

## Comparative Analysis of AI Technology Adoption and Country Economic Advantage: A Case Study of the United States and China

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**Abstract:** The development of artificial intelligence (AI) is changing the global economy through innovation, geographical power and productivity. The two main participants in this changing world economy through AI are China and the United States. According to the approach of AI adoption, the two participants are compared in this paper. The use of AI in the private sector helps the country US to strengthen capital funding, proper intellectual poverty protection system and advanced educational institutions. Contrarily, another country China takes the state-led strategy and develops artificial intelligence in their plan to advance the country at each level along with a significant investment in workforce development, research and infrastructure. In the different approaches of the two countries, different types of economic, political and cultural contexts are reflected. The study utilizes both the bibliometric analysis as well as a structural literature review to examine the global implications, economic benefits and limitations of AI adoption for both countries. The results highlight the potential of AI to transform industries, develop new markets, and impact labor relations while also bringing up issues related to social ethics, equality, and governance. This analysis addresses the implications for global power dynamics in addition to revealing the factors influencing economic advantage through AI. The report provides useful guidance for governments and corporate executives navigating the landscape of AI and its revolutionary impacts on the global economy.

### 1. Introduction

The beginning of the Artificial Intelligence (AI) era has opened a new chapter in technical history, providing a revolutionary force with substantial consequences for economic competitiveness and geopolitical superiority. The United States and China are at the forefront of this AI revolution, carving their own paths in AI technology adoption and deployment. This comparative study aims to highlight the differences and estimate the economic benefits that different countries may reap because of their AI strategy. AI technology in the United States is mostly driven by a thriving ecosystem that comprises world-renowned academic institutions, cutting-edge startups, and major industry behemoths [1]. The approach to AI in the United States has been characterized by a combination of entrepreneurial innovation, significant venture capital investment, and a powerful intellectual property framework that encourages risk-taking and creativity. This innovation atmosphere has created a favorable environment for considerable advances in AI, with applications ranging from better healthcare diagnostics to autonomous vehicles and beyond. Historically, US policies have created a laissez-faire system in which the private sector leads technological advancement, aided by federal research money and incentives [2]. China's foray into artificial intelligence, on the other hand, is symptomatic of its greater global ambitions. China has set explicit AI goals in its national development plans, indicating its ambition to become the leader in AI through an assertive government-led strategy. Massive expenditures in AI research and infrastructure,

combined with aggressive strategies to foster local talent and technology skills, underpin this objective.

The Chinese approach emphasizes AI's strategic value, incorporating it into numerous sectors of the economy and considering it as a critical component of national security and international influence. According to Wang contrasting pathways of the United States and China in the AI arena are firmly based on their respective economic systems, political ideologies, and cultural values [3]. This study aims to investigate how these various approaches influence the economic benefits that AI technology can provide. The United States benefits from a dynamic environment that encourages the rapid commercialization of AI, which is critical for retaining the country's competitive edge and economic viability. Furthermore, the bilateral technological-strategic struggle between the United States and China has enormous implications for the global economic order. AI is not only a productivity and growth generator, but also a tool of geopolitical power. This comparative analysis will delve into how AI adoption impacts each country's economic stature, the challenges posed by AI in terms of job displacement, ethics, and governance, and the broader implications for US-China relations and global economic dynamics. The ensuing narrative will endeavor to untangle the complex web of factors that contribute to the economic advantages of AI adoption in the U.S. and China, offering insights into the future trajectory of this technology as a catalyst for economic and strategic transformation.

The significance of this study is underscored by the anticipated profound influence of AI on the economic vitality of nations, their security frameworks, and the overall balance of global power. As AI transforms industries, from automating manufacturing to enabling advanced data analytics, it becomes a crucial determinant of productivity and economic growth. The nation that leads in AI stands to gain unparalleled economic advantages, including the creation of new markets and the domination of existing ones [3]. Moreover, AI has strategic implications that extend beyond economic metrics. As the US and China are central players in shaping the global order, their AI strategies will influence not only their bilateral power dynamics but also the socio-economic and political contours of the 21st century. Furthermore, understanding how these two nations approach AI adoption is critical for anticipating future developments in labor markets, privacy, ethics, and international norms [4]. The issue is not only important for policymakers and businesses but also for society at large, as the AI race will impact job creation, social equity, and the global competitive landscape. Therefore, a detailed comparative analysis provides essential insights for navigating the challenges and opportunities presented by the AI revolution.

## **2. Literature Review**

The ubiquitous rise of artificial intelligence (AI) has heralded a new epoch, with its influence pervading every layer of societal interaction from conversational bots to high-stakes governmental decision-making processes thereby reshaping global lifestyles [5]. AI, traditionally rooted in computer science, is evolving to perform tasks akin to human intellect such as learning and problem-solving. AI entails machine learning through neural networks honed on extensive datasets. Its ability to progressively 'learn' makes it unique among technologies, thus continually enhancing its functional prowess in practical applications [6]. AI's deep integration into operational systems signals its emerging role as a cornerstone for economic activities and societal functions, becoming pivotal for sustainable growth across various industries. It is propelling economic advancement, altering production methodologies, and revolutionizing consumption paradigms [7]. Nevertheless, the narrative is not devoid of skepticism. Critics point to potential long-term adversities, such as dependence-induced unemployment, ethical dilemmas, and privacy incursions. Furthermore, disparities between AI's theoretical promise and its practical application persist, signaling unresolved technical challenges. Despite the intricate entanglement of AI with economic development, the literature spanning the last two decades has struggled to converge on a unified understanding, owing to the topic's expanding scope and complexity [1]. Current reviews are often piecemeal, reflecting the expansive nature of the field and revealing the difficulty scholars face in delivering an objective and

holistic analysis. This situation underscores the need for more comprehensive research to navigate the intricate relationship between AI and economic growth

In the USA, the impact of AI on business and the economy is becoming increasingly apparent. However, a clear understanding of its adoption patterns is still lacking, raising concerns about the potential for ill-informed investments and policies [8]. To address this, new survey data from the U.S. Annual Business Survey (ABS) has been analyzed to provide insights into the early stages of AI integration across the U.S. economy, focusing on its implications for labor, companies, and broader society. This survey, with a 69% response rate from over 850,000 firms, coupled with the Longitudinal Business Database (LBD), offers a representative snapshot of AI usage across approximately 4 million firms [9]. Firms employing AI are also heavily invested in digital information and cloud services, hinting at synergy with other advanced technologies. Moreover, a notable number of firms combine AI with robotics, suggesting a trend toward integrated technological advancements that could drive significant economic shifts [10]. Early adopters seem to prioritize formal intellectual property protection and display growth-centric strategies, which may shape competitive dynamics in the AI landscape. Additionally, higher AI adoption rates in firms with prosocial foundations could potentially mitigate risks of unethical AI use [7]. However, there's a risk of reinforcing existing market inequalities if such trends are dominated by large incumbents and geographically concentrated, potentially exacerbating a digital divide.

By 2030, China is expected to leverage its robust foundation in AI to revolutionize various sectors, potentially adding billions annually to its economy. Significant strides have been made in consumer-facing industries with AI adoption in finance, retail, and high-tech spearheaded by giants like Alibaba and ByteDance, renowned for their personalized AI-driven applications. Looking forward, the automotive, transportation, and logistics sectors in China appear most ripe for AI integration, with an anticipated economic boon of over \$380 billion [11]. This growth is largely driven by autonomous vehicles, which could diminish road accidents and enhance shared mobility, promising a substantial portion of the projected value. Personalized automotive experiences and optimized fleet management, aided by AI, also contribute to potential economic gains, improving efficiency and reducing costs. The manufacturing industry in China is also undergoing a transformation, set to shift from being a global manufacturing hub to a pioneer in high-end precision manufacturing. AI is expected to fuel this transition, introducing innovations in process design and product development that could create an additional \$115 billion in economic value [12]. The deployment of digital twins and advanced robotics is expected to fine-tune production lines and expedite new product designs. Furthermore, constructing new business models and establishing partnerships will be crucial to developing data ecosystems, setting industry standards, and shaping conducive regulations. China's progress in AI could become a global benchmark with the right strategic moves, as it stands at the cusp of transforming traditional industries into AI-driven powerhouses [13]. This shift not only promises economic prosperity but also sets a precedent for how AI can be integrated across various sectors to catalyze innovation and efficiency.

### **3. Research Methodology**

To delve into the intricate landscape of research linking Artificial Intelligence (AI) with Economic Development (ED), we adopt a comprehensive two-step methodology. This approach begins with a scientific, bibliometric analysis to scrutinize a vast array of publications quantitatively, followed by a structured literature review to qualitatively explore recent dominant themes and uncover research gaps within the AI&ED nexus. The initial stage employs bibliometric methods to perform a systematic and extensive quantitative assessment of scholarly works, which serves as a preliminary checkpoint for research hypotheses. This meticulous analysis is instrumental in uncovering the evolving patterns and core trends within the AI&ED research arena, as evidenced by Qin et al. (2021). The primary source for data collection is the authoritative Web of Science (WoS) Core Collection database. In line with established scholarly protocol, we define our research domain's boundary via a comprehensive set of keywords reflective of the study's intent. To encompass a broad spectrum of

pertinent literature, we employ expansive search strings covering a wide array of terms associated with AI (such as Artificial Intelligence, Machine Learning, etc.) and economic development indicators (like GDP, Economy, etc.). Additionally, the search is confined to a historical scope stretching from 1900 to 2021. This process yielded many items, which, after meticulous manual screening for relevance based on titles, abstracts, and keywords, were distilled into many pertinent records for this study.

The analytical and visualization components of the bibliometric study necessitate advanced tools. Bibliometrics, rooted in quantitative analysis, is pivotal for identifying, describing, and evaluating the breadth of published research, offering reproducible and objective insights while mitigating the subjective bias and inaccuracies commonly associated with manual reviews [14]. This discipline has gained traction as a vital method for scholars aiming to navigate and unearth novel insights in academic terrains. In response to this demand, tools like Bibliometrix and VOS Viewer have emerged, facilitating sophisticated bibliometric analyses. Bibliometrics, an open-source R package conceived by Aria and Cuccurullo, supports a structured workflow for bibliometric investigations and has been employed for the bibliometric aspects of this paper, such as performance analysis and scientific mapping [15]. Complementing Bibliometrix, VOS viewer specializes in the visual representation of bibliometric maps. This tool's bibliographic coupling capabilities have been instrumental in this paper for a more nuanced exploration of the intellectual backbone of core AI&ED publications. The bibliometric analysis furnishes an objective and broad-strokes understanding of the AI&ED domain's intrinsic structure and extrinsic performance, presenting a macroscopic, quantitative view that delineates connections across various research attributes. However, it lacks the depth required for nuanced qualitative insights. Therefore, in the subsequent phase, the study engages in a manual and qualitative examination of clusters within the bibliographic network. This step aims to synthesize the thematic hotspots and lacunae within the existing body of knowledge, setting the stage for answering specific research inquiries.

#### **4. Discussion**

The study's findings should demonstrate notable differences between the US and China in terms of the financial gains attained using AI. Because of its decentralized and entrepreneurial approach, the United States is likely to show superior advancements in innovation-driven sectors like healthcare, finance, and autonomous technologies. In contrast, China's state-led approach and infrastructure investments are anticipated to propel significant advancements in large-scale applications such as smart cities, manufacturing automation, and logistics. Although the United States may lead in technology advancements and China may dominate in implementing AI for national strategic goals, we still expect both countries to see significant productivity increases. Important issues like losing one's job and moral conundrums are also anticipated to appear in different ways. While China's centralized strategy would enable more seamless policy implementation, the United States might encounter stronger popular pushback to job migration. These results will probably highlight AI's dual function as a geopolitical instrument and an engine of economic growth. Furthermore, the findings might show that cooperation in establishing international AI standards could help both countries while tackling problems like inequality and governance, ultimately forming a more equitable global economic system.

#### **5. Conclusion**

The competition of the US and China for the dominance of AI can show the potential of the AI revolution as an engine for the development of the economy and as a tool for geographical influence. In the United States, it can be seen as a decentralized economy which is also innovation-driven and supported by private leadership, venture capital funding and robust intellectual property. On the other side for the country China a high priority is given to the national objectives which follow the state-led strategy as well as the use of significant investments in labor skill development and AI infrastructure

to accelerate the adoption in the industry. In different kinds of strategies for both countries, major differences can be seen in political ideology, social values and economic systems. After coming a long way both countries still face challenges in some places like labor migration, moral dilemmas and some regulatory restrictions. This in turn impacts the international trade of the countries and shifts the balance of power worldwide which also impacts the growth of the economy. This comparative study can help in highlighting the need to combine the initiatives of AI along with workforce reskilling, international collaboration and growth to maximize the benefits and minimize the risks. Addressing concerns like privacy, governance, and equity is necessary for lawmakers and business leaders to achieve long-term AI integration. As artificial intelligence continues to transform the global economy, the lessons China and the US have learnt will be crucial benchmarks for navigating this disruptive future.

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