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SH. A.
أكاديمية الشروق
عضو اتحاد الجامعات العربية

المعهد العالي للحاسبات وتكنولوجيا المعلومات

Artificial Intelligence impact on Chinese economy

Dr Amany Salah Mahmoud Elmakhzangy

Economics Instructor

Higher Obour Institute for management & informatics

amanis@oi.edu.eg

Key words: **Artificial Intelligence, Chinese Economy, Investment, production, labor, China.**

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Artificial Intelligence impact on Chinese economy

أثر الذكاء الاصطناعى على الاقتصاد الصينى

د. أمانى صلاح محمود المخزنجى
مدرس اقتصاد – معهد العبور العالى للإدارة والحاسبات ونظم المعلومات
amanis@oi.edu.eg
Orcid: 0000-0002-4492-1800

ملخص البحث:

هدفت هذه الدراسة إلى دراسة أثر الذكاء الاصطناعي على إعادة تشكيل الاقتصاد العالمي بشكل عام، والاقتصاد الصيني على وجه الخصوص، وذلك من خلال تحليل تأثيره على قطاعات الإنتاج والعمل والاستثمار في الصين خلال الفترة (1990–2023). كما تطرقت

الدراسة إلى قياس أثر كل من مؤشر الإنفاق على البحث والتطوير ومؤشر الجاهزية الشبكية (Network Readiness Index)، كمتغيرات مستقلة، على متوسط نصيب الفرد من الناتج المحلي الإجمالي بالأسعار الثابتة، وصافي تدفقات الاستثمار الأجنبي المباشر، والقيمة المضافة من القطاع الصناعي، ومعدل البطالة في الصين.
علاوة على اعتماد الدراسة على طريقة المربعات الصغرى العادية (Ordinary Least Squares)، وفقاً لاختبار استقرار السلاسل الزمنية. وقد أظهرت نتائج الدراسة التأثير الإيجابي للذكاء الاصطناعي على التنمية الاقتصادية، بمعامل تحديد بلغ 88% ، وكذلك الأثر الإيجابي للذكاء الاصطناعى على صافي تدفقات الاستثمار الأجنبي المباشر، والقيمة المضافة من القطاع الصناعي، ومعدل البطالة في الصين، بمعامل (R^2) تحديد بلغت 90% ، 85% و45% على التوالي.

الكلمات المفتاحية: الذكاء الاصطناعى ، الاقتصاد الصينى ، الاستثمار ، الانتاج ، العمل، الصين.

Artificial Intelligence impact on Chinese economy Abstract:

Dr Amany Salah Elmakhzangy

Economics Instructor
Higher Obour Institute for management & informatics
Orcid: 0000-0002-4492-1800 , amanis@oi.edu.eg

Abstract:

This study highlights the impact of artificial intelligence on reshaping the global economy in general, and the Chinese economy in particular, by analyzing its impact on the production, labor, and investment sectors in China during the period (1990-2023). It measures the impact of both the research and development expenditure index and the network readiness index, as independent variables, on average per capita GDP at constant prices, net foreign direct investment flows, the added value from the industrial sector, and the unemployment rate in China. The study relies on the ordinary least squares method, according to the time series stability test. The results of the study showed the positive impact of artificial intelligence on economic development, with a coefficient of determination of 88%, as well as the positive impact on net foreign direct investment flows, the added value from the industrial sector, and the unemployment rate in China, with coefficients of determination of 90%, 85%, and 45%, respectively.

Key words: **Artificial Intelligence, Chinese Economy, Investment, production, labor, China.**

1-Introduction:

Artificial Intelligence (AI) is increasingly embedded in everyday life, from healthcare to transportation; AI is rapidly moving from the lab to daily life. medical devices, On the roads, self-driving cars are no longer experimental, while Baidu's affordable Apollo Go robotaxi fleet now serves numerous cities across China.[1]

Moreover, Artificial intelligence has become an important driving force for the green transformation of companies (Liang et al., 2023). Companies need to enhance pro-environmental behaviors to ameliorate the negative impact caused by manufacturing activities (Chang et al., 2024).and improve the environment by increasing environmental investment and adopting green technology, which enhances production processes, reduces emissions, and boosts resource efficiency, thus lessening ecological impacts (Huang and Chen 2022; Liu et al., 2022).under the current development strategy calling for high-tech and green transformation, some companies have turned to adopting artificial intelligence technology to optimize the whole production process (Cardoso, 2023).

So, China's AI development strategy, which was mainly set out in the State Council's 2017 New Generation AI Development Plan, contends with a progressive erosion of global interdependencies[2]. US tech giants have downsized or halted their AI research and development (R&D) in China. Smaller firms based elsewhere, like British AI chip startup Graphcore, have had to pull out of China due to US export controls. (Webster. G., et al,2021) Moreover, Chinese AI firms have come under growing scrutiny in the West for their contributions to Beijing's strategy of "military-civil fusion" and state surveillance projects[3]

In addition to , As stated in the 'China Green Development White Paper 2023', the concept of green development should be integrated into all aspects of the industrial chain, vigorously promote technological innovation, model innovation, and standard innovation, and comprehensively enhance the

[1] https://hai.stanford.edu/ai-index/2025-ai-index-report
[2] https://digichina.stanford.edu/work/full-translation-chinas-new-generation-artificial-intelligence-development-plan-2017/
[3] https://merics.org/en/report/chinas-ai-development-model-era-technological-deglobalization

greening level of traditional industries.[4] This implies that under the guidance of the latest environmental governance policy, the convergence of artificial intelligence has become an irreversible trend in the green development of manufacturing companies.(Dong, Z.et al.2024)

Emerging technologies AI are revolutionizing our lives and are central to the development of Industry 4.0, characterized by hyper-automation and hyper-connectivity (Sony, N. et al,2019). A prominent AI authority, Andrew Ng, believes that artificial intelligence will reshape every industry within the next few years, drawing parallels to the transformative power of electricity. (Marr 2017) Artificial intelligence has played a significant role in the financial growth of many companies and the increase in their investments, as both investments and profitability have risen. A financial analysis was conducted on the top five AI companies during the period (2010-2019), namely Google, Apple, Amazon, Microsoft, and IBM.

Driven by globalization, technological advancements, and evolving consumer demands, companies face intense competition across various domains. To maintain a competitive edge, both domestically and internationally, businesses must adopt innovative and strategic approaches. Attracting foreign direct investment (FDI) is a key strategy for enhancing company competitiveness and national economic prosperity (IMF,2024). Furthermore, countries that successfully attract FDI tend to have companies with higher levels of innovation and technological advancement, ultimately contributing to improved individual life satisfaction (Kemeny, T. (2010)

The CFA Institute in 2019 suggested that the integration of artificial intelligence and big data is likely to be the most transformative development in investment practices for professionals. Due to the intricate nature of FinTech, achieving full implementation will require a phased, collaborative approach. Significant investment in distributed computing and finance-focused natural language processing has streamlined our development process, allowing us to bring new solutions to the market much more rapidly.

Work on mechanisms that mimic human elements can be traced back to developments in electronics before and during World War II, which enabled effective laboratory experimentation (Lea, G. R.,2020). In 1943, Warren McCulloch and Walter Pitts constructed an electronic 'neural element' to

[4] Benjamin Larsen, “Drafting China’s National AI Team for Governance,” DigiChina, October 14, 2021, https://digichina.stanford.edu/work/drafting-chinas-national-ai-team-for-governance/.

provide a simple simulation of a human neural cell (McCulloch and Pitts, 1943). In 1948, Donald Hebb discovered the electrical networking mechanism that allowed human nerve cells to engage in associative learning, a concept later transferred into hardware (Hebb, 1949; Rosenblatt, 1958). Then, in Britain in 1950, Alan Turing wrote about the possibility of developing machine intelligence through computational means (Turing, 1950).

A significant turning point was when a young American researcher named John McCarthy, in August 1955, proposed funding for a two-month workshop study involving ten people on what he called 'artificial intelligence,' marking the first use of the term. This study assumes that any attribute of intelligence can be precisely described so that a machine can be made to simulate it, such as enabling machines to use language, form abstractions and concepts, and solve problems now exclusive to humans (McCarthy et al., 1955).

Then, artificial intelligence went through two periods of stagnation, first from 1974 to 1980 due to funding cuts from the Defense Advanced Research Projects Agency, and the second from 1987 to 1993, due to the termination of the US Strategic Computing Initiative and the collapse of the Japanese Fifth Generation Computer Initiative funded by the Japanese Ministry of Trade and Industry (Crevier, 1993) .This led most researchers from the mid-1990s onwards to focus on more specific research areas, such as speech recognition, natural language processing, and visual pattern recognition .

Concurrently with the interest of states and governments worldwide in artificial intelligence for its importance in military and national security fields, in addition to the potential scientific, technological, and economic gains, massive public investment programs have emerged in Japan, South Korea, and China. The Japanese government has allocated approximately $974 million to a ten-year flagship project in the field of artificial general intelligence at its new Riken Center for Advanced Integrated Intelligence (Demura, 2016). South Korea has also announced additional public spending of $890 million on research and development in artificial general intelligence, along with private contributions of $2.23 billion up to 2020 (Basu, 2016).

China also made AI a national priority, allocating a significant portion of its science and technology spending in the subsequent Five-Year Plan period (McClaughlin, 2016). As early as 2016, China publicly declared its ambitions to lead the world in AI (Jing, 2017). By 2016, Chinese universities and

research institutes had caught up with their US counterparts in terms of AI papers presented at top-ranked conferences and papers on deep learning in top-ranked journals (Fung, 2016). The Association for the Advancement of Artificial Intelligence (AAAI) had to reschedule its 2017 annual conference at the last minute because it clashed with the Chinese New Year, and over 40% of the submitted papers were from authors based in China (Zhang, 2017).

This increased US concerns about China's actions (Mazur and Markoff, 2017), leading it to reprioritize AI research and development in February 2019 through an executive order and subsequent funding arrangements (White House Office of Science and Technology Policy, 2020). Despite the military and diplomatic tensions between China and the United States after 2014, with accusations of hacking and South China Sea disputes (Smith, 2017), US-China AI venture capital channels remain active (Fannin, 2020). Major companies in both countries maintain significantly established relationships with their counterparts. This includes Google and Microsoft Labs in Beijing, and Baidu Labs in Silicon Valley and Seattle. The United States is among the largest investors in artificial intelligence in China (Soo, 2017). Additionally, China spent approximately $225 billion on foreign technology in 2016, with Chinese companies investing an estimated $12.4 billion in Silicon Valley startups alone between January 2015 and September 2016, focusing on AI and robotic systems with military and security applications (Mazur and Perlez, 2017).

2-Study problem:

Artificial intelligence is a double-edged sword, as it is a pivotal force contributing to the transformation of the structure of many economies and is involved in various fields such as trade, industry, and financial services. This has extended its impact on many markets, decision-making methods, and even forecasting. However, on the other hand, it poses many challenges, including automation and the replacement of human elements with machines, leading to increased unemployment rates. Therefore, countries must exercise caution when engaging in the currents of artificial intelligence. This study attempts to clarify the negative and positive impacts of artificial intelligence on the Chinese economy and the challenges associated with it. (Acemoglu, D., & Restrepo, P. ,2019)

3-Literature Review:

Given the widespread adoption of artificial intelligence in various fields, numerous studies have addressed AI in these different sectors. Some studies

have examined the impact of AI on finance (Ashta, A., et al, 2021), (Bahoo, S. et al, 2024), (Kuang, M.et al,2024), (Lee, Song, & Lee, 2023), while others have explored the effect of AI on labor and employment (Soni, N.et al, 2019). Additionally, some have focused on the impact of AI on production, (Antonioli, D.et al.2024), (Agrawal, A. et al ,2019), and others have analyzed its effect on prediction (Agrawal, A. et al, 2019). Furthermore, some studies have addressed its impact on economics and investment (Bruneckiene.J.et al, 2019), (Liao, Hu, Sun, & Ye, 2023), Dong.Z., et al. 2023)

(Bahoo, S. et al, 2024**)** Study reviewed all previous studies that addressed artificial intelligence and finance during the period 1992-2021. It collected all studies published in the Scopus and Web of Science databases, totaling 892 research papers on artificial intelligence and finance. The study then analyzed and classified these articles by country and various sectors, categorizing them into 10 main sectors, including artificial intelligence and the stock market; trading models; volatility forecasting; portfolio management; performance, risk, and default valuation; Bitcoin and cryptocurrencies; financial derivatives; and artificial intelligence and credit risk in banks. The study also predicts that the use of artificial intelligence tools will further expand geographically, across sectors, and across financial areas. Therefore, companies still struggling to adapt to the latest wave of technological change should be aware of this and try to overcome this burden to reap the potential benefits associated with adopting artificial intelligence and maintaining competitiveness

as (Ashta, A., et al ,2021) study aimed to investigate the impact of using artificial intelligence technologies in the financial sector and achieving economic growth. The study relied on interviews with managers of high-growth and high-value companies. Following initial online contact via LinkedIn, a questionnaire was sent to CEOs/partners of organizations that deploy or are considering an AI strategy in their operations. study showed that artificial intelligence tools contribute to analyzing big data to help reduce costs, minimize risks, and increase customization, all of which led to economic growth through increased aggregate demand and investments. Cost reduction also creates significant shifts in the financial market, forcing companies to merge and build larger customer platforms. Artificial intelligence creates a surge of opportunities in the financial sector, but financial organizations must be aware of the inherent risks in using this technology.

More there (Bruneckiene.J.et al,2019) study aimed to analyze the relationship between artificial intelligence and attracting investments to European countries during the period 2000-2018 in 29 countries, using the main factors of traditional and modern investment attraction. It combined traditional economic concepts—economic, social, managerial, governmental, and geopolitical elements (A.T. Kearney Foreign Direct Investment Confidence Index, 1 2019, World Economic Forum, 2019, Global Retail Attractiveness Index, 2019, GFICA index, 2018)—with smartness determinants including intelligence, networking and infrastructure, sustainability, digitalization, learning, agility, innovation, and knowledge-drivenness to measure the countries' ability to attract and maintain investments.

While (Agrawal, A. et al ,2019) study aimed to investigate the impact of artificial intelligence on the labor element when used in the prediction process and to compare the substitution of capital for the human element through automation processes. The study found that some automation processes are effective when relying on artificial intelligence, while others fail because they require human element skills. Additionally, substitution processes are valuable in large companies where artificial intelligence technologies are used to analyze data in a short time and with higher accuracy.

As AI and automation rapidly transform business strategies, there's a critical need to understand their broader impact. This study (Soni, N.et al, 2019) employs a Neo-Schumpeterian model to explore AI's effects on innovation, markets, strategic goals, and business environments, while also addressing its potential negative consequences and stakeholder implications. A three-dimensional model, based on innovation, knowledge, and entrepreneurship, is used to analyze AI's business impact. The model examines algorithm success and AI deployment, as well as the strategic AI initiatives of leading companies and startups.

In addition to (Kuang, M.et al,2024) Study This study investigates the complex relationship between AI in industry and tech-driven green finance, focusing on the top ten global AI leaders. Unlike previous research that overlooked the varying degrees of autonomous adoption, this paper utilizes a unique 'Quantile-on-Quantile' method to provide both global and country-specific insights. The findings reveal that industrial AI can stimulate green finance, but this effect is not uniform across all economic sectors.

Consequently, policymakers are urged to develop nuanced strategies for AI and green finance integration.

Some studies have also addressed the relationship between artificial intelligence and increased investments and the achievement of environmental sustainability, where recognizing the manufacturing industry's environmental impact on sustainability, (Dong.Z. et al ,2023) study investigates how AI applications influence corporate environmental investment. It finds that AI directly promotes such investment, but this effect is hindered by short-sighted management. AI-driven pollution reduction leads to increased environmental investment, particularly in overvalued and East-Central region companies. This research underscores AI's role in fostering green innovation and sustainable manufacturing.

Such as (Aboelmaged, M., & Hashem, G. (2019). study validated and analyzed the responses of 193 owners and managers of small and medium-sized enterprises (SMEs) in an emerging economy context to examine the effect of absorptive capacity on green innovation adoption. It also investigates the mediating role of three sustainable capabilities, namely, sustainable orientation, sustainable human capital, and sustainable collaboration, using partial least squares-based structural equation modelling methods. Surprisingly, sustainable human capital showed no significant impact on green innovation adoption.

Moreover, (Buerkle, A. et al,2023) aims to demonstrate the impact of industrial robots on increasing and accelerating production and reducing waste and scrap because of the absence of errors, unlike the human element. It also aims to develop a system for the delivery and ease of operation of industrial robots for small and medium-sized enterprises (SMEs) that suffer from low investment volumes, which has been a reason for their reliance on human labor. This system has been named Towards Industrial Robots as a Service (IRaaS). Despite the study of (Antonioli, D.et al.2024) examined the previously unclear link between incorporating robot technology and the development of new products. Using data from Spanish companies and a sophisticated analysis method, we discovered that, contrary to expectations, adopting robots decreases the likelihood and frequency of product innovation. This effect is especially pronounced in larger, established companies outside the high-tech sector. We argue that this is due to increased production capacity leading to a narrower focus, hindering broader innovation. The study

also questions the supposed innovation-driving capabilities of robots in this context, offering crucial insights for businesses and policymakers.

There are studies that have discussed the impact of AI on green economic growth, such as (Lin, S. et al,2024), (Qian, Y.et al, 2023), (Wang, Y., & Li, Y. ,2023). **(**Zhao, P.et al,2022), (Fan, D., & Liu, K. ,2021) Which aimed to examine the impact of artificial intelligence on green economic growth. It uses green total factor productivity (GTFP) as the explained variable, artificial intelligence as the core explanatory variable, and other factors affecting GTFP as control variables to create a static panel model between artificial intelligence and GTFP across Chinese provinces. The study constructs a relevant mathematical model to propose the two-way impact of artificial intelligence on GTFP and systematically analyze the impact of artificial intelligence on green economic growth. The main finding is that artificial intelligence has a significant "U-shaped" effect on GTFP, which is estimated to use a nonlinear dynamic panel regression model. The analysis of regional heterogeneity shows that improving artificial intelligence in resource-rich areas can boost GTFP and break the "resource curse".

3-1-Research Gaps:

Based on previous studies that have examined the impact of artificial intelligence on the Chinese economy, we can identify several gaps, including a methodological gap. Most studies that addressed the impact of artificial intelligence on the Chinese economy dealt with either industry alone or productivity alone. However, this study is distinguished by examining the impact of artificial intelligence on productivity, represented by the industrial sector, and on investments and labor in a comprehensive manner at the macro level, using modern variables such as the Network Readiness Index and research and development expenditure as a percentage of GDP. In addition, there is a temporal gap represented in studying the relationship between the variables during the period(1990-2023) .

4-AI Impact on Macroeconomy:

To build systems capable of assisting or replacing human decision-making, AI has been incorporated into operating systems (Gomes et al., 2020). AI is also progressively evolving into a crucial technology for supporting social and economic activities towards sustainability (Naimi-Sadigh et al., 2021). It is often argued that AI-related activities will drive future economic development, fundamentally transforming production

structures and approaches, as well as the quantity and quality of consumption (Vyshnevskyi et al., 2019).

The rise of Artificial Intelligence (AI) has the potential to significantly impact various aspects of the macroeconomy. Here are some key areas of influence(oecd,2021):

- **Productivity Growth:** AI can automate tasks, improve decision-making, and optimize processes. This can lead to increased productivity across various sectors, potentially boosting economic growth[5].
- **Labor Market:** While AI can create new jobs, it may also displace some workers, especially those in routine tasks. Analyzing the impact on employment levels, wages, and skill requirements is crucial.
- **Investment:** Businesses may invest more in AI technology, impacting overall investment levels and capital allocation. Analyzing capital expenditure and its sectoral distribution can be helpful.
- **Inflation:** Automation and AI-driven efficiencies could potentially lead to lower production costs and reduced inflation. However, changes in consumer behavior due to AI might also impact inflation. Monitoring inflation rates and consumer spending is important[6].
- **Economic Growth:** Depending on the net effect on productivity, employment, and investment, AI could lead to faster or slower economic growth. Measuring GDP growth and its components becomes crucial.

By analyzing these variables, policymakers and economists can gain a better understanding of how AI is shaping the macroeconomy. This knowledge can be used to develop policies that maximize the positive impacts of AI and mitigate potential risks.

4-1-*AI role in attracting investments:*

The growing popularity of AI is driving significant investment increases in areas like AI research, development, marketing, and production, creating a cyclical growth pattern Soni, N.et al, 2019. There's a fierce global competition

[5] https://www.technologyreview.com/topic/artificial-intelligence/
[6] https://www.weforum.org/agenda/2022/04/green-future-index-2022/

to develop, fund, and buy AI technology and startups. AI applications are booming in both developed and developing countries. It has the potential to boost economic growth in both regions. In energy, AI can optimize power grids. Healthcare can see major advancements in diagnosis and drug discovery thanks to AI. Education can benefit from AI through improved learning environments, better outcomes, and preparing students for the workforce. In manufacturing, AI can help design better products (functionality, quality, and cost) and improve maintenance through predictions. AI can even help expand access to credit and financial services. While transportation and logistics will see automation and improved road safety thanks to AI, its impact goes even further, influencing the entire supply chain. However, despite potentially benefiting more from AI than developed nations, emerging markets (except China and India) haven't received a significant share of global investment in this cutting-edge technology. (IFC, p:12)

Regardless of the controversy surrounding it, the race to develop artificial intelligence is progressing steadily. Given that the distribution of venture capital (VC) investments in AI-specific technologies closely tracks the flow of total venture capital investments, the latter can be used as an indicator of each country's interest in AI. It is evident from the data that the United States and China lead AI investments, with China dominating global AI funding .

Chinese AI companies raised a total of $31.7 billion in the first half of 2018, representing approximately 75% of the total global investments of $43.5 billion. China appears poised to lead the field of artificial intelligence in many sectors, including healthcare and autonomous driving. China's progress in artificial intelligence is largely attributed to strong and direct government support for this technology, leadership from Chinese technology industry giants, and a robust venture capital community. Excluding China and India, emerging markets received a modest share of global investments in advanced technologies. Total venture capital flows to emerging markets between 2008 and 2017, excluding China and India, amounted to only $24 billion, compared to global flows to the United States during the same period, which reached $694 billion (Figure 2.1)

There are three main stages of AI development:

1. **Basic AI or Artificial Narrow Intelligence (ANI):** This is the most limited type of AI, focusing on a single task like AlphaGo, the AI program that plays Go.
2. **Advanced AI or Artificial General Intelligence (AGI):** This is a more advanced stage where AI can handle multiple tasks, potentially including reasoning, abstract thinking, and problem-solving at a human level.
3. **Super AI or Artificial Superintelligence (ASI):** This is the theoretical future stage where AI surpasses human intelligence across all aspects. This level of AI is not expected to be achieved for many years.

4-1-1-***shape of private investment in AI globally by geographic area:***

In 2024, U.S. private AI investment grew to $109.1 billion—nearly 12 times China's $9.3 billion and 24 times the U.K.'s $4.5 billion. Generative AI saw particularly strong momentum, attracting $33.9 billion globally in private investment 18.7% increase from 2023. AI business usage is also accelerating: 78% of organizations reported using AI in 2024, up from 55% the year before. Meanwhile, a growing body of research confirms that AI boosts productivity and, in most cases, helps narrow skill gaps across the workforce.[7]

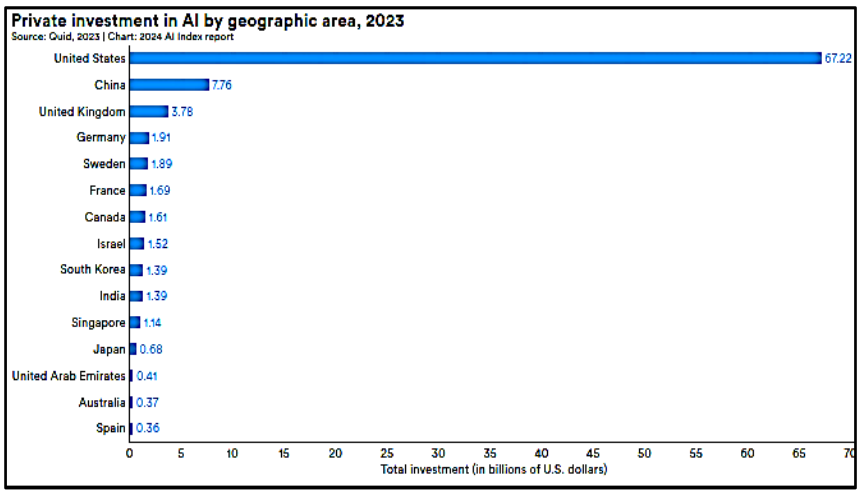


Fig:(1) Private investment in AI by geographic area (country)in 2023 billion $

[7] https://hai.stanford.edu/ai-index/2025-ai-index-report

source: Source: Quid, 2023 | Chart: 2024 AI Index report

Upon reviewing global private investment data in artificial intelligence by geographic region, we observe that there are 15 major economies where AI investments are concentrated worldwide. These regions, in order according to the Quid report (2023), are as follows:

The United States, which led the world in attracting approximately $67.22 billion. followed by China, with $7.76 billion. Then The United Kingdom, with $3.78 billion. followed by Germany, with $1.91 billion. Then Sweden, with $1.89 billion. France, with approximately $1.69 billion. Followed by Canada, with 1.61 billion $, then Israel, with $1.39 billion. South Korea, with approximately $1.39 billion. India, with $1.39 billion. Singapore, with $1.34 billion. Japan, with $0.68 billion. Then The United Arab Emirates, with $0.41 billion. Then Australia, with $0.37 billion. Finally, Spain, with $0.36 billion. As the following figure illustrates.

These regions attracted a total of $495.37 billion during the period (2013-2023), distributed as follows: The United States leads the list with a total of 335.24 billion dollars during the period 2013-2023. Followed by China, with a total of $103.65 billion during the same period. Then the United Kingdom, with a total investment value of $22.25 billion during the same period. Then Israel, with a total of $12.83 billion. And Canada, with a total of $10.56 billion during the same period. As the previous figure illustrates.

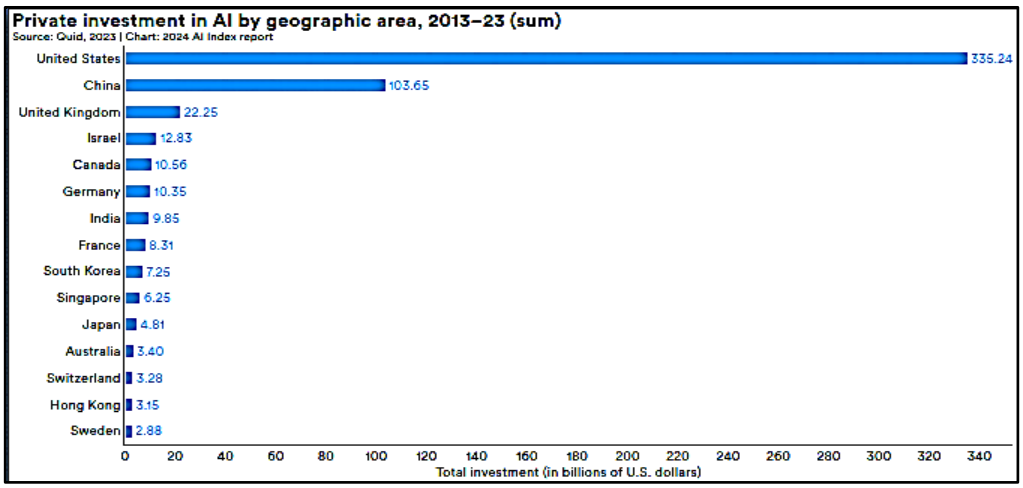
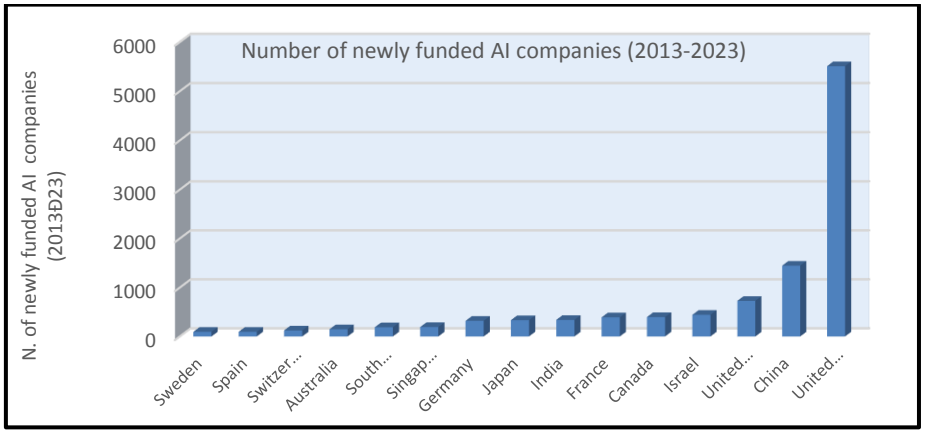


Fig:(2) Private investment in AI by geographic area (country)2023-2013 billion$

source: Source: Quid, 2023 | Chart: 2024 AI Index report

The United States, China, and the European Union have been classified as the most attractive regions for artificial intelligence investments. The following table illustrates the number of companies in each of the three regions and the size of investments in artificial intelligence during the period (2013-2023) as follows:



Source: fig:(3) Number of newly funded AI companies (2013-2023)

Source: Quid, 2023 | Chart: 2024 AI Index report.

1. **United States:** The United States remains the global leader in AI investment, with a strong concentration of AI startups and research institutions in tech hubs like Silicon Valley. The US government has also been supportive of AI development, with initiatives like the National Artificial Intelligence Initiative. Where the number of AI-driven companies in 2013 was approximately 337 companies with a value of $6.96 billion, then it increased during the period to reach 5,515 companies by 2023 with a total investment of $335.24 billion. Investments are concentrated in sectors such as self-driving cars, healthcare, and IT infrastructure.

Table (1): AI Investment in China, the United States, and the European Union (2013-2023)

European Union and United Kingdom		China		United States		Year
Investments in billions	N.of Companies	Investments in billions	N.of Companies	Investments in billions	N.of Companies	
0.62	53	0.53	27	6.96	337	2013
0.67	78	1.2	43	9.3	352	2014
2.09	90	0.79	72	10.15	292	2015
4.52	117	1.16	69	14.07	402	2016
6.62	170	2.43	92	21.05	510	2017
13.97	225	2.74	205	32.07	516	2018
14.05	224	5.88	217	36.17	496	2019
16.36	246	5.39	192	79.56	547	2020
23.08	346	12.55	260	55.07	662	2021
13.91	275	12.81	147	67.22	504	2022
7.76	368	11	122	6.96	897	2023
56.48	2192	103.65	1446	335.24	5515	Sum

Source: Source: Quid, 2023 | Chart: 2024 AI Index report

2. **China:** China is rapidly closing the gap with the US in AI investment and is now considered a major competitor in the field. China has a large and growing AI ecosystem, and the government is committed to making AI a key driver of economic growth. Where the number of AI-driven companies in 2013 was 27 companies with a value of $0.53 billion, then it increased during the period to reach 1,446 companies by 2023 with a total investment of $103.65 billion. Investments focus on robotics, industrial AI, logistics, and smart cities.

3. **European Union:** The European Union is also a major player in AI investment and is home to many world-leading AI research institutions and companies. The EU has been working to establish a common AI strategy and is investing heavily in AI research and development. Where the number of AI-driven companies in 2013 was approximately 53 companies with a value of $0.62 billion, then it increased during the period to reach 2,192 companies by 2023 with a total investment of $56.48 billion. Investments are more diversified, including Enterprise AI, FinTech, and AI for manufacturing[8].

It is also evident that investment in artificial intelligence witnessed a surge during the outbreak of the COVID-19 pandemic (2020-2022), where investments increased unprecedentedly, especially in the medical sectors.

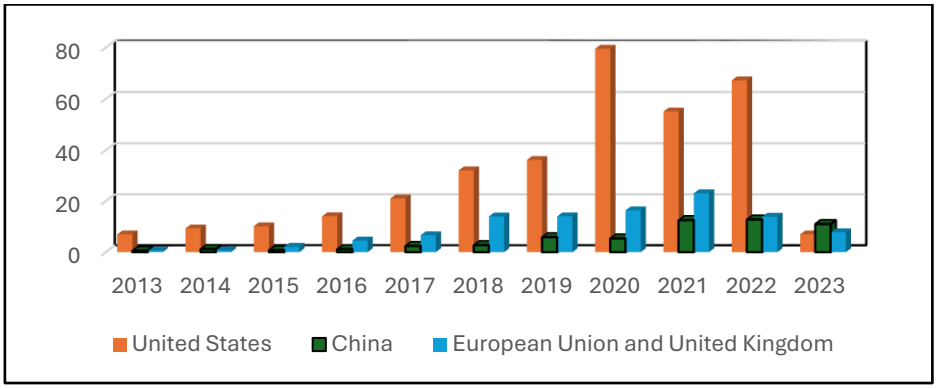


fig:(4) AI Investment in China, the United States, and the European Union (2013-2023)
Source: Quid, 2023 | Chart: 2024 AI Index report

In terms of the number of companies, the United States led the world in the number of companies established during the period (2013-2023), with 5,515 companies. China came in second with 1,446 companies, followed by the United Kingdom in third place globally with 727 companies. India had 338 companies, and Japan had 333 companies established during the same period, indicating that the United States attracted more investment in artificial intelligence.

In 2023, the number of new companies in China reached 1,204,643, including 127,563 in the manufacture of electrical machinery and equipment,

[8] https://oecd.ai/en/data?selectedArea=investments-in-ai-and-data&selectedVisualization=top-countries-in-vc-investments-in-ai-by-industry

133,541 in the manufacture of computers, communication devices, and other electronic equipment, 11,332 in the production and supply of electric and thermal power, and 117,031 and 107,200 in the manufacture of general and specialized machinery, respectively[9]. Furthermore, IN 2024, investments in China's artificial intelligence primary market amounted to 105 billion yuan. As the number of financings decreased, the investment value also decreased after it peaked in 2017. Many of the Chinese AI companies are still in the early stages of financing. More than half of start-ups are in the angel investor, A-round, or strategic investment phase.[10]

Goldman Sachs Research projects that China's adoption of AI will surpass 30% by 2030, reach its highest point in the early 2030s, and become fully integrated within the next fifteen years. This timeline suggests that China's AI adoption trajectory will more closely resemble that of developed nations rather than other emerging economies[11]. And anticipate that the ability of Chinese companies to enhance performance while lowering costs and computing power demands will continue to drive capital expenditures and investment. The race to develop AI agents and applications is fueling increased investment across China's tech ecosystem — encompassing semiconductors, data centers, cloud services, software, and telecommunications companies. Our equity analysts project that the top four AI model developers in China will increase their total capital expenditure by 38% in 2025[12].

4-1-2-**The direction of investment in artificial intelligence towards specific sectors globally:**

The value of investments directed towards artificial intelligence across different sectors is characterized by fluctuation and instability from year to year. Its value changes annually within the same sector, indicating a search for promising investment opportunities based on the prevailing economic, political, and social conditions in the world.[13]

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[9] https://www.stats.gov.cn/sj/ndsj/2024/indexeh.htm

[10] https://www.statista.com/statistics/1560860/china-investment-value-in-the-primary-ai-market/

11 https://www.goldmansachs.com/insights/articles/what-advanced-ai-means-for-chinas-economic-outlook

[12] www.goldmansachs.com/insights/articles/what-advanced-ai-means-for-chinas-economic-outlook

[13] Source: Quid, 2023 | Chart: 2024 AI Index report

Artificial Intelligence impact on Chinese economy

As observed from the following figure, private investments in artificial intelligence in the research, development, infrastructure, and governance sectors increased in 2023 compared to 2022, reaching values of $18.27 billion and $0.82 billion respectively for the years 2023 and 2022. Meanwhile, private investments in AI applications were higher in the healthcare sector in 2022 than in 2023. This is explained by the need for detection and treatment of COVID-19 during the period 2020-2022, where they reached $9.18 billion and $4.2 billion respectively for the years 2022 and 2023. Conversely, private investments directed towards AI in financial technology were relatively equal during the two years, reaching $2.18 billion and $2.13 billion respectively for the years 2022 and 2023.

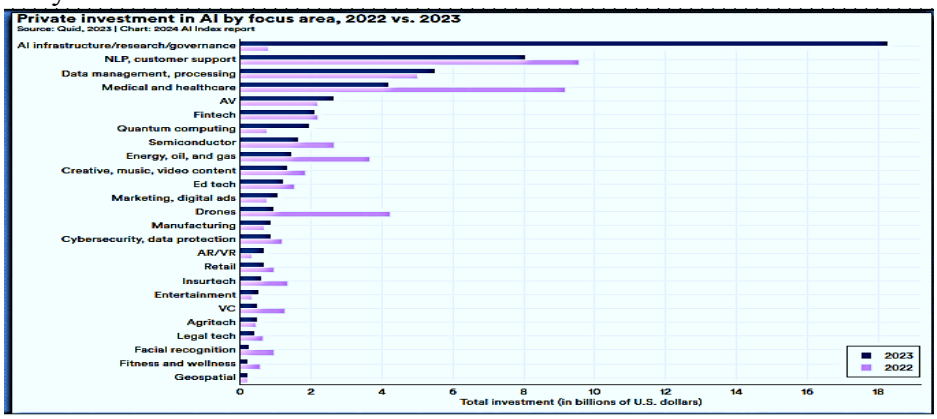


fig:(5) Private investment in AI by focus area, 2022 vs. 2023 AI infrastructure/research/governance in 2023 rather than 2022
Source: Quid, 2023 | Chart: 2024 AI Index report

Investments were directed more towards these sectors in 2022 than in 2023Retail, Insurtech, Drones, Facial recognition, Fitness and Wellness, Creative, music, video content. This is likely due to COVID-19 and the resulting lockdown conditions. Where The healthcare sector was the fourth most popular for AI investment in 2023. However, the proportion of investment in this sector decreased from 2022 to 2023. This suggests that the increased focus on healthcare in 2022 was due to the COVID-19 pandemic and the associated lockdowns and restrictions. In 2022, consumer-facing applications were the most popular sector for AI investment, likely due to the shift to online shopping and the use of AI tools on various platforms during the pandemic

The flow of investments towards specific sectors has influenced the change in job demand. The most in-demand jobs, according to the 2023 job report, are those related to the service sector (such as contact center automation at 26%, service operations optimization at 19%, and predictive service and intervention at 16%). This is followed by the marketing and sales sector at 23% (personalization, customer acquisition, customer service analytics, sales). Then, the research and development and product

McKinsey & Company Survey, 2023) (development sector at 22%[14].

4-2-Ai Impact on Production:

The adoption of technology and the industrial revolution has led to the mechanization of production, which has resulted in increased output in volume and improved quality in terms of efficiency, effectiveness, and adequacy (Mokyr et al., 2015). As a result of adopting artificial intelligence technology in production, global output increased, where Global GDP is estimated to have been approximately $75 trillion in 2016 Our baseline projections suggest that that figure is estimated to be approximately $114 trillion by 2030. [15] Our S-CGE model analysis suggests that global GDP could be up to 14% higher than this figure in 2030 as a result of AI – the equivalent of up to $15.7 trillion.

 We estimate that approximately 58% of the 2030 GDP impact will come from consumption side impacts, or $9.1tn of additional GDP. However, over the entire period 2017-2030, approximately 55% of the GDP impact will be due to productivity increases. This is reflective of the faster (total) transmission mechanism on the production side of the economy, as the consumption-side GDP effects rely more heavily on the more delayed, indirect effect of dynamic firm entry which increases the supply of personalised, high quality AI-augmented products and makes these goods more affordable.

4-2-1-*Spending on research and development:*

China's innovation spending in industrial enterprises reached a total of 32,593.5 million Chinese yuan in 2023. The manufacturing sector accounted for 30,993.9 million yuan of this total, representing 95%, with the remaining

[14] McKinsey & Company Survey, 2023 | Chart: 2024 AI Index report

[15] https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html. This study formed part of a series of PwC publications related to artificial intelligence which address the key questions discussed in this section.

1 McKinsey Global Institute (2017), “A future that works: Automation, employment and productivity

5% directed to other sectors such as mining and energy. Notably, innovation spending in the computer, communications, and electronics manufacturing sector reached approximately 6,655.9 million yuan, or 21% of the total manufacturing expenditure. This reflects China's emphasis on prioritizing innovation and technology in industrial sectors[16]. It is worth mentioning that 68.4% of the total spending is allocated to research and development, while 29% is spent on the acquisition of machinery, equipment, and software across all sectors.

4-2-2-*The use of robots in manufacturing:*

Global production, industries and economies are being reshaped by the integration of cutting-edge technologies. Industrial artificial intelligence (INAI), which applies AI to industrial sectors, is a prime example (Liu, J.et al ,2020). in addition to Innovations powered by AI, such as smart navigation, ride-sharing pricing, and online recommendations, are making our lives increasingly intelligent. The rapid spread of AI is creating intense pressure for companies to become AI-centric (Soni, N.et al, 2019).

Furthermore, artificial intelligence has led to the automation of production and the use of industrial robots, which are considered capital goods contributing to production and multi-purpose equipment capable of performing various tasks with minimal reprogramming. This is what is known as modern manufacturing (Aghion et al., 2023). This is characterized by the era of the Fourth Industrial Revolution, with its intensive reliance on robots in manufacturing and production (Benassi et al., 2022; Martinelli et al., 2021). This opens the door for robots to increase their role and become a fundamental component in larger systems, such as cyber-physical systems and advanced digital production technologies (UNIDO, 2019). According to The International Federation of Robotics (IFR)(IFR, 2024) the significant growth in the number of operational robots worldwide, reaching a record 3.9 million units in 2024.in various industries, including language processing, coding, computer vision, and robotics[17].

[16] https://www.stats.gov.cn/sj/ndsj/2024/indexeh.htm

[17] https://search.brave.com/search?q=nternational+Federation+of+Robotics+-+2024+AI+Index+Repor&source=desktop&summary=1&summary_og=c382429ecfb31b54c74dc8

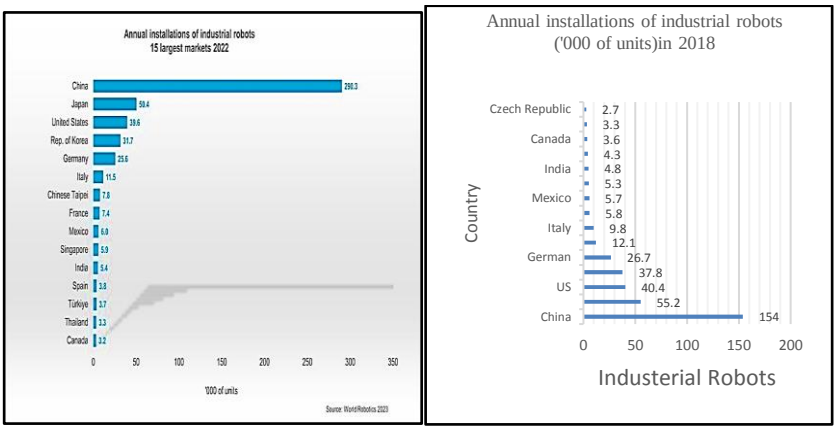


fig:(6) annual installation of industrial robots15 largest markets (2022)
Source: world of robotics (2018), (2023)
https://ifr.org/img/worldrobotics/Contents_WR_Industrial_Robots_2023.pdf

Table (2): annual installation of industrial robots15 largest markets (2023)

Annual installations of industrial robots ('000 of units)	290.3	50.4	39.6	31.7	25.6	11.5	7.8	7.4	6	5.9	3.8	5.4	3.7	3.3	3.2
	154	55.2	40.4	37.8	26.7	9.8	12.1	5.8	5.7	4.3	5.3	4.8	3.6	3.3	2.7
2023,2018	**China**	**Japan**	**US**	**Korea**	**German**	**Italy**	**Chinese Taipei**	**France**	**Mexico**	**Singapore**	**Spain**	**India**	**turkiya**	**Thailand**	**Canada**

source: world of robotics (2018), (2023)
https://ifr.org/img/worldrobotics/Contents_WR_Industrial_Robots_2023.pdf

From the previous figure, we observe China's significant progress in the field of industrial robot manufacturing during the period 2018-2023. It led the list of the top 15 robot-producing countries with 154,000 robots in 2018. This number increased to 290,300 robots in 2023.

Japan followed with 55,200 robots in 2018 and 50,400 in 2023, then the United States with 39,600 robots in 2023, and Korea with 31,700 robots in 2023

China has achieved significant outcomes in the field of AI, leading to distinct advantages in its application across diverse manufacturing sectors such as manufacturing, finance, education, and medical imaging**. (**Xiao and Liu, 2019**).** The economic impact of AI will be driven by (a) productivity gains from businesses automating processes as well as augmenting their existing labour force with AI technologies (assisted, autonomous and augmented intelligence) and (b) increased consumer demand resulting from

the availability of personalised and/or higher-quality AI-enhanced products and services (Dong.Z., et al. 2023).

As a result of using robots in manufacturing, China's Gross Domestic Product (GDP) in 1991 was approximately 2,062.1 billion yuan. The GDP for the primary industry sector was 5,135.3 billion yuan, the secondary industry sector was 8,811.6 billion yuan, and the tertiary industry sector was 6,674.1 billion yuan. Over the period, the GDP at constant prices increased to 1,191,037.3 billion yuan, with the primary industry sector reaching 90,590.6 billion yuan, the secondary industry sector reaching 447,953.3 billion yuan, and the tertiary industry sector reaching 652,493.3 billion yuan[18].

Furthermore, China's total added value reached 986,515.2 billion yuan in 2019 and then increased to 1,204,724 billion yuan in 2022. The industrial sector contributed 326,077.0 billion yuan, representing 33% of the total added value, followed by the retail sector with an added value of 116,294 million yuan, and then the financial intermediation sector with a value of 93,265 billion yuan[19].

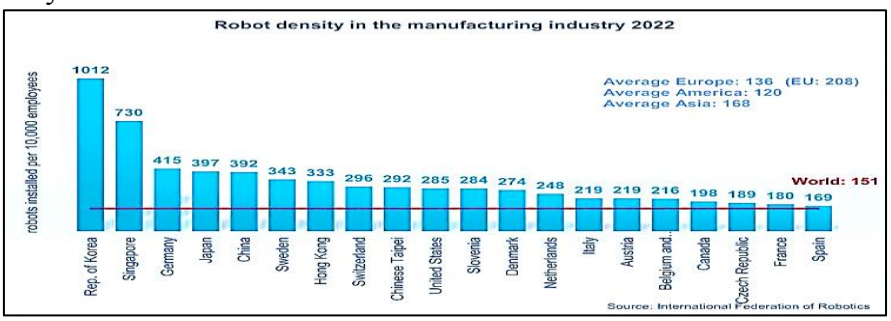


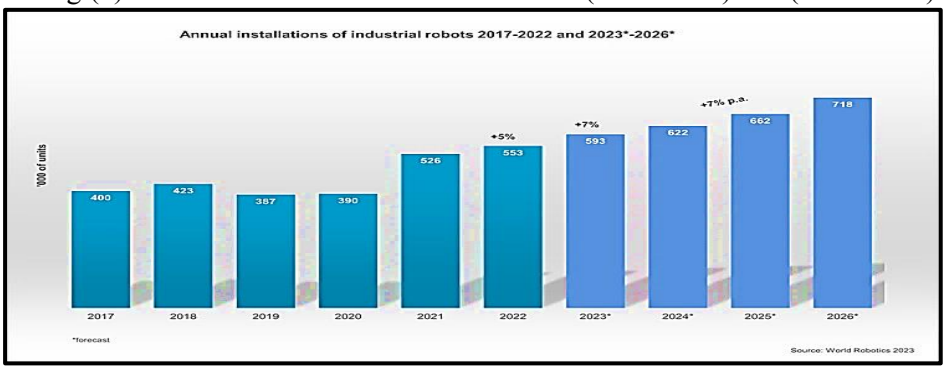
Fig:(7) robot density in the manufacturing industry 2022
Source: international federation of robotics (2023)
https://ifr.org/img/worldrobotics/Contents_WR_Industrial_Robots_2023.pdf

Despite China being the global leader in industrial robot installations, it does not rely on them heavily in industry. This may be due to the skill and low cost of the Chinese workforce, whereas South Korea, as shown in the previous figure, is one of the largest users of robots in industry, but it does not rank first globally in artificial intelligence-related investments. This indicates

[18] https://www.stats.gov.cn/sj/ndsj/2024/indexeh.htm
[19] https://www.stats.gov.cn/sj/ndsj/2024/indexeh.htm

that a country's use of industrial robots does not necessarily lead to an increase in investment in artificial intelligence but rather leads to increased productivity. The matter relates to increased productivity, meaning that increased use of robots in industry or manufacturing leads to increased productivity and reduces waste from the production and design process. As for the increase in private investments related to artificial intelligence, it is linked to the increase in the number of companies working in artificial intelligence. Thus, the greater the number of companies working in artificial intelligence fields, the more these companies attract huge investments and funds from abroad and within the country. Consequently, the United States of America leads the world in acquiring foreign investment in artificial intelligence due to the increase in the number of related companies.

Fig:(8) annual installation of industrial robots (2017-2022) and (2023-2026)



Source: world of robotics (2023)

https://ifr.org/img/worldrobotics/Contents_WR_Industrial_Robots_2023.pdf

Table (3): annual installation of industrial robots (2012-2022) and (2023-2026)

.000 units

Annual installations of ind. Rob.('000 of units)	159	178	221	254	304	400	423	387	390	526	553	593	622	662	718
year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026

Source: world of robotics (2023)

https://ifr.org/img/worldrobotics/Contents_WR_Industrial_Robots_2023.pdf

Because production is linked to labor, Goldman Sachs reported that the primary economic impact of generative AI is expected to come from task automation that increases productivity. Their economists point out that the implementation of these new technologies will require careful management,

particularly given the current weak state of China's labor market and persistent deflationary pressures.[20]

4-3-AI Impact on labour:

While academics and practitioners largely agree that innovation fuels productivity, economic growth, and job creation, the impact of 'digitalization' on these aspects is heavily debated. This controversy is particularly pronounced when considering digitalization's effect on job creation versus job displacement (Balsmeier, B. et al., 2019).

The swift automation of labor processes generates apprehension that emerging technologies will lead to the redundancy of human workers (Acemoglu, D., et al, 2018). However, the situation is different in China; because of greater concentration of jobs in physical domains, China's labor market is less vulnerable to the impacts of AI automation in short -term than that of the US. Approximately half of China's employment lies within agriculture, manufacturing, and construction, considerably higher than the 19% these areas constitute in the US. In contrast, sectors in China more susceptible to AI-driven automation, such as finance, insurance, and professional/technical services, account for under 3% of the workforce, significantly less than the 14% seen in the US. In addition to Approximately 15% of young people are unemployed, and in recent years, over 10 million students have graduated from college annually, so the implementation of these new technologies will require careful management in China Labor market[21].

[20] https://www.goldmansachs.com/insights/articles/what-advanced-ai-means-for-chinas-economic-outlook

[21] https://www.goldmansachs.com/insights/articles/what-advanced-ai-means-for-chinas-economic-outlook

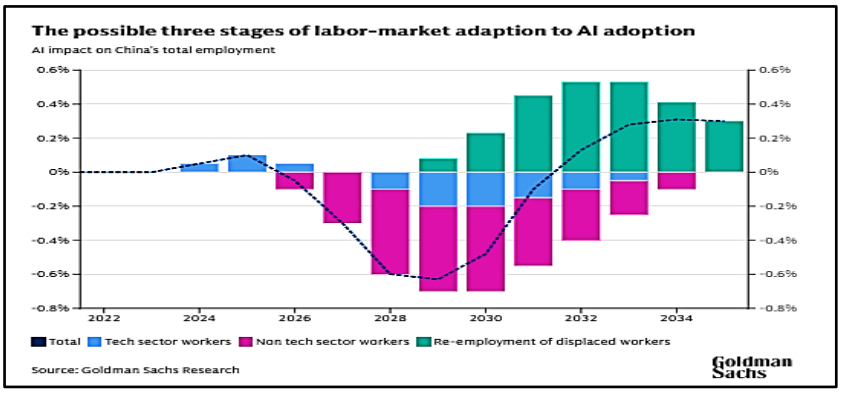


fig:(9) AI Impact on China's total employment (2022-2034)

Source: Goldman Sachs Research

In the long term, China's adoption of artificial intelligence will lead to changes in the structure of the labor market. In the short term, the gradual trend towards applying AI will result in a slight boost in jobs within the technology sector due to increased investment in those areas, and some job losses in non-tech sectors due to the introduction of technology. However, in the long run, due to the full adoption of AI technology and applications, workers will be displaced from both the tech and non-tech sectors to jobs in other industries, thereby altering the structure of labor distribution in China, and the labor market will adapt to the adoption of AI in China.

Althaugh The displacement effect implies that automation reduces the labor share of value added. Historical examples of automation are aplenty. Many early innovations of the Industrial Revo lution automated tasks performed by artisans in spinning and weaving (Acemoglu, D.et al, 2020) . on the other hand, Automation technology enhances productivity by enabling a more adaptable distribution of tasks among different factors of production. This productivity increase, in turn, drives demand for labor in tasks that are not automated. Therefore, the overall effect of automation on labor demand hinges on the balance between job displacement and this productivity-driven demand.(Acemoglu, D.et al ,2019).

more over, industrial robot imports affect company performance. Robot-importing firms were larger, more productive, and employed more high-skilled workers. Robot adoption followed firm growth and preceded

efficiency gains and labor demand decline[22]. Using a simple model and various empirical approaches to identify causality, we found that while demand shocks correlate robot imports with job growth, externally driven automation causes job losses. Robot adoption also increased productivity and the proportion of high-skill jobs but had little impact on total sales, suggesting limited price reductions from automation-led productivity gains.(Bonfiglioli, A.et al,2020)

Finally, from all the above, it becomes clear that employment and artificial intelligence are two sides of the same coin, as AI will impact the labor market in two main ways (OECD ,2021): firstly, by creating new jobs. AI is expected to generate numerous new job opportunities in fields such as AI development and application, data analysis, cybersecurity, education, and training. Secondly, AI will lead to the replacement of some jobs, particularly those involving routine and repetitive tasks. These are the jobs most at risk and include manual data entry positions, routine manufacturing jobs, and simple customer service roles, where automated systems can handle these tasks.[23]

5-The role of artificial intelligence in supporting sustainable development goals:

Artificial intelligence directs investments within specific sectors in each country, and not only that, but it also controls production methods. Given that artificial intelligence is considered a safe path towards clean green production, where The application of artificial intelligence leads to a reduction in pollution emissions, which in turn stimulates a wider scope of corporate environmental investment, enhances green innovation in the manufacturing industry, and supports sustainable development (Dong, Z. et al, 2023). which is accompanied by a decrease in carbon emissions, countries are accelerating to build artificial intelligence in various fields, in order to achieve development and sustainability at the same time

Simultaneously, there has been a risings tress on sustainability and environmental re sponsibility across global economies, leading to the evolution of con cepts such as Green Finance (GNF). GNF seeks to channel investments towards environmentally friendly and sustainable projects, facilitating the transition to a greener future (Lee, Song, & Lee, 2023; Liao, Hu, Sun, & Ye, 2023).

[22] https://www.ilo.org/resource/article/what-green-job
[23] https://www.pwc.co.uk/economic-services/assets/youth-employment-index-2024.pdf

The 'Made in China 2025' [24]strategy advocates for integrating high-end smart technologies, particularly artificial intelligence, into manufacturing to foster sustainable and green production. This initiative recognizes AI as a key driver for the industry's green transformation, aligning with the broader trend towards intelligent and sustainable manufacturing development (Liang et al., 2023) Wu et al., 2022).

To effectively reduce the negative environmental impact of manufacturing, companies need to focus on both implementing artificial intelligence technology and fostering pro-environmental behaviors (Chang et al., 2024).As sustainability can be achieved through increased environmental investment and the adoption of green technology, which streamline production, cut emissions, and improve resource efficiency, thus lessening ecological impacts (Huang and Chen 2022; Liu et al., 2022; Wu et al., 2022)

6-Data and methodology:

The researcher relied on data from the World Bank for China, the national statistical database, EPS database, and China Economic network database. The artificial intelligence variable was represented by the logarithmic value of research and development expenditure as a percentage of GDP, the Network Readiness Index (NRI) as an independent variable. China The Network Readiness Index (NRI) is one of the leading global indices on the application and impact of information and communication technology (ICT) in economies around the world. In its latest version of 2024 the NRI Report maps the network-based readiness landscape of 133 economies based on their performances in four different pillars: Technology, People, Governance, and Impact. Each of these pillars is itself comprised of three sub-pillars that have been populated by a total of 54 variables[25].

Otherwise, Economic development indicators were represented by the logarithmic value of the average per capita GDP at constant prices, as well as the logarithmic values of net flows, foreign direct investment, net foreign direct investment inflows as a percentage of GDP, industrial added value, and the unemployment rate total exports and imports, and the human development index. The study will be applied to China during the period 1990-2023 according to available data.

6-1-*Method:*

[24] Retrieved from Made in China 2025 https://www.gov.cn/zhengce/content/2015 05/19/content_9784.htm

[25] https://download.networkreadinessindex.org/reports/countries/2024/china.pdf

Determining the Algebraic Form of the Relationship: considering the Unit Root Tests to determine whether the time series data of the variables are stationary or not, and based on ADF & KPSS, it was found that the time series of the variables are stationary at level according to the KPSS test. This allows the use of regression analysis without the fear of falling into spurious regression, where the value of R2 is high but unrealistic, and the results of the significance tests F and T are significant but incorrect, because the results of the goodness of fit of the equation are not correct unless in the case of normal distribution and the stability of the mean and variance.

Accordingly, the study hypotheses can be formulated as follows:

1. There is a statistically significant relationship between artificial intelligence and economic development in China.
2. There is a statistically significant relationship between artificial intelligence and net foreign direct investment in China.
3. There is a statistically significant relationship between artificial intelligence and industrial added value in China.
4. There is a statistically significant relationship between artificial intelligence and labor in China.

The equations expressing the relationship between the study variables were formulated as follows:

1- **Log Gdpcapita** = B0+B1 logEx. R&D +B2 log HDI +B3 logNRI + B4 log GOV+ B5 LFDI + U …….(1)

2- **Log FDI** = B0+B1 logEx. R&D +B2 log HDI +B3 logNRI + B4 log GOV+ U ……. (2)

3- **Log IND.V** = B0+B1 logEx. R&D +B2 log HDI +B3 logNRI + B4 log GOV+ B5 LFDI + U ……. (3)

4- **Log Labor** = B0+B1 logEx. R&D +B2 log HDI +B3 logNRI + B4 log GOV+ B5 LFDI + U ……. (4)

Table (4): China's economic development indicators during the period (1990-2023)

year	(NRI)	rank	GDP	LOGGDP	Ex.R&D % GDP	Value added industry	Invest	FDI	Govexp	HDI	Age
1990			8.30E+11	27.44	0.45	2.9078E+11	34.73	0.97	2.8	0.482	68
1991			9.07E+11	27.53	0.47	3.30865E+11	35.87	1.14	2.8	0.489	68
1992			1.04E+12	27.67	0.48	4.0046E+11	39.84	2.61	2.8	0.501	69
1993			1.18E+12	27.8	0.49	4.79529E+11	44.24	6.19	2.8	0.512	69
1994			1.33E+12	27.92	0.50	5.66524E+11	40.95	5.99	2.6	0.522	70
1995			1.48E+12	28.02	0.54	6.44846E+11	39.68	4.88	3.1	0.532	70
1996			1.63E+12	28.12	0.56	7.22823E+11	38.37	4.65	3.3	0.543	70
1997			1.78E+12	28.21	0.64	7.9856E+11	36.34	4.6	3.5	0.554	71
1998			1.92E+12	28.28	0.65	8.69656E+11	35.68	4.25	3.5	0.565	71
1999			2.06E+12	28.35	0.75	9.40996E+11	34.96	3.54	3.8	0.575	71
2000			2.24E+12	28.44	0.89	1.03014E+12	34.43	3.48	4.1	0.586	72
2001			2.42E+12	28.52	0.94	1.11762E+12	36.42	3.51	4.3	0.597	73
2002			2.64E+12	28.6	1.06	1.2282E+12	37.08	3.61	4.3	0.608	73
2003			2.91E+12	28.7	1.12	1.38378E+12	40.63	3.49	4.2	0.619	73
2004			3.20E+12	28.8	1.21	1.53802E+12	42.89	3.48	4	0.613	74
2005			3.57E+12	28.9	1.31	1.72455E+12	41.39	4.55	4.1	0.631	74
2006	5.28	13	4.02E+12	29.02	1.37	1.95652E+12	40.93	4.51	4.3	0.643	75
2007	4.15	46	4.60E+12	29.16	1.37	2.25099E+12	41.46	4.4	4.6	0.656	75
2008	4.15	46	5.04E+12	29.25	1.45	2.47246E+12	43.27	3.73	5	0.678	75
2009	4.31	37	5.51E+12	29.34	1.66	2.72695E+12	46.44	2.56	5.8	0.689	75
2010	4.31	37	6.10E+12	29.44	1.71	3.07282E+12	47.61	3.99	5.9	0.698	76
2011	4.11	51	6.68E+12	29.53	1.78	3.40127E+12	47.69	3.7	6.1	0.706	76
2012	4.11	51	7.21E+12	29.61	1.91	3.68573E+12	47.23	2.82	7.2	0.715	76
2013	4.03	58	7.77E+12	29.68	2.00	3.98012E+12	47.39	3.03	7.6	0.723	76
2014	4.05	62	8.33E+12	29.75	2.02	4.26492E+12	47.01	2.56	8	0.732	76
2015	4.02	62	8.91E+12	29.82	2.06	4.51769E+12	45.4	2.19	8	0.741	77
2016	4.02	59	9.51E+12	29.88	2.10	4.79018E+12	44.26	1.56	8.1	0.749	77
2017	57.63	41	1.02E+13	29.95	2.10	4.89018E+12	43.6	1.37	8.2	0.757	77
2018	57.63	41	1.03E+13	30.02	2.11	4.99018E+12	44.30	2.74	8.4	0.766	77
2019	57.63	41	1.04E+13	30.26	2.12	5.07128E+12	45.47	2.81	8.9	0.775	77
2020	58.44	40	1.12E+13	30.43	2.14	5.36503E+12	44.51	2.94	9.1	0.781	78
2021	65.62	29	2.23E+13	30.45	2.24	5.62655E+12	45.61	3.27	9.3	0.785	78
2022	68.83	23	2.34E+13	30.52	2.56	5.76521E+12	46.21	3.51	9.7	0.788	78
2023	67.31	19	3.02E+13	30.57	2.65	6.2653E+12	47.34	3.62	9.8	0.788	78

Source: https://download.networkreadinessindex.org/reports/countries/2024/china.pdf
Source: Portulans Institute ،Network Readiness Index2024,2023-2006
http://www.Elbank Eldawly.Data.Country.Chn. Com
https://countryeconomy.com/hdi/chin
https://www.stats.gov.cn/sj/ndsj/2024/indexeh.htm

Table(5): Stability of Time Series Data of Variables: Results of (ADF) and (KPSS) Analysis for China

Var.	**Dickey–Fuller Augmented**	**(KPSS)**

	Level			First difference			Level		First difference	
	Const	Constant and trend	No constant, no trend	Cons.	Constant and trend	No constant, no trend	Const.	Constant and trend	Const.	Constant and trend
GDP	0.662	-1.800	3.655	-2.602	-1.636	-1.122	0.623	0.144	0.209	0.083
FDI	-2.210	-4.339	-0.613	-4.051	-4.157	-4.152	0.256	0.222	0.258	0.091
Ind.v	-1.580	-2.533	0.710	*3.477	-2.596	-2.698	0.477*	0.096	0.103	0.090
labo	-1.988	-1.468	0.147	*2.854	-2.265	-2.095	0.331	0.144	0.287	0.080
GOV	-0.891	-0.735	-0.782	-2.723	-3.058	-1.419	0.153	0.152	0.343	0.104
HD	1.018	-0.707	0.846	-0.442	-2.104	1.164	0.645	0.183	0.730	0.096
R&D	-1.963	-2.752	1.789	-2.362	-2.172	-1.338	0.674	0.092	0.295	0.102
Critical values (tabular)										
1%	-4.057	-4.339	-2.754	-4.420	-5.521	-4.416	0.739	0.216	0.739	0.216
5%	-3.119	-3.587	-1.970	-3.259	-4.107	-3.622	0.463	0.146	0.463	0.146
10%	-2.701	-3.229	-1.603	-2.771	-3.515	-3.248	0.347	0.119	0.347	0.119

Source : EVIEWS output

The source is calculated by the researcher based on the figures in previous tables using the E-VIEWS 12 program. The results clearly indicate that the time series of the variables, according to the ADF test, are integrated of the first order, as they did not stabilize until after taking the first difference I(1), such as FDI, IND.V, and Y4. However, when using the KPSS test, the results indicate that all variables are integrated of order zero, although some of them are significant at the 5% level, as is the case with GDP, IND.V, HDI, and Cap, while FDI and GOV are significant at 1%. In light of these results, the OLS method can be used to estimate the different relationships without falling into the problem of spurious regression in the case of China.

7-Results:

The impact of the independent variable, represented by spending on research and development (R&D), and expressing artificial intelligence, on the dependent variables, economic development indicators, such as average per capita GDP at constant prices, net foreign direct investment inflows as a percentage of GDP, industrial added value, and the unemployment rate, was estimated. The results were as follows:

7-1- ***Estimating the impact of artificial intelligence on GDP per capita at constant prices:***

When estimating the impact of artificial intelligence on GDP per capita at constant price, the results were as follows:

- The value of R2 reached 88%.
- The significance of the regression relationship as a whole was confirmed according to the F-test(54.26).
- Regarding the D.W. statistic, which is estimated at (1.0765), Falls within safe bounds, indicating the presence of no an autocorrelation problem among the errors.

7-2- ***Estimating the impact of artificial intelligence on FDI as a percentage of GDP :***

When estimating the impact of artificial intelligence on FDI per capita at constant price, the results were as follows:

The results were as follows:

- The value of R2 reached 85%.
- The significance of the regression relationship as a whole was evident according to the F-test, where it reached(136.24**)**
- Regarding the D.W. statistic, which is estimated at (1. 214), Falls within safe bounds, indicating the presence of no an autocorrelation problem among the errors

7-3- ***Estimating the impact of artificial intelligence on production (industerial value added) :***

When estimating the impact of artificial intelligence on production per capita at constant price, the results were as follows:

The results were as follows:

- The value of R2 reached 90%.
- The significance of the regression relationship as a whole was evident according to the F-test, where it reached(84.41).
- Regarding the D.W. statistic, which is estimated at (0.989), Falls within safe bounds, indicating the presence of no an autocorrelation problem among the errors.

7-4- ***Estimating the impact of artificial intelligence on unumployment :***

When estimating the impact of artificial intelligence on unumployment per capita at constant price, the results were as follows:

The results were as follows:

- The value of R2 reached 45%.

- The significance of the regression relationship as a whole was evident according to the F-test, where it reached.(72.16)
- Regarding the D.W. statistic, which is estimated at (1.327), Falls within within safe bounds, indicating the presence of no an autocorrelation problem among the errors.

7-4-Consequently, the results showed:

1. Acceptance of the first hypothesis, which states that there is a positive impact of artificial intelligence on economic development in China, with a coefficient of determination of 88%.
2. Acceptance of the second hypothesis, which states that there is a positive impact of artificial intelligence on increasing foreign direct investment inflows into China, with a coefficient of determination of 85%.
3. The results also showed a positive impact of artificial intelligence on industrial added value as an indicator of production, with a coefficient of determination of.%
4. The results also showed the positive impact of artificial intelligence on increasing unemployment rates in China, with a coefficient of determination of 45%.

8-Recommendition :

In light of the above, the researcher recommends the following:

1. China should enhance its reliance on artificial intelligence in developing the manufacturing sector due to its positive and green effects on sustainable development in China.
2. Support investment in artificial intelligence applications due to their positive economic, social, and environmental impact, thereby enhancing development in China.
3. Increase spending and development on infrastructure and support network readiness due to artificial intelligence's connection to the internet.
4. Support spending on research and development for its positive effects on the industrial sector and attract foreign direct investment.

5. Rely on industrial robots cautiously due to their positive effects on productivity and the environment, while also developing and improving workers' skills to become competitive.

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