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## **The Race for Global AI Dominance: USA vs. China**

### **How Do We Measure Who's Ahead?**

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*Developed by Nada Alwadi<sup>1</sup>*

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### **Background**

The race for global Artificial Intelligence (AI) dominance has intensified, with the United States and China emerging as the primary rivals. The outcome of this race is critical, as leading AI powers will shape the norms governing its use, and the broader role of technology in society. This will have an important influence on other states and the future of the international order.

Powerful nations are constantly battling for political influence and economic supremacy. International relations scholars have long recognized that major technological advances often precede economic power transitions, with implications for global military and political leadership. In this context, AI is expected to play a pivotal role in shaping state power—primarily by driving economic growth and enhancing military capabilities. For example, AI is expected to boost the economies of developed nations significantly. According to research by [Accenture](#) and Frontier Economics, AI could potentially double annual economic growth rates by 2035 and raise labor productivity by as much as 40 percent. Similarly, the [McKinsey Global Institute](#) estimates that AI could generate \$13 trillion in global economic activity by 2030, while [PricewaterhouseCoopers](#) projects an even higher impact—up to \$15.7 trillion in global GDP growth by 2030—driven largely by gains in productivity.

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<sup>1</sup> Nada Alwadi is a Ph.D student, School of Public and International Affairs, Virginia Tech

AI has emerged as a central front in the rivalry between the US and China. So, how do we measure who's ahead? And how should we interpret the AI race within the broader context of the great global power competition?

In 2024, [political scientist Jeffrey Ding stated](#) that China still sits far behind the US in terms of being able to leverage AI to improve productivity across the entire economy and capitalize on AI to sustain productivity and growth. This is in contrast to a 2019 essay [in New America](#) arguing that although the United States currently possesses significant AI talent, this does not guarantee a decisive or lasting advantage in AI development.

The following case will explore these questions and arguments, revealing why the race for global AI dominance is far more complex than it appears.

## Presentation of The Case

If someone wanted to assess a nation's Artificial Intelligence capabilities, how should they measure it?

Researchers often focus on a nation's "innovation capacity"—that is, its ability to develop and produce novel AI technologies. However, Jeffrey Ding (2024) argues that focusing solely on innovation can be misleading. He introduces the concept of "diffusion" to assess a nation's ability to spread innovations. Both **Innovation** and **Diffusion** are central concepts in this case, and it is important to understand the difference between them.

**Innovation:** the first introduction of a new product or process.

**Diffusion:** the spread of an innovation through a system or population.

Let's take ChatGPT as an example of an innovation. It is an advanced AI-powered conversational assistant developed by the U.S.-based AI company, OpenAI. The introduction of an innovative technology like this is not enough to measure its impact—it must spread or "diffuse". Of course, we know that ChatGPT has achieved significant global reach and a vast user base, with over 400 million [weekly active users worldwide](#) as of February 2025.

### **Innovation vs. Diffusion: Comparing U.S and China's AI Capabilities**

Scholars and researchers in International Relations increasingly recognize that scientific and technological capabilities are becoming primary components of a nation's overall power. Debates over a possible U.S.–China power transition highlight China's rise as a science and technology superpower.

The advancement of the Chinese AI company, **DeepSeek**, serves as a clear example of China's growing prominence in the field of artificial intelligence. DeepSeek is an innovative technology, but does it have a diffusion capacity?

[DeepSeek](#) is a Chinese artificial intelligence company that gained international attention in early 2025 with the release of its R1 model, an open-source AI system comparable in performance to leading models like U.S.-based [OpenAI's](#) GPT-4. Its rapid rise has sparked significant controversy and technological, ethical, and geopolitical debates.

Most studies comparing the U.S. and China focus on each country's ability to generate new innovations while neglecting their relative capacities to effectively adopt and implement emerging technologies. By highlighting the gap between China's innovation capacity and its diffusion capacity, Ding (2024) argues that innovation-centric assessments mistakenly inflate China's scientific and technological power.

**Innovation capacity:** A State's ability to introduce novel Science and Technology advances.

**Diffusion capacity:** A State's ability to spread new innovations throughout its domestic ecosystem.

According to Ding's analysis of historical events related to the rise and fall of great powers, a "diffusion-centric" approach is especially critical for evaluating a rising power's ability to leverage technological changes and maintain higher economic growth rates than its rivals. In other words, without diffusion, even the most extraordinary innovations will not have an impact. "Achieving great heights requires nightly toil, not just moments of sudden flight" (Ding 2024).

Of course, it is difficult to completely disentangle innovation and diffusion. To derive power from scientific and technological advances, nations like China and the United States must both introduce and spread these advances. The two processes can overlap and interact, as evidenced by the fact that additional innovations often occur in the process of diffusion. Moreover, a state's innovation capacity strongly correlates with its diffusion capacity. The state that introduces a new method can benefit from first-mover advantages, thereby also leading to the widespread adoption of that method.

A country's innovation capacity and diffusion capacity can widely diverge. A country's adoption rate of new technologies depends not just on its innovation capacity but also on many other factors, such as institutions for technology transfer, human capital, and openness to trade. In many cases, a nation being the first to introduce new technologies makes it easier for it to adopt these technologies widely, quickly, and effectively. However, this advantage can be offset by other factors that affect the rate at which a country adopts new innovations at scale, such as the efficacy of communication channels that inform small and medium-sized enterprises about new technological advances, and the density of linkages that connect research institutes and firms. Therefore, a country's innovation capacity can diverge significantly from its diffusion capacity.

So, let's apply a diffusion-centric approach to evaluate China's AI capacity.

### **China's AI: A Focus on Diffusion**

A diffusion-centric perspective provides valuable insights into China's science and technology capabilities. While discussions overwhelmingly center on China's capacity to generate innovations, evaluating its ability to adopt new technologies across productive processes reveals what Ding (2024) refers to as a "diffusion deficit". This deficit leads him to question whether China can truly become a science and technology superpower.

China still lags far behind the United States and other countries in terms of diffusion capacity. Notably, beyond highly developed clusters like Beijing, the adoption of digital technologies in third- and fourth-tier Chinese cities, as well as in areas beyond the coastal regions, remains extremely slow. Additionally, China is falling behind other countries in adopting key information and communication technologies such as cloud computing. Thus the diffusion-centric approach reveals that China is less likely to sustain its rise to become a science and technology superpower.

On the other hand, artificial intelligence (AI) implementation is increasingly enabling authoritarian governance around the world, offering China a golden opportunity for diffusion. Chinese companies have played a key role in spreading the technologies and practices that digital rights organizations refer to as “digital authoritarianism”. While some Western companies also export surveillance technologies, most democratic governments take measures to protect human and digital rights. It is fair to say that, due to China’s authoritarian political landscape, its government and private companies are likely less constrained by ethical and legal norms when developing AI as compared to their American counterparts.

China’s government is proactive in seeking to set [global standards](#) and norms for artificial intelligence and its use in society, aiming to be a key player in [the global discussion](#) on ethical AI governance. It advocates for the interests of government-driven technical organizations while attenuating the voices of the kind of independent civil society actors that typically play a central role in shaping the debate in North America and Europe.

## Conclusion

While China is making significant advances in AI innovation, its limited capacity for diffusion—that is, the widespread adoption and integration of its technologies globally—may hinder its ability to truly become an AI superpower.

At the same time, the United States no longer holds uncontested dominance in the global AI landscape. China remains a close competitor, especially in developing and diffusing technologies of “digital authoritarianism”, but the race for AI dominance is becoming [increasingly crowded](#) and is no longer a two-horse race. Other countries, such as France, are making notable progress in developing advanced AI models and carving out competitive positions within the global AI industry. This shift reflects a broader diversification in AI capabilities, mirroring the increasing complexity of the AI industry.

## Processing Questions

1. Why is the race for global AI dominance important?
2. What is the difference between innovation and diffusion in measuring a state’s AI capacity?
3. Why does Jeffrey Ding argue that focusing solely on a state’s AI innovation capacity is misleading?

4. Give an example from the article of a technology with a high diffusion rate.
5. What is DeepSeek? Explain the controversy surrounding it.
6. Explain the difference between innovation capacity and diffusion capacity.
7. Why does Jeffrey Ding suggest that China is far from becoming an AI superpower?
8. What is China's "diffusion deficit"?
9. Explain the leading role China plays in digital authoritarianism around the world
10. What would Chinese-led global AI standards look like?
11. Is the United States currently dominating the AI race?

## **Thematic Reflection and Discussion**

### **Global Cooperation in the Age of Artificial Intelligence**

Artificial Intelligence is widely regarded as one of the most transformative technological advancements of our time. Developing ethical policies to govern AI has become an important shared goal for much of the world. As the capabilities of AI systems rapidly evolve, the international community increasingly emphasizes the need for global cooperation to manage the risks posed by powerful and potentially disruptive technologies, particularly transformative AI. Despite geopolitical tensions, especially between major powers like the United States and China, meaningful collaboration in AI governance remains key to ensuring safe, equitable, and beneficial outcomes worldwide.

### **Discussion Questions**

1. Is it possible for policymakers in the United States and China to find ways to cooperate rather than compete in the realm of AI?
2. What stands in the way of this cooperation, and what needs to happen to facilitate it?
3. What role can international organizations play in mediating trust and setting shared standards for AI governance?

### **Digital Authoritarianism**

In this case, you learned about the term "[Digital Authoritarianism](#)", which refers to the growing practice among authoritarian regimes of using digital technologies to surveil, repress, and

manipulate their citizens. This trend raises serious concerns about the misuse of technologies, especially unregulated artificial intelligence systems such as facial recognition. Reflecting on China's role in the development and global diffusion of such technologies, it becomes crucial to examine the broader human rights implications and the responsibilities of the international community in responding to this challenge.

### Discussion Questions

1. What would be the impact of unregulated AI technologies like facial recognition on human rights in authoritarian countries?
2. How can the international community stand in the way of the spread of Digital Authoritarianism?
3. What are the ethical responsibilities of tech companies that export surveillance technologies to authoritarian regimes?

### Technology Diffusion: Deficits, Surpluses, and Global Impact

Building on what you've learned in this case about innovation and diffusion, let's introduce two important concepts: **Diffusion Deficit** and **Diffusion Surplus**.

- **Diffusion Deficit** occurs when a country is good at developing new technologies but struggles to put them into widespread use. As a result, its actual progress may be slower than it appears on paper.
- **Diffusion Surplus** is the opposite. It happens when a country isn't creating many new technologies itself but is highly effective at adopting and using innovations developed elsewhere. Such countries can grow and advance faster than expected, even without being innovation leaders.

Use this explanation, along with the information you've explored in this case, to reflect on and discuss the following questions:

### Discussion Questions

1. Compare U.S.-based ChatGPT and its Chinese rival Deepseek. How would you categorize each in terms of diffusion deficit or surplus, and why?
2. From the case presented, give examples of countries that demonstrate a diffusion

surplus.

3. What factors—such as infrastructure, policy, education, or economic systems—enable some countries to become diffusion leaders even if they are not innovation leaders?

## References

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