Candidate 1 evidence

Will the global costs of Artificial Intelligence and technology outweigh the benefits? Word count - 4153

Section one – Employment (Number of jobs)

As part of this new era of technology workers are facing an uncertain time. For the technology to be made, workers are needed, they need to design and programme and manufacture. However, the technology that is being made can now do all these jobs faster and better than human workers.

The loss of jobs

An article from The Guardian[3] has stated that UK factories are laying off workers at the fastest rate for seven years due to costs of manufacturing. This highlights how AI and technology is now capable enough to replace workers and is actually better to businesses than humans. Despite the large upfront cost of these technologies, they are faster at working, consistent high quality, removes potential for human error, can work 24/7 and requires no holidays or bonuses. The impact of this is it could lead to a fall in demand for workers as firms choose the technological alternatives whilst at the same time the supply of workers is the same, if not growing due to population increases. This is especially detrimental in the UK as labour costs in factories is already higher than in other countries, so businesses have moved abroad for the lower production costs, major European countries including the UK have 10-20%[4] higher production costs compared to China, so this has already caused a fall in who is being employed by these manufacturing firms. This has created large economic costs as lost jobs has a knock-on effect into the spending in the economy, the tax received by the Government and the loss of skill of workers.

An article by Deloitte[5] describes research by Organisation for Economic Cooperation and Development which states that 14% of global jobs will be eliminated and 32% will be disrupted by the increasing capabilities of technology meaning the workers are likely to be demanded as much. This highlights the ever-growing shift to the left

[3] https://www.theguardian.com/business/2019/dec/02/uk-factories-are-laying-off-workers-at-fastest-rate-for-seven-years?CMP=Share_AndroidApp_Gmail

[4] https://www.sellerlabs.com/blog/chinese-manufacturing-affordable/

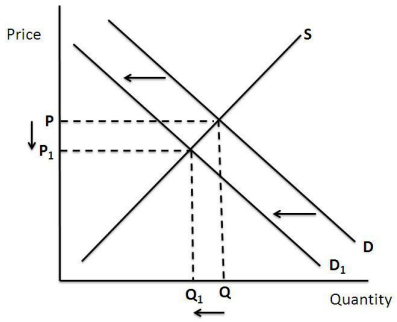
[5] https://www2.deloitte.com/us/en/insights/focus/technology-and-the-future-of- work/redefining-work-workforces-workplaces.html

of demand for workers in the labour market (Diagram one) which will then lead to a fall in average and disposable income and therefore lowered spending and decreased standard of living.

A report by McKinsey[6] has also performed research that indicates that 50% of work is technically automatable, 6 out of 10 jobs current occupations are at least 30% technically automatable and that by 2030 over 800 million workers may be displaced due to this rapid advancement of technology which has already occurred, and which will most likely occur in the not too distant future.

Diagram one

Supply and demand curve representing fall in demand for workers in the labour market



On the other hand, the is a record number of workers in the UK (lowest unemployment) means that supply of workers is falling as they are filling all the jobs, therefore suggesting that the supply is also shifting left meaning that firms are having to pay higher wages (according to the Office of National Statistics[7] the average salary in the UK rose by 3.5% from 2018 to 2019. This however may again lead to the fact that machines are replacing workers because as the cost of human labour is rising, managers may then be encouraged to decide to make the large upfront investment in technology, replacing the worker and eliminating the job.

[6] https://www.mckinsey.com/~/media/mckinsey/featured%20insights/Future%20of%20Organizations/What%20the%20future%20of%20work%20will%20mean%20for%20jobs%20skills%20and%20wages/MGI-Jobs-Lost-Jobs-Gained-Report-December-6-2017.ashx

[7] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annualsurveyofhoursandearnings/2018#measuring-this-data

New types of jobs

However, despite this drop-in demand for workers, unemployment in the UK is at its lowest since 1944 to 3.8% in March (Get newer figure nearer hand in) and an article by The Guardian[8] research carried out by PricewaterhouseCoopers reports that AI and technology will create 7.2 million jobs and that from their data they believe that there we be the displacing of 7 million workers, and therefore AI and technology is actually a net job creator. This means that the UK should benefit in several different ways from technology; technology can do the dangerous and boring repetitive jobs we don't like doing, it will provide more jobs leading to high disposable income which will also mean that standard of livings will increase and spending will increase leading to higher tax income for the government to then spend back on society, especially since it seems to be the end of austerity with the Conservative party promoting the fact they are going to increase government spending under this new term.

Research conducted by the World Economic Forum (WEF)[9] has also said that AI and technology in the future is going to have a net increase in jobs globally. Their data states that 75 million jobs will be displaced by 2022 however 133 million will be created.

However, these new jobs being created are likely to be in different fields. WEF[10] has stated that many of the jobs are likely to require skills in technology which could prevent many workers switching fields (workers may not be occupationally mobile to change to the new jobs). The jobs which are being taken over are those such as accountants which can be heavily automated and the jobs that are to be created are predicted to be those such as AI assisted healthcare technicians. These jobs require different skills and even if workers are able to find training and willing to transition fields, it will bring high levels of cost and assumes that workers are going to be capable of retraining efficiently and that there is a sufficient amount of training programmes for the vast number of displaced workers. These jobs may also be in

[8] https://amp.theguardian.com/technology/2018/jul/17/artificial-intelligence-will-be-net-uk- jobs-creator-finds-report
[9] https://www.bbc.co.uk/news/business-45545228
[10] http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf

different places around the global and so are therefore not geographically mobile, for example, these new jobs are likely to arrive in the most technologically advanced countries such as Norway and Japan (according to Global Finance Magazine)[11] rather than less advanced countries such as India where many jobs in low cost production may be taken over by newer, more efficient technology. This could therefore be harmful to the development of emerging countries as well as leaving unemployment pockets throughout countries where the region depended on jobs which have now been taken over by AI and technology.

Another piece of research conducted by the World Economic Forum[12] states that these new technologies may be eliminating some jobs, but they are also augmenting others. Data gathered suggested that where 1 million jobs may be lost, that 1.75 million will be gained. This shows how jobs in the future are likely to change, they will no longer be physically completed but they instead will be data driven and machine powered, likely meaning that jobs in the future will be higher skilled than those of the past meaning that education may become even more prominent. This stat contradicts with the stat from PricewaterhouseCoopers as there is a 6 million difference between the two publications. This exemplifies why there is such doubt within the economy of what the impact of the advancement of technology is going to have as where people would usually look to professionals for answers to give them certainty, they are receiving many different, opposing data collections and statements. I believe that the research by PricewaterhouseCoopers is more accurate as from other data shown AI and technology is having a large impact on the economy so I see a greater number to be more accurate.

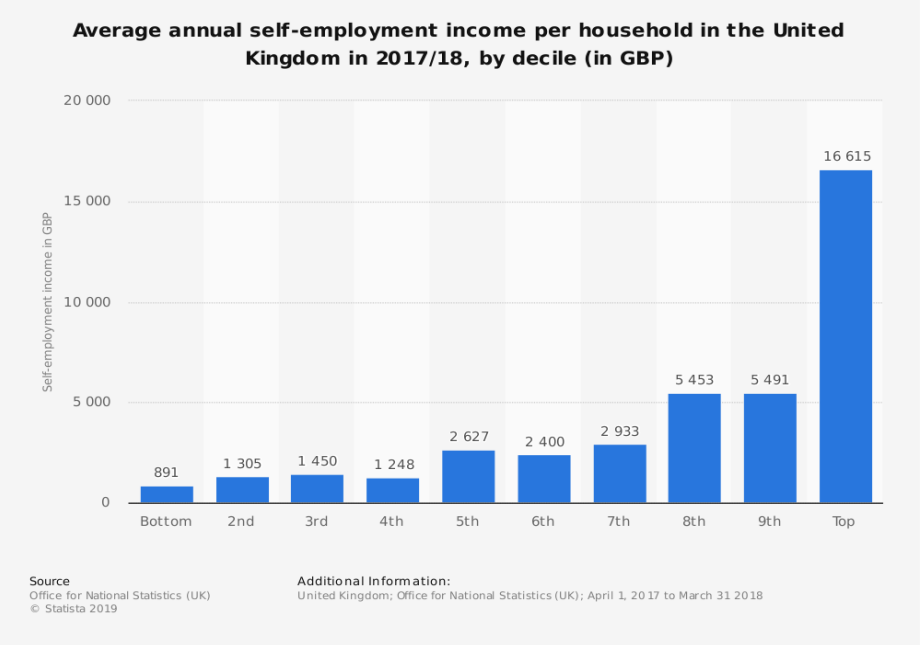
Self-employment

Another reason why unemployment has reached this new low is there has been a large increase in those who are self-employed. In the UK a record high of 4.93 million[13] people are self-employed which has led to the redundant workers actually becoming

[11] https://www.gfmag.com/global-data/non-economic-data/best-tech-countries
[12] http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf
[13] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/trendsinselfemploymentintheuk/2018-02-07

more efficient as instead of being unemployed they are working for themselves. Being self-employed has also become more of a viable option for those willing to try it, however, the UK Government have estimated that the average weekly income is only around £240,[14] compared to £400 of those in full employment. Despite this however, it is improving as the UK Government all assessed that the estimated annual earnings have risen from £10,400 to £11,300[15] meaning that there is growing potential in the area.

Diagram two



There has also been growth in the freelance and contracting labour industry as workers have chosen to become freelance due to technology replacing their previous roles. An article by Upwork[16] states that freelance work is up 8.1% in the US and that this is faster growth than the total workforce which is only up 2.6%, meaning that the freelance area of work is growing due to more than just their general number of people working. One of the reasons for this according to the data found was that self-employment meant that individuals could balance their lives better as well as an

[14] https://www.ons.gov.uk/articles/trendsinselfemploymentintheuk/pdf
[15] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/500317/self-employed-income.pdf
[16] https://www.upwork.com/i/freelancing-in-america/2018/

increase in tax deductions. On top of the fall in taxes from the tax deductions is that on average, self-employed have a lower income than those in full time employment by an employer. A study carried out in 2018 has estimated that there has been a £5.3 billion loss of public finances due to the rise in self-employed. The impact of this fall in taxes being paid by a proportion of the self-employed being on low incomes to the Government is that they are likely to reduced spending on certain areas which will lead to a fall in services provided and therefore a decrease in standard of living and this could lead to a rise in the poverty rate in the UK as more households will have reduced income.

Training available to retrain

Due to the likely change in jobs training is going to be a necessity for many workers from different fields. In an article from Economics Today Magazine[17] says that "Temporary and part time workers are less likely to receive training" and this is an issue as in the UK there is 800,000 temporary workers[18] and 8.5 million part-time workers.[19] The impact of this will be that the UK will have a large number of unskilled individuals in the workforce and that the workers who aren't skilled are still of a working age, therefore leaving a large number of unemployed as they can't fill the jobs that need filled. The impact of this is it will lead to a fall of GDP in the UK as jobs can't be done as well if at all if there are not enough workers to do the work as well as there being unemployed resources meaning that firms are not being economically efficient.

[17] Ellis, B., 2020. Reasons for low UK productivity growth in last decade. *Economics Today*, (4), p.27.

[18] https://www.independent.co.uk/news/business/news/uk-economy-latest-agency-workers- employment-workforce-labour-resolution-foundation-research-a8202686.html

[19] https://www.statista.com/statistics/621607/total-number-of-persons-employed-part-time-in-the-uk/

Section conclusion

In conclusion, employment is likely to have a net benefit due to the advancement in technology and AI. It is creating new jobs in the labour market as well as taking them away. However, these news jobs are likely to be in new fields, requiring different skills and potentially located in different areas to where they are needed and accessible. For some they may be able to retrain but for many others they don't have the resources facilities or mobility to do so. On top of this those choosing to go self-employed are then more likely to have a lower wage and therefore a reduced standard of living.

Section two – Environmental impact

Introduction to topic

The advancement of technology has been a huge creator of environmental damage, the destruction caused in the attainment of raw materials, carbon footprint of transporting the materials and fossil fuels burnt in the manufacturing have all harmed the planet in unimaginable ways. However, despite this the advancements of AI and technology are providing solutions of reducing these harmful gases being produced. For example, electric and hydrogen cars and being manufactured, lowering the amount of fossil fuels used, but on the other hand, in the production of these cars there is a huge carbon footprint.

How AI and technology advancement is helping the environment

An article from the European Automobile Manufacturers Association[20] states that despite the number of cars produced rising from 11.9 million cars in 2013 to 17 million in 2017 (latest stat available) that the environmental impact has been reduced. CO2 emissions fell by 24% since 2008 and despite the fact that it is still producing a huge amount of pollution, the advancement of technology in the production of cars and how cars are powered in ways such as advancement of renewable energy technology has allowed this fall in harmful gases being released.

An article from Brookings[21] says that the amount of renewable energy sources created from the advancement of technology such as gas turbines and fuel cells is not only a non-harmful energy source but actually is improving the air quality by the fact that hydrogen and natural gas being used actively helps, rather than the coal and petroleum being used before. An example of this is hydrogen powered agricultural equipment which is replacing petrol powered machinery.

[20] https://www.acea.be/press-releases/article/environmental-impact-of-car-production- strongly-reduced-over-last-decade
[21] https://www.brookings.edu/articles/cutting-through-environmental-issues-technology-as-a- double-edged-sword/

How AI and technology advancement is damaging the environment

The same article from Brookings[22] also states that in the US the energy sector which provides power for houses, businesses, factories, cars, WIFI and anything else that can be thought of creates 85% of total greenhouse gas emissions. The use of coal and petroleum, which are single use fossil fuels, are huge drivers in global warming and that fact that the energy sector is completely irreplaceable means that this damage won't stop anytime soon without the improvement of technology, BUT this improvement will require more energy to develop, therefore still harming the planet.

CarbonBrief[23] reports that after the fastest rate of increasing CO2 emissions in 2018 in seven years, that the increase is set to be much smaller this year. This would suggest that improvements are being made, however, it also means that is it still rising and not falling, meaning that another record high of CO2 emission has been reached. Emissions are expected to be 36.81 billion tonnes of CO2 which is only a 0.6% increase from 2018 (according to the Global Carbon Project). It also states that China was the leading driver in this rise of global emissions with estimates of 0.8%, 6.9% and 9.1% in emissions from coal, oil and gas. This would suggest that technology is to blame as China's top industries are machinery, automobile and steel (which is then used in other technology manufacturing) production.

ChinaPower[24] backs this up as its most recent statistics (2016) says that 62% of China's energy comes from coal alone and that in the past two decades its consumption has gone from 1.05 billion tons to over 3.97 billion. These increases are also happening despite falling prices of renewable energy sources and improvements in those technologies making them valid options for large scale manufacturing. China is also the leading supplier of Solar PV yet they are still so reliant on non-renewables which would indicate that the Chinese government hasn't decided to help ensure that their population is able to receive and use this technology perhaps by not providing subsidies and cost based incentives to purchase.

[22] https://www.brookings.edu/articles/cutting-through-environmental-issues-technology-as-a- double-edged-sword/
[23] https://www.carbonbrief.org/analysis-global-fossil-fuel-emissions-up-zero-point-six-per- cent-in-2019-due-to-china
[24] https://chinapower.csis.org/energy-footprint/

Section conclusion

In conclusion, technology and AI is only damaging to the global environment when those creating it are being irresponsible with the methods of production. Countries such as China are neglecting the environment so that they can use cheaper energy sources such as coal to increase their profits rather than protect the planet. The new technology being invented is helping the planet, new methods of gathering and producing renewable energies are becoming advanced enough to be a legitimate option for manufacturing. As well as this the advancements in fuel cell technology and hydrogen powered machinery highlights the improvements being made.

Section three – Productivity (Efficiency)

Current UK factors impacting recent productivity trends

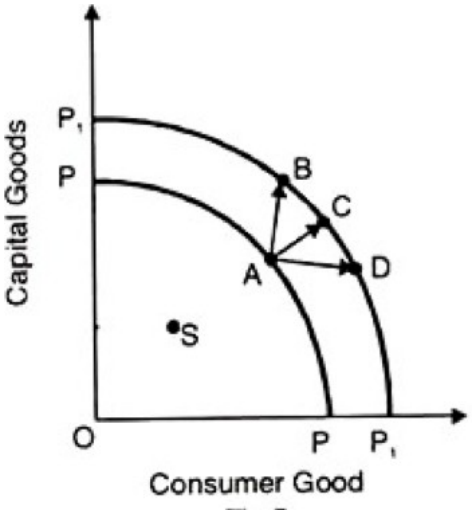
One factor currently impacting the UK's productivity is the low rate of unemployment which is at 3.8%[25] (in 2019 Oct-Dec) which has meant there are more workers turning input into greater output. Due to firms being concerned about the uncertain economic future of the UK they were unwilling to invest in new, high-cost capital so instead hired more labour. This labour is just as if not more efficient than firm's old capital or else they would not be being utilised by organisations so therefore productivity increases. As well as this, due to more individuals having a higher disposable income they are demanding more which means firms are having to increase their production to match the new increased demand and when doing this they are trying to maximise output whilst maintaining lower inputs, therefore, an increase in productivity occurs.

Are we now more productive?

An article by The Guardian[26] states that UK productivity has grown by only 0.5%, barely a quarter of what it was ten years ago. This low productivity has also occurred during the rise in more efficient machines and higher employment which is the opposite of what would be predicted. This would suggest that within the UK economy there is a lack of technical and allocative efficiency which is preventing this improvement in the productive possibility of the UK. This means that despite the outwards shift on the PPC diagram (Diagram 3), the UK is improving its productivity by less and less which will have huge economic consequences such as fall in exports which will have a spiral/knock on effect on the economy such as likely leading to a rise in unemployment and a fall in standard of living.

25 https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment
26 https://www.theguardian.com/business/2019/apr/05/uk-productivity-grows-by-just-05-in- 2018-amid-brexit-uncertainty

Diagram three



Section conclusion

The most recent AI and technology hasn't had a discernible effect on productivity of firm's production as of yet. This may be due to some barriers such as the high skill level required of some employees to use the equipment, as well as the high cost of switching and maintaining the new technology. The result of this is the new machinery may be better and do work faster however businesses are sticking with labour and existing technology as the investment required is too high for them to make the switch.