Economics of Transformative AI Research Sprint

Economic Impact Analysis: The Impact of AI on the Indian Information and Communication Technology Sector

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Abstract

New technologies are changing labor market paradigms. These technologies are becoming increasingly common, potentially leading to partial automation and potentially displacing some workers while creating opportunities for others.

With the development of artificial intelligence, the need for human capital and expert development is increasing. The education system will not be able to adapt quickly, resulting in a gap between employer needs and worker offerings.

The OECD's latest TIVA 2023 report on India provides significant information on the impact of AI technologies in different sectors.

We studied the sectors of information and communication, telecommunications and computer programming, consultancy, and information service activities, which are particularly targeted because, in our opinion, they have faced potential disruptions related to AI implementation in these sectors.

We applied a 20% shock to the labor coefficient of this sector, which allows us to analyze the variation in sectoral value added leading to variations in employment and tax revenues.

This gave us an opportunity to predict the economic consequences of AI-induced displacement. We then concluded that we have potential job losses and revenue declines.

Keywords: Economic growth, labor markets, AI distribution effects, market dynamics, policy interventions, sectoral shocks, workforce upskilling, layoff Insurance, automation risk

1. Introduction

The term "technological unemployment" was coined in the 1930s by J. M. Keynes. This unemployment is due to the fact that the emergence of new technological opportunities, which allow us to reduce the need for labor in the economic context, outpaces the emergence of new ways to use that labor.

It can be noted that each industrial revolution has been accompanied by rapid developments in technology and innovation, which radically changed production, the usual way of life, and, consequently, employment.

Our study shows the economic implications of transformative AI technologies on labor markets in India, notably we are focusing on information and communication, telecommunications and computer programming, consultancy, and information service activities.

Our central research question is: How does AI-induced labor displacement impact sectoral value added, employment, and tax revenues?

Our economic hypothesis shows that this significant shock to labor coefficients in sectors with AI involvement will lead to big reductions in employment and tax revenues, leading to increased economic inequality and labor market instability. This would lead to worsening economic inequality and labor market instability.

We are interested in a labor market transition, where workers may lose these jobs and then lose their income as a result of automation and AI-induced tightening of job requirements.

This research explores policy interventions, such as upskilling vouchers and layoff insurance, to reduce the economic shock and help dismissed employees to make a transition to new roles that will be created by AI.

We consider economic risks such as labor market disruptions, a trend toward increasing income inequality, and the risk of reduced economic mobility for workers who have difficulty adapting to technological developments.

Our research is presented within the framework of the "Distribution" of the AI economy and is based in particular on the distribution of the economic benefits and challenges of AI in different sectors, taking the example of India.

It provides guidance on the development of public policies to ensure a more safe transition to a future envisioned by AI technologies.

2. Methods

We conducted a partial input-output economic analysis to estimate the first-order impacts of AI-driven disruptions on India's IT-BPM sectors. Sectoral value added data was extracted from the OECD Trade in Value Added (TiVA) 2023 dataset for India (2020 edition), focusing on three subsectors: Information and communication, Telecommunications, and Computer programming, consultancy, and information service activities.

We modelled a $\pm 20\%$ shock to the combined sector's value added, simulating potential growth or decline driven by transformative AI developments. Employment levels were estimated based on 20 jobs per million USD value added. Tax revenue was estimated at an effective rate of 25%.

To help reduce the impact, we designed two policy interventions: an upskilling voucher programme offering ₹75,000 per displaced worker and a layoff insurance programme offering ₹120,000 per displaced worker.

Additionally, we modelled a hybrid approach that combined elements of both interventions. We estimated the potential costs, job-saving impacts, and trade-offs between all three strategies to inform policy decisions.

Analysis and visualisation were done using Python (pandas, matplotlib). All code, calculations, and graphs were generated locally based on OECD TiVA data. Dummy data was used to estimate the cost of potential policy interventions (upskilling vouchers and layoff insurance), since sector-specific cost data was not available. Figures show job and tax outcomes across different scenarios.

3. Results

A 20% contraction in India's IT-BPM sectors was projected and could result in approximately 675,000 job losses and a tax revenue decline of 8.4 billion USD. In contrast, a 20% expansion would generate similar gains.

Policy cost estimates indicated that:
An upskilling voucher programme would cost approximately **607.5 million USD** (₹50.625 billion).
A layoff insurance programme would cost approximately **972 million USD** (₹81 billion).
Both interventions were significantly cheaper than the projected tax revenue loss of approximately 8.4 billion USD. This makes our policies affordable options to help workers impacted by AI-driven disruptions.

In addition to sector-level shock analysis, we modelled and visualised three policy intervention strategies: an upskilling voucher programme (₹75,000 per worker), a layoff insurance programme (₹120,000 per worker), and a hybrid approach combining both.

We compared total programme costs, the cost per job saved, and the return on investments. It showed that the hybrid approach can save more jobs at a moderate cost while keeping a positive cost-benefit ratio. The radar chart showed that upskilling vouchers are strongest for building long-term resilience, while layoff insurance is faster for immediate support.

Overall, these policy simulations show the trade-offs between cost and long-term outcomes when designing responses to AI-driven labour disruptions.

Figures produced:

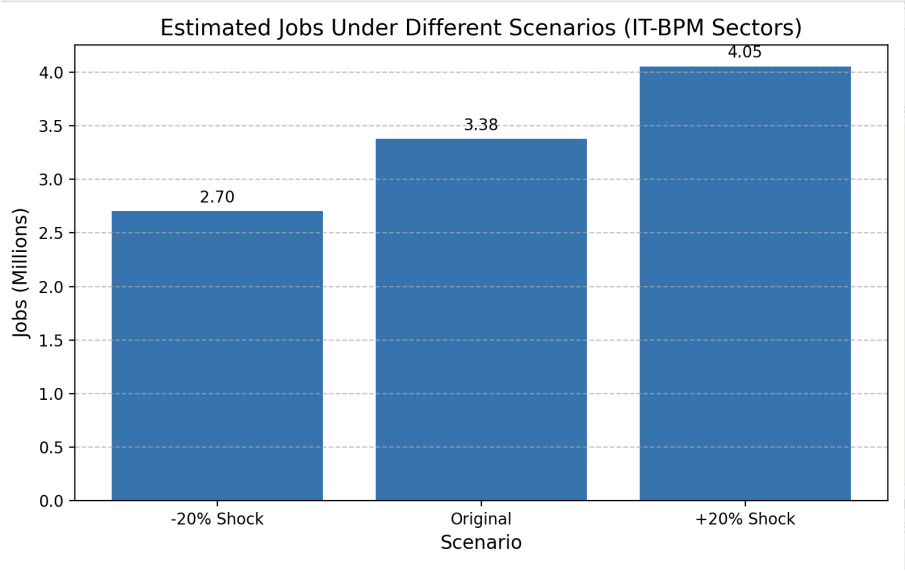


Figure-1– Estimated number of jobs under -20%, 0%, and +20% shock scenarios.

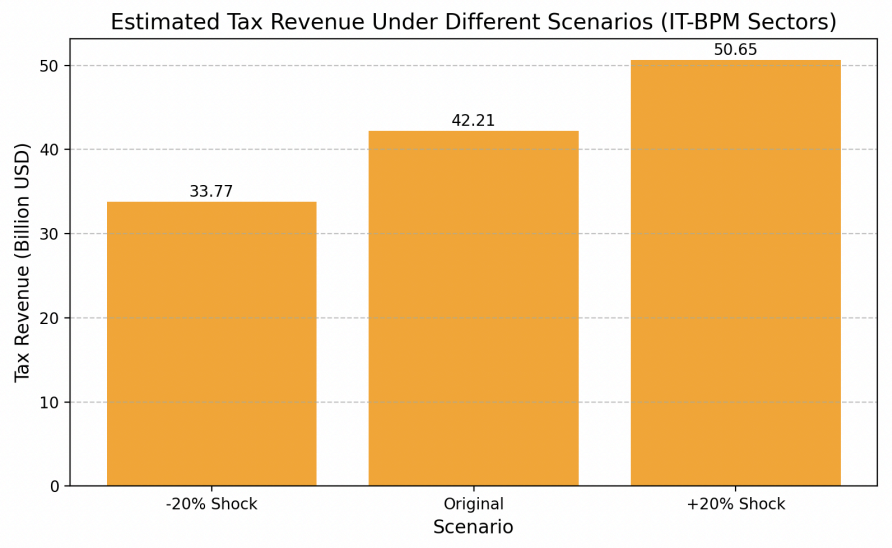
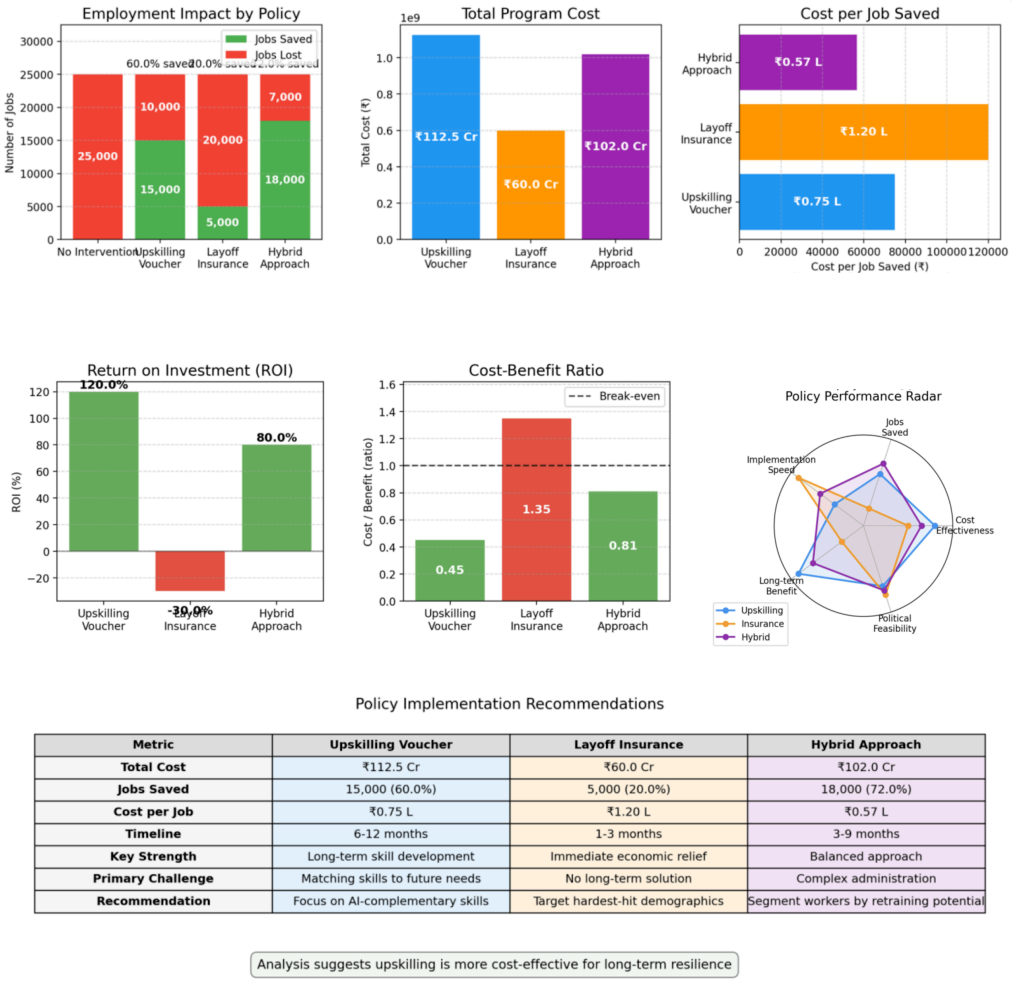


Figure-2– Estimated tax revenue under -20%, 0%, and +20% shock scenarios.



Policy Implementation Recommendations

Metric	Upskilling Voucher	Layoff Insurance	Hybrid Approach
Total Cost	₹112.5 Cr	₹60.0 Cr	₹102.0 Cr
Jobs Saved	15,000 (60.0%)	5,000 (20.0%)	18,000 (72.0%)
Cost per Job	₹0.75 L	₹1.20 L	₹0.57 L
Timeline	6-12 months	1-3 months	3-9 months
Key Strength	Long-term skill development	Immediate economic relief	Balanced approach
Primary Challenge	Matching skills to future needs	No long-term solution	Complex administration
Recommendation	Focus on AI-complementary skills	Target hardest-hit demographics	Segment workers by retraining potential

Analysis suggests upskilling is more cost-effective for long-term resilience

Figure-3 – Projected Impacts and Trade-offs across Policy Interventions

These visualisations highlight the distributional impacts of AI-induced sectoral shifts and the potential effectiveness of policy responses.

4. Discussion and Conclusion

Potential impacts on economic growth, productivity, and employment:

A shock of $\pm 20\%$ to the labor input in the IT-BPM sector has a significant impact on significant changes in sectoral value added. In our analysis, a 20% negative shock could lead to a loss of approximately 675,000 jobs and a tax revenue drop of 8.4 billion USD in the Indian IT-BPM sector alone.

We can see a positive shock through an increase in labor input. This is why we can see potential employment gains in the short term.

But at the same time, a decline in productivity if capital intensities are not adjusted. We can see a negative shock, such as labor displacement due to AI, which will lead to a reduction in employment and value added.

In the future, this will be the reason for the overall GDP growth of the Indian economy, particularly in the services sector.

Distributional consequences across different segments of populations:

According to Goldman Sachs, generative artificial intelligence could soon destroy 300 million jobs. They also predict that 50% of the workforce is at risk of losing their jobs.

We can observe an employment shock in this sector that affects all segments of Indian society. Such as urban populations, middle-class individuals, and experts in different fields with high levels of qualifications and education. We can see a disproportionate trend in this shock.

This leads to inequality among workers, such as difficulty finding employment without specialized certification and upgrading of these skills. Our policy simulations show that interventions like upskilling vouchers and insurance programs can save up to 60–70% of jobs at risk. It prevented up to 60–70% of potential job losses from AI-driven displacement.

At this time, new professions being created thanks to advances in artificial intelligence require higher qualifications. However, this also provides opportunities for greater professional development, and consequently, higher salaries.And new graduates can enter the workforce more easily and find employment faster.

Implications for market structure:

An AI-driven shift that results in job losses can be favorable for large, innovative IT companies.

They have the necessary level of automation, which gives them the opportunity to increase their market share. It can also limit smaller companies because they lack the resources to compete with larger companies.

Temporal considerations (short-term and long-term):

We see a negative short-term scenario, such as job losses and a decline in sectoral production. Service industry jobs such as call centers and basic back office tasks are immediately vulnerable.

However, we can prevent a positive long-term scenario. AI can increase productivity. This would be the reason for greater efficiency in the sector. This also heralds the creation of new jobs.But without growth in the AI sector, the losses will not be offset by the creation of new tech jobs.

Policy recommendations to curb negative economic impacts:

The main objective of educating people is the creation of advanced training centers in each sector. It is also important to offer training programs to released personnel to increase productivity. It can be a valuable measure to support the population during a transition period where the demand for skills is evolving due to automation, digitalization, and structural changes (e.g., AI management, cybersecurity, data analytics). The country's government must help companies adopt the technology and create incentives and conditions for collaboration with universities. This helps promote new technology and facilitate this adaptation.Creating favorable tax conditions, financial support, and infrastructure development should become attractive factors for companies and experts.

The structure of jobs must change and there will be a redistribution of workers within and between organizations. Companies must invest in the development of their employees to retain talent. Notably, the lack of qualified talent is the most common obstacle to widespread adoption of technologies. We offer both solutions to reduce the impact of AI on employees' lives. Notably, Upskilling Voucher program and Layoff Insurance program.

Upskilling vouchers: This program will be funded by the government to enable workers in at-risk sectors to transition to new positions by acquiring new professional skills related to AI development. In our model, an upskilling voucher programme of ₹75,000 per worker could prevent large-scale job losses. The total cost would be much lower than the annual tax revenue loss caused by AI disruption.

Layoff insurance: This program aims to provide financial help to workers laid off due to the implementation of AI, particularly a transition to new sectors. A layoff

insurance scheme offering ₹120,000 per worker could also help workers against sudden displacement. However, the total cost would be higher than for upskilling and closer to the size of the tax revenue loss.

A **hybrid strategy** combining upskilling and insurance saved the most jobs in our simulations. It offered a balance between cost, speed of impact, and long-term benefits.

In conclusion, our research demonstrates the need for proactive economic policies to manage the disruptive effects of AI, which is gradually transforming labor markets.

We analyzed employment shocks in the target sectors and, by considering their impact on employment and tax revenues, presented the magnitude of potential displacement and fiscal pressures.

Comparing policy measures such as upskilling vouchers and severance insurance provides us with a way to slow these risks. Effective intervention can cushion immediate economic shocks. Moreover, we can see that it can be conducive to a more equitable distribution of AI-driven growth. We must prepare now to ensure that the transition to an AI-driven economy strengthens a global economy.

5. References

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Prompts Used

We used ChatGPT 4o for modelling code
Help in regards to the modelling:

- "shock the labour coefficient for one AI-exposed sector such as IT-BPM by plus or minus 20 percent in a spreadsheet Convert the change in sectoral value added into absolute jobs and tax revenue swings,
- the OECD tiva data first few rows btw:
- DATAFLOW,OECD.STI.PIE:DSD_TIVA_MAINLV@DF_MAINLV(1.0), "Trade in Value Added (TiVA) 2023 edition: Principal Indicators, levels",I,FFD_DVA,Domestic value added in foreign final demand,IND,India,A,"Agriculture, forestry and fishing",W,World,USD,US dollar,A,Annual,2020,,35553.2,,6,Millions
(truncated)"
- "see the attached csv india_tiva data"
- "can we consider these Information and communication, Telecommunications, Information and communication, Computer programming, consultancy, and information service activities"
- “give me the code and make sure it does visualization.”
- "1.can we have better graphs? 2. we cant do IO? what is io model"

Help with writing the report:

- “do we mention Policy mechanism design: already in methods and results? or leave it for later”
- “help write methods and results”
- “alternatives of xyz words”
- “refine xyz text”