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A STUDY ON FUTURE OF WORK: HOW AUTOMATION IS CHANGING EMPLOYMENT TRENDS IN INDIA

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ABSTRACT

The advent of automation in various sectors is reshaping employment trends across the world, including in India. Automation, fuelled by artificial intelligence (AI), robotics, and machine learning, has the potential to revolutionize traditional industries, enhancing productivity and reducing costs. However, its implications for the labour market, particularly in developing economies like India, are complex. This paper investigates the multifaceted impact of automation on employment in India, with a focus on job displacement, the emergence of new roles, skill requirements, and policy challenges. The study also examines the potential for automation to foster economic growth, while acknowledging the significant socio-economic challenges that need to be addressed.

Keywords: Automation, Employment, AI, Robotics, Labour Market, India, Skills, Economic Growth, Job Displacement.

1. INTRODUCTION

The rapid advance in automation technologies is changing industries all over the world, and India is not immune to the situation. The trend of automation through innovations in AI, robotics, machine learning, and data analytics can bring revolutions in all sectors, starting from agriculture and manufacturing to transport and service sectors. Such technological innovations promise higher productivity, reduce operational costs, and open up new economic avenues. However, they also create complex challenges in emerging economies, such as in India. As a country with a large and diverse workforce, India has a unique set of opportunities and risks in the context of automation. Being the world's largest democracy and an emerging

economy, the country depends significantly on the sectors of agriculture, textiles, and manufacturing. These sectors are traditionally labour-intensive. The integration of automation into these sectors will lead to mass job losses among millions of low-skilled workers. Most of the jobs in manufacturing, agriculture, and retail are susceptible to automation technologies that replace routine, manual labour with more efficient, cost-effective systems.

On the other hand, automation also opens up new job opportunities in data science, robotics, and digital technology, which require an evolving workforce with advanced skills. In this context, the future of work in India is tied to a critical question: How can the nation effectively balance the benefits of automation with the risks of widespread job

displacement and inequality? Further, with automation gaining widespread acceptance across sectors, there are possibilities to rethink job roles, ensure greater safety at workplaces, and raise productivity, thus unlocking new growth spaces for the economy. With India emerging as a technological innovation leader globally, this shift toward automation presents both challenges and opportunities that need to be understood in the nuanced manner in which it can impact employment. For India to take full advantage of the economic benefits of automation, it needs to address the skills development issue, ensure that technological growth benefits are equitably distributed, and create policies that safeguard vulnerable workers. The success of automation depends not only on growing scientific knowledge but also on the ability of a country to invest in human capital and address the social, economic, and policy-related challenges involved in such transition.

2. STATEMENT OF THE PROBLEM

The rapid growth of automation in India poses significant challenges to employment, particularly in low-skilled and informal sector jobs, which make up a large portion of the workforce. As machines replace manual labour, concerns arise over job displacement, income inequality, and a widening skill gap. Many workers lack access to retraining opportunities, exacerbating these issues. Without effective policies and reskilling programs, automation could lead to increased unemployment and socio-economic disparity, particularly for vulnerable workers.

3. REVIEW OF LITERATURE

The article *"A Review of Automation and Robotics for the Bioindustry"* by Tony Grift, Qin Zhang, Naoshi Kondo, and K.C. Ting (2008)

In this article Tony Grift, Qin Zhang, Naoshi Kondo, and K.C. Tingⁱ(2008) examines the

integration of automation and robotics into the bioindustry, focusing on sectors like agriculture, food processing, and biotechnology. It highlights how robotic systems, such as drones and autonomous vehicles, are improving efficiency, precision, and scalability by automating tasks like planting, harvesting, and monitoring. The authors discuss the benefits of these technologies in addressing labour shortages and enhancing production quality, while also noting challenges such as the need for advanced sensors and machine learning. Overall, the paper emphasizes the transformative potential of automation in advancing the bioindustry, encouraging further innovation for greater sustainability and cost-effectiveness.

The article *"Robotics, IoT, and AI in the Automation of Agricultural Industry: A Review"* by Akshay Krishnan, Shashank Swarna, and Balasubramanya H. S (2020)

In this article Akshay Krishnan, Shashank Swarna, and Balasubramanya H. Sⁱⁱ(2020) explores the integration of robotics, the Internet of Things (IoT), and artificial intelligence (AI) in transforming the agricultural sector. It discusses how these technologies are revolutionizing farming practices by enhancing automation, improving precision, and optimizing resource use. Robotics is used for tasks like planting, harvesting, and monitoring crops, while IoT enables real-time data collection and tracking of environmental conditions. AI algorithms help in data analysis, decision-making, and predictive maintenance. The paper highlights the benefits, including increased efficiency, reduced labor costs, and higher crop yields, while also addressing the challenges, such as the high cost of implementation and the need for technological expertise. Overall, the article emphasizes the potential of these technologies to make agriculture more sustainable and efficient.

The article ***“Robotics and Automation in Agriculture: Present and Future Applications”*** by Mohamad Shukri Zainal Abidin, Abioye Abiodun Emmanuel, and Hameedah Sahib Hasan (2020)

In this article Mohamad Shukri Zainal Abidin, Abioye Abiodun Emmanuel, and Hameedah Sahib Hasanⁱⁱⁱ provides an overview of how robotics and automation are currently being applied in agriculture and the potential for future developments. It examines the use of automated systems like robotic harvesters, drones, and autonomous tractors to increase efficiency and productivity in farming. The paper highlights the advantages of these technologies, such as reduced labor costs, improved precision in tasks like planting, monitoring, and harvesting, and the ability to manage resources more effectively. It also discusses the challenges, including high initial costs, the need for skilled labor, and issues related to system integration. The authors emphasize the future potential of robotics and automation to revolutionize agriculture by making it more sustainable, scalable, and efficient.

The article ***“Automation, AI, and the Future of Work in India”*** by Anita Hammer and Suparna Karmakar (2021)^{iv}

4. CASE LAWS

1. Transport and Dock Workers Union v. Mumbai Port Trust, AIR 2011 SC 2235

The Supreme Court recognized the right of employers to modernize and adapt to new technology but emphasized that the transition must be fair and just to workers. The Court directed that affected workers be compensated and alternative employment options be considered.

2. Standard Chartered Bank v. Directorate of Enforcement, AIR 2006 SC 1301

The Supreme Court reiterated that while foreign entities and technological advancements influence Indian employment structures, they

cannot override labor protections enshrined in Indian laws.

5. RESEARCH GAP & OBJECTIVES :

Despite growing research on the global impact of automation, there is a huge gap in understanding its specific effects on India's labour market. Most studies are done in developed countries, and little has been explored in terms of the broader societal implications of automation in India. Most of the existing research focuses on manufacturing and IT industries, with little attention to regional disparities, rural-urban differences, and the informal sector, which is a significant part of India's workforce. Moreover, there is a lack of policy analysis in addressing these issues. This research aims to fill these gaps by examining how automation affects employment in India and its potential to drive inclusive economic growth.

OBJECTIVES

1. To Analyse the Impact of Automation on Employment in India
2. To Investigate the Skills Gap and the Need for Reskilling
3. To Evaluate the Socio-Economic Implications of Automation
4. Examine the Impact of Automation on Employment Patterns in India
5. Assess the Skill Shifts Required for the Future Workforce

6. SIGNIFICANCE OF THE STUDY

The significance of this study lies in its potential to provide critical insights into how automation is reshaping India's labour market, which is vital for developing effective policies and strategies. With automation rapidly transforming sectors like manufacturing, agriculture, and services, understanding its impact on employment trends is essential for both workers and businesses. The research will highlight the

skills gap, emphasizing the need for reskilling and upskilling programs to ensure that India's workforce is prepared for future challenges. Additionally, it will explore regional disparities and socio-economic implications, guiding the creation of inclusive policies that benefit all sections of society.

7. HYPOTHESIS

H1: Automation of the work-sector have significantly increased the inequality.

H2: Automation tends to replace major job sectors especially agriculture and tech-industry.

8. LIMITATIONS OF THE STUDY

When examining how automation affects job trends, the study encounters a number of difficulties. First, the availability and reliability of data are limited since it is frequently difficult to obtain precise and thorough data on the consequences of automation, which makes in-depth study difficult. quick and dynamic technology change also poses a problem because it is hard to forecast how automation technologies will affect the labor market in the long run due to their quick evolution. The problem of restricted long-term forecasting makes matters more difficult because it is impossible to foretell the future consequences of automation technologies due to their unexpected nature. Furthermore, it is challenging to gauge the impact on the unorganized sector due to its lack of documentation, which makes it challenging to evaluate how automation affects both informal employment and general economic trends.

9. RESULTS AND DISCUSSION

A. Doctrinal Research on Automation and Its Impact on Employment Trends in India

India is at the forefront of an evolving job market driven by automation and technological advancements. The widespread adoption of artificial intelligence (AI), robotics, and machine learning (ML) is redefining traditional employment

structures. While automation has introduced increased efficiency and productivity, it has also raised concerns about job displacement. The following sections explore both the positive and negative impacts of automation on employment trends in India.

• Positive Impact

i. Job Creation in Emerging Sectors:

Automation has led to the rise of new industries, particularly in data analytics, cybersecurity, cloud computing, and AI-driven solutions. The demand for skilled professionals in these fields is expected to rise, with India becoming a hub for AI and IT services. As a result, sectors such as software development, digital marketing, and robotic process automation (RPA) are witnessing rapid employment growth.

ii. **Enhanced Productivity and Economic Growth:** Automation increases operational efficiency, reducing human error and improving production capabilities. Indian industries, particularly manufacturing and services, benefit from automation-driven cost savings, allowing businesses to reinvest in innovation and workforce expansion. This contributes to overall economic growth and increased employment in high-skill sectors.

iii. **Shift Toward Upskilling and Reskilling:** The rise of automation has prompted a shift in skill requirements. Organizations and government initiatives such as "Skill India" and "Digital India" are focusing on training employees in digital skills, AI, and advanced manufacturing techniques. As a result, individuals who upgrade their skills remain relevant in the evolving job market.

iv. **Boost to the Gig Economy:** With automation taking over routine tasks, there is a growing reliance on gig and freelance workers. Platforms like Upwork, Fiverr, and India-based portals such as NaukriGig are enabling professionals to work on specialized projects remotely, leading to more flexible

and diversified job opportunities.

v. **Transformation of Traditional Industries:** Sectors such as agriculture, logistics, and healthcare are also benefiting from automation. Precision farming, AI-driven diagnostics, and automated logistics systems are improving efficiency while creating new employment opportunities in tech-assisted domains.

vi. **Strengthened Global Competitiveness:** Indian companies leveraging automation are enhancing their competitiveness in the global market. Businesses adopting AI and automation-driven supply chains are attracting international investments, strengthening

vii. **Growth in Smart Cities and Infrastructure Development:** The implementation of automation in urban planning and infrastructure development has accelerated the growth of smart cities in India. Automated traffic management, AI-driven energy grids, and smart public transportation systems are contributing to improved urban employment and service sectors.

viii. **Expansion of E-Commerce and Digital Services:** Automation has facilitated the expansion of e-commerce and digital services, leading to increased demand for supply chain experts, AI-driven customer support roles, and logistics management professionals. The growth of digital platforms has further expanded employment opportunities in warehousing, delivery services, and fintech.

ix. **Development of Robotics and AI-Driven Research:** India is witnessing a surge in robotics and AI-driven research, creating new job opportunities in engineering, software development, and data science. Universities and tech startups are increasingly investing in AI and robotics research, leading to employment growth in these sectors.

x. **Increased Financial Inclusion:** Automation in financial services has improved financial accessibility for underserved populations. AI-powered banking solutions, digital lending platforms, and automated customer service systems have enhanced employment opportunities in the fintech industry while expanding access to financial services.

Negative Impact

xi. **Job Displacement in Low-Skilled Sectors:** Automation is replacing repetitive and manual jobs, particularly in industries such as manufacturing, retail, and customer service. Many low-skilled workers face job losses as machines and AI-driven systems perform tasks more efficiently and at a lower cost.

xii. **Widening Skill Gap and Unemployment Risks:** The transition to an automation-driven workforce requires upskilling, but not all workers have equal access to training. The digital divide and lack of resources for skill development in rural and semi-urban areas may lead to rising unemployment and increased economic disparity.

xiii. **Impact on Traditional Employment Models:** Full-time, permanent jobs are being replaced by short-term contracts and project-based work. While this offers flexibility, it also leads to job insecurity, lack of employee benefits, and income instability.

xiv. **Increased Pressure on Policy and Education System:** The rapid pace of automation necessitates changes in education curricula and labor policies. There is an urgent need for reforms in technical education, vocational training, and labor laws to accommodate the evolving job landscape.

xv. **Economic Polarization:** Automation favors highly skilled professionals while displacing low-skilled workers, leading to a growing divide between high-income and

low- income groups. This can exacerbate economic inequality and create social unrest if not addressed through policy interventions.

xvi. **Ethical and Social Concerns:** The rise of AI-driven decision-making raises ethical concerns regarding bias, fairness, and transparency in hiring practices. Automated recruitment systems may inadvertently discriminate against certain demographics, leading to social and employment inequalities.

xvii. **Decline of Traditional Job Roles:** Sectors such as clerical work, manual accounting, and traditional retail are experiencing a decline in employment due to AI-driven automation. The reduction in job roles that once provided employment to a significant portion of the workforce may lead to widespread economic challenges.

xviii. **Psychological and Workplace Challenges:** Automation-driven job transitions can create psychological stress among workers facing job uncertainty. The pressure to constantly upskill and adapt to new technologies can contribute to burnout and workplace dissatisfaction, affecting

overall employee well-being.

• **The Role of Government and Policy Interventions**

The Indian government is actively working to mitigate the negative impacts of automation while fostering job creation. Policies such as the "National Policy on Software Products" and "Production-Linked Incentive (PLI) Scheme" are encouraging investment in digital transformation. Additionally, collaborations between educational institutions and industries are crucial in bridging the skill gap.

• **Future Outlook for Employment in India**

The future of work in India is being shaped by a digital and automated economy. While automation presents challenges, proactive measures in education, policy, and workforce training can ensure a balanced transition. Industries that adapt to automation trends and integrate human-AI collaboration will thrive, creating a dynamic and resilient employment landscape.

[B] NON-DOCTRINAL RESEARCH

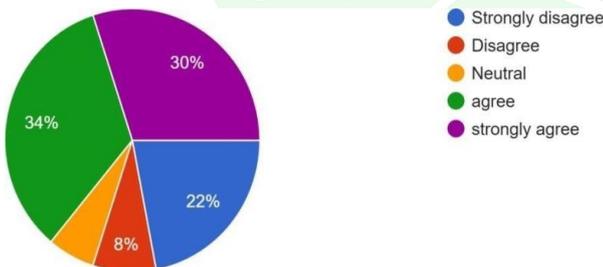


Table No.1 Companies should train employees for new roles instead of replacing them with automation

INDICATORS	Strongly disagree	Disagree	Neutral	agree	strongly agree	Total
Male	11	2	1	7	14	20
	[22.00]	[4.00]	[2.00]	[14.00]	[28.00]	[70.00]
Female	15	2	2	10	1	30

	[30.00]	[4.00]	[4.00]	[20.00]	[2.00]	[60.00]
Transgender	0	0	0	0	0	0
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Total	26	4	3	17	15	50
	[54.00]	[8.00]	[6.00]	[34.00]	[30.00]	[100.00]

Source : Primary Data

The survey results indicate that a majority of respondents (34percentage agree, 30percentage strongly agree) support the idea that companies should train employees for new roles rather than replacing them with automation. However, a smaller proportion remains neutral (6percentage, while 8percentage disagree and 22 percentage of

the respondents strongly disagree. This suggests that while there is significant support for retraining employees, there is still a notable portion of people who either oppose or remain uncertain about this approach. The second question's responses, which are not visible in the image, would further clarify public sentiment on automation's impact on job opportunities.

Table No.02 Automation has the potential to reduce job opportunities in the country.

INDICATORS	Yes	No	Total
Male	31	2	33
	[62.00]	[4.00]	[66.00]
Female	16	1	17
	[32.00]	[2.00]	[34.00]
Total	47	3	50
	[94.00]	[6.00]	[100.00]

Source : Primary Data

The survey results strongly indicate that most respondents (94 percentage of the respondents believe automation will reduce job opportunities in their country, while only a small minority (6 percentage of the

respondents disagree. This overwhelming concern aligns with the previous question, where a majority supported retraining employees instead of replacing them with automation. The data suggests that people

perceive automation as a threat to employment and prefer companies to focus on upskilling rather than job displacement.

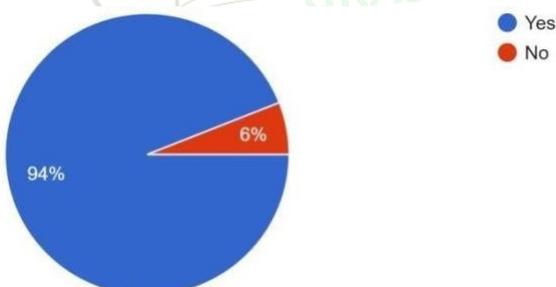
10. TESTING OF HYPOTHESIS

H1: Training employees for new roles instead of automation replacement significantly improves job retention, productivity, and cost-effectiveness

Table 1 shows that the survey results indicate that a majority of respondents 34percentage agree, 30percentage strongly agree support the idea that companies should train employees for new roles rather than replacing them with automation. However, a smaller proportion remains neutral 6percentage, while 8percentage disagree and 22percentage strongly disagree. This suggests that while there is significant support for retraining employees, there is still a notable portion of people who either oppose or remain uncertain about this approach. The second question's responses, which are not visible in the image, would further clarify public sentiment on automation's impact on job opportunities.

H2: Automation significantly reduces job opportunities in affected industries compared to non- automated sectors.

Table 2 shows that the survey results strongly indicate that most respondents (94percentage) believe automation will reduce job opportunities in their country, while only a small minority (6percentage) disagree. This overwhelming concern aligns with the previous question, where a



majority supported retraining employees instead of replacing them with automation.

The data suggests that people perceive automation as a threat to employment and prefer companies to focus on upskilling rather than job displacement.

11. CONCLUSION

Automation is reshaping employment trends in India, presenting both opportunities and challenges. While it is creating new jobs in advanced sectors, it is also leading to displacement in traditional industries. The key to mitigating negative impacts lies in proactive policymaking, investment in skill development, and fostering an adaptive workforce. Moreover, strong collaboration between the government, educational institutions, and private sector stakeholders is essential in ensuring a smooth transition into an automation-driven economy. By creating a workforce that is adaptable and skilled in emerging technologies, India can position itself as a global leader in the automated economy. If properly harnessed, automation can drive sustainable economic growth, reduce inefficiencies, and elevate India's status as a technology-driven economy, while ensuring that no segment of the workforce is left behind.

12. SUGGESTION

- Strengthening skill development programs to prepare workers for automation-driven jobs.
- Encouraging public-private partnerships for better reskilling initiatives.
- Expanding employment in emerging sectors like AI and cybersecurity.
- Implementing inclusive labor policies to protect workers in vulnerable industries.
- Promoting human-AI collaboration to balance job displacement and workforce adaptation.

13. END NOTES

iGrift, T., Zhang, Q., Kondo, N., & Ting, K. C. (2008). "A Review of Automation and Robotics for the

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