing of AI technologies that surpass those possible in most other nations. The AI model of China follows a state-focused path which concentrates on surveillance measures together with social control functions and enhanced military autonomy capabilities. (Chance, 2017; Lynn, 2020).

This U.S.-China competition generates consequences that Pakistan along with other countries must face. The technological sector in Pakistan remains under development yet demonstrates promising prospects because it attracts support from young professionals who are adept at technology and from home-grown business start-ups. (Kshatri, 2020; Ministry of Science and Technology, 2022). The broader geopolitical situation determines how much access Pakistan obtains to top-notch AI tools alongside necessary infrastructure and foreign investment. U.S. regulatory limitations on Chinese companies including Huawei created hurdles for Pakistan to obtain reasonably priced 5G and AI technology systems. (Feldstein, 2019).Meanwhile, China's Digital Silk Road, as part of the Belt and Road Initiative (BRI), offers Pakistan a range of digital and technological investments. (Cheng and Zhang, 2021; Bremmer, 2020).

Pakistan benefits from Chinese entities entering its digital infrastructure but these developments create new challenges for cyber protection together with data security standards alongside dependence on digital systems (Lynn, 2020). The strategic circumstances of Pakistan bring forth an intricate condition where they want to take advantage of the two powers yet preserve their neutral status. (Shin, 2021).

Realism in international relations presents a valuable theoretical basis through which people can better comprehend this situation. An anarchic global environment forces nations to build power while furthering their fundamental national goals in order to survive. This theory explains states function as

rational agents whose key objective centres on security enhancement and influence creation. Both China and the United States are using their AI technological capabilities to enhance their strategic dominance which exemplifies the U.S.-China AI rivalry under this framework. From a realist perspective Pakistan follows the same path as it works to defend its national interests while simultaneously advancing economic growth while building independence from any particular major power. The deliberate behaviour of Pakistan when dealing with United States and Chinese interests allows the country to retain independence and secure technological gains along with investment opportunities. Realism shows AI exists as more than an instrument since it functions as a powerful weapon during international competition between nations whose smaller states require precise movements to preserve their future prospects

Research questions

1. How does the AI rivization between the United States and China reflect the principles of realism in international matters?

2. What are the implications of this rivalry for Pakistan's technical growth and digital sovereignty?

3. How can Pakistan balance the relationship with both forces to protect their national interests?

Theoretical framework

The rivalry between the United States and China on the development of artificial intelligence (AI) represents one of the most important geophysical and technical competitions in the 21th century. (Breammer, 2020). Competition extends beyond just the economic and scientific domains under national security, global influence and technical management. (Alan, 2019; Chance, 2017).Pakistan lies between these two forces, facing intensive implications for its own technical field and extensive technical scenario. (Kshatri, 2020; Ministry of Science and Technology, 2022).To understand this dynamic, broad theoretical structure is needed that analyses the AI throw and the status of Pakistan, analyses politics, economic dependence, innovation skills and geopolitical strategies. (Shin, 2021).

This structure integrates four main principles: realism, addiction theory, innovation system theory and technical nationalism. Together, they provide a multidimensional lens to analyze the interaction between global power rival and technological development that affects Pakistan. (Smith and Wang, 2019).

Realism and AI Rivalry

Realism is still a fundamental international principle of relationships that focuses on the national interest in the power competition and a chaotic global system. This believes that the state is a rational actor who seeks to maximize security and power. (Shin, 2021; Smith & Wang, 2019).

(i) **AI as a Strategic Property:** AI is considered a technique of double use with economic, military and intelligence applications. America and China consider AI dominance to be essential for future global leadership. (Alan, 2019; Feldstein, 2019).Race for AI Domination is a classic example of a security dilemma: efforts to ensure technical gains from one state of another provoked motion, increase stress and increase competition. (Chance, 2017).

(ii) **Zero- sum Competition:** Realism explains rivalry as zero, where the surplus with one power is seen as a loss of another. The United States has responded to China's AI steps with export control on AI tags, banning technical transfer and diplomatic pressure on colleagues. (US Department of Defence, 2020).China pursues indigenous people's innovation to reduce addiction and expand the AI ability. (Cheng and Zhang, 2021).

(iii) **Balance of power and alliances:** Both countries want to consolidate alliances and influences through AI collaboration and technology transfer. AI forms a partnership with American Western

allies and India-Pacific. (Lynn, 2020).China involves AI in its belt and road initiative, and exports AI infrastructure and technology to land including Pakistan. (Breammer, 2020). Implications for Pakistan: Within this realistic structure, Pakistan should carefully balance the relationship to protect its national interests. A strength is very close in line with risk insulation and complicates its own technological development. (Kshatri, 2020; Ministry of Science and Technology, 2022).

Dependency Theory and Pakistan's Technical Weaknesses

The dependency theory develops economic and technical inequalities between the developed "core" countries and develops the "circumference" countries. Applied here, the Pakistan's technical dependence on AI technologies produced by the United States and China. (Kshatri, 2020).

(i) **Technical addiction:** There is a lack of R&D financing, infrastructure and expertise to develop state - Art -art AI system regardless of Pakistan's technical field. This addiction forces Pakistan to rely widely on hardware, software, AI services and imports of investments from US and Chinese companies. (Smith and Wang, 2019).

(ii) **Core Perifert Mobility:** U.S. And China represents the "core" of global AI innovation, and controls large patents, technologies and markets. Pakistan, as a perimeter, should interact to access these techniques, often in unfavourable terms that limit technical sovereignty. (Muller, 2020; Bremmer, 2020).

(iii) **Risk:** There are risks such as luxurious pressure in addiction, data sovereignty problems, dangers of cyber security and low capacity for autonomous technical policy. (Feldstein, 2019; Lynn, 2020).

(iv) **Opportunity:** Strategically controlled, partnerships can improve technology transfer, skill development and infrastructure. (Kshatri, 2020; the World Economic Forum, 2021).

Innovation system theory

The innovation system theory focuses on the institutional environment that enables technological innovation. It examines how authorities, universities, industry and international partners speak to promote technological progress. (Smith & Wang, 2019; Shin, 2021).

(i) **National Innovation System (NIS):** Pakistan's AI development depends on the strength of NIS, including education, political structures, industrial academy collaboration and start-up ecosystem. (Ministry of Science and Technology, 2022).

(ii) **Global Innovation Network:** U.S. And China has a strong, well -funded innovation system that increases the AI progression. (Alan, 2019; Bremmer, 2020). Pakistan's integration into these global networks through collaboration and foreign investments is important for building capacity. (World Economic Forum, 2021; Kshatri, 2020).

(iii) **Obstacles:** Pakistan's NIS faces challenges such as limited R&D financing, brain escape, insufficient infrastructure and regulatory barriers. Kshetri, 2020; Muller, 2020).

(iv) **Enablers:** The government's initiative that supports digital skills, incubation centers and research grants can strengthen the innovation environment. (Ministry of Science and Technology, 2022; the World Economic Forum, 2021).

(v) **Effect of rivalry:** The U.S.-China competition has access to technologies, standards and research collaboration that directly affects Pakistan's innovation environment (Feldstein, 2019; Smith & Wang, 2019). Effect of rivalry: The U.S.-China competition has access to technologies, standards and research collaboration that directly affects Pakistan's innovation capacity.

Technical Nationalism and AI

Technical nationalism claims that technical superiority is central to national identity, security and economic power. The states pursue self -sufficiency in aggressively important technologies. (Shin, 2021;

Smith & Wang, 2019).

(i) **Technical-nationalism of American and China:** Both countries have made AI development important for national existence and global power. US military implementing policies that promote AI leadership through participation in the R&D and private sector. (Alan, 2019; US Defence Department, 2020) China's "Made in China 2025" scheme is clearly aimed at AI as a driver for economic change and sovereignty. (Cheng and Zhang, 2021).

(ii) **Results for Pakistan:** Pakistan is experiencing pressure from both forces to match its technology ecosystem. As he benefits from investment and technology imports, Pakistan becomes a risk dependent and loses autonomy. (Kshatri, 2020; Lynn, 2020).

Geopolitical economy

This approach integrates geopolitical and financial analysis of technology competition.

AI Supply Chains Control: Rivalry involves control of main components- semiconductor, cloud infrastructure, data centre and AI algorithms. China's pressure for US export control and chip self-supply affects Pakistan's technical imports (Bremmer, 2020; Feldstein, 2019).

Standard and criteria: AI regime, morality and competitive standards for differences affect Pakistan's policy and adoption of AI. (Lynn, 2020; Muller, 2020).

(i) **Digital sovereignty:** Pakistan should control the data, the infrastructure and the AI regime in the midst of the influence of competition from the United States and China. (Ministry of Science and Technology, 2022; Shin, 2021).

This theoretical structure provides a wide lens for analysing how American-China AI rivalry affects Pakistan's technical fields. Realism explains the power struggle that shapes global AI policy; the addiction theory highlights the weaknesses of Pakistan; Innovation system theory examines Pakistan's ability to innovate; Technical nationalism refers to the strategic driving force of both forces; And the perspective of the geo -political economy challenges the complex supply chain and the steering that challenges Pakistan's face.

Entity 1: The United States

The United States has been a global leader in technological innovation for a long time, and in the modern AI race there is still a great strength. The US government, private sector and research institutes work together to maintain artificial intelligence management as an important element of national security, economic competition and global influence. AI requires analysis of its strategic priorities, innovation ecosystems, political approaches and connection to colleagues and partners to understand the American role of the AI rival - where how Pakistan's technical fields are affected. (Alan, 2019; US Defence Department, 2020).

US strategic priorities in AI

The United States views AI as a significant strategic technique for its military superiority, economic prosperity and geopolitical impact.

I. **National Security and Defence:** AI applications in defence, such as autonomous weapons, intelligence analysis, cyber defence and Battlefield Robotics, are central to US military modernization efforts. (Chance, 2017; Alan, 2019). The Ministry of Defence (DOD) launched initiatives such as the Joint Artificial Intelligence Centre (Jaic) to speed up AI adoption in all branches of the armed forces. AI is expected to provide crucial benefits in speed, accuracy and decision -making in conflict landscape.(US Department of Defence, 2020).

II. **Economic competition:** AI runs innovation in industries such as health care, finance, transport and production. The US government encourages innovation in the private sector by promoting policies to

support AI research, start -up development and workforce development. The goal is to maintain leadership in new technologies and create economic development. (Smith and Wang, 2019).

III. **Ethical management and governance:** US AI advocates development that respects privacy, openness, disability and human rights. This promotes international cooperation on AI standards and morals, and gives itself a position as leader of the AI rule. (Lynn, 2020).

US innovation ecosystem

The strength of the United States lies in the dynamic innovation ecosystem that integrates state research funding, world -class universities and a vibrant private sector. (Alan, 2019; World Economic Forum, 2021).

I. **Government funding and agencies:** agencies such as Darpa (Defence Advanced Research Projects Agency), NSF (National Science Foundation) and NIST (National Institute of Standards and Technology) invests heavily in AI research and development. Recent initiatives include the National AI Initiative Act (2020), which coordinates AI research in federal agencies. (US Department of Defence, 2020).

II. **Private sector management:** Technical giants such as Google, Microsoft, Amazon, IBM and NVidia run AI innovation through extensive R&D investments. These companies develop advanced AI algorithms, cloud computing platforms and hardware (e.g. GPU and TPU). The private sector is also a partner with the government for AI applications in defence and public services. (Smith and Wang, 2019).

III. **Academic research and talent:** American universities such as MIT, Stanford and Carnegie Melon led the AI research and trained top AI talent. The country attracts international students and researchers and strengthens their human capital base. (Alan, 2019).

American AI Policy and International Connection

The US approach to AI includes regulations, export control and international partnerships.

Export control and technical prohibition: To maintain technical superiority, American important AI components, such as advanced semiconductor and export control over software. These controls aim to limit access to China's state -art -art technologies, but have global effects affecting countries such as Pakistan, which depend on technology imports. (Bremmer, 2020; Feldstein, 2019).

(i) **Alliance and Partnership:** U.S. NATO members, Japan, South Korea, Australia and India form an AI partnership, promotes joint research, standard setting and information sharing. This participation works to imbalance China's increasing technical impact. (Shin, 2021).

(ii) **Promote democratic AI values:** Unlike the US State-centred approach, US advocates for the AI regime model that emphasizes openness, privacy and moral standards. (Lynn, 2020).

Effect on Pakistan's technical field

The American AI strategy affects Pakistan's technical fields in many ways and provides opportunities and challenges. (Kshatri, 2020).

(i) **Technology access and limitations:** Pakistan's American AI technology and access to hardware are affected by US export control and geopolitical views. While Pakistan has demanded technology participation, some limitations limit the availability of advanced AI pieces, cloud services and software, and potentially slow down local AI development. (Kshatri, 2020).

(ii) **Skills development and research collaboration:** U.S.-based scholarship, education exchange and joint research programs provide valuable opportunities for Pakistani students and researchers to do AI competence. Pakistani technological professionals employed by US technology companies contributed to knowledge transfer and skills growth. (World Economic Forum, 2021).

(iii) **Market Opportunities:** Pakistani start -ups and IT companies can use US markets for software services and AI solutions, which benefit from the installed global tea (Smith and Wang, 2019).

Challenges ahead of the US AI leadership

Despite the benefits, the United States faces important challenges in maintaining the AI leadership.

Competition from China: American dominance in China's mass investment, large data sets and government coordination challenges AI. China's "State Capitalism" model allows a rapid distribution of AI in surveillance, social management and infrastructure projects. (Cheng and Zhang, 2021).

(i) **Lack of talent:** America struggles with a lack of AI talent, which is increased by restrictive immigration policy and global competition for skilled professionals. (Alan, 2019).

(ii) **Regulatory security:** The absence of extensive AI regulations creates uncertainty for newcomers and can slow the adoption in sensitive areas. (Lynn, 2020).

(iii) **Ethical and social concerns:** Questions of prejudice, privacy violations and job shift face challenges for public beliefs and acceptance of AI technologies. (Muller, 2020).

The United States is still a key player in the global AI rival, which benefits from its innovation ecosystem, strategic priorities and international alliances to maintain leadership. Its policy, investments and regulatory alternatives affect Pakistan's ability to achieve technology, create human capital and develop their AI skills. Geopolitical complications as a result of the wide American-China competition should be linked to the American to strategically take advantage of the opportunities for innovation.

Entity 2: China

China is certainly the most important rival for the United States during artificial intelligence dominance. With a clear national strategy, enormous state support and a huge digital ecosystem, China has quickly advanced AI technology, built into economic, military and governing areas. China's approach to AI, U.S. Different than the state -led development, emphasizes data -driven innovation and integrates AI into social leadership. The AI ambitions and rivalry with the United States deeply affect global technical mobility and are specific results for Pakistan's technical fields and strategic status.

China's strategic AI vision

China considers AI as a national priority as important for its economic modernization, military change and international influence.

Next Generation Artificial Intelligence Development Plan: Launched in 2017, emphasizes China's goal to become a world leader in AI by 2030. The scheme emphasizes the construction of a strong AI industry, cultivation of talent and setting up AI standards. (Ministry of Science and Technology, 2022).

(i) **Military modernization:** The Chinese army wants to exploit AI to strengthen the command and control, autonomous weapons, cyber wars and intelligence analysis. The integration of AI is central to China's attempts to achieve "informing" and "intelligent", which is aimed at skipping traditional military technologies.

(ii) **Economic development and social control:** AI is placed in industries such as production, finance, health care and transport. In addition, China uses AI for social rule, including surveillance systems, facial recognition and social credit scoring - which increases governance, but increases moral concerns.

China's AI -Innovation Equer System

China's AI progress is largely inspired by a combination of computer resources, state support and a wealthy technology sector (Cheng and Zhang, 2021).

(i) **Government investment:** China's central and local authorities invest billions in AI start -ups, research institutes and infrastructure. The government supports "National Ai Labs" and fund projects in accordance with strategic priorities. (Ministry of Science and Technology, 2022).

(ii) **Large data sections:** China's large population and relatively relaxed data provide plenty of data to

train privacy rules AI algorithms. This data part accelerates growth in areas such as computer vision, natural language treatment and autonomous vehicles. (Feldstein, 2019).

(iii) **Technical Giants and Startups:** Bedu, Alibaba, Tensent("Bat" trio), Huawei and Sensitime Drive Ai Innovation AI Innovation with investments in Cloud Computing, AI pieces and research. These companies also cooperate with the government and military, blurry lines between commercial and state goals. (Smith and Wang, 2019).

(iv) **Development and talent development:** Chinese universities produce a large number of votes, supported by state scholarships and research funding. However, China is still facing challenges to maintain the AI talent at the top level, where many experts seek opportunities abroad.

China's AI Policy and Global Strategy (Kshatri, 2020).

China's AI policy reflects a combination of strategic ambition, state control and international expansion. Shin, 2021).

(i) **Integration of Civil and Military AI:** China's "Military Citizen Fusion" strategy ensures that the commercial AI has been used for advance defense purposes. This integration reinforces AI weapons and innovation. (Chance, 2017).

(ii) **Data Management:** China's laws for cyber security and data protection use strict data flow control, but allow extensive government to access data at domestic level. This model supports AI applications largely, but contradicts Western privacy criteria. (Lynn, 2020).

(iii) **International AI diplomacy:** China promotes its AI standards and technologies globally through infrastructure projects such as Belt and Road Initiative (BRI). This provides AI-based monitoring technology to partner countries, which expands its geopolitical effect. (Feldstein, 2019).

(iv) **Technical self -sufficiency:** In response to US export sanctions, China focuses on developing indigenous peoples AI pieces, software and hardware to reduce the dependence on foreign technology. (Breammer, 2020).

Effect on Pakistan's Technical Field

China's AI rivization with the United States creates unique opportunities and risks to Pakistan, giving them their close relationship.

(i) **Technology transfer and collaboration:** During China-Pakistan Economic Corridor (CPEC) structure, China supports Pakistan's digital infrastructure development, including AI skills. Chinese technology companies collaborate with Pakistani start -ups and public agencies, which facilitates technology transfer. (Ministry of Science and Technology, 2022).

(ii) **Access to Affordable AI Technologies:** China's competitive prices and desire to share AI tools offer Pakistan's affordable alternatives for Western technology, which helps Pakistan build local AI applications in areas such as agriculture, health care and urban management. (Kshatri, 2020).

(iii) **Military and security cooperation:** Pakistan comes Chinese AI progress in military hardware, surveillance systems and cyber defence skills, and strengthens the security currency among regional tensions. Chance, 2017; Smith and Wang, 2019).

(iv) **Data Privacy and Moral Concerns:** Use Pakistan's Chinese AI technologies increase the concerns of monitoring, data sovereignty and potential abuse, especially to look at the China's computer control model. (Lynn, 2020; Muller, 2020).

(v) **Geophysical Balance:** Pakistan's intimate relationship with China affects their relationship with the United States and Western countries, and potentially affects access to various AI technologies and investments. Pakistan should carefully balance these conditions to maximize the profits (Shin, 2021; Alan, 2019).

Challenges ahead of China's AI ambitions

While China's AI growth is rapid, many obstacles remain.

(i) **Dependence on foreign components:** Despite efforts for self -sufficiency, China is still dependent on foreign AI pieces and software, especially the United States from, the business creates the weaknesses between stress(Breammer, 2020; US Defence Department, 2020)..

(ii) **Talent drainage and innovation gap:** China faces the challenges of maintaining Ai researcher's world -class, many of whom prefer Western institutions. In addition, basic AI research successes often occur in the West. (Kshatri, 2020).

(iii) **Ethical and global criticism:** The use of AI for large -scale surveillance and social control attracts international criticism, which possibly limits the technology acceptance globally (Feldstein, 2019; Lynn, 2020).

(iv) **Data Privacy Policy:** China's data policy increases privacy problems that complicate cooperation with countries according to data security laws.

 Chinese state-interacted, data-intensive AI strategy keeps it as a malignant rival to the United States. Its investment, military integration and international search have shaped global AI criteria and technologies. For Pakistan, China is an important partner that provides access to AI technologies, infrastructure and security cooperation. However, geopolitical rivalry between China and American Pakistan holds a composite position, which requires strategic navigation to utilize the AI benefits of dealing with the risk related to technology dependence, computer management and diplomatic balance, and dealing with the risk related to technology dependence, data thesis and diplomatic balance. (Muller, 2020).

Entity 3: Pakistan

Pakistan, as a developing country with strategic significance in South Asia, faces both opportunities and challenges in the context of American-China rival in Artificial Intelligence (AI). While the global AI race is mainly affected by this dynamic under the leadership of powerful states such as the United States and China, Pakistan's technical sector and national security. Pakistan's efforts to use and integrate AI technologies into their finances, governance and defence sectors have been shaped by both forces, its domestic abilities and its relationship with major regional views. The section examines its role in Pakistan's AI landscape, the U.S.-China AI competition and its resulting impact on its technological development and political environment.

Pakistan's AI Landscape: Current Status and Capacity

(i) **Emerging Tech Ecosystem:** Pakistan's AI sector is still new-born, but is continuously increasing. A handful of startups, educational institutions and state initiatives focus on AI applications in areas such as agriculture, health services, education and fin tech. However, general research and development (R&D) investment compared to global leaders is limited. (Ministry of Science and Technology, Pakistan, 2022).

(ii) **Government initiative:** The Pakistani government recognizes the importance of AI for future development. Politics such as "Digital Pakistan" initiatives and the launch of artificial intelligence laboratories and skill centres take steps toward building AI capacity. However, extensive AI strategy and regulatory structures are still in the early stages. (Ministry of Science and Technology, Pakistan, 2022).

(iii) **Challenges on human capital:** Pakistan is facing a lack of skilled AI professionals. While universities expand informatics and engineering programs, the country struggles with brain flight and inadequate industrial academia that promotes innovation. (Lynn, 2020).

(iv) **Infrastructure and data hulls:** Digital infrastructure boundaries, Internet penetration and quality data availability prevent AI progress quickly. Data is underdeveloped for privacy and cyber security structures, which presents challenges for responsible AI

Pakistan when it comes to American-China AI Rivalry

Pakistan's position in the AI rivization between the United States and China takes shape from its strategic alliance, economic dependence and geopolitical views.

(i) **Strong relationships with China:** Pakistan's close partnership with China, especially through China-Pakistan Economic Corridor (CPEC), provides access to Chinese AI technologies, investments and infrastructure. Chinese companies and state agencies collaborate with Pakistan in telecommunications, smart urban projects and defence technologies, including AI-enabled Systems. (Shin, 2021).

(ii) **U.S. Limited direct commitment with:** Although Pakistan maintains diplomatic and economic relations with the United States, collaboration on advanced technology that AI is limited. Security problems and geopolitical friction have disturbed deep technology transfer and collaboration. (Smith & Wang, 2019; US Defence Department, 2020).

(iii) **Navigation of double addiction:** Pakistan should balance its increasing dependence on China for AI-related technologies in order to maintain practical conditions with the United States and Western countries. This balance action affects decisions on technology, standards and participation. (Breammer, 2020; Shin, 2021).

Effect on Pakistan's Technical Field

(i) **Access to cheap AI technologies:** China's desire to give Pakistan cheap AI maker, software and expertise helps to accelerate digital changes in Pakistan's public and private sectors. This is especially valuable for Pakistan's efforts to increase agricultural productivity, urban management and health care through AI applications. (Kshatri, 2020; Cheng and Zhang, 2021).

(ii) **Technology transfer and capacity building:** CPEC includes knowledge transfer programs and joint companies that help Pakistani engineers and developers gain experience in AI and related fields. This promotes local capacity building, but is insufficient to close technical differences with leading countries. (Cheng and Zhang, 2021).

(iii) **Defence and security applications:** Pakistan benefits China's advanced AI-competent defense technologies, including monitoring drones, autonomous systems and cyber defense equipment. These abilities strengthen Pakistan's military modernization and imbalance regional threats, especially from India. (Chance, 2017; Alan, 2019).

(iv) **Challenges with excessive:** Chinese AI provides severe dependence on technologies, technology locks, potential risk of monitoring and vulnerability to geopolitical intercourse. Pakistan is facing the challenge of developing indigenous people's AI skills to reduce addiction and create permanent development (Feldstein, 2019; Lynn, 2020).

Politics and Regulatory Environment

Emerging AI Policies: Pakistan is in the early stages of preparing the AI regime, data hood and moral ideas that deal with guidelines. Political decision makers identify the need for a framework that promotes innovation and protects the rights of citizens. (Ministry of Science and Technology, Pakistan, 2022; Muller, 2020).

(i) **Cyber Security concerns:** For example, AI adoption increases increase Pakistan cyber security risk, including abuse of cybercat and AI technologies. Strengthening the network defence system and using internationally best practice are immediate priorities. (Feldstein, 2019; Alan, 2019).

(ii) **International cooperation:** Pakistan's participation in regional and international forums about AI, technology standards and digital regime is limited, but there is an opportunity for development. Connection with multilateral institutions can help Pakistan to coordinate its policy with global criteria (World Economic Forum, 2021).

Economic and Social Implications

(i) Job Market and Skills Development: AI is a double age in Pakistan's labour market. While AI provides opportunities to create new jobs in technology and related fields, traditional employment has been threatened with automation to produce, agriculture and services. To utilize the benefits of AI, strategic investments in education and revival are necessary. (Lynn, 2020).

(ii) Digital split and inclusion: AI-controlled technologies increase digital inequalities in Pakistan due to uneven access to infrastructure and skills. Including AI adoption requires targeted policy to reach rural and signed populations. (Kshatri, 2020).

(iii) Innovation ecosystem: It is important for sustainable AI development to strengthen the innovation eco-system through incubators, financing and participation in industrial academia. Pakistan's start - up culture shows up, but sufficient support is required to compete globally.

Strategic views for Pakistan (Shin, 2021; Ministry of Science and Technology, Pakistan, 2022).

(i) **By taking advantage of geopolitical status:** Pakistan's strategic location and alliance with China It as an important partner in China's AI extension plans, especially South Asia and beyond. Pakistan can use this length to attract investment and technology transfer. (Cheng and Zhang, 2021; Bremmer, 2020).

(ii) **Balancing U.S. Relations:** While aligning with China on AI may offer short-term benefits, Pakistan must maintain balanced relations with the U.S. to access broader technology ecosystems and maintain diplomatic flexibility. (Smith & Wang, 2019; Shin, 2021).

(iii) **Building indigenous people:** Long -lasting stability requires Pakistan to develop technologies and reduce external dependence on making heavy investments in AI education, research and entrepreneurship. (Ministry of Science and Technology, Pakistan, 2022).

(iv) **Ethical and regulatory preparations:** Pakistan must develop moral guidelines and regulatory mechanisms to carry out AI applications, which ensure the transparency, responsibility and protection of human rights. (Muller, 2020; Lynn, 2020).

Pakistan's status in the U.S.-China AI rivalry presents both important opportunities and complex challenges. Access to Chinese AI technologies and investments under CPEC facilitates Pakistan's digital and defence modernization, but increases the concerns of addiction and sovereignty. U.S. In the AI Limited Association with Pakistan, the ability to diversify its technology participation. The development of Pakistan's AI region depends on strategic political initiatives, capacity building and an increase in infrastructure. Navigating the geopolitical and technical dimensions of this rivalry would be important for the development of Pakistan's technical fields and its broad socio -economic development.

Research Question Answers

1. Application of realism for U.S.-China AI rivalry

Realism emphasizes power policy and national interest. The United States and China, as two great powers, are closed in a zero-zodiac competition for Ai-Dominans. With companies such as Google, Amazon and IBM, with their elongated technical management, AI tries to maintain its Suzerainty to implement export control and limit the partnership with Chinese companies by investing greatly in research and development. These actions are consistent with the real approach to gaining national power and reducing the dangers.

On the other hand, China quickly advanced its AI abilities under a state-centric model that merges with national surveillance, defence and economic plan. Through the initiative such as "Next Generation Artificial Intelligence Development Plan", China aims to be the United States until 2030. Must also cross the approach is also ruled by realism, which focuses on creating relative power to challenge the status quo for American dominance.

Both states are only inward, but also make AI a weapon in search of strategic dominance. This involves the impact of establishing military applications, data control, surveillance system and international AI criteria. Their actions show how realism views technology as an extension of power policy

2. Effect on Pakistan: a realistic reading

In a realistic system, small states such as Pakistan are not passive observers, but rational actors navigate the dynamics of power to preserve sovereignty and safe benefits. The situation in Pakistan in the middle of the American-China Ai competition reveals the dilemmas and the possibilities of the intermediate powers in a polarized technical scenario.

A. Strategic dilemma and technical addiction

Pakistan must meet a strategic dilemma: U.S. complying with provides access to advanced technologies and diplomatic lenses, while collaboration with China provides cheap infrastructure and digital investment through Digital Silk Road. However, these benefits come with trade -offs.

US restrictions on Chinese technical companies such as Huawei affect Pakistan's cost -effective AI and access to 5G technologies. This limits Pakistan's alternatives, pressed to the close Chinese offers. While

Chinese investments improve Pakistan's

Digital infrastructure, they also raise concerns about superintendent, data monitoring and privacy. This reflects the concept of dependence on realism and the risk of asymmetrical power.

B. National interest and strategic autonomy

From a real perspective, Pakistan's actions showed a strategic effort to maximize the national interest in maintaining autonomy and diversifying participation. The country has welcomed Chinese AI investments with careful involvement with Western companies and regulatory structures. Pakistan wants to take technical benefits from both camps, without satellite.

The country's participation in regional and global digital dialogues, attempts to develop local AI talents and its cyber security infrastructure that is interested in creating infrastructure is a rational strategy for avoiding strategic traps. This balance action provides an example of the actual survival principle through calculated diplomacy and coalition flexibility.

C. Danger Dharna and security issues

Realism also considers the role of the father's opinion in shaping the behaviour of the state. Pakistan's increasing dependence on the AI-driven system introduces new security weaknesses, such as cyberspionage, digital monitoring and information manipulation. These concerns are intensified in the context of great power -rivization, where digital systems can become a tool with geo -political effects.

In order to reduce these dangers, Pakistan must develop his cyber security protocol and strategic rules. Increasing the law on data protection, investing in local innovation and reducing external technical dependence is necessary steps to ensure national sovereignty in a rapid AI-controlled world.

3. Strategy and balance of future approaches

The AI rival is likely to intensify, and for Pakistan a strategic balance is important in politics that matches realism. The following measures reflect a real -informed approach to protect Pakistan's long -term interests:

- **Technical diversification:** AI technology completely rely on a power can compromise sovereignty.

Pakistan should diversify its technical partnerships, which promote indigenous capacity and connect to both western and eastern platforms.

• **Strengthening state institutions:** Realism advocates strong state institutions that can protect national interests. Pakistan should build an institutional mechanism to regulate AI imports, ensure data privacy and implement cyber defence strategies.

• **Strategic fuse:** Instead of choosing pages, Pakistan can practice fuse - the United States and can develop economic and technical connections with both China. It enables flexibility and reduces the risk.

• **Regional cooperation:** Pakistan can detect collaboration with regional powers and multilateral platforms such as regional powers and an organization of Islamic

Cooperation to develop general AI criteria and strategies. This will increase collective negotiations and reduce vulnerability.

Conclusions

The rivalry between the United States and China in artificial intelligence represents one of the most defined geophysical and technical competitions of the 21st century. This competition not only improves innovation and resumes the dynamics of global power, but also affects third -party countries such as Pakistan, whose technological development and strategic interests are influenced by the politics and functions of these superpowers. This research has discovered the theoretical structure of realism to understand how the states behave in the discovery of strength and security in a chaotic international system, focusing on the US AI rival. It then investigated three large institutions - the United States, China and Pakistan - analyse associated positions, strategies and interactions within the AI domain. The United States is still a global leader in AI innovation, which is run by the dynamics of the private sector, strong research institutes and strategic political initiatives with a view to maintaining technical dominance. AI's efforts focus on military superiority, economic competition and security for democratic values, and emphasizes moral AI development and international cooperation.

On the other hand, China is increasingly going through strategic initiatives such as enough state investments into AI, integration of AI into industries and "new generation AI development scheme". China's approach emphasizes the nature of the Dual use of AI in civil and military areas, with technical self -sufficiency and focuses on taking advantage of AI for monitoring and controlling. Pakistan is in a more complex position in this rivalry. Although it lacks widespread AI infrastructure and investments in the United States and China, Pakistan's strategic partnerships with China, especially under CPEC, provide access to new AI technologies and expertise. This relationship improves Pakistan's technical field and defence modernization, but also exposes the country to addiction and geopolitical weaknesses.

Pakistan's challenge lies in the development

Theoretical reflection

Using realism in this scenario shows that the United States and China are primarily inspired by national interest and the discovery of power, and acts as an important remedy for Stats Kraft with AI. Both forces want to maximize the safety and influence of achieving technical superiority. This competing dynamic creates an environment zero where cooperation is limited and strategic distrust is strong.

For Pakistan, realism sheds light on the need to match strong forces to strengthen the obstacles and national security and development imposed by the chaotic system. However, it also emphasizes the importance of cultivation of autonomous abilities to avoid the risk of over existence and strategic subordination at the same partner. The midst of this major power competition, Pakistan's technical fields are at a junction. On the one hand, Chinese investment and technology transfer provides an important lifeline for Pakistan's AI ambitions, which enables infrastructure development, capacity

building and integration of AI into important areas such as agriculture and defence. On the other hand, limited technology ecosystems with limited involvement with the United States and Vest -kachz Pakistan, and potentially limit innovation and flexibility.

In order to maximize the benefits of this rivalry for Pakistan and to reduce the related risks, many strategic steps are needed:

- **Diversification of partnerships:** Pakistan should expand cooperation from China to include other global AI leaders and international organizations. This diversification addiction can reduce the risk and postpone Pakistan in a wide range of technologies and standards.
- **Investment in education and research**: Increased voice education, research funding and a strong AI labour force through the linking of industrial academy are important for developing indigenous people's AI skills and promoting innovation.
- **Strengthening regulatory structure:** Pakistan will develop extensive AI guidelines and regulatory mechanisms that deal with moral concerns, computer paediatrics and cyber security, and correspond to global norms for responsible AI adoption.
- **Increased cyber security:** Given the increasing cyber threats associated with AI technologies, Pakistan should prioritize its cyber security infrastructure and flexibility.
- **Taking advantage of regional cooperation:** Regional AI initiatives and commitment to digital governance forums can help Pakistan share knowledge, pool resources and harmonize politics with neighbouring countries.

Extensive geopolitical and financial results

The U.S.-China AI rivalry has the ability to elaborate on technical duration with competitive standards, platforms and ecosystems. This division has a deep implications for global rule of AI and digital technologies. Countries such as Pakistan, located at the intersection of these regions, should carefully navigate these complications to protect their sovereignty and development interests.

Economically, AI promises to accelerate Pakistan's digital change, improve productivity and open new markets. However, challenges such as digital inequality, job shift and infrastructure intervals should be continuously controlled. In terms of safety, the integration of AI into security systems increases the strategic preventive of Pakistan, but also increases the risk of regional weapons and autonomous conflict. It is necessary to balance technological progress with strategic stability. American-China rival in artificial intelligence is not just a technical competition; this is a conflict with far overall consequences for future global leadership. For Pakistan, this rivalry presents a challenge for maintaining development and strategic autonomy and security.

Pakistan's success in this environment will depend on the ability to develop further politics, create human and technical abilities and to be creatively engaged with many international partners. By doing this, Pakistan can place itself as a competent player in the global AI ecosystem and protect its national interests in a rapid complex and competitive digital world

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