How Robots' Uptrend Affects the Economy and The Future

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ABSTRACT

There is no doubt that modern technologies have greatly influenced the business world in recent years. All technological applications brought by Industry 4.0 have provided more mechanization and started processes that do not involve people. This revolution is at the initial stage of changing the world order. People can now imagine a world dominated by robots at work. In the 18th century, many people could not have imagined that such a thing would happen. Over the years, humans have perfected the technologies that robots tend to work on. In this article, the effects of the economic system called robonomics as a result of widespread use of robotics, artificial intelligence and automation are discussed. The positive and negative aspects of the effects of the increase in the use of robots on productivity, cost and labor, which are economic indicators, are examined in this article. With the widespread use of robots, it is predicted that more technicians, economists, and mechanical engineers will be needed in the workplaces, as well as unemployment concerns due to the spread of robots to work areas. The mentioned process will not take place in the short term, positions and roles will change gradually. The study has a conceptual aspect, and it reveals the effect of robots on the industrial use from different perspectives.

Key Words*: Technology, Robots, Robonomics*

JEL Classification*: O30, J21, Z10*

Robotların Yükseliş Trendi Ekonomiyi ve Geleceği Nasıl Etkileyecek?

ÖZ

Modern teknolojilerin son yıllarda çalışma dünyasını büyük ölçüde etkilediğine şüphe yoktur. Endüstri 4.0'ın getirmiş olduğu tüm teknolojik uygulamalar daha fazla mekanizasyon sağlayarak insanların dâhil olmadığı süreçler başlatmışlardır. Bu devrim, dünya düzenini değiştirmenin başlangıç aşamasındadır. İnsanlar, artık iş yerlerinde robotların hükmettiği bir dünya hayal edebilmektedirler. 18. yüzyılda, birçok insan böyle bir şeyin olacağını hayal dahi edemezdi. Yıllar geçtikçe, insanlar robotların üzerinde çalışma eğiliminde oldukları teknolojileri mükemmelleştirdi. Bu makalede robotik, yapay zeka ve otomasyonun yaygınlaşması sonucu robot ekonomisi (Robonomics) adı verilen ekonomik sistemin etkileri tartışılmaktadır. Robot kullanımındaki artışın ekonomik göstergelerden verimlilik, maliyet ve emek üzerine etkilerinin olumlu ve olumsuz yanları bu makalede incelenmektedir. Robotların kullanımının yaygınlaşması ile işyerlerinde daha fazla teknisyene, ekonomiste ve makine mühendislerine ihtiyaç duyulacağı gibi aynı zamanda robotların iş alanlarına yayılmasından duyulan işsizlik endişesi de yaratması tahmin edilmektedir. Bahsedilen süreç kısa vadede gerçekleşmeyecek olup, pozisyonlar ve roller kademeli olarak değişecektir. Çalışma kavramsal nitelikte olup, robotların endüstriyel alandaki kullanımına yönelik etkisini farklı açılardan ortaya koymaktadır.

Anahtar Kelimeler*: Teknoloji, Robotlar, Robot Ekonomisi*

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INTRODUCTION

Years ago, philosophers and futurists made some predictions about the rise and dominance of Artificial Ingelligence (AI). They claimed that technology would replace human jobs. The major area of imaginations amongst Hollywood producers and economists is whether we will be having a future that has similar features like "Terminator" whereby robots made more headlines than humans. "Wall-E" is another demonstration of a world taken over by robots whereby people became so fat that they couldn't stand. They got very distracted up to the extent of never realizing the dominance of machines. The argument about work and robot is similar to debates on how the increasing problem of income inequality can be addressed.

Robots have been able to dominate the imagination of many people over the years. This is based on the roles they have played in popular songs, television programs, movies and literature. Despite ideas of machines that are human-like existing much earlier, robot is a term that first appeared in the science fiction of KarelČapek, Rossum's Universal Robots from the year 1920. Fast forward to now, it can be said that robots are no longer imaginary. Instead, they are real characters. They can be found in warehouses, factories and other work environments where they carry out various roles that humans are supposed to perform. Given their functions, they tend to be making lots of headlines. These only shows that they can have a great impact (negative or positive) on jobs being currently undertaken by humans.

Robots are available in different categories. For instance, they were small machines initially with features that are limited. However, today there are robots that look and act like humans. Sometimes they are praised for ensuring increased level of productivity as compared to humans. Also, they are said to make tasks being handled by humans interesting. Finally, they are applauded for helping small businesses to compete favorably with bigger firms. The problem is that there is the fear of them replacing humans in workplaces. This study is also going to examine the effects when robots get introduced as labor in industries. There is a positive and negative side to this development. For instance, on the positive side, it can lead to increased productivity. On the other hand (negative), humans face the danger of being replaced in their jobs. Robots can also determine the jobs which will be created in the future. Furthermore, it can determine the amount of power that an electronic worker is given. This study evaluates all the positive and negative effects of robots.

I. THE RISE OF ROBOT

Since the play, Rossum's Universal Robots was introduced in 1921 as outlined above, there have been lots of predictions about the society being dominated by robots (O'Connell, 2017: 21). Since then, many robots have been designed and created to perform different functions. For instance, robots have been introduced in manufacturing and agricultural fields. Retailing and

distribution, warehouses, self-service cashiers and auto industry are not left out. Robots no longer exist in a world of fiction. Instead, they have been introduced into our daily lives.

Robots are increasingly supporting humans both at work and in their private lives. We can examine robots on two bases as industrial and service robots. Industrial robots are defined by ISO 8373:2012 as being automatically controlled, programmable in three or more axes, mobile or stationary in industrial automation applications. We see that industrial robots are used in repetitive, dangerous processes that require speed and accuracy in the manufacturing industry. Service robots are robots that are used outside of industrial automation, generally have less than 3 axes of application- special design, and can also be used in housework to help people.

There are differences between industrial and service robots. The most important difference is in terms of application areas. An industrial robot is used in the manufacturing field, while service robots are used more in homes and offices. Industrial robots are less flexible in terms of tasks they can do without reprogramming. However, it is more accurate than a service robot.

According to the IFR (International Federation of Robotics) 2020 report, the use of industrial robots have been increasing over the years (Figure 1). Although it increased by approximately 13% every year between 2014 and 2019, this increase could not be shown in 2019. The biggest reason for this decline in 2019 is the pandemic process. It has the largest share in the Asian for industrial robot market. Three important countries stand out in Asia; China, Japan and Republic of Korea. Asia is followed by Europe and America, respectively.

Figure 1. Annual Installations of Industrial Robots ('000 of Units)

Source: IFR Report (2020)
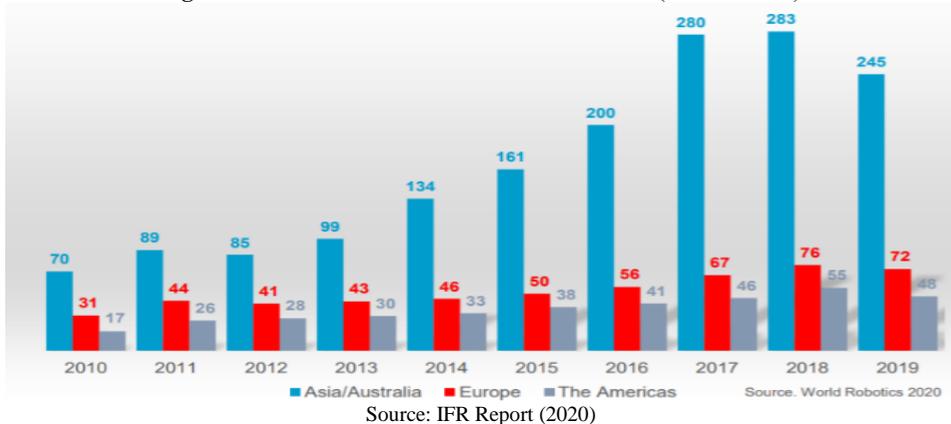
According to the IFR report, the automotive industry has been the area where industrial robots have been used the most since 2010. Approximately 28% of all industrial robot installations are from this industry. Investments and competition to increase production capacities and modernize production have increased the demand for robots. This change and development in the automotive industry has also increased the interest and demand of parts suppliers for robots. At this point, the installations of robots in the electrical / electronics industry have

increased since 2013. However, since 2018, the global demand for electronic devices and components has decreased significantly, and the China-American conflicts have greatly affected the industry.

Figure 2. Annual Installations of Industrial Robots by Customer Industry – World (1000 units)

Source: IFR Report (2020)
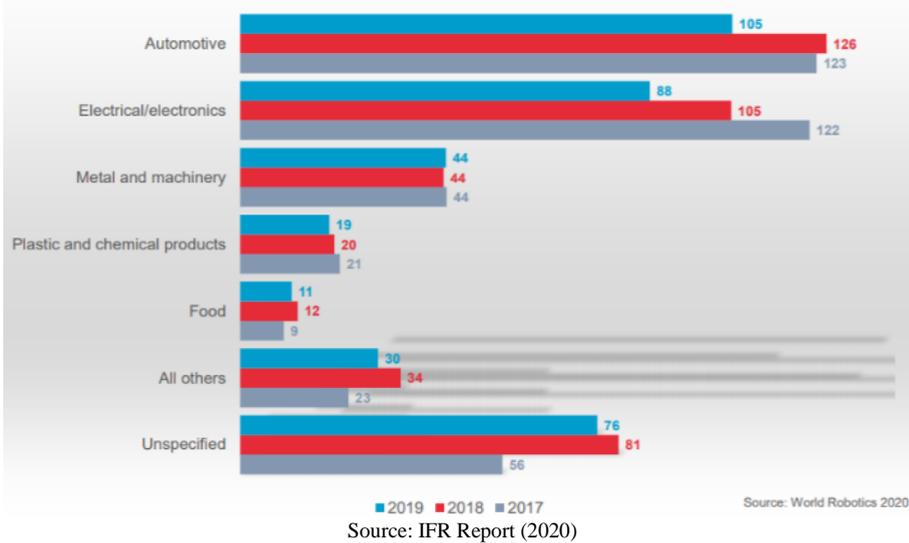
According to reports, analyses and fiction sources have reportedly linked the future with AI and robotics (Amos and Page, 2014: 57-58). Impacts of AI have been highlighted on both print as well as social media articles (Knight, 2015:1; Mollman, 2015:1). This is resulting from the predictions about robot-human interaction (Jozuka 2015:1; Kageyama 2015:1). EU Commission recognizes how important robotics and AI is to the future prosperity of EU. This has led to its funding of PPP (Public Private Partnership) with €700m. SPARC is an initiative which involves more than 190 organizations as well as businesses which had affiliation to euRobotics. They have managed to invest €2.1bn into such project. Neelie Kroes, EU commissioner for Digital Agenda spoke during the partnership launch claiming that such is a perfect chance for Europe. In addition, impacts of AI have been highlighted on both print as well as social media articles (Knight 2015: 1; Mollman 2015: 1).

There have been different forms of people showing interest in AI technology. The media is keen on research and development programs of companies like Google to perfect the technology of "driverless cars". There are forward-thinking governments like China which have started thinking of how to make some huge investments in AI research. Also, firms producing consumer goods like Bosch, Midea and Toyota have invested heavily in AI. These are products that can be used by households and others (Bosch Global 2017: 1; Christopherson, 2017: 1). They are signs that affordable robots will be produced in more quantities which people can make use of at various levels (Fortunati, 2017: 2675).

In an interview with IFR members, robot trends for 2021 were mentioned. Accordingly, robots will be smarter, provide flexible production and supply chains, reduce carbon footprint and can be use in more and different markets. In the next 10 years, robots will be able to easily assess their environment and create rapid responses. They will have the ability to distinguish between an object standing in front of them as a human or a machine, and to make more of their own decisions. Robots will be seen more often in the field of logistics and production area. The use of autonomous forklifts, mobile robots and service robots will also become widespread in the storage and distribution areas of logistics. In addition to the intensive use of robots in the logistics field, the use of robots will be further adopted in service areas such as the retail and healthcare sectors. The impact of robots on the environment is also undeniable. They reduce the carbon footprint in production by minimizing material waste and not needing lighting and heating requirements. Especially in the service area, the use of autonomous robots provides energy efficiency and minimizes their impact on the environment. The pandemic process of 2019 and 2020 caused the desired targets in production not to be met. In this context, it has also caused the targets to change. But with normalization, it is obvious that robots will join our lives more actively especially in the field of production and service.

II. LITERATURE REVIEW

Graetz and Michaels (2003) investigated the adoption and economic contribution of robots in seventeen countries between the year of 1993 and 2007. The results of the study that increasing use of robots contributes approximately 0.36 points to the annual increase in labor productivity and increases the total factor productivity. In addition, it is also stated in the research, although the use of robots reduces the employment rate of low-skilled workers, that it does not decrease the total employment significantly. Frey and Osborne (2017) studied on the sectors with the lowest and highest risk with automation. They stated that the unemployment increased in the sectors that were most exposed to the effect of automation. Dauth et al. (2018) examined the effects of industrial robots on employment, wages and workforce in German. In their studies they did not find any evidence that robots taking peoples' jobs but they replace labor in the manufacturing sector. In addition, in regions where automation is used more, they have obtained results that labor productivity increased while the share of labor in total income decreased. Chiacchio et al. (2018) investigated the effect of industrial robots on employment and wages in 6 European Union member countries. It is in the results of the study that industrial robots are replaced by young and middle-level educated people and there are no solid and important findings about the effect of robots on wage growth. Carbonero et al. (2018) stated that the impact of the use of robots on employment in developed countries is low, and this effect level has been 14% since 2005 in developing countries. Wirtz et al. (2018) conducted a conceptual research of service robots' potential for the future. In their studies', the definition and basic features of service robots were defined and an understanding of what kind of tasks the robots would dominate in service

delivery and in which areas humans and robots would interact. The ethical and social issues surrounding the services provided by robots at micro and macro levels are also addressed. Acemoglu and Restrepo (2018) investigated the effect of automation and AI on labor, wages and employment. They claim that AI and automation improve the level of production with the capital available. As a result, wages per worker increase more and the share of labor in national income decreases. Su (2018) focuses on AI and its impact on structural unemployment. AI will accelerate automation, causing structural unemployment. In their work, the government, organizations and industries indicate that they should be encouraging in the creation of new business areas where AI replaces. Such precautions will also prevent structural unemployment. Cheng et al. (2019) conducted research for the manufacturing sector in China where the use of industrial robots is more than 80%. In their work, they made statements about the adoption levels of robots with using industry and firm-level data by manufacturers. Wang and Siau (2019) explore the promises, challenges and future positions of today's advanced technologies. It is a conceptual research on AIart, automation, machine learning and robotics. Dixon et al. (2019) research at the firm level, they show that investments in robotics increase the employee turnover rate, but at the same time, it is associated with the increase in all employment within the firm. In terms of workforce categorization, they found that the number of employees at managerial level did not decrease, and that the number of employees in non-management business areas increased. They state that robots replace managerial work. Humlum (2019) studied using with data on the interrelationship of employees, companies and robots in Denmark to find out the distribution of industrial robots' usage. Using the case studies, he found that firms increased their output when they adopted industrial robots, fired production workers, and hired technologic workers. In his studies, he states that industrial robots increased average real wages by 0.8 percent, but reduced real wages of production workers working in manufacturing by 6 percent. Saich (2020) claims that AI has a very destructive effect on employment and this situation causes a sectoral translation. As a result of development automation, employment in the service sector has started to increase with the decrease in employment in agricultural and production areas. However, there will be no new sectors for humans with the involvement of robots in the service field. Klenert et al. (2020) assess the impact of adoption of robots on employment in Europe. Unlike many previous studies, they could not find any evidence that robots reduce employment for low-skill workers. They stated that employment and wages can be reduced by increasing usage of robots. Koch et al. (2021) carried out a study on the adaptation of robots to the manufacturing companies in Spain between the years 1990-2016. They investigated which firms adopt robots, what impact robot adoption has on the labor markets at firm level, and how firm heterogeneity in adoption of robots affects the industry balance. They found that larger firms were more likely to adopt robots, the adoption of robots led to significant output gains of 20-25% within four years, and lastly firms that did not adopt robots had

significant job losses. Mutascu (2021) analyzed the effect of high technology and AI on unemployment in 23 developed countries. He concluded that AI has a non-linear effect with unemployment, and that unemployment will decrease only with increasing use of AI at low inflation levels.

III. ROBONOMICS

We are involved in an economic system based on robots, AI and other automation technologies in order to create speed, flexibility and cost advantage in production, in the provision of services in different fields and in various administrative processes. This economic system, based almost entirely on automation rather than human labor, was named Roboeconomics for the first time by John Crew in 2016. current economic theories are based on two main issues; labor and capital. Technology is considered a part of capital. Robonomics, on the other hand, is a subfield of economic theory that analyzes the problems of the economy from the perspective of three factors of production - capital, labor and automation technologies. Although many principles valid in economics apply in roboeconomics, different principles will emerge. Ivanov (2017) lists the features of this economic system for automation as follows;

- The economy is focused on automation rather than labor.
- Few job opportunities for employees as many activities are automated in production
- Disconnection between employment and incomes
- Cost efficiency in production through automation
- Making economic decisions with AI
- Multiple, scattered factories close to customers
- High standardization of services
- Knowledge and creativity replacing labor and capital as a competitive advantage

Robonomics has positive and negative aspects. If we list the positive aspects; It is the elimination of repetitive, dangerous and routine jobs and job stress for people, and people taking more time for themselves. In the long run, such a change will increase the quality of life for people and improve health. On the downside, the automated economic system is the change in employment. Employment is the most important source of income for most households worldwide. Unemployment to be experienced with the increase in technology can cause a social tension and affect all relationships. Although it is seen as an opportunity for people to make use of free time, it can cause psychological problems and social problems created by free time. Besides the technological impact of the robotonomy revolution, there will be economic, social, political and cultural reflections (Ivanov 2021).

With the increase in technology, new jobs cannot be substituted for lost jobs in the short and long term (10-15 years). Those who are unemployed will not be able to adapt to roboconomy in a short time and easily. According to Ivanov (2017) the society will experience unemployment in the short and medium term

and there will be a surplus of labor. Roboconomy will first spread in developed countries and then it will be effective all over the world.

IV. ACCUSATION – ROBOTS ARE LEADING TO JOB LOSS

According to the New York Times, there is evidence that humans are being replaced with robots in various job positions. The Guardian also claimed that robots are likely to replace most workers (25,000) in the UK public sector. Furthermore, The Economist pointed out that robots may displace humans since motorized vehicles have been used in replacing horses. Fortune claimed that by 2030, about 40% of jobs in the US will be stolen by robots. Forbes put forward a very sensitive question by asking what could be next when robots have taken over positions and jobs in organizations.

The assumption of all these publications that robots are made to take over the roles of elementary personnel. Based on this, humans will not have any income. It is very crucial to point out that all of these publications are popular. Stories/publications like these are produced by researchers from higher institutions. Other outlets can use a more alarming tone to explain the situation. However, the reports have shown that there is a lot of concern at the moment given the threat posed by robots to human jobs. These are clear evidence that it is a problem which is becoming more pronounced by the day. New jobs must be created for human beings as simple operational tasks of humans are taken over by robots. Just as it has always been, it is expected that humans will find a way to overcome such robotic automation like past years.

The headlines that robotic technology has managed to create over the years has been noticed by different governments in the world. People are becoming more aware of roles carried out by these machines in organizations. This awareness makes businesses invest heavily in education to prepare their staff for what will happen in the future. Some countries are considering the possibility of adopting income tax on robots. The generated revenue will be used in compensating workers whose jobs were replaced with such robots.

V. THE IMPACT OF ROBOTS ON THE LABOUR MARKET
A. Predictions About Future Employment

Having observed how AI and robotic technology is impacting labour markets, we have decided to ask one major question – what are those jobs that are expected to be replaced by robots in the future? According to Manyika et al. (2017), jobs that will be affected are those which can be automated. Such could be office support roles like accounting, finance, assistants and record clerks. Customer interaction jobs are not left out such as food service workers, cashiers, travel and hotel workers. Also, jobs which can be executed in predictable manner will be affected like farm machinery operation, drivers, food preparation workers, dishwashers, and assembly line workers. Furthermore, roles which are expected to be performed by people with secondary education qualification may require automation. These are office clerks and truck drivers. The automation potential for these two jobs is very high. The first step to be taken for preparation of the labour market is ensuring that occupations which face the risk of being automated

are properly defined. This is the only way that the society can make such transition smooth without any problem being created. The list below contains occupations as well as sector that are likely to be replaced by robots in the nearest future (European Commission, 2018: 6).

- Agriculture has been greatly influenced via the introduction of tractors with self-driving features
- Call centers being taken over by speed recognition applications
- Postal service jobs
- Data entry clerks
- Shop assistants
- Legal clerks
- Bus, taxi and truck drivers
- Tax accountants
- And lots of others

As earlier pointed out in this report, focusing on the economic picture is crucial when carrying out a complete assessment of how robotics and AI has impacted the labour market. In most industries, automation has been based on replacing workers. According to World Bank (2018), in the automobile industry, spot welding can cost around $8/hour when robots are used. However, in Germany, the cost for the same process is around $20 when a worker is used. In Slovakia, the cost is $20. Given the advent of technology, such gap is getting wider. Making predictions about jobs that are likely to be destroyed as compared those that will be created is much easier. For the transition to be smooth, it is therefore recommended that policymakers consider the pros and cons of such development. This can enable them come up with the best strategies to ensure workers still have a source of living.

B. New Job Examples

Furthermore, it is important that new jobs are created as some of the existing ones will be lost to automation and robots. This was supported by Manyika et al. (2017) who claimed that future labour demand will be influenced by several trends. These could be taking care of aged people, improvement of energy efficiency, production of more goods and services, development of infrastructure and building, and investing hugely in technology. Predictions like these are quite vague though. This is because history has shown that automation has brought about creation of new job opportunities. In other words, roles which were not existing before were created. The position of data scientist is a typical example. This professional has the role of analyzing, collecting and interpreting data to enable businesses become more competitive through improvement of their operations. Data scientists are experts with the role of analyzing data. They have the skills required for solving problems that are complex. Also, they are always curious about problems which require their attention. They have developed the combined abilities of computer scientists, mathematicians, and trend spotters. Also, they are well-paid and highly sought after in the world of Information and Technology. When it comes to data cleaning, these professionals are also very

crucial in such process. They also take active part in the development of AI by helping to handle issues related to privacy. Given how companies and organizations are embracing the idea of AI technology, there is every reason to believe that more positions for data scientists will be available in the future. Ethics officers are another example. These professionals are skilled at looking at an organization in a bid to finding out whether its procedures are in line with existing code of ethics as explained by European commission (2019). The advent of AI has brought about various ethical issues. This is a sign that ethic officers will be needed more than ever before.

C. Impact or Influence on Specific Groups

Considering how AI technology has influenced the labour markets in various countries, there is every reason to believe that it is going to affect some groups as compared to others. Women and young people are a typical example. For Europe, this has some vital policy implications. Due to demographic developments in coming decades, it is expected that the European labour force will likely shrink. Aggregate EU labour supply is projected to drop in 2070 to around 9.6%. Labour supply for men will experience a much larger reduction of around-10.6% when compared to that of women which is-9.2%. According to Bain & Company (2018), such development can be advantageous to young workers. Their market value can increase due to labour scarcity. In the same vein, OCED (2018) has claimed that automation will likely affect teenage jobs the more. As compared to older workers, there is a higher risk of automation amongst youth. Given all of these, there is every reason to believe that automation can affect young workers as compared to older workers. In other words, youth unemployment will be more obvious. The occupational choices of young workers will be the major triggering factor for this problem. As revealed by OECD (2018), 20% of people between 20 years and below prefer taking up elementary occupations like refuse jobs, food preparation, agricultural jobs, cleaners, helpers, and labourers. It was also discovered that the number of people who are 20 years and above working in such jobs is about 7%. Also, 34% of teenager jobs can be found in personal and sales services. This occupation faces the risk of being automated in the future. The older people who occupy such roles are only 13%. Given the unemployment situation in some European countries at the moment, a report like this is definitely beginning to generate cause for concern. For instance, in Q4 2018, Spain experienced youth unemployment of around 33.5%. In Greece, youth unemployment is 40%.

Another group of people that will be strongly affected by the embrace of AI technology in organizations is women. According to World Economic Forum (2018), about workers are expected to be affected by such disruptions/transitions. It further claimed that 57% of women are expected to make up such number. A major reason is that there is a higher possibility for women to take up roles that will face automation in the future. A study conducted in 2016 showed that women made up about 73% of cashiers as explained by Taylor (2017). For instance, over

90% of cashiers will likely lose their jobs in the nearest future according to Amazon Go.

The number of men being employed in studies that are related to ICT (Information and Communication Technologies) is 4 times more than that of women. Also, men working in digital sector are 3 times more than women (European Commission, 2018: 7). This is only a pointer that there is a growing gap in digital skills that are gender-related. The expected AI revolution is only going to emphasize the significance of STEM (Science, technology, engineering, and mathematics) and ICT jobs.

D. Productivity & Wages Impact

There are various ways to know the impact that automation and AI will have on employment. Standard of living and wages is how its emergence has affected growth productivity. Although the first 2 industrial revolutions (Industry 1.0 and industry 2.0) brought about increased productivity, they don't have similar impact. With the invention of the steam engine in 1712, the foundations of Industry 1.0 (Industrial Revolution 1.0) began to be laid. The Industry 2.0 period includes the years 1870-1914. In addition to iron, steel and other chemicals have started to be used in the industry, and there has been a conversion from steam energy to electrical energy. Many effects of the Second Industrial Revolution still exist. Refrigerator, microscope, plastic paint. The production growth in hourly output by around 1.5% annually from 1890 to 1920 as explained by Mohajan (2019). During the second revolution (Industry 2.0), there were inventions like communication technology, motor vehicles, chemicals, electricity, changes in conditions pertaining to work and many others. This led to an annual growth in production of around 2.8% per hour from 1920 to 1970 according to O'Brien (2017). In the period we call Industry 3.0, automation in production was started with the use of electronics, information technologies and the internet. The aim of businesses has been to open up to the world with globalization. This period led to the emergence of many different approaches in production; higher quality and cheaper production, efficiency in production, etc. The developments in the field of informatics and communication in this period play a decisive role in terms of production and performance of enterprises.

There were several factors that hindered productivity though. OECD pointed out that global productivity had slowed down as result of increased productivity divergence between laggard and frontier firms. Companies that are operating on international and global level tend to be enjoying growth in productivity. This has only led to an increased gap between them and laggard firms. Technological divergence due to structural changes taking place within the economy will explain a problem like this clearly. Digitization and globalization are typical examples. As explained by McKinsey, the firms which decided to adopt AI technology during its early years of coming into existence are about 20%. These were majorly firms operating in the financial, telecommunication and information technology sectors. Due to this

gap, the growth in productivity never reached what had earlier been predicted. Most of the firms were either reluctant about adopting AI in their daily operations or decided to carry out studies that were not used. Also, there are other factors that can be traced to such gaps. Another which has further widened the gap is that the processes of implementing AI in most firms remained uncoordinated or poorly organized according to Bain and Company (2018). Most of the successful companies began by having to ensure AI is not just adopted straightaway. Instead, they had to define the objectives of such adoption. After that, workflows were redesigned and proper dataset was made available. In order for automation to work as expected, this was crucial in the opinion of OECD (2018). Simply put, this was basically having the company's organization and traditional ways of operation redesigned/restructured. Manyika et al. (2017) highlighted another factor explaining that majority of the technological inventions (consumer-based) have approached their peak. For instance, someone who has bought iPhone 8 will be reluctant about purchasing iPhone 10. This is because there will always be the thought that iPhone 8 has lots of features already. The only time most people will consider the option of having their phones replaced is when such devices are broken or damaged. Furthermore, majority of inventions that robotization and AI has brought are still lagging behind in the area of mass consumption. Based on these challenges, it is suggested that policymakers find a way of ensuring AI technology is fully supported.

It is crucial to take into consideration the fact that although the productivity boom began to experience a decline during 90s, the financial crisis had also contributed. It has brought about a decrease in demand, and unwillingness of companies to invest hugely. With the next industrial revolution around the corner, this has some serious implications. There is no doubt that companies are expecting AI to greatly influence productivity. Some other factors are cost of transition, losses incurred, and many more. These influence the rate at which technologies are adopted in companies. Many economies are yet to be digitalized. According to McKinsey, Europe is only operating at 12% of its digital potentials while US is at around 18%. Majority of the industrial sectors seem to be lagging very much behind. Although financial, ICT, media and other sectors are adopting new technologies, sectors like education, healthcare, and construction are behind. Although e-commerce seems to be generating more sales as compared to what physical stores generate, the former seems to have only contributed only 10% of the entire sales generated. How new technologies are disseminated is much lower than what was experienced with past technologies. Productivity growth can be dampened by this development.

AI has slowly become a reality for everyone. It has been brought into existence to ensure that people live a better life without going through too much stress. The problem is that as AI is getting more efficient in systems, there is the fear of labour force being affected. AI brings about social changes that are technologically-driven. This has some good and bad implications. Maynika et al. (2015) conducted a 2-year research and predicted that by the year 2030, about

30% of human labour may be replaced by robots all over the world. According to Maynika et al. (2017), such automation can bring about increased productivity. In other words, the new era will usher in greater productivity that wasn't recorded in past industrial revolutions. Depending on various instances, it is expected that automation will be replacing about 400 to 800 positions in workplaces by 2030. This implies that over 370 million people will change their positions. Given such huge shift, there is cause for concern both from government, economics, and workers.

E. More Robots Leading to Increased Inequality

Most people are of the opinion that the more automation is promoted in the workplace that is how inequality problem will get worsened. There is no doubting the fact that companies and businesses have experienced increased in productivity. However, it is difficult to predict how introduction and adoption of AI can impact worker wages. This is because numerous factors are usually taken into consideration. Just as mentioned earlier on, the major one has to do with how AI has influenced or impacted productivity growth. There is also the factor of how AI technology has affected workers based on their different skills. A major negative scenario in wage development could be growth in overall productivity being stagnant continually while low as well as medium skilled jobs are being affected by AI. From all indications, it is likely that workers who are highly skilled will benefit from automation. This is due to how they can easily adopt to changes within their work environments. This simply implies that the problem of income inequality can be worsened by automation.

In the US as well as other developed countries, majority of the job growth are seen in occupations which are at high-end wage distribution. Low-wage occupations such as teaching assistants and nursing assistants will equally increase. Employment declines is expected to take place in middle-income occupations as revealed by Layne (2018). The major future challenge that countries and governments are faced with is how to deal with the growing inequality problem. There is also the issue of how workers' skills can be upgraded to meet up with the present demands of labour market and companies (Arntz et al., 2016: 19).

There are people who don't see the idea of automation and robotisation as a challenge though. As a matter of fact, they welcome such development given that they will not do too much work manually again. However, there is no doubt that many systems will finding it hard managing the transition in the most effective manner. This is a long-term reality that workers and governments will have to deal with.

CONCLUSION

This article is looking at positive and negative views about the introduction of AI and robotic technology in systems and companies.

There is no doubt that the use of AI technology and robots has become more popular and these machines are set to take the place of humans in their respective workplaces. However, this doesn't mean that humans will become

jobless. Instead, it is a practice that will usher in the creation of new jobs. Also, it is worthy of note to point out that this transition is not one that will happen overnight. Rather, positions and roles will be replaced gradually.

The need for more robots in workplaces will bring about employment of more technicians, economists and mechanical engineers. Furthermore, the introduction of robots doesn't necessarily mean such attempt will be successful at first. It is a system that will require plenty of tweaking and adjustments from experts. Again, workers will also be needed for such process to be successful. For robots to work as expected in any field, humans will have to train them. As discussed earlier, robots are machines which can be easily affected by faults. For such problems to be fixed, the expertise of humans will be required.

According to McClelland (2020), authoritarian policies might be adopted when automation hits 38% of the forecasts. Such can cause great chaos like that experienced during the great depression when economies were faltering. A situation like this can make US look like Iraq or Syria where young men would take up arms as their next line of action to solve the problem of unemployment. Theft and violence would become the order of the day as he claimed. Given scary predictions of this nature, there is no doubting the fact that automation has made most people to lose their sleep.

It is undeniable that AI and robotic technologies, which are components of Industry 4.0, have workforce, salary, social, political and environmental effects. An affected factor has positive and negative aspects for society and companies. This article aims to present the innovations, threats and opportunities of technology, which can bring for human beings with an objective way. As researchers, we are only making analysis based on future happenings and expecting that the problem will be reduced to its barest minimum. It is however thought that approaches which stem from anthropology, sociology, social psychology will ensure that theoretical tools are provided to help carry out a holistic investigation of AI and robots.

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ÖZET

İçerisinde bulunduğumuz Endüstri 4.0 dönemi, akıllı uygulamalardan ve gelişmiş bilgi teknolojilerinden oluşmaktadır. Bu dönem dijitalleşmenin yoğunlaştığı, düşük maliyetli üretimle birlikte yüksek verimliliğe olanak sağlayan bir süreçtir. Bu süreci etkin olarak kullanabilen ve adapte olabilen işletmeler ciddi anlamda rekabet üstünlüğü sağlamaktadır. İşletmelerin ayakta kalabilmeleri, ülkelerin ekonomik düzeylerinin artabilmesi için gelişen teknolojiye uygun olarak

yeni iş alanlarının yaratılması ve iş modellerinin teknolojiye uyarlanması gerekmektedir.

Robotlar, yıllar boyunca birçok insanın hayal gücüne hükmetmeyi başarmıştır. İnsan benzeri makinelere ilişkin fikirler çok daha önceden var olmasına rağmen, robot ilk kez 1920 yılından itibaren Rossum'un Evrensel Robotları olan KarelČapek'in bilimkurgusunda ortaya çıkan bir terimdir. Şimdiden ileriye, robotların artık hayal olmadığı söylenebilir. Depolarda, fabrikalarda ve insanların yerine getirmesi gereken çeşitli rolleri üstlendikleri diğer çalışma ortamlarında bulunabilirler. İşlevleri göz önüne alındığında, birçok çeşitlilikte iş yapabilme kapasitelerine sahiptir. Robotlar farklı kategorilerde mevcuttur. Her sanayi gelişim sürecinde robotların da gelişimi beraberinde artmıştır. Başlangıçta sınırlı özelliklere sahip küçük makinelerdi. Ancak günümüzde insan gibi görünen ve hareket eden robotlar vardır. İnsanlara kıyasla daha yüksek bir üretkenlik düzeyi sağlamaları ve rekabetçi olmaları güçlü yanlarıdır.

Robotların çevre üzerindeki etkisi de yadsınamaz. Malzeme israfını en aza indirerek, aydınlatma ve ısıtma gereksinimlerine ihtiyaç duymadan üretimdeki karbon ayak izini azaltırlar. Özellikle hizmet alanında otonom robotların kullanılması enerji verimliliği sağlamakta ve çevreye olan etkilerini en aza indirmektedir. Tüm bu gelişmeler ışığında, robotların sağlamış olduğu verimlilik, paralelinde ekonomik kalkınmayı da sağlamaktadır.

Uzun dönemde maliyet avantajı sağlayan, kaliteyi artıran, ürün kalitesinin sürdürülebilirliğini sağlayan ve verimliliği yüksek oranda artıran robotların üretimde, sağlıkta ve hizmet sektöründe kullanımı artan bir hızla sürmektedir. Robotların ekonomik fayda sağlaması nedeni ile işletmeler robotic, yapay zeka ve otomasyon uygulamalarına (RYO) daha fazla yatırım yapmaktadırlar. Crews (2016) tarafından robotic, yapay zeka ve otomasyon uygulamalara dayalı ekonomik sistem "robonomics" olarak tanımlamaktadır. Robot ekonomisinde işgücü yerine RYO teknolojileri kullanılmaktadır.

Teknoloji ve ekonomik büyüme arasında paralellik olduğu düşünülebilir. Ülkelerin refah düzeylerindeki farklılıklar teknolojiyi kullanım oranlarına bağlı olup, teknoloji ve ekonomik büyüme arasında bir ilişki olduğu Romer (1986) ve Lucas (1988) tarafından savunulmaktadır. Özellikle sanayi devriminden sonra, kişi başına milli gelirdeki hızlı yükseliş teknolojik gelişmelere dayandırılmıştır. Gerçekleşen her teknolojik yenilik karlılıklara etki ettiği gibi, GSYİH yansımaları sonucu ülkelerin ekonomik kalkınmasına da katkı sağlamaktadır. Teknolojinin uzun süreçte ekonomiye olan katkısının yanı sıra, emek üzerindeki değişkenliği de tartışmaya değerdir.

Teknoloji refah düzeyini artırırken, bir yandan da işgücü üzerinde olumsuz etkileri olacağı endişesi vardır. Teknolojik değişim sadece işletme düzeyinde değil, mesleklerin çeşitliliğinde de etkili olacaktır. Basit operasyonel görevler robotlar tarafından üstlenildiğinde, insanlar için farklı yeni iş alanları doğacaktır. Robotların bakımı, yazılımları, üretilmeleri ve yönetilmeleri gibi birçok yeni iş kollarının ortaya konulması ile bu endişeler ortadan kalkacaktır.

Gelecek yıllarda robotların artışı iktisadi bir kalkınmayı getireceği gibi, işgücü açısından da farklılıklara sebep olacaktır.

Uluslararası Robot Federasyonu (IFR) tarafından, robotların verimliliği ve rekabeti artırdığı, artan verimlilik ile birlikte talebin arttığı, yeni istihdam olanakların yaratıldığı, otomasyonlaşan süreçlerin aslında emek talebini artırdığı ve bu durumun da ücretlere olumlu yansıdığı ifade edilmektedir.

Bu çalışmada, teknolojik gelişimi halen sürdürmekte olan robotların işletmeler ve ülkeler için ekonomik etkileri başta olmak üzere, verimliliğe ve maliyetlere olan etkisi ve emek piyasası ile ilişkisi tartışılmaktadır. Çalışma kavramsal nitelikte olup, sektörden örnekler vererek ve sayısal değerler sunarak robot kullanımının öngörüsünü ortaya koymaktadır. Araştırmacılar olarak sadece gelecekteki olaylara dayalı değerlendirmelerde bulunuyoruz. Bu çalışmanın robotların insan yaşamına etkileri konusunda gelecekte yapılacak çalışmalara da ilham vermesini umuyoruz.