

## Editor in Chief



**Dr. R. Rajesh Kanna** is a faculty member in Economics Vels University's School of Law, Pallavaram, Chennai, specializing in Development Economics and areas like Indian Economy, Health Economics, Environmental Economics, Micro/Macro Economics, Labour Economics, and Rural

Economy. He holds M.A., M.Phil. B.Ed., Ph.D. in Economics; M.B.A. (Finance); M.A. (Tamil); M.S.W. (Social Work). Over 15 years in teaching / research; 14+ years in NGOs/corporate sector; visited 165 Indian colleges/universities/IITs for conferences; resource person at institutions; NCC Officer (2019-2022); Sri Lanka conference (2025). Awards: Best Teaching (2019, 2020, 2023, 2024); AET Best Economics (2014); World Human Rights (2023). 135 articles (National/ International, Scopus /UGC-CARE); 9 International books (German/Indian publishers).

## Editor



**Dr. M. Dillip Anand** is working as an Assistant Professor in economics at Presidency College, Chennai, Tamil Nadu. His area of research is development economics. He has specializations in the fields of Indian economy, health economics, environmental economics, microeconomics, macroeconomics, managerial economics, international economics, economic

statistics, and monetary economics. He has educational qualifications at M.A., M.Phil., PG.DCA., B.Ed and Ph.D. in Economics University of Madras, Chennai. He has more than 13 years of teaching and research experience, and he has published more than 52 articles in national and international journals. 11 articles UGC Care Listed journals and 5 Scopus Journals. He has visited more colleges, universities, and IITs throughout India for national and international conferences.

## Editor



**Dr. A. KRISHNAN** working as a Professor in the Department of Commerce at Vels Institute of Science, Technology and Advanced Studies (VISTAS), Pallavaram, Chennai. He graduated in B.Com at S.R.N.M. College, Sattur, Tamil Nadu, India. He completed M. Com., & M. Phil

Department of Commerce, Madurai Kamaraj University, Madurai, Tamil Nadu, India. He completed Ph.D., in the Department of Commerce at Madurai Kamaraj University, Madurai, Tamil Nadu, India. He is in teaching profession for more than 23 years experience. He has produced 5 Ph.D Research Scholars and presently pursuing 8 Scholars. He has published 61 research papers in National and International Journals and presented 55 papers in National and International Conferences. His main area of interest includes Marketing, Accounting and Finance

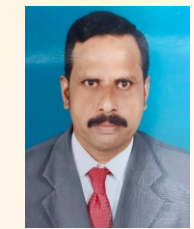
## Editor



**Dr. A. Abdul Raheem** is a distinguished academician serving as the Head and Associate Professor in the Post Graduate and Research Department of Economics at The New College (Autonomous), Chennai. He is also a recognized Research Coordinator at the institution.

He holds an extensive array of degrees across Economics, Management, and Computer Applications. His research focus primarily revolves around developmental and social economics, with specific expertise in Development Economics, Islamic Banking & Finance, Women Empowerment, Socio-Economic Development and Social Exclusion.

## Guest Editor



**Dr. N. SHANMUGASUNDARAM** received his BE in Electrical and Electronics Engineering from Anna University, Chennai, India. He did ME in Power Electronics and Industrial Drives from Sathyabama University, Chennai, India and PhD in Electrical Engineering from Anna University Chennai, Tamilnadu

India. He is working as a Head of the Department, Department of Electrical and Electronics Engineering Vels Institute of Science, Technology & Advanced Studies (VISTAS), Tamil Nadu, and India. His field of interest includes Electrical Machines and Control, Electric Vehicle Control and Charging, Power Converters and Power Cable Modeling.



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# GROWTH AND DEVELOPMENT OF THE INDIAN ECONOMY IN THE 21ST CENTURY : TOWARDS ECONOMY 4.0



GROWTH AND DEVELOPMENT OF THE INDIAN ECONOMY  
IN THE 21ST CENTURY:TOWARDS ECONOMY 4.0

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Dr. A. ABDUL RAHEEM Editor

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DR. A. KRISHNAN Associate Editor

Dr. N. SHANMUGASUNDARAM- Guest Editor

*Growth and Development of the Indian Economy in the 21st Century: Towards  
Economy 4.0*

***Editor in Chief:***

Dr. R. Rajesh Kanna, Economics Assistant Professor School of Law,  
Vels institute of science technology and advanced studies (VISTAS.) Chennai Pallavaram

***Editor :***

Dr.A. Abdulraheem, Head and Associate Professor, Department of Economics,  
The New College (Autonomous), Affiliated with the University of Madras

Dr. M. Dillip Anand, Assistant Professor, Economics, Presidency College, Chennai

Dr. A. Krishnan., Professor, Department of Commerce,  
Vels institute of science technology and advanced studies (VISTAS.) Chennai Pallavaram

***Associate Editor:***

Dr. N Shanmugasundaram, Professor, Department of EEE, Vels institute of science technology  
and advanced studies (VISTAS.) Chennai Pallavaram

## **Growth and Development of the Indian Economy in the 21st Century: Towards Economy 4.0**

### **Preface**

The Indian economy has undergone remarkable transformation in the 21st century, emerging as one of the fastest-growing economies in the world. With the advancement of globalization, technological innovation, and policy reforms, India has steadily moved from a traditional economy toward a knowledge-driven and digitally enabled economic system. The concept of Economy 4.0 reflects this transition, where digital technologies, automation, artificial intelligence, and data-driven decision-making play a crucial role in shaping economic activities and development.

In recent decades, India has experienced significant growth across various sectors such as manufacturing, services, agriculture, and digital infrastructure. Government initiatives aimed at economic reforms, financial inclusion, digitalization, and industrial development have contributed to strengthening the country's economic foundation. Programs such as Digital India, Make in India, and Startup India highlight India's commitment to building a modern and innovation-driven economy.

The emergence of Economy 4.0, inspired by the principles of Industry 4.0, emphasizes the integration of advanced technologies such as artificial intelligence, big data analytics, the Internet of Things (IoT), and automation into economic systems. This transformation is reshaping production processes, financial systems, governance, and employment patterns, creating new opportunities while also presenting significant challenges.

This work aims to explore the growth and development of the Indian economy in the 21st century and analyze the country's journey toward Economy 4.0. It examines the structural changes in key sectors, the role of technological innovation, policy initiatives, and the impact of digital transformation on sustainable economic growth. Understanding these developments is essential for policymakers, researchers, academicians, and students who seek to comprehend the evolving dynamics of India's economic landscape.

***Dr. R. Rajesh Kanna: Dr.A. Abdulraheem: Dr. M. Dillip Anand: Dr. A. Krishnan:  
Dr. N Shanmugasundaram.***

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### **INNOVATION AND ENTERPRISE: INDIA’S JOURNEY THROUGH ECONOMY 4.0**

***Christeena Wilson K and Dr. A. Krishnan***

*Research Scholar  
Department of Commerce,  
Vels Institute of Science Technology and Advanced Studies, Pallavaram, Chennai 600117*

*Professor & Research Supervisor  
Department of Commerce  
Vels Institute of Science Technology and Advanced Studies Pallavaram, Chennai - 600117*

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*ABSTRACT: This study examines how India's role in Economy 4.0—the Fourth Industrial Revolution—is changing as a result of the incorporation of big data, IoT, and artificial intelligence. The two main government programs that are driving the change are Startup India, which provides financial and policy assistance to create a strong entrepreneurial ecosystem, and Digital India, which develops digital infrastructure and encourages e-governance. Success stories in industries like health tech, agritech, fintech, and edtech show how innovation can address societal issues on a large scale. But obstacles, including insufficient R&D expenditure, reliance on foreign money, and the gap between university and industry, restrain progress. Despite these challenges, India is well-positioned to become a global innovation powerhouse by concentrating on domestic deep-tech research and talent development, thanks to the enormous opportunities presented by the explosion in digital infrastructure and the decentralized growth in Tier-2 cities.*

***Keywords:*** *Economy 4.0, Innovation, Enterprise, Digital India, Startup India, Fintech, EdTech, R&D, Entrepreneurial Ecosystem.*

### **INTRODUCTION: OVERVIEW OF ECONOMY 4.0 AND ITS IMPACT ON BUSINESS AND SOCIETY**

A new stage in global development, Economy 4.0, or the Fourth Industrial Revolution, is characterized by digital technology, automation, and connectivity that are changing how society and corporations function. Intelligent, technology-driven models driven by big data, cloud computing, robotics, artificial intelligence (AI), and the Internet of Things (IoT) will replace conventional industrial systems. This revolution creates faster, more intelligent, and more efficient systems by fusing the digital and physical worlds, going beyond simple computerization or mechanization.

Economy 4.0 has created both new opportunities and problems for businesses. To stay competitive, businesses are now emphasizing innovation, agility, and data-driven decision-making. Digital platforms are

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being used by both startups and well-established businesses to contact consumers, increase efficiency, and create customized goods and services. While digital tools have revolutionized marketing, finance, supply chains, and customer engagement, automation has increased efficiency.

The effects of Economy 4.0 on society are equally noteworthy. It is changing how people communicate, work, learn, and live. Access to services and information has gotten quicker and easier, and people are more connected than ever. Digital inequality, data privacy, and job displacement are some of the issues brought up by this shift to digital technology.

### **UNDERSTANDING ECONOMY 4.0**

#### **Meaning:**

The Fourth Industrial Revolution, or Economy 4.0, is the term used to describe how advanced digital technologies are integrating with traditional sectors and economies. The previous era's computer-based automation (Industry 3.0) is giving way to intelligent systems that integrate the digital, biological, and physical realms. In Economy 4.0, technologies such as data analytics, robotics, the Internet of Things (IoT), and artificial intelligence (AI) are essential for enhancing productivity, creativity, and decision-making. With the help of this revolution, industries will become more intelligent and responsive as machines, people, and systems can interact, learn, and collaborate in real time.

#### **Key Features of Economy 4.0**

1. **Digital Integration:** This entails the smooth integration of machines, gadgets, and humans through the use of smart sensors, digital networks, and the Internet of Things (IoT) to establish a cohesive ecosystem.
2. **Automation and Intelligence:** Robotics and artificial intelligence (AI) enable tasks to be completed quickly and accurately, with less human participation.
3. **Data-Driven Decision-Making:** Real-time collection and analysis of big data is used to forecast market trends, streamline processes, and facilitate well-informed, strategic business choices.
4. **Customization and Flexibility:** Production systems are sufficiently flexible to enable mass customization of goods and services, promptly adjusting to the specific needs of each client.
5. **Connectivity and Collaboration:** Digital platforms that mostly use cloud computing facilitate improved communication and collaboration across global supply chains and many industries.
6. **Sustainability:** Smart technologies are actively employed to minimise the overall environmental impact by optimising resource utilisation, reducing waste, and reducing energy usage.

#### **Emerging Technologies:**

1. **Artificial Intelligence (AI):** Enables machines to learn, analyze, and make intelligent decisions.
2. **Internet of Things (IoT):** Connects physical devices to the internet, allowing real-time monitoring and control.

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3. **Big Data and Analytics:** Helps businesses understand patterns, predict outcomes, and improve performance.
4. **Cloud Computing:** Provides flexible access to data storage and applications over the internet.
5. **Robotics and Automation:** Increases production efficiency and reduces human errors.
6. **Blockchain:** Ensures transparency and security in financial and business transactions.
7. **3D Printing:** Allows rapid and customized product manufacturing.
8. **Augmented Reality (AR) and Virtual Reality (VR):** Enhance learning, design, and customer experience through simulation and visualization.

### **GROWTH OF ENTREPRENEURSHIP AND INNOVATION CULTURE IN INDIA**

In recent years, India has undergone a remarkable shift, characterized by the quick expansion of the culture of innovation and entrepreneurship in a number of industries. This change in perspective represents a shift away from traditional job searching and towards the creation of new business prospects that propel social and economic advancement.

The Government of India has played a crucial role in promoting this culture through initiatives like *Startup India, Digital India, Make in India*, and the *Atal Innovation Mission*. These programs provide entrepreneurs with financial aid, mentorship, incubation support, and easier business registration processes. The establishment of innovation hubs, business incubators, and accelerators in universities and cities across India has created an environment where creativity and experimentation can thrive.

Additionally, many small firms are now able to expand their operations because to the availability of crowdfunding platforms, angel investors, and venture capital. With their great technology abilities and exposure to the world, India's youth are becoming the main drivers of this entrepreneurial trend. Cities like Bengaluru, Hyderabad, Delhi, and Pune have become thriving hubs for startups, drawing in both foreign and domestic capital. Innovation is not limited to technology anymore. Indian entrepreneurs are bringing innovative solutions to the fields of renewable energy, agritech, fintech, healthcare, and education. An increasing innovation attitude that values experimentation, problem-solving, and adaptability is reflected in this.

### **DIGITAL INDIA, STARTUP INDIA, AND POLICY SUPPORT FOR INNOVATION**

Along with extensive legislative support for innovation, the Indian government has established a series of interrelated flagship programs called Digital India and Startup India with the goal of transforming the country into a knowledge-based economy and a society empowered by technology. With the motto "Power to Empower," Digital India is a significant initiative that focusses on three main areas: creating a safe and reliable digital infrastructure as a service for all citizens (such as digital lockers and high-speed internet); providing governance and services on demand via electronic means (such as UMANG and e-Hospital); and guaranteeing that all citizens are digitally empowered through universal digital literacy. By utilising technology in all fields, it seeks to promote inclusive growth, close the digital divide, and simplify government.

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To support this, the Startup India program was started with the intention of fostering a startup culture and creating a robust, inclusive environment for innovation and entrepreneurship, ultimately turning India into a nation that creates jobs. Through handholding and simplification, it aims to make it easier for new businesses to do business. It provides advantages including self-certification under different labour and environmental rules and expedited patent filing with significant fee refunds. Additionally, it encourages incubation and industry-academia partnerships through programs like the MAARG mentorship platform and the creation of various incubators and research parks, while offering vital funding and incentives such as tax exemptions on income and capital gains, access to capital through the Fund of Funds, and the Seed Fund Scheme.

The work of top organisations like NITI Aayog and its flagship project, the Atal Innovation Mission (AIM), forms the foundation of these programs, which are supported by a larger framework of governmental support for innovation. By supporting established incubators like the Atal Incubation Centres (AICs) and implementing programs like the Atal Tinkering Labs (ATLs) in schools, AIM works to foster an innovative culture at the local level. The government's policies are designed to foster research, development, and the commercialisation of new ideas. They do this by providing a favourable regulatory environment, financial support through various schemes (such as the Department of Science & Technology's NIDHI program), and an emphasis on emerging technologies like artificial intelligence (AI) and electronics manufacturing. All of these initiatives work together to build a strong ecosystem that promotes innovation, entrepreneurship, and the adoption of new technologies as important forces behind national growth.

### **EMERGING SECTORS AND START-UP SUCCESS STORIES**

#### **FINTECH (FINANCIAL TECHNOLOGY)**

Fintech is the automation, improvement, and delivery of financial services via the use of cutting-edge technology. By providing faster, easier-to-access, and frequently less expensive options through digital channels, it radically upends traditional banking. Peer-to-peer (P2P) lending platforms, digital payments and mobile wallets (such as UPI systems), and robo-advisors—which employ algorithms to handle investments automatically—are significant elements. To evaluate creditworthiness, identify fraud, and customise client experiences, fintech significantly depends on AI and big data. In the end, it facilitates corporate operations and promotes financial inclusion by providing services to underserved or previously unbanked communities, enabling instantaneous and transparent transactions worldwide.

#### **EdTech (Education Technology)**

EdTech improves teaching and learning results by utilising digital tools, hardware, and software. By encouraging personalised learning pathways—where AI and analytics modify information to fit each student's pace and learning preferences—it is transforming education. Popular examples include massive open online courses (MOOCs), e-learning platforms for K–12 and university-level courses, and applications for vocational training and professional upskilling. EdTech breaks down geographic boundaries by providing round-the-clock access to excellent educational materials, enabling learning to take place anywhere. Additionally, it provides teachers with strong tools for administrative duties and progress

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evaluation, and it employs strategies like gamification and interactive simulations to boost student involvement.

### **Agritech (Agricultural Technology)**

Agritech is the use of contemporary technology to increase farming's sustainability, productivity, and efficiency. Its main focus is Precision Agriculture, which gathers data on crop conditions, soil health, and moisture levels in real time using satellite imaging, drones, and Internet of Things devices. Through precision resource management—applying the right amount of water, fertiliser, and pesticides only where necessary—farmers may cut expenses and waste. Other advances include internet marketplaces that link farmers with businesses or customers directly, assuring greater price realisation and streamlining the supply chain, and farm automation (such as robotic harvesting). Agritech is essential to solving global food security and reducing farming's negative environmental effects.

### **Health Tech (Healthcare Technology)**

Health technology, or "Healthtech," refers to the use of IT systems and digital tools to enhance the quality, management, and delivery of healthcare services. Making healthcare more patient-centered, accessible, and efficient is its main objective. Important fields include the use of AI for medication research and diagnostics, Electronic Health Records (EHR) for smooth data sharing, and telemedicine and virtual consultations, which link patients in remote areas with specialists. Vital signs can be continuously tracked with wearable technology and remote patient monitoring (RPM) systems, facilitating proactive care and early problem detection. In order to increase accuracy and recovery times, Health Tech also uses robotic assistance during surgery.

## **START-UP SUCCESS STORIES**

### **PhonePe (Driving UPI Adoption)**

**Sector Focus:** Digital Payments, Mobile Wallets, and Financial Services. Using India's Unified Payments Interface (UPI), PhonePe became a significant player in the country's payments ecosystem and expanded to a huge extent. Millions of daily transactions, utility bill payments, and financial investments are all made possible by its seamless transformation from a wallet to a full-fledged financial platform. Its smooth, easy-to-use interface facilitated digital transactions for the general public, promoting financial inclusion at all social levels.

### **Unacademy**

**Sector Focus:** Competitive Exam Preparation and Test Prep. Unacademy began as a YouTube channel and effectively made money off of excellent instructional content by creating a subscription platform for competitive tests like UPSC, NEET, and JEE. Its success stems from democratising access to world-class educators by providing specialised courses and live, interactive sessions, which enable millions of students to effectively prepare from far-off places. Star educators and students alike are empowered by its platform approach.

### **Ninjacart**

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**Sector Focus:** Agri-Supply Chain Optimization (Farm-to-Retail). Ninjacart's direct connection between farmers and merchants, and enterprises (B2B) effectively addressed the long-standing issue of inefficient agricultural supply chains. By utilizing technology, data analytics, and a strong logistics network, the company significantly lowers waste—which in traditional chains can reach over 25%—and guarantees farmers fair pricing while delivering fresh fruit to retailers on time. Its business strategy has simplified the extremely dispersed fresh produce industry.

### **Practo**

**Sector Focus:** Doctor Appointment Booking, Telemedicine, and Digital Health Records. Practo has developed become an all-in-one digital healthcare platform. Before branching out into telemedicine (virtual consultations) and electronic health record (EHR) management, it first enabled patients to locate and schedule appointments with physicians in a variety of specialties. In the frequently turbulent healthcare ecosystem, Practo enhanced convenience, decreased wait times, and made better data management possible by digitizing the patient-doctor relationship.

## **CHALLENGES AND OPPORTUNITIES**

### **Barriers to Innovation**

Even while the startup environment is growing, there are still several important institutional and cultural barriers that prevent innovation, especially in long-term and deep-tech domains:

#### **1. Integration Gap (Siloed Institutions)**

- **Academia-Industry Disconnect:** Because of this weak link, theoretical ideas frequently do not find their way into commercial items or industrial processes. Instead of working together in clusters for collaborative innovation, research organizations and businesses usually work in silos.
- **Exam-Driven Education:** The educational system is still mostly theoretical and test-oriented, which restricts its emphasis on applied sciences, real-world experimentation, and the formation of an early culture of entrepreneurship and critical inquiry.

#### **2. Funding Dependency & Bureaucracy**

- **Foreign Capital Dependence:** The startup scene in India is still largely dependent on foreign venture finance. This puts the country's innovation engine at risk of losing its techno-sovereignty by making it susceptible to foreign economic shocks and global liquidity cycles.
- **Regulatory Bottlenecks:** Regulatory obstacles, exorbitant levies, and intricate bureaucratic procedures for obtaining permits, filing patents, and transferring technology can hinder market entry and deter domestic private investment in research and development for startups.

### **R&D Investment and Talent**

- **Low R&D Investment:** Short-term profits are sometimes given precedence over long-term cooperative research with academic institutions in Indian corporations, which frequently underinvest in R&D.

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- **Skilling Deficit & Brain Drain:** Specialized labor is in short supply in cutting-edge fields like advanced biotechnology, quantum computing, and artificial intelligence. Additionally, poor facilities and uncompetitive pay can cause top researchers to relocate elsewhere.

### **FUTURE PROSPECTS FOR GROWTH AND OPPORTUNITIES**

India offers enormous growth potential due to its enormous population and rapidly evolving digital landscape, particularly in the high-tech and vital service industries.

#### **1. Digital Infrastructure and Data Services**

- **Data Center Boom:** The capacity of India's data centers is expected to increase fivefold by 2030 due to data localization regulations and growing cloud adoption. This lays the groundwork for digital fantasies on a gigawatt scale and draws significant international investment for AI infrastructure clusters.
- **AI-Enabled Outsourcing:** As artificial intelligence develops, the demand for complicated outsourcing will grow. By controlling higher-value, AI-enabled workflows by combining automation and human experience, the Indian IT industry is expected to surpass \$400 billion by 2030.

#### **2. Decentralization and Tier-2 City Growth**

- **Emerging Hubs:** The tech industry is dispersing outside of well-known metropolises, such as Hyderabad and Bengaluru. Tier-2 cities—such as Jaipur, Mysuru, and Lucknow—are quickly becoming IT hotspots because they provide a robust talent pool at a reduced cost, fostering equitable, sustainable IT growth (60 percent of grads come from smaller cities).
- **MSME Digital Adoption:** MSMEs are putting themselves in a position to integrate into fintech-driven value chains and e-commerce more quickly as they embrace digital payments and services.

#### **3. Addressing Social Challenges**

- **Focus on Services and Jobs:** The services sector, which accounts for around 55% of the country's GVA, remains the main driver of India's economic expansion. The most promising sectors for the creation of high-caliber, productive jobs are modern services like finance and IT.
- **The Silver Economy:** It is anticipated that by 2036, there would be 230 million senior people in India. Health Tech firms that specialise in geriatric care, assistive technologies, and digital healthcare access have a lot of market prospects as a result of this enormous demographic transition.

### **CONCLUSION**

India's journey through Economy 4.0 is a tale of bold digital ambition supported by all-encompassing legislative measures. Disruptive growth in industries like Fintech, EdTech, Agritech, and Health Tech has been made possible by initiatives like Digital India and Startup India, which have effectively established the foundation for a thriving entrepreneurial ecosystem and a working digital public infrastructure. The nation has enormous potential for the future, despite significant obstacles in the form of R&D investment, skill shortages, and administrative roadblocks. There are enormous chances to create high-quality jobs and

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address long-standing societal issues due to the size of the market, the speed at which digitalization is spreading throughout Tier-2 cities, and the impending boom in data centers. By focusing on domestic deep-tech research and methodically closing the gap between university and industry, India may establish itself as a worldwide innovation powerhouse that innovates for societal benefit as well as size.

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