



AUTOMATION AND LABOUR IN INDIA: POLICY IMPLICATIONS OF JOB POLARISATION PRE AND POST COVID-19 CRISIS

Advancements in ICTs have heightened the potential of such technology to automate jobs en masse. Realistically, however, concern revolves not around redundancy of labour, but the polarising effect automation exerts on jobs. Job polarisation widens wage disparity, lowers the aggregate skill level of labour, and exacerbates existing social inequalities. Proponents of laissez-faire automation argue that while automation may exert adverse effects on labour in the short run, it is bound to realise higher net benefits and employment in the long run due to the increased efficiency it entails. However, world over and in India, firms have been merely substituting labour with capital, sans efficiency gains. This trend is only set to worsen with the ongoing health crisis due to varied reasons. In such a situation, it becomes imperative to enable labour mobility, design novel methods of social security, and incentivise retention and continuance of labour engagement.

Introduction

The advancement in Information Communication Technology (ICT) characterising the third industrial revolution has resulted in a paradigm-shift, often being dubbed as the 4th industrial wave (Tandem Research 2018) and catapulting automation of labour. With such automation of labour, a concerning phenomenon, known as 'job polarisation' emerged. It refers to the hollowing out of mid-skill jobs with a relative increase in demand of low- and high-skill jobs. Job polarisation naturally results in wage polarisation and widening of existing inequalities.

Advocates of automation have claimed that it would follow a Schumpeterian trajectory, and even if jobs are lost or polarised in the short-term, the evolving system will eventually provide newer and better opportunities for labour as a whole. However, empirical evidence globally and in India seems to suggest that automation has been following a different trajectory wherein firms have been automating to merely replace labour with capital, without any greater productivity goals.

Moreover, the ongoing health crisis is expected to lead India into recession, and periods revolving recessions have been shown to accelerate automation, resulting in a jobless recovery. The chief concern is that we must be prepared for a situation wherein the individuals who have lost their jobs due to the health crisis will not be able to re-enter the workforce as their jobs can be automated.

This paper seeks to understand the conceptual framework of job polarisation owing to automation and the underlying analytical framework as to how has automation induced job polarisation in India, the impact of COVID-19 on this phenomenon and the policy implications that arise from this.

Sections two and three discuss the problem of job polarisation as it has existed globally and in India. Section four seeks to understand how the ongoing health crisis would impact automation of labour. And lastly, Section five discusses the policy implications that arise from this problem in India.

Conceptual framework of Job Polarisation

Job polarisation is a term used to indicate a drop in demand for mid-skill jobs, and a simultaneous increase in demand for high- and low-skill jobs, which results in a 'hollowing out' of mid-skill jobs (Jaimovich and Siu

2018). Job polarisation linked to automation has been empirically observed in the USA (Acemoglu and Autor 2011; Jaimovich and Siu 2018); UK, Sweden and other European countries (Petroopoulos 2018); and even in developing countries such as Brazil and Colombia (Kuriakose and Iyer 2018).

Canonical Method and Task-Based Analysis

Traditionally, impact of automation on labour had whole occupations (banker, IT professional, etc.) as the unit of analysis, and occupations were ranked as per skill levels (high, medium and low). Acemoglu and Autor (2011) conceptualised an innovative and revolutionary framework to understand how automation interacts with various aspects of labour and results in polarisation. Under this framework, jobs are not considered as strictly comprising a single function or role, as was understood previously. Rather, they are often made of multiple tasks. They termed this a ‘task-based model’, and hold that tasks are the fundamental units of jobs, and accordingly, every job can be broken down into various tasks to better analyse the effect of automation on them.

Based on their repetitiveness and cyclical nature, tasks are categorised into two broad groups - routine and non-routine tasks. This is further classified into mechanical and cognitive task, based on the complexity of task involved. Routine tasks, whether cognitive or manual, both overwhelmingly constitute mid-skill jobs. On the other hand, automation is said to augment the functioning of non-routine jobs, which comprise low-and high-skill jobs.

TABLE 1: Occupational Typology

Repetitiveness/Complexity	Manual	Cognitive
Routine	Assembly-line	Clerical, Sales
	Middle Skill Substitutive Effect	Middle-Skill Substitutive Effect
Non-Routine	Personal services, Security	Managerial, Creative
	Low-Skill Limited Effect	High-Skill Complementary Effect

Source: (Kuriakose and Iyer 2018)

The twin effect of automation substituting routine tasks while simultaneously augmenting non-routine tasks is what results in ‘hollowing out’ of mid-skill jobs and leads to job polarisation (Acemoglu and Autor 2011).



I. Job Polarisation in Indian Economy At A Glance

In a comprehensive study by Sarkar (2018), the author uses National Sample Survey Office (NSSO) employment data covering 270 occupations in urban India from the years 1983-84 to 2011-12 to arrive at a few key observations. Firstly, she notes that there is a strict dichotomy between industries that generate output and ones that provide employment, which has a role in shaping the demand for routine and non-routine jobs. Secondly, post- liberalisation, demand of routine tasks has considerably fallen. This has been attributed to the susceptibility of routine tasks to automation.

Vashisht and Dubey (2018) reaffirm the findings of Sarkar (2017) by stating that the demand of labour skilled in non-routine tasks increased substantially at the turn of the century, with the demand of labour skilled in non-routine cognitive tasks having increased four-fold.

Persistence of Routine Tasks

Despite the foregoing discussion on automation and routine jobs, a development that deviates from job polarisation observed in other economies is that in India, routine jobs have managed to persist at a higher level than expected (Kuriakose and Iyer 2018; Vashisht and Dubey 2018).

Kuriakose and Iyer (2018) argue that the persistence of routine task intensive jobs in India is due to two reasons, neither of which are directly related to automation or technology. First, due to the increase in supply of educated labour (secondary and tertiary education) has resulted in labour oversupply. This has not only depreciated the wage premium placed on education, but over supply has pushed educated workforce that would find itself in mid-skill jobs into low-skill jobs. Second, building on Sarkar (2018), the authors state the second reason for the persistence to be the divergence between labour-intensive and output generating industries in India.

Market and Socially Desirable Automation

It is often assumed that firms choose to automate as the same brings in substantial strides in efficiency. Moreover, this substantial increase in efficiency increases the economy's overall productivity, which results in creation of new jobs as economies evolve. Such an understanding is based on Schumpeter's (1943:83) famous words:

...process of industrial mutation—if I may use that biological term—that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism..

In such a system, though automation may destroy jobs, it will open up new sectors and opportunities leading to creation of new jobs. This is what Acemoglu and Restrepo (2019) term as the *reinstatement effect* of automation, wherein the productivity of such technology is so high that displaced labour is reinstated in new forms within the economy.

Implicitly, creation of new employment is contingent on the belief that only automating technologies which possess productivity far greater than labour will be adopted. What happens, then, if firms bring in technology that only substitutes existing labour and does not raise overall productivity? In such a situation, the displacement effect of automation would manifest, resulting in what Keynes (1930) termed as *technological unemployment*. Technological unemployment is the redundancy of labour caused by our inability to generate new jobs at a rate faster than rate at which technology substitutes labour.

The real situation is grim. There is increasing evidence to show that firms have been adopting automating technology as a means to merely substitute labour globally (Acemoglu and Restrepo 2020) and in India (Tandem Research 2018). This is corroborated by the fact that labour productivity has remained largely stagnant for almost 60 years (The Wire 2017).



This gives rise to a few important concerns. Firstly, the mere replacement of labour with automation technologies results in a decrease in the share of workers at the original level of overall earnings. Essentially, automation aimed at substituting labour always reduces its share in the overall earnings, since the number of workers engaged has declined. Secondly, considering that automation in most probability will bring about at least some marginal improvements (but not so productive as to give rise to enough new opportunities), the increment in earning is now shared among the smaller section of the society.

The question that next arises is, whether the market is able at all to deliver socially desirable automation technology? Acemoglu and Restrepo (2020) note that when there are multiple competing paths to automation available, the market tends to become parochial and bandwagon on the most dominant path, which is known as the *technological paradigm*. There is nothing that guides the firms to pursue the 'right' technological paradigm, and considering the dynamic and yet to be understood 4th industrial wave, "our trust in the market mechanism getting it right should be even lower" (Acemoglu and Restrepo 2020:31).

The need for tech progress to be productive enough to create additional jobs is not necessarily an economic need. Rather, it is a social need based on equity before an economic one. Such a need thus does not translate into an economic need for the market, which is now not bothered to invent/adopt mere substituting automation which is marginally more productive than their labour counterparts. This is in line with traditional understanding that efficient allocation of resources can, and often is, mutually exclusive to distributional concerns or how the pie is shared.

II. Automation Post Covid-19

Almost all the research and literature relied on up till this point where studies based on trajectories before the Covid-19 health crisis hit the world. The crisis has left millions of people without a job, with an astonishing 122 million Indians having lost their jobs in the month of April alone (*The Hindu* 2020). Moreover, industries that have been affected by Covid-19 are industries which were considered as susceptible to automation even before the health crisis (CSLF 2020). Adding to this, changes in attitudes and social dynamics which prefer physical distance and reduced human contact could potentially drive up the rate of automation. The aim of this section is to highlight the concern that a substantial portion of the labour which was rendered jobless due to the health crisis will discover that their jobs have been automated.

Recession and Jobless Recoveries

Jaimovich and Siu (2018) set out to study the correlation between job polarisation and jobless recoveries, and their analysis has borne extremely crucial findings. For purposes of clarity, jobless recovery is the phenomenon revolving recessions wherein bouncing back of the economy from a slump does not result in a recovery in aggregate employment levels. Or in other words, though the economy as a whole recovers to pre-recession levels, there is no corresponding recovery in the number of jobs that were lost to the recession.

The authors find that over the last three recessions in the USA, a shocking 88 per cent of jobs that were lost comprised routine tasks, indicating that recessions primarily result in deletion of routine-based jobs. They conclude by stating that jobless recoveries are intrinsically linked to job polarisation, since automation of routine mid-skill jobs results in, if not an increase in relative demand of high- and low-skill labour, a hollowing out of mid-skill workers.

Covid-19's Unique Impact on Automation

The Covid-19 pandemic is projected to only increase the rate of automation globally (Muro 2020) and in India (Livemint 2020). India is also posed to enter into a recession (BBC 2020). The health crisis will give rise to a range of varied incentives and motivations to go for automation, which will have the effect of further polarising jobs.



1. Business prerogatives; adjusting business operations amidst lockdowns.
2. Lockdowns throughout the world have made firms look at operating without humans.
3. Changes in attitudes and socio-cultural norms regarding human contact and physical distance may induce employers to opt for automation.
4. Health concerns over sanitation and physical distancing, from workers to customers.
5. Volatility of labour supply in India which has conventionally been considered strictly inelastic. The discontinuation of work by migrant and other workers en masse in mid- to low-skill jobs may provide employers the impetus to consider automation.

A report by NASSCOM (2020) titled *COVID-19: The Tipping Point for Automation*, is very telling on its own. The report notes that global and domestic economy has to take unprecedented efforts to recover from this crisis, and on this path, it will adopt wide-scale automation, whose rates will grow at 'highest-ever rates'. The predictions of this report are in consonance with Jaimovich and Siu (2018.).

The concern raised at the beginning of this section thus garners validity. The Covid-19 crisis will increase automation in two ways. First relates to the recession which India, and the world at large, is posed to enter.

Secondly, the health crisis will bring about new attitudes and changes in commercial, socio-cultural and health related incentives. Dynamics of business operations, workers' needs and consumers' demands will change, giving way to greater automation.

Perhaps what is most concerning of all is that post the health crisis, substitution of labour and replacement of humans with automation technology will in itself be a valid ground. In this case, the productivity effect - which is responsible for generating new jobs - is no longer a concern.

III. Policy Implications

Job polarisation owing to automation falls within the textbook definition of a wicked problem highlighted by Rittel and Webber (1973). It is nearly impossible to definitively describe the policy problem in its entirety, there is no consensus on what approach is considered equitable and it is impractical to label any interventions as optimal.

Yet, something must be done.

This signals towards the need to have pre-emptive safety nets or protective mechanisms in place. To analyse effects as they are unfolding and devise policies is not only next to impossible, but a foolish strategy. We can adopt a principle-based approach, wherein we know the outcome must conform to principles agreed upon. The following two guiding principles are selected:

Do not hamper automation, let the market experiment.

Automation has the potential to bring in substantial improvements in aggregate quality of life and work opportunities. The quest for realising such technology must not be thwarted by restrictive policies stemming from Luddite paranoia.

Right to decent work; do not plan for mass technological unemployment, but facilitate reinstatement.

Work is essential to humans and provides benefits that transcend the individual person it originally concerned. A state of affairs wherein nobody needs to work as technology has taken care of the 'economic problem' - as Keynes (1930) predicted 2030 would be - might not be the most desirable outcome.

W. J. Wilson states that "the consequences of high neighbourhood joblessness are more devastating than those of high neighbourhood poverty" (quoted in Brynjolfsson and McAfee 2016).

Imperative 1: Skilling and Labour Mobility

Oversupply of educated labour in India has resulted in funnelling of mid-skill labour into low-skill jobs (Kuriakose and Iyer 2018). Part of the reason for this rigidity in upward mobility of mid- and low-skill workers is that skilling and other aspects which characterise high-skill workers are acquired from a young age. As highlighted by Vashisht and Dubey (2018) jobs comprising cognitive and analytical tasks demand high-skill labour and are dominated by socially forward castes. It is a well-known fact the schools which matter the most, i.e. primary and secondary are reserved for economically privileged strata of the society.

The government has recognised the need to impart skills to place labour in a better position in the ruthless market. Ministry of Skill Development and Entrepreneurship (MSDE) has launched various schemes to this end. *Pradhan Mantri Kaushal Vikas Yojana* (PMKVY), a flagship scheme of the present government, aims at skilling the youth in industry demanded skills. Skills Acquisition and Knowledge Awareness for Livelihood Promotion also has similar aspirations (MSDE b). Projects in the past have indicated that attempts at scaling up skilling of the workforce have not been met with increase in labour demand/job creation as expected.

These, and other efforts by the government, though well-intentioned, are not steps in the right direction. A key requirement for workers in the coming years would be the ability to undertake cognitive tasks. Though routine-tasks in general get automated, routine-manual is usually affected worse than its cognitive counterpart.

Therefore, as long as skilling is largely based on ITIs, manual skills and other skills which fall within routine-manual jobs, individuals are being skilled for certain failure, as their skills are not desired by the market.

There is empirical evidence supporting this claim. In 2018, a market labour demand survey in India showed that machine operators and technical staff (both of which are extensive routine-manual jobs) were part of the top ten jobs demanded by the industry (ManpowerGroup 2020). The 2019 survey of market labour showed that the top ten jobs demanded by the industry consisted of cognitive tasks.

It thus becomes important to re-envision skilling and education in general. Various labour competencies are determined which people attend at a young age, which is highly class-contingent in India. To right this wrong, we need to stop treating education and skills training as they have conventionally been understood. Workers from all spheres will have to keep re- and up-skilling throughout their careers as and when disruptive technology keeps emerging. We cannot allow labour to compete solely on privilege of good education received in childhood, competencies have to be developed in individuals that go beyond specific tasks. An example of this is soft-skills training aimed at integrating individuals into hotels and accommodation industry - these skills can be utilised across jobs.

Imperative 2: Social Security

There is an urgent need for simultaneously devising a social security measure. If labour mobility turns out to be low, it becomes extremely important to have a social safety net which mitigates the adverse impacts of automation on labour. The job polarising effect of automation will result in two ills revolving social security - first, many mid-skill workers are displaced from formal employment structures wherein they received social security benefits; second, the wage polarising effect reduces the dispensable income available to workers, which could result in reduction in an amount being utilised for health purposes.

While a universal basic pay, without doubt, is the right way to go (Frey 2020), a more actionable and immediate step is to create portable social security funds into which the government, employer, and employee contribute. The instrument would not cease to exist if the employee changes his/her job. The new employer would simply make their contribution to the social security. In today's platform economy of 'on-demand' work (Ola, Uber Swiggy, etc.), contractual digital work and alike, workers simultaneously work for multiple employers, while receiving social security benefits from none of them.



To avoid confusion and unneeded complications, employers would make contributions based on task or set of tasks performed, instead of continuous periodic payments.

A portable social security instrument of this sort will be able to adjust to the trends observed in labour. Firstly, it will help combat the growing ills of rampant contractualisation of work in India which leaves hundreds of millions without access to employment related social security.

The role of the State in financing this fund is important as the funding aspect should not burden industry too much, as it could catalyse automation. The Vice Chairman of the Niti Aayog has recognised this responsibility and stated that in developed economies, social security is extensively provided by the State (Livemint 2017). To this end, India should have a labour fund which helps with provident fund, medical costs and so on (*ibid.*).

Imperative 3: Labour's Competitive Edge over Automation

The last implication draws on the potential inability of the market to deliver socially desirable automation technologies.

Government policies can aim at making labour have the competitive edge over automation in industries where automation is intended to merely substitute labour with capital. This can be done in two ways.

First, we can increase the relative cost of capital thereby disincentivising automation. However, this goes against the first principle of letting automation flow freely.

The second approach focuses on making labour have the competitive edge by implementing beneficial measures made available if firms opt for labour over automation. The Vice Chairman of the Niti Aayog has stated that we must dispense with capital subsidies, and it is time to focus on labour subsidies (Livemint 2017). Such subsidies reduce the cost of labour directly, while protecting wages from dropping below a desired level.

Secondly, employment will have a dynamic nature going forward, with increasing contractualisation and digital platforms wherein workers can sell their labour to multiple employers. Such a situation calls for developing a social security mechanism which is detached not only from any specific employment but also the number of hours. ■

Conclusion

While automation has the potential to increase efficiency and productivity, its effect on labour is polarising. The ongoing health crisis has accelerated the demand for automation, and millions of Indians who lost their jobs due to the crisis might be unable to re-enter the labour force.

These two considerations together make it necessary for the State to intervene. However, such an intervention must respect the rights of the two key stakeholders involved, i.e. firms and workers. Firms should have the freedom to adopt automation technology they deem fit, while workers should be empowered to allow them to take their rightfully deserved share in the economic pie.

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