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An International Perspective on how Artificial Intelligence Affects Employment across Industries

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The history of the last three industrial revolutions is a testimony to the fact that though the nature of jobs might have changed over time, but today we have more jobs (and output) than ever before. Despite the previous three industrial revolutions, the total workforce participation rates today in most of the countries are higher. The debate about machines replacing humans and the impact of technology on jobs is very old (Leontief, 1952) and is still on. The technological changes will affect skills, occupations and industries in all the countries. The affect may be less on some and more on others and it may benefit some and harm others. Technology through increase in efficiency and productivity has helped to produce more and at a lower cost bringing in expansion of markets, increasing GDP, employment and even its welfare. It is true that during the transition, workers in some sectors may be displaced but not necessarily for the total economy. Each new technology may bring some destruction of the traditional jobs but it may also create new jobs and new equipment- the process is Schumpeterian (1942) 'creative destruction'. The new industrial revolution I 4.0 triggered by AI (automation) will also exert its influence on people's employment. AI on future expansion may bring opportunities and challenges to the labor market of multifarious industries. It has the potential to reshape skill demands in industries and occupations around the world. The digital technology has already created millions of technology nomads who can work from anywhere and for anyone.

AI has threatened many jobs across industries, especially where jobs are repetitive and data driven- both low skilled and high skilled. AI has altered and changed the jobs of humans in industries of logistics, electronics manufacturing, auto- industry, food industry, construction industry, security services, banking and insurance, travel, accounting, tele-marketing, stock trading, etc. but most AI applications are targeted toward automating just some specific skills performed by specific occupations. The number of robots in use, which on an average may displace 1.6 manufacturing workers, worldwide multiplied three-fold over the years to 2.25 million, according to a June 2019 report by Oxford Economics. It is feared that over the next 20 years, the number will multiply even faster-could reach 20 million by 2030 and factories could 'light-out' production, i.e. they can operate without the presence of human workers. Some doomsayers estimate the loss to be 47% in US (Frey and Osborne, 2017), 35% in Finland

(Pajarinen, et.al 2015), 59% in Germany (Brzeski and Burk 2015), 45-60% across Europe (Bowles, 2014), 17-18 % across ASEAN countries (WEF, 2018). WEF in its Future of Jobs report (2018) also finds that 50% of the companies expect that AI will lead to some reduction in their full-time workforce by 2022. The report also however finds that '38% of the businesses plan to extend their workforce to new productivity-enhancing roles, and more than a quarter expect automation to lead to the creation of new roles in their enterprise'. There are however, many optimists from industry to politics (Barack Obama, Satya Nadella, Sunder Pichai, Bill Gates, Jack Ma, Elon Musk; among many others) who believe that AI is positive and will help the economy in unimaginable ways to increase efficiency and boost economic wealth if AI is adopted and adapted carefully. The optimists argue that while machines are good in repetitive works and may take over some of the manufacturing units and replace humans but the machines still cannot substitute human's creativity, genius, emotions, love, empathy. It can create wealth but not necessarily happiness. Unlimited human creativity will invent new products, new ideas, new needs and always new works to do. Today the way we work and we live has changed and new changes will emerge. Longevity of life will need and create jobs in health care. More participation of women in labor market will demand better child care. Increased tourism will require more and better transport, hotels, etc. and will create million of new jobs despite digitization. Within AI, there will be huge demand for jobs of machine learning engineers, robotic engineers, computer vision engineers, big data and AI scientists, cyber security experts, private service providers, etc.

Since AI has altered the skill requirements of the jobs, so the problem is basically the skill mismatch between the existing jobs and future jobs. All AI jobs are, however not for only highly skilled persons, it has also created new opportunities in the job market for others. In US, the proportions of high skilled workers and the low skilled workers have increased from 25.2% to 38.6% and 13.7% to 18.2% respectively over the period 1979 to 2016. So, jobs have loaded on both ends and contracted in the middle skills- thereby in the process also increasing inequalities of income. In India, much of the 'skill mismatch' problem is more at the middle skill level and many unskilled and semi- skilled persons are now employed in 'data labeling'.

The only solution to escape from future job losses is to invest in education and skills - train and retrain the workforce, especially the poorest of the poor to prepare them for the future jobs which for sure cannot be predicted because of uncertainty in predicting technological change and the skills and the occupations it will adversely affect. Humans and machines have to work in partnership in decisions making because AI is based on data and if data is flawed, then decisions based on AI will be flawed.

In view of the divergent views on the effect of AI on different industries (micro effect) and on the economy (the macro effect), it is pertinent to dig deeper into the available evidence for different countries. The paper will endeavor to explore different data sources, despite the flaws, for a better understanding of the impact of AI on jobs. It will focus on the skills, occupations and the industries which are likely to be impacted in selected countries.