

AI and Robotics Redefine Output and Growth: The New Productivity Equation

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Abstract

The article examines the macroeconomic impact of artificial intelligence (AI) and robotics and how these technologies are redefining productivity, efficiency, and economic growth across industries. It traces the evolution from the industrial and digital ages to the current AI-driven transformation, highlighting how technological advancements such as automation, data analytics, and intelligent machines are reshaping business models and public institutions. AI and robotics have significantly enhanced operational efficiency by automating routine and labour-intensive tasks, reducing costs, and improving output quality. At the same time, these technologies are influencing major economic indicators, including GDP growth, global competitiveness, and capital flows, as reflected in studies by international institutions and consulting firms.

The article also discusses the social and economic challenges associated with AI adoption, particularly job displacement, data security, and privacy concerns. However, it emphasizes that automation simultaneously creates new employment opportunities in areas such as programming, data analysis, and system management. Special focus is given to the Indian economy, where AI and robotics are transforming key sectors such as manufacturing, healthcare, agriculture, infrastructure, and smart cities. By enabling data-driven decision-making and attracting foreign investment, AI and robotics have the potential to accelerate sustainable economic growth. The article concludes that strategic planning, ethical regulation, and inclusive innovation are essential to maximize the economic benefits of AI and robotics while minimizing associated risks.

Keywords:

Artificial Intelligence, Robotics, Automation, Economic, Job Displacement.

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The advancement in new technologies such as internet, smart devices, robotics, metaverse, AI, blockchain, cryptocurrency, robotic process automation, etc. these all also leads to the impact in the economy. On the other side, there are financial crises that are affecting economic developments. The change in the behaviour and requirement of the public is laying down heavy pressure on the economy worldwide. Also, business has been upshot on the revenue and profitability sides of the financial work surface. The latest monetary turmoil across the world accelerated the new age of humanity by resulting indestructible impact and consequences on the economy. The pecuniary and insurance-based G – 20 countries through the development are exponentially heightening the capital and cash flow in the emerging nation by way of non-bank financial institutions, business angels, risk on capital funds such as microfinance, SMEs (Small and medium sized enterprises), new entrepreneurship augment by mobile operators, new inventions and researches in the industries.

Year 2000, the digital age started with technologies like internet, mobile, cloud, and web and mobilizing along with customers as well as government. How government is dragged? Government came into technological space by launching and operating e-government institutions, such as financial institutions, social media, and smart phones. Business is advanced by transformation into corporate as well as human life. Some examples of electronic are: e- commerce, e- signature, e- invoice, e- payment, mobile banking, etc. Optimizing and decrease in work procedure led to engineering industrial age shifting towards digital industrial age through the electronic mode. In lieu the amount of transaction is becoming bigger in amount day by day that is causing big data simultaneously with CRM (Customer Relationship Management) organization.² Thus, digital age has given rise to new issue i.e. ‘Space Economics’. Other sciences including nano technology, mechatronics, genetic and much more progresses created space economics, these will be changes the economy and business that can be either directly or indirectly. Here in this paper these progresses are artificial intelligence and robotics.

The new evolution came into existence, called as ‘industrial age’ that was introduced by revolution of industries and the mechanization base in United Kingdom and the automobile makers (McKenzie, 2015).³ This mechanism had

² Tech for Good Institute, 'Robots and AI: A New Economic Era' (Tech for Good Institute, n.d.) <https://techforgoodinstitute.org/blog/perspectives/robots-and-ai-a-new-economic-era/>.

³ The Editors of Encyclopaedia Britannica, 'Industrial Revolution' (Encyclopaedia Britannica, 3 December 2025) <https://www.britannica.com/event/Industrial-Revolution>.

made huge impact on the economy and business at the starting of 20th century. It also led to the production factors like work force, entrepreneurship, land, capital, monetary, education and much more were effected after the industrial revolution, it had completely changed the lifestyle of people (Mokyr, 1985). New challenges and issues came forward such as white-collar crime, one of the biggest crimes which is majorly done by the rich people. To solve such crimes higher education in the field was needed to level up the investigators (Keller, 1983). Workers in search of work come to the city and live in flats, apartments, etc rather than in villages also the living standards have changed the way of dressing, cooking, travelling, attitude of people, social behaviour (Davies, 1962) Human work force is the major drawback as there is bulk population management in transportation, employee rights, business, depreciation of product allowances, cost of capital.

The artificial intelligence and robotics will also be changes the economy at large scale that will be affecting sociological change it can either be in benefit or in demerit. Roubini and Stiglitz had analysed about the impact in economy after the full implementation of robotics and AI. The biggest effect and scam will be jobless ratio, one of the major concerns. Most of the arguments are still been discussed it may be good and beneficial in today's world but in future it is all imagination.

Economic impacts globally linked with artificial intelligence and robotics, a study conducted by experts - Kevin Gallagher, Greg Rafert, Nicholas Chen and Law Christensen- have analysed the potential outcome in economy through the use of artificial intelligence, technology and robotics in broadband internet, IT investments, mobile phones and various industries.⁴ The experts have concluded that by 2025, there will be trillion of outcomes through the technology innovation. The artificial intelligence technology and robotics also helps in identifying fraudulent insurance claims, this would help in saving millions of dollars by predicting the wrong.

The EU (European Union) shoes positive impact of AI in the economy, states that they had potentially improved its stance in worldwide rivalry. The EU made

⁴ Nicholas Chen and others, The Global Economic Impacts Associated with Artificial Intelligence (Analysis Group, 2016)
https://www.analysisgroup.com/globalassets/uploadedfiles/content/news_and_events/news/ag_executive_summary_economic_impact_of_ai.pdf.

strategy and standard plan in order to penalization and strengths of member countries suitability in monetary (Webster and Ivanov, 2019).

Price water house coopers: research analysed that global GDP increase to 14% i.e. corresponding to 15.7 trillion in US dollars by the year 2030 because of speedy development in AI field (Wladawsky Berger, 2018).⁵ It also outlined the up rise in digital era of data from Internet of Things that will be of more storage than the current. The price water house coopers report also perceive the means through which artificial intelligence exert influence of world economy. Firstly, AI productively yields with the technologies that are closer like routine activities that will be affecting robotic industries and such other capital industries. The utilization of autonomous motors and robot that enterprises AI automation, it requires capital/ finance for machines, software, aided, making the employees to work efficiently and with more dedication for adding high value and tasks (Chen et al., 2016).

As per Wladawsky- Berger (2018), just like EU made presumption on profit, it stated that artificial intelligence has potential to gross 16% or in other words nearly thirteen trillion in U.S. dollar by the year 2030.⁶ Also, annual donation is 1.2 percent in comparison to current and 2030 scenario. The McKinsey review that AI cause fundamental disordering for firms, workers and most importantly economy. The economy makes an appearance over a particular session.

The innovations of artificial intelligence and robotics have potential to remarkably impact on the economy of India. Some key factors that can influence the economy are-

1. Increased Automation- The combination of technology can automate labour intensive task that will be increasing the efficiency and productivity of manufacturing and management. This mechanization can improve quality, boost the production and reduce cost. It will overall give raise in economy
2. Enhanced Productivity and Competences- the AI robotics can assist India to become more competitive worldwide. With the help of these

⁵ PwC, 'AI to drive GDP gains of \$15.7 trillion with productivity, personalisation improvements' (PwC, 6 July 2017) <https://www.pwc.com/au/en/pressroom/2017/ai.html>.

⁶ I. Wladawsky-Berger, 'The Impact of Artificial Intelligence on the World Economy' (The Wall Street Journal, 16 November 2018) <https://www.wsj.com/articles/the-impact-of-artificial-intelligence-on-the-world-economy-1542398991>.

technologies the business can enhance their processes, operations, goods and services. This advancement can let foreigner to invest, it can lead to economic growth, and also there will be increase in employment opportunities.

3. Job Displacement – The automation can cause job displacement but also their will be new opportunities created. Such as the job can be replaced by machine but a human being and human mind will be required for programming, analysing.
4. Biotechnology and Healthcare- the AI robotics can assist well in the health care sector, now robots are even doing operation on the direction of the specialized doctor. Hence it is very helpful if the doctor is not available the automation smart machine can diagnose and treat the patient. This can improve the efficiency, accessibility and accuracy of health care services.
5. Agriculture and Rural Development- India earns a lot from agriculture sector and impacts the growth of economy of India. The automation machines in the sector can transform the farming practices, through smart technologies such as optimize resource utilization, enhanced yield, and monitor crop health and other smart farming techniques. The AI robots can also assist human work in activities such as pest control, harvesting, seeding. This will lead to quick and smart work and will increase the income and profit of farmers.
6. Data- driven decision making- The technology rely on large amount of data for its applications. The collected data can analysis can lead to better decision making on the finance sector, marketing, better customer experience and much more for the raise in economy.
7. Smart Cities and Infrastructure- schemes and techniques like smart traffic management, waste management, development in rural areas, enhanced lifestyle and much more. These will make the country attractive and encourage other countries to make investments. This will automatically help in the growth of the economy.

It is also necessary to understand to adoption of the technologies of artificial intelligence and robotics will also lead to some challenges like storage of data, privacy and security concerns. To use the technology in positive impact it is

necessary to plan and make strategies on innovation, regulation, ethical consideration, and infrastructure. Though if all together will work smoothly it will lead to enhancement in the economy of India.

Industries in India are appreciating the advantages of AI and Robot system. They are investing in acquisition of machines and automation innovations. Currently the two research institutes (IIT- Indian Institute of Technology, Delhi and AIA- Automation Industry Association) merge together on a project of developing smart manufacturing. Also IT sectors such as Infosys, TCS and Wipro are developing their software and merging with the smart technologies.

With the rapid development, the economic efficiency can increase the economy.