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## Job polarization and future of jobs in India

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### Abstract

World Economic Forum report on future jobs have brought in wave of questions and expectations about the future job market. Even though technological upgradation is not new to the economy, the pace at which current changes are happening is extreme. Its high time that economies must rethink about theoretical occupational classification and make way to coming changes. Current job market must be reskilled and upskilled to attain the benefits of this change. Job polarization is a not a new term to many countries, developed countries have already gone through job polarization and wage inequality. The wages per hour for high and low skilled are much more than middle skilled in developed countries. India has already felt the impact of job polarization, but the percentage of impact is much less than other developed countries. This paper explains the impact of job polarization in India and why India will be one among those countries most effected by job polarization. Since India's job market is more concentrated on middle skilled employees, with future jobs accelerating its presence in India, it's time to reskill and upskill the existing middle skilled job force to reap its benefits fully.

**Keywords:** Job polarization, future of jobs, Indian labour market

### Introduction

Occupational structure of employment has always changed depending on different factors such as technological change, globalization and labour market institution that alter relative wages of different types of labour. According to different economist the most important driving force among these are technological changes. Right from the beginning technological changes has been the basis for moulding occupational structure.

As per economists' technological changes was biased in favour of skilled workers, leading to the hypothesis of skilled based technological changes. In the past, automation primarily substituted low-skilled workers but now, ICT-driven automation has impacted middle and some high-skill occupations, leading to a 'hollowing out' of the labour market in the middle of the skills distribution. (Bárány & Siegel, 2018) <sup>[6]</sup>

Autor in his study argues convincingly that technology replaces human labour in routine tasks, at the same time cannot replace human labour in non- routine tasks. In his study Author also provides evidence that industries in which routine tasks were heavily used has adopted technology and this has reduced the usage of labour input of routine tasks (Autor D. , 2010) <sup>[3]</sup>. These routine tasks were mainly performed by middle skilled workers. Many lowest paid jobs such as housekeeping, catering, personal care is non- routine in nature and therefore are relatively unaffected by technological change. As a result, distribution of jobs is concentrated more on higher and lower levels at the cost of middle skilled jobs, thus leading to polarization. Job polarization also leads to wage polarization. In many developed countries as a result of job polarization relative wage rate of high skilled and low skilled are much higher than middle skilled workers. India is not far behind this phenomenon, with reports from World Economic Forum, lot many routine and middle skilled jobs are soon to become obsolete. The World economic forum termed that the fourth industrial revolution brings in lots of development in terms of Artificial intelligence, robotics, data science etc, but all these jobs focus on high skilled workers, this shows that middle skilled jobs that require routine cognitive and manual application would be automated in short-term. India's' 65% of global IT offshore work and 40% of global business processing, will face 69% of its jobs in formal

employment automated by 2030 (Frey & Osborne, 2017) [8]. Currently only only 49.2% of India's force is digitally skilled (WEF, 2016).

India, which has 60% of work force engaged in middle skilled, the question that ascends is that whether India can reap the benefits of Industrial revolution 4.0 and to what extend job polarization would impact India.

### Literature Review

(Pankaj, 2017) [16]. This study concludes that the Indian manufacturing sector is not secluded from the current wave of technological change. Technology has reduced the labour demand for a given level of output in Indian manufacturing sector. The adoption of new technology has increased the demand for high skilled workers at the cost of intermediary skills, leading to polarization of manufacturing jobs. But this has also led to wage inequality. Since technology is rapidly reducing the jobs opportunities in certain middle skilled occupations, and renovation of vocational and technical education is much needed to ensure a demand-supply balance.

(Andrea, 2018) [2]. Technology is main base for decline of middling occupation. Large increase in number of graduates contributed to reallocation of employment from middling to top occupations. Workforce accounted for most decline in routine jobs due to technological changes and need for higher skilled employees.

(Nir & Henry, 2018) [14]. This paper discusses about two major labour market phenomena – Jobless recoveries and job polarization. Job polarization and jobless recoveries are linked to each other. The loss of middle-skill employment in routine occupations is the result of economic downturns. Routine employment was relevant in the last three recessions. The contraction in aggregate employment during recessions can be attributed to job losses in routine occupations. Jobless recoveries refer to periods following recessions in which rebounds in aggregate output are conveyed by much slower recoveries in aggregate employment.

(Balwant & Ishwar, 2019) [5]. The study elaborates that the situation of job loss is likely to worsen with emerging industry 4.0 technologies which is more skill-based and capital intensive in nature. This scenario will lead to obsolescence of some occupation and at same time emergence of new opportunities. Even though at present impact is marginal but in long term it will be much higher. The government and other stakeholders such as companies and other employers need to focus on upskilling and re-skilling the existing workforce with new requisite skill and restructure their business models in the light of these technologies to ensure competitiveness.

### Objective

The primary objective of this paper is to theoretically analyze the concept of Job polarization. The paper has also attempted to discuss the future of job market in Indian economy and impact of job polarization on Indian economy.

### Methodology

This research primarily uses secondary data. The relevant sources of the information are collected from published and unpublished sources such as books, magazines, journals, reports, publications, unpublished doctoral dissertations, and the website of numerous online journals, etc.

### Data Analysis

#### 1. Concept explanation: Polarization

Economists refer to the polarization of the labor force, when middle-class job which require a moderate level of skills seems to disappear comparative to those at the bottom, requiring few skills, and those at the top, requiring greater skill levels. (Joseph, 2012) [12]. Autor in his publication mentions that the economy has increased its demand for high-skilled (high-wage) workers and low-skilled (low-wage) workers, while opportunities for middle-skilled (middle-wage) jobs have declined. The shift toward this U-shaped employment distribution is known as job polarization. (Autor D. , 2010) [3]. Job polarization 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 & Siu, November, 2018) [11]. Job polarization is a transformative change where demand for high level and low-level increases compensating the need for mid-level labour. Job polarization was a major trend in many advanced countries like USA, UK and other European countries. It is evident in US and Europe that share of employment of upper and lower skill distribution has increased over the past years. Distribution of job is one of the most important characteristics of any labour market. According to economists the two main reasons for this phenomenon is firstly technological progress and secondly globalization of world economy.

#### Two main economic forces behind polarization:

- Technology - Technological changes has happened in our economy over years.

Computer revolution that took hold in 1990s dramatically changed the way people worked. It created opportunities for highly skilled workers- such as engineers, software developers, managers, financial analysts etc. but at the same time it affected workers performing routine and procedural tasks. Middle skilled manufacturing and clerical occupations are characterized by high intensity of procedural, rule-based activities termed as "routine tasks" (Autor, Levy, & Murnane, 2003) [3]. These tasks can be easily coded in computer programs. As such, rapid developments in computer technology have provided organizations with cheaper technology, which led to the substitution of workers who perform routine task such as bookkeeping, clerical tasks, repetitive production tasks with automated capital equipment's and machineries. In contrast to above scenario cheaper technology complimented non – routine task that are intensively carried out by high-skilled employees and insulated low skilled workers performing non- routine tasks such as hairdressers, waiters, health care aides, delivery boy, truck drivers, plumber, electrician, cleaners because computers and robots are still considered less capable than humans and people prefer personal contact.

For instance: Managers in any organization need a team to do repetitive tasks such as maintaining database, processing data to make better decisions but now with automation analyst, engineers and scientists can pool data from large database and interpret the result within seconds, eliminating the need for middle- skilled employees doing repetitive jobs.

- Globalization – The impact of globalization was more evident in developed countries like US. Offshoring to low-wage countries is typically accompanied by increasing shares of knowledge workers, who generally have much higher overall job satisfaction and are involved in mostly abstract and non-routine work tasks. (Pekkala Kerr & Maczulskij, 2016) <sup>[17]</sup>. Another important impact is wage inequality. In the United States, the occupational polarization of employment has also been argued to coincide with the polarization of wages. (Autor D. , 2010) <sup>[3]</sup>. The reason for such variance in wage was due to the technological advancement and substitution for tasks performed by middle skill workers engaged in routine tasks with inexpensive labour from other countries. It pushed up the wage for highly skilled workers as these changes complimented their tasks with increased efficiency and exerted downward pressure on wages of middle skilled workers.

## 2. Occupation Typology – Task based analysis of job polarization

Occupation typology refers to classification of job, based on certain characteristics and each group in typology are internally homogeneous in terms of its characteristics and externally distinct from other groups. A job typology is either an established framework or it is derived through analytic procedures applied to data at the individual or job level, but in either case job typologies contain groups of jobs that, to a greater or lesser extent, adhere to the principle of internal consistency and external distinctiveness. (Psychology Research And Reference, 2021)

Traditionally, to study impact of automation, jobs were classified based on their skill level (high, medium, low). But this method was not effective in studying how exactly automation co-operates with and affects labour. In order to overcome the difficulties Acemoglu and Autor in their study conceptualized a task-based model which takes into consideration tasks as fundamental units of jobs and accordingly jobs were breakdown on the basis of its repetitiveness and cyclical nature. In this model tasks are classified into routine and non-routine tasks, this is further classified into manual and cognitive task, based on complexity of task involved. One can infer the skill required based on the task to be performed. Routine tasks, whether cognitive or manual constitute mid-skill jobs and automation has substitution effect on it. Whereas non-routine task constitute low and high skill and automation has limited or complementary effect.

**Table 1:** Impact of Automation on Occupational Typologynative

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: Secondary <sup>[13]</sup>

To conclude, As shown in above figure the impact of automation is different for different type of occupation.

Automation has substitution effect for tasks which are repetitive in nature because these jobs can be easily formalized, for example, sales, clerical and operational jobs. But for the tasks which need managerial and creative skill categorized as non-routine tasks has complementary effect and finally impact of automation on tasks which needs personal assistance such as hairdressers, waiters, health care aides, plumber, electrician are limited. (Kuriakose & Deepa, 2018) <sup>[13]</sup>. Job polarization hollows out the middle skill jobs which are repetitive in nature relatively creating higher demand for high and low skilled jobs in economy. In many developed countries the employment share for high and low skilled workers increased at the expense of middle skilled workers. (Goos & Manning, 2007) <sup>[9]</sup>

## 3. Future of Jobs in India

World economic forum in their report clearly showcased how uncertain economies labour market are and how far future of work is being accelerated. According to World economic forum report globally around 85 million jobs would be displaced across 15 industries and 26 economies. Report also highlights about new roles that will emerge as part to adaption to changes.

The skill content of a job held is defined in accordance with the third version of the International Standard Classification of Occupations – ISCO-88. Skill content is divided into 3 categories:

Low Skill Workers – It includes jobs in sales and services and elementary occupation.

Middle Skilled Workers – They hold jobs as clerks, craft workers, plant and machine operators and assemblers.

High Skilled Workers – They are those who have jobs in managerial, professional, technical and associated professional occupations.

As per the reports, jobs that hit the list of top 5 are AI and machine learning specialists, data analysts and scientists, information security analysts, internet of things specialists and big data specialists. Likewise, jobs like administrative and executive secretaries, general and operations managers, assembly and factory workers, accounting, book keeping, payroll clerks and data entry clerks will soon become obsolete. Majority of the jobs showing decreasing trend comes under the category of middle skilled labours. Across key job families, such as in Installation and Maintenance, as well as for Architecture and Engineering and Computer and Mathematical roles recruitment is currently perceived as most difficult for traditional middle-skilled and skilled trade occupations and also office and administrative roles will be among the hardest jobs to recruit for in absolute terms by 2020, apparently partly due to the perceived unattractiveness of the field. (WEF, The Future of Jobs - Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution, 2016) Skills that are higher in demand is of analytical thinking, creativity, complex problem solving, critical thinking, leadership, technology design and programming which are associated with non-routine high skilled jobs.

World Economic Forum also discusses about the opportunities of low skilled workers. The report, defines how new assembly lines in revolutionary process create opportunities for low skilled workers. Machine learning algorithms are carried out using voluminous dataset which needs to be annotated by humans. Humans are in the loop and inspect every piece of data provided to neural networks. Eventhough, factories and manufacturing sectors are

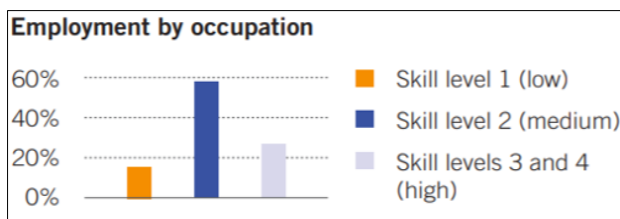


becoming smater, by robots taking care of manual tasks which were handled by human workers, data annotation are new to assembly lines in the age of artificial intelligence. Data annotation represents great opportunity for low skilled workers. It is not true that all jobs created by AI are for highly skilled workers, there are also many new opportunities for low skilled workers. Even after complete automation and upgradation there still remains tasks which needs human support. (Croce & Musa, 2019) [7]

From the report it is evident that majority of the jobs which are at highest risk of obsolescence in near future are mostly done by middle skilled workers. This in deed will create job polarization effect. Developed countries like US, Europe already experience job polarization in increased numbers. As far as developing countries are concerned, they are in the midst of job polarization. Percentage of job polarization in developing countries is increasing at a greater pace.

#### 4. Current status of employment and job polarization in India

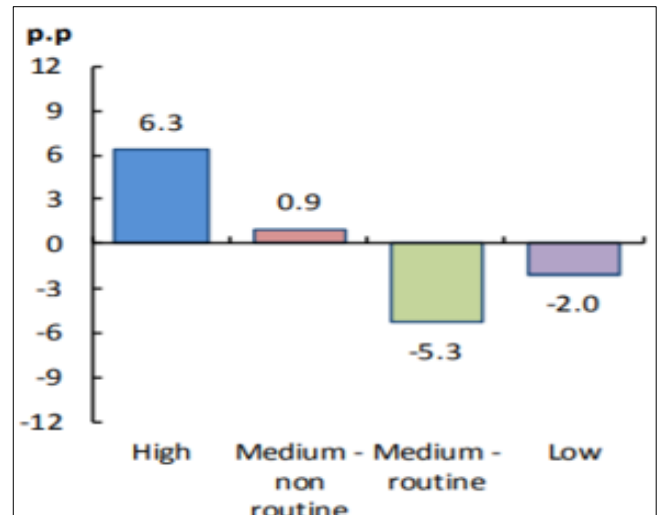
The formal employment in India is heavily dependent on medium skilled occupations. These include clerical, service, administration, trade workers, operations. As per ILO data, nearly 60% of workers are employed in middle skill level.



Source: Secondary (ILO, 2012)

Fig 2: Skill Distribution in India

Above figure estimates that people employed in medium skill level is much higher than high and low skill level. India is one of the major countries which international companies depend upon for outsourcing their tasks. One of the main reason for choosing India is its capacity to provide low cost labour without compromising the quality of work. Quality of work represents India's capacity to provide skilled labour. Top six tasks which are outsourced to India are finance and accounting, Information technology, call center support, administrative support, human resource, insurance back office. All these tasks are performed by middle skilled labour in India. With industry revolution 4.0 all these tasks will soon become obsolete and thus effecting middle skilled workers in India which represents more than half of total employment. This will only add up to current educated unemployment rate. As suggested earlier, middle skilled jobs are at highest risk of obsolescence, which may ultimately lead to job polarization.



Source: Secondary

Fig 3: Evidence of labour market polarization Percentage point change in employment shares by occupation category, 2002 - 2014

India is already amid job polarization of skill demand, with increasing demand for high skilled workers such as managers, supervisors and associates as well as increasing demand for low skilled production workers. On contradictory, demand for medium skilled workers as machine operators, clerks and administrators has decreased. According to WEF report, only 49.2% of India's force is digitally skilled. It shows that India still lack behind for supply of skilled workers in proportion to futuristic demand. India's job polarization is unlike that of developed countries, where polarization is mainly driven by skill-based technological change and trade. In India, supply side factors, especially growth of educated workforce and deviation between output and employment generation have been the main source of polarization. (Kuriakose & Deepa, 2018) [13].

#### Two major impacts of future of work on India economy would be:

- **Disparity between supply and demand of skill** – India's labour force is still widely held by middle skilled labour and at the same time digitally skilled labour only represent 49.2%. Majority of labour still lacks the expertise to handle future work. Moreover, dependency of international organization for India's skill pool would decrease because industrial revolution 4.0 demands more high and low skilled labour than middle skilled. So, there will be a huge gap between supply and demand sides.
- **Wage Inequality** – Job polarization also leads to wage polarization. Recent trends in technology is biased towards high and low skilled workers leading to labour market disequilibrium which would result in higher wage disparity. Elimination of routine tasks and increased supply of workers in low pay occupation, middle skill workers would crowd up in those occupation as a result it will lead to reduced demand and wage for middle skilled workers. Middle waged occupation share will have lower growth compared to higher and lower.
- **Increase number in educated unemployment** - Since major portion of India's labour consist of middle skilled workers. Job polarization would lead to educated

unemployment. Educated youth would find it hard to fit in due to polarization effect. They would either compromise to do low skilled jobs or will be forced to upskill or reskill themselves to meet the requirements.

Future of jobs report provides a forecast of job market in India, over the coming years. It provides overview of projected job creation rates for next five years, new jobs that will emerge and skills and experience that will be on demand for success in emerging environment. Thus, government must undertake huge upskilling and reskilling mission for middle skilled labors to enable them to retain their jobs. A huge reskilling eco- system incorporating the major learning components such as English, AI, robotics, and data analytics needs to be created.

### Conclusion

Previous industrial revolutions took decades to redefine the exiting labour market systems but now, the pace and scale of disruption brought in by Industrial revolution 4.0 is so quick that immediate actions are necessary.

It is important to understand that unless we have a strategy in place to prepare ourselves for upcoming revolution, the gains will not be pervasive. As new job roles emerge with demand for high and low skilled labour, it is necessary to reform the education and skilling infrastructure across all sectors. Industrial revolution 4.0 demands for change in core curriculum content in many academic fields. Nearly 50% of subject knowledge acquired will soon become outdated in just few years. Beyond hard skills and formal qualification, employers are more concerned about their practical, managerial and data analysis skills. World economic forum illuminates list of future skills that will be on demand, on contrary giving emphasis on obsolescence of middle skilled jobs.

Job disruption is counter- balanced with job creation, in coming years there is scope for all new jobs or transformation of existing occupation in terms of skill. Economic forum report highlights that 97 million new roles may emerge that are more adapted to new division of labour between humans, machines, and algorithms. Based on the report by WEF in the Future of Jobs Survey 2020, employers expect that, by 2025 15.4% of the workforce engaged in redundant roles will decline to 9% (6.4% decline) and that emerging professions will grow from 7.8% to 13.5% (5.7% growth) of the total employee base of company respondents. (WEF, 2020) Job that are at forefront are related to AI, robotics, data science, cloud computing, materials engineers in the automotive sector, social media specialists in the consumer sector and Ecommerce, Fin Tech engineers in financial services, renewable energy engineers in the energy sector, biologists and geneticists in healthcare and technicians in mining and metals. These roles are more concentrated towards high skilled employees and at the opposite, roles such as data entry clerks, administrative and executive secretaries, accounting, payroll clerks and bookkeeping, auditors and accountant, business services and administrative assembly managers as well as factory workers which are to be redundant by 2025 remain largely consistent to middle skilled employees. India's demographic dividend gives it an edge. But to take advantage of it, the education system needs to restructure to meet demands of the future workforce for multi skilled professionals and

those capable of working with machines, data and algorithms.

COVID-19 pandemic situations has accelerated arrival of future of work. Disparity between supply and demand for high skilled labour and increased educated unemployment due to job polarization would make drastic impact on India. India is still in the edge of recovery from pandemic but the pace at which industry revolution 4.0 is approaching, its high time that policy makers take immediate action on upskilling and reskilling existing workforce and adapt to changing needs.

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