Joblessness And The Importance Of Reskilling In The Fourth Industrial Revolution

Maximilian Leschenar
Saxion University of Applied Science
Enschede, CA 94022, USA
maxleschenar@hotmail.com

Abstract
The fourth industrial revolution is currently underway and in the process of revolutionizing almost every field of work. This revolution will most likely lead to an increase in joblessness based on more jobs being automated than new ones will be created. In this paper I discuss this fear and others regarding the further automation of advanced industry and possible ways to fight this. I will also name some other possible socio-economic dangers and challenges which come through the process of automation and integration of robotics and the new demand for certain more advanced specialization which come from the newly created jobs. In general, I will name the most glaring issues coming with automation when it comes to the issue of joblessness while also discussing the importance of using reskilling to solve these by further schooling the new workforce to match the demands of the evolving industry and other measures.

Author Keywords
Automation; Wealth gap; Socioeconomics; Robotics; Poverty; Joblessness

Introduction

New technology has always been a cause of fear. Looking back at great invention of the past like the printing press or electricity one notices these were always connected with the fear of the unknown and the possibilities connected. This primal fear has always sprung up if we look at the three previous industrial revolutions our industry went through, were it has always manifested as the fear of job loss. An early example of this would be the Luddites, craftsmen who lost their job because they were automated by new machines introduced during the first industrial revolution. These Luddites who, beginning in 1811, started destroying the very factory equipment that had caused their job loss. While these people lost their field of work as a victim of automation, a lot of new workplaces were created, which in the long term led to increased living standards for most of the European population. There are a lot of similarities between these fears from over 200 years ago and the up and coming 4th industrial revolution which just like back then seeks to replace human labor with automated machines. This new industrial revolution mainly takes place, because automated labor is advanced enough to replace even difficult manual labor which previously had to be done by humans. Since the work which is being automated is so advanced the chance that not enough jobs will be created and the once which will be created will be so advanced that previous factory workers will not be able to pick them up. This huge amount of job loss would lead to millions of jobless workers which would further deepen the already deepening socio-economic gap between the rich and the poor. The question now is how we solve these issues and while still maintaining the positive impact of automation.

The fourth industrial revolution

"The fourth industrial revolution" or as it is also called: "the second machine age" is a general term to describe the current trend in most industries towards automation and implementing robots to replace human labor (1). The term itself was first coined by Klaus Schwab, founder and executive chairman of the World Economic Forum, in the article "The fourth industrial revolution" which was written in 2015 for the publication Foreign Affairs. There is not **A** set date on when the third industrial revolution, which was defined by the digitalization of the workplace by the usage of computers, merged into the fourth, but what caused it and what it will be defined by is already clear. There are three main developments one can look at to see what started this fourth revolution all of which are heavily intertwined(2):

1. Digital development
   The digital development has advanced the most in the last years and is therefore one of the main reasons behind this new era of technology. Many of the advances made in other field are also enhanced by these new digital developments. The main technological advantages responsible for kicking off the fourth industrial revolution are:
   - digital platforms
   - Internet of Things
   - Cloud computing and the shrinking of data saving mediums
   - Advancements in AI

   All of which allow for easier communication and production methods which increase productivity (1).
2. Physical development

Kommentiert [ВД1]: Ok but how know

Kommentiert [ВД2]: Wer ist sors?

Good Utilization of the Side Bar

Preparation: Do not change the text box size or position. Do copy text box to other pages. You may change the surrounding box to be visible or invisible, up to you.

Materials: This cannot appear higher or lower on the page because of pagination and specific headers added during the indexing and pagination process. A 0.75 inch rule is beneficial to break this apart from the body text. The text in this text box should remain the same size as the Body Text: 8.5 Verdana or Arial (with use of **bold** and *italics* to highlight points)

Images & Figures: Images and figures can be placed in this section. They should be captioned in the manner of other images and figures.

This field of development was heavily depended on the development which happened in digital technology as the main new development, self-driving cars are heavily dependent on new Artificial Intelligence to work. Another notable development is the invention and widespread use of 3D-Printers.

3. Biological development
   The main developments in this field are mostly that, thanks to advanced computing powers, we are now able to easier work with genomes and that we are now able to produce neurotechnology advanced to enough to simulate actual limbs for people with prosthetics. (3)

I am mostly going to focus my attention on the first two as the potential for Job loss it the biggest based on the technologies invented in them.

Automation and its possible effects on jobs

Both the digital and the physical developments have the potential to replace huge amount of labor which is currently done by humans. Huge innovations for instance the advancements in artificial intelligence have made it possible to automate entire fields of work which have existed for thousands of years. The jobs most endangered by this are mostly focused on manual labor with repetitive tasks in factories. A study conducted by Carl Benedikt Frey and Michael Osborne(4), which studied the US labor market in 2013 on how many jobs are in danger of automation, estimated that about 91 percent of mechatronic technicians and 97 percent of assemblers could be replaced by robots by automation.(5) The same study, conducted by Frey and Osborne which was one of the first major studies engaging with the possible danger of automation, estimated that 47 percent of the US employment is at risk of being automated in the next two decades.(4) This estimation would have catastrophic effects on the job markets and the economy. But this study has also been criticized for how it doesn't consider that even though most jobs which could be replaced often do require work with which machines still struggle with, for instance problem solving or influencing. (6)

More modest studies place the amount of jobs which are going to be automated at about 25 percent of the American job market.(8) If you apply this to the population of working Americans, this amounts to about 37 million people who are going to lose their job (7).Most of these jobs will be in the administrative sectors as computerization increases even further. But the transportation industry will be impacted from this harshly as well as self-driving vehicles become more common. In the US alone this puts 4.8 million jobs at risk (9).

Job gain in the fourth industrial revolution and its problems

While automation puts a lot of jobs at risks it will also create a lot of new jobs which will be closely connected to the new technologies coming with "Industrie 4.0." as it is called in Germany. Estimations vary wildly on how many new jobs will be created but it is already clear that these jobs will most likely require a higher education than the ones they replaced as a lot of them will center around maintain and creating the advanced software and hardware for the new robots.(8) At this point in time there are 3.6 million software developer in the US alone and it estimated that this number will continue to rise.(10)Not all of the jobs created will deal with software

and computers. For every 10 software jobs created, another 5 are added to other industries connected with it.(11) But this carries another problem with since low skill manual repetitive work is replaced by high skill work a lot of people whose jobs have been automated have to know switch their field of work and receive further education if they want to stay competitive in the job market.

Retraining as the Solution

Even though the high skill ceiling could affect a lot of people, especially older generations, it is the only way we can possibly prevent huge parts of the population going jobless. Most companies have already realized this and 65% of companies already invest into reskilling their current workers to fit with current demands. (12)And the necessity of this is immense as it is predicted that even though not all of these workers will be automated 54% will still require reskilling(14). Most of this reskilling can be done under 6 months but 35% of these employees require training that will take longer than 6 months to complete and about 10% will need longer than a year of special training to get up to industry standards.(13) The most prominent skills which are being thought are technology design and programming to fill the ever increasing demand for more soft and hardware developer. But other more creative skills are also being promoted as these become more valued as creative jobs are not in high danger of being automated. One problem that comes from a lot of workers needing to be retrained and this taking a while is that the quickly evolving software industry can change direction very quickly and has done so often enough and not every industry has adapted to this yet.

The thing that is currently still hindering reskilling the most and therefore endangers millions of jobs is the unwillingness of companies to reskill more of its workforce as currently companies are mostly focused on reskilling high-performing employees while only 33% of companies want to focus their reskilling initiative on workers who are actively being threatened by automation(13). This means that the ones who need the reskilling the most are less likely to receive it even if they are willing to learn it. Which means as a policy solution that companies should be encouraged to reskill their workers.

One way to do so would be by taxing companies who are not likely to reskill their workers and by subsidizing courses done towards closing the skill gap and creating companies focused on reskilling employees of other companies. This would give a financial incentive to reskilling as it currently costs around 24.800 US Dollars to reeducate one worker which is considered to much for most companies. (15)

Conclusion

For us to fully enjoy the advantages coming to us via the fourth industrial revolution we must look at its current projected problems and how to solve them. The possible job crisis at hand can be meaningfully handled by reskilling large amount of the displaced workforce which is the only way we can retain our current high employment levels in most industrialized nations without overloading our social systems. Even if the challenge of reeducating huge amount of our current workforce is a big task and the financial burden is a hefty one it will be worth it in the end as it will ensure future prosperity and job chances.

1. http://orizonturi.ucdc.ro/arhiva/khe-vol8-nr1-2016/09.%20Petre%20Prisecaru.pdf
2. https://link.springer.com/content/pdf/10.1007/s11769-017-0890-x.pdf
3. Hochberg L R, Bacher D, Jarosiewicz B et al., 2012. Reach and grasp by people with tetraplegia using a neurally controlled robotic arm. Nature, 485(7398): 372–375. doi: 10.1038/ nature11076
4. https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf
5. https://s3.amazonaws.com/academia.edu.documents/50842050/2016industrie40.pdf?response-content-disposition=inline%3B%20filename%3DThe_Fourth_Revolution_The_Transformation.pdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWOWYYGZ2Y53UL3A%2F20200115%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20200115T145609Z&X-Amz-Expires=3600&X-Amz-SignedHeaders=host&X-Amz-Signature=87264fa82719223a6d2bb29d0fb7756114b1e67914521f9b0c0922fa2f0cdfec
6. file:///C:/Users/maxle/Downloads/arntz_gregory_zierahn_2017.pdf
7. https://www.statista.com/statistics/269959/employment-in-the-united-states/
8. https://www.brookings.edu/wp-content/uploads/2019/01/2019.01_BrookingsMetro_Automation-AI_Report_Muro-Maxim-Whiton-FINAL-version.pdf#page=29
9. https://www.bls.gov/careeroutlook/2015/article/transportation-and-warehousing.htm
10. https://www.daxx.com/blog/development-trends/number-software-developers-world
11. https://www.tandfonline.com/doi/pdf/10.1080/00131857.2016.1177412?needAccess=true
12. http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
13. http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf
14. http://www3.weforum.org/docs/WEF_Globalization_4.0_Call_for_Engagement.pdf
15. http://www3.weforum.org/docs/WEF_Towards_a_Reskilling_Revolution.pdf