

# Role, Issue and Challenges of Artificial Intelligence to Develop Indian Economy

DR. NIRUL CHOUDHARY Assistant Professor, M. P. Arts and M. H. Commerce College for Women

## Abstract:

Artificial intelligence (AI) has emerged as a revolutionary force with the ability to restructure economies throughout the world, and India is at the forefront of this technological revolution. With its massive population, developing digital infrastructure, and dynamic economic sectors, India is particularly positioned to capitalize on AI for economic success. This article delves into the complex role of AI in driving India's economic development, the crucial concerns surrounding its adoption, and the hurdles that must be overcome to reap its benefits. The essay gives a detailed path for harnessing AI to move India toward becoming a global economic powerhouse by delving into its applications across major industries, legislative efforts, and worldwide comparisons. The conversation also covers ethical issues, skill development demands, and the necessity of inclusive growth in ensuring that the advantages of AI are dispersed evenly.

**Keywords:** Artificial Intelligence in India, AI and Indian Economy, AI economic development India, AI role in India, AI challenges in India, AI issues India

## 1. Introduction

Artificial Intelligence, encompassing machine learning, deep learning, natural language processing, and computer vision, is revolutionizing industries and economies globally. In India, a nation with a projected GDP growth rate of 6-7% annually and an ambition to become a \$5 trillion economy by 2027, AI offers unprecedented opportunities to enhance productivity, foster innovation, and address socio-economic challenges. According to a report by the McKinsey Global Institute, AI could add \$957 billion to India's GDP by 2030, boosting the national growth rate by 1.3 percentage points. Additionally, the EY report estimates that generative AI alone could contribute \$359–438 billion to India's GDP by 2029–30. However, realizing this potential requires overcoming significant hurdles, including data access, skill shortages, ethical concerns, and infrastructure limitations.

This article examines AI's role in key sectors such as agriculture, healthcare, manufacturing, retail, and education, while addressing the issues and challenges that could impede its adoption. It also explores India's policy framework, including the National Strategy for Artificial Intelligence by NITI Aayog and the AI for India 2030 initiative, to assess the country's readiness for an AI-driven future. By analyzing case studies, statistical data, and global trends, the article aims to provide actionable insights for policymakers, businesses, and academia to harness AI for inclusive and sustainable economic development.

## 2. The Role of AI in India's Economic Development

## **1.Agriculture**

India's agricultural sector employs over 40% of its workforce but suffers from inefficiencies. AI applications like precision agriculture, weather forecasting, and crop yield prediction are helping farmers

make informed decisions. AI-powered platforms provide real-time market data, enabling farmers to access better prices and reduce post-harvest losses.

# 2.Healthcare

India faces a shortage of medical professionals, especially in rural areas. AI is bridging this gap through tools that support diagnostics, telemedicine, and disease surveillance. AI algorithms can detect diseases such as cancer or tuberculosis early, improving patient outcomes and reducing the burden on hospitals.

## **3.**Manufacturing and Industry

AI is accelerating the shift to Industry by enabling automation, predictive maintenance, and quality control. Indian industries are using AI to enhance productivity, reduce waste, and optimize supply chains. This not only makes Indian products more competitive globally but also encourages investments.

# 4.Education

With a massive and diverse student population, AI is helping personalize learning. Adaptive learning platforms adjust to individual student needs, while AI-based language tools help bridge linguistic gaps. AI also aids in remote education, bringing quality learning to rural and underserved areas.

# **5.Financial Services**

FinTech is booming in India, and AI is a driving force. From fraud detection and credit scoring to automated customer service, AI is making financial services more secure, efficient, and accessible. It also helps in bringing unbanked populations into the formal financial system.

# **6.Urban Development and Smart Cities**

India's Smart Cities Mission is leveraging AI for intelligent traffic management, waste disposal, and energy efficiency. AI helps urban planners analyze data for better decision-making, leading to more livable and sustainable cities.

## **7.Startups and Innovation**

India is home to a growing number of AI startups across sectors like agritech, edtech, healthtech, and cybersecurity. These startups are fostering innovation and creating new job roles, including data scientists, AI engineers, and algorithm specialists.

## 3. Current Status of AI in India

India has made considerable progress in AI development. In 2024, the government announced the IndiaAI Mission, a \$1.25 billion plan to build AI infrastructure, encourage companies, and promote ethical AI development. India has also emerged as a leader in AI talent development, with a 263% rise in AI talents from 2016 to 2023.

Private investments have soared. Microsoft announced a \$3 billion AI investment in India, while businesses such as Databricks and Google are also increasing R&D. India's corporate AI adoption rate is presently 30%, which is higher than the worldwide average. In industries such as BFSI, adoption is approaching 70%.

Despite these breakthroughs, AI research and development continue to fall behind worldwide rankings. India ranks 36th on the UNCTAD Frontier Technologies Readiness Index, requiring additional highquality datasets, processing capacity, and regulatory clarity to remain competitive.

## 4. Issues in AI Adoption in India

## **1.Lack of Infrastructure**

Although initiatives like IndiaAI aim to improve infrastructure, the country still lacks the computing resources and data centers needed for large-scale AI deployment. Access to GPUs, cloud services, and secure networks remains a barrier, especially for small enterprises and startups.

## 2.Talent and Skill Gaps

While India produces millions of STEM graduates, many lack practical AI skills. The demand for AI engineers, data scientists, and machine learning experts far exceeds supply. Upskilling and industry-academia collaboration remain critical areas of improvement.

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# **3.Data Challenges**

AI thrives on data, but India faces issues related to data availability, quality, and accessibility. Public datasets are limited and often unstructured. Moreover, the lack of clear data governance policies affects how data is shared and used.

# **4.Digital Divide**

AI development is largely urban-centric. Many rural areas lack the internet connectivity, digital literacy, and infrastructure to benefit from AI. This uneven distribution risks widening the socio-economic gap between urban and rural populations.

# **5.Privacy and Security**

As AI systems collect and process sensitive information, concerns about data privacy and cybersecurity are growing. India lacks comprehensive data protection laws, raising risks of misuse and undermining public trust in AI technologies.

# 4. Challenges in the Path of AI for Economic Development

# **1.Ethical and Legal Issues**

AI can reinforce biases if not trained on diverse and representative data. Facial recognition and predictive policing systems have already shown discriminatory outcomes in some countries. India must ensure fairness, accountability, and transparency in AI systems.

# 2.Regulatory Vacuum

AI regulation in India is still in its infancy. There are no binding laws on algorithmic accountability, explainability, or AI safety. A robust regulatory framework is essential to mitigate risks while encouraging innovation.

## **3.Job Displacement**

Automation threatens to displace low-skill and repetitive jobs. In a country like India, where informal employment is widespread, the social impact of job loss could be severe. Reskilling programs and safety nets are urgently needed to prepare the workforce for AI-driven change.

# **4.Environmental Impact**

Training large AI models consumes significant energy. With India's renewable energy goals in mind, sustainable AI development is crucial. Innovations in low-power AI chips and green data centers can help reduce the carbon footprint.

## **5.Global Competition**

India faces stiff competition from countries like the US and China, which have more developed AI ecosystems and deeper investments. To remain competitive, India must improve its research output, patents, and international collaborations.

# 5. Way Forward and Recommendations

# **1.Strengthen AI Policy and Governance**

India should establish a clear regulatory framework that encourages innovation while protecting citizens. The framework should include guidelines on data protection, algorithmic transparency, and AI ethics.

# 2.Invest in AI Research and Infrastructure

Public and private sectors must increase investments in AI research, supercomputing infrastructure, and open datasets. Government support for AI hubs and AI-as-a-service platforms can democratize access.

## **3.**Focus on Inclusive AI Development

AI policies should ensure that rural and marginalized communities benefit equally. Investment in digital literacy and rural connectivity is essential to bridge the digital divide.

# 4. Promote Responsible AI

India should take the lead in developing responsible AI standards—emphasizing fairness, transparency, and accountability. Collaboration with global institutions can help shape international norms.

# **5.Accelerate Skilling and Education**

Educational curricula need to be updated to include AI, data science, and related disciplines. Government, industry, and academia should collaborate on training programs to create a future-ready workforce.

Dr. Nirul Choudhary [Subject: Commerce] [I.F. 5.91] International Journal of Research in Humanities & Social Sciences

#### 6. Conclusion

Artificial Intelligence offers India a unique opportunity to leapfrog into the next phase of economic development. From revolutionizing agriculture and healthcare to transforming education and manufacturing, AI has the potential to solve some of India's most pressing challenges. However, this promise comes with risks that cannot be ignored—ethical dilemmas, job displacement, digital inequality, and regulatory gaps.

To fully harness AI's transformative power, India must adopt a holistic strategy that balances innovation with inclusion and progress with responsibility. By investing in infrastructure, talent, and regulation today, India can not only become a global AI powerhouse but also ensure that its economic growth is sustainable, equitable, and forward-looking.

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