THE EFFECTS OF EMERGING ARTIFICIAL INTELLIGENCE & AUTOMATION ON INCOME DISTRIBUTION AND TRANSFORMATION OF LABOUR FORCE INTO CYBERTARIAT

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THE EFFECTS OF EMERGING ARTIFICIAL INTELLIGENCE & AUTOMATION ON INCOME DISTRIBUTION AND TRANSFORMATION OF LABOUR FORCE INTO CYBERTARIAT

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ABSTRACT

The recent integration of Artificial Intelligence, a special sub-branch of automation technologies, is expected to generate unprecedented transformations in labour dynamics and income distribution. This thesis investigates the multilayered impacts of emerging AI & automation on labour-force and subsequently on income distribution and emphasis why this transformation is labeled different from previous milestone transformations across economy centered view of history and the consequent transformation of the labour-force into what is termed by some as the "Cybertariat."

Study consists of comprehensive review of existing literature to reveal historical perspectives on labour with technological change, explaining the rise of AI and automation alongside the shifts in income distribution patterns. From theoretical frameworks that encompasses technological unemployment on income distribution theories and labour market transformations, this study constructs a conceptual framework to explore the complex interplay between AI, automation and income distribution, which are the underlying process to the formation of the Cybertariat.

Methodologically, the thesis adopts a mixed-methods approach, incorporating qualitative analysis of market studies and empirical examination of income distribution trends. Literature review regarding subject with scientific research and case researches which emphasizes the discussed propositions in this thesis are chosen as methodology

Findings of study reveal significant changes in employment patterns, wage effects and sectoral impacts related to AI and automation. These transformations not only increase income inequality but also reshape the nature of work, leading to the emergence of the Cybertariat class of workers heavily reliant on information and communication technologies for their function and livelihoods. In that regard, nuanced and beneficiary policy responses are essential for well-being of the labour force which is an essential part of economy.

In conclusion, this thesis contributes to discussion surrounding AI, automation dilemma, income distribution and labour market dynamics. By revealing the implications of these

technological advancements on societies, income distribution and the formation of the Cybertariat, the research offers insights for policymakers, educators and shareholders seeking to navigate the complexities of the digital economy and ensure inclusive economic growth in the era of AI and further automation.

Keywords: Labour Force; Artificial Intelligence; Automation; Cybertatiat; Income Distribution

ÖZ

Otomasyon teknolojilerinin özel bir alt dalı ve çekirdeği olarak özetlenebilecek Yapay Zeka'nın (YZ) son dönemde ekonomideki geniş sektörlere entegre edilmesinin, işgücü dinamikleri ve gelir dağılımında benzeri görülmemiş dönüşümler yaratması beklenmektedir. Bu tez, gelişmekte olan yapay zeka ve otomasyonun işgücü ve ardından gelir dağılımı üzerindeki çok yönlü ve çok katmanlı etkilerini araştırmaya ve bu dönüşümün neden ekonomi merkezli tarih görüşünde önceki dönüm noktası dönüşümlerinden farklı olarak etiketlendiğini ve bunun sonucunda işgücünün bazıları tarafından "Sibertariat" olarak adlandırılan şeye dönüştüğünü vurgulamaya çalışmaktadır.

Çalışma, teknolojik değişimle birlikte işgücüne ilişkin tarihsel perspektifleri ortaya koymak, yapay zeka ve otomasyonun yükselişini ve gelir dağılımı modellerindeki değişimleri açıklamak için mevcut literatürün kapsamlı bir incelemesinden oluşmaktadır. Teknolojik işsizlikten gelir dağılımı teorilerine ve işgücü piyasası dönüşümlerini kapsayan teorik çerçevelerden yola çıkan bu çalışma, Sibertariat'ın oluşumunun altında yatan süreç olan yapay zeka, otomasyon ve gelir dağılımı arasındaki karmaşık etkileşimi keşfetmek için kavramsal bir çerçeve inşa etmektedir.

Metodolojik olarak tez, piyasa çalışmalarının nitel analizini ve gelir dağılımı eğilimlerinin ampirik incelemesini içeren karma bir yöntem yaklaşımı benimsemektedir. Bilimsel araştırmalarla konuya ilişkin literatür taraması ve bu tezde tartışılan önermeleri vurgulayan vaka incelemeleri metodoloji olarak seçilmiştir

Çalışmanın bulguları, yapay zeka ve otomasyonla ilgili istihdam modellerinde, ücret etkilerinde ve sektörel etkilerde önemli değişiklikler olduğunu ortaya koymaktadır. Bu dönüşümler sadece gelir eşitsizliğini artırmakla kalmayıp aynı zamanda işin doğasını da yeniden şekillendirerek, işlevleri ve geçim kaynakları için bilgi ve iletişim teknolojilerine büyük ölçüde bağımlı bir işçi sınıfı olan Sibertariat'ın ortaya çıkmasına yol açmaktadır. Bu bağlamda, ekonominin önemli bir parçası olan işgücünün refahı için nüanslı ve faydacı politika yanıtları şarttır.

Sonuç olarak, bu tez, yapay zeka, otomasyon ikilemi, gelir dağılımı ve işgücü piyasası dinamikleri ile ilgili süregelen tartışmalara katkıda bulunmaktadır. Araştırma, bu teknolojik ilerlemelerin toplumlar, gelir dağılımı ve Sibertariat'ın oluşumu üzerindeki etkilerini ortaya koyarak, dijital ekonominin karmaşıklıklarını yönlendirmek ve yapay zeka ve daha fazla otomasyon çağında kapsayıcı ekonomik büyümeyi sağlamak isteyen politika yapıcılar, eğitimciler ve paydaşlar için değerli bilgiler sunmaktadır.

Anahtar Kelimeler: İş Gücü; Yapay Zeka; Otomasyon; Sibertarya; Gelir Dağılımı

I dedicate this study to my wife Elif, my brother Erkan, My Mother Buket and finally my father Huseyin. Their support made this study possible. In that regard I would like to express my gratitude to them.

TABLE OF CONTENTS

ABSTRACT iv

ÖZ vi

TABLE OF CONTENTS ix

LIST OF ABBREVIATIONS xii

1 INTRODUCTION 1

1.1. Background and Context 1

1.2. Statement of the Problem 3

1.3. Research Questions and Investigation Topics 4

1.4. Significance of the Study 6

1.5. Scope and Limitations 7

1.5.1. Scope 7

1.5.2. Limitations 8

2 LITERATURE REVIEW 10

2.1. Historical Context of Technological Disruption 10

2.2. Conceptual Framework: AI, Automation and the 'Cybertariat' 12

2.3. Existing Research on Income Distribution 13

2.4. Labour Market Shifts in the Digital Age 16

3 AI AND AUTOMATION IMPACT ON LABOUR 18

3.1. Job Displacement and Creation 18

3.1.1. Job Displacement 18

3.1.2. Job Creation 20

3.2. Changing Skill Requirements 23

3.2.1. Shift Toward Non-Routine Skills....23
3.2.2. The Role of STEM Education....25
3.3. Sectoral Impact Analysis....27
3.3.1. Manufacturing....27
3.3.2. Services....29
3.3.3. Finance....33
3.3.4. Transportation and Logistics....35
3.4. Geographical Disparities....37
3.4.1. Urban-Rural Divide....37
3.4.2. Global Disparities....39
4 INCOME DISTRIBUTION AND INEQUALITY....42
4.1. Effects on Wages Across Industries....42
4.2. Skill-Based Wage Inequality....44
4.3. Concentration of Wealth in Tech Sectors....46
4.4. Implications for Middle-Class Stability....48
5 THE CYBERTARIAT: TRANSFORMATION OF THE LABOUR FORCE....51
5.1. Definition and Characteristics of the "Cybertariat"....51
5.2. Economic Vulnerability and Precarity....53
5.3. Skill Gaps and Limited Career Mobility....54
6 POLICY IMPLICATIONS....57
6.1. Redefining Employment Classifications....57
6.2. Universal Basic Income (UBI) and Social Safety Nets....58
6.3. Labour Rights and Regulatory Responses....59
6.4. Corporate Responsibility and Fair AI Practices....61

7 CONCLUSION 64

REFERENCES 69

LIST OF ABBREVIATIONS

AB5:	California Assembly Bill 5
AI:	Artificial Intelligence
CNC:	Computer Numerical Control
FAO:	Food and Agriculture Organization of the United Nations
HFT:	High Frequency Trading
IFR:	International Federation of Robotics
ILO:	International Labour Organization
IMF:	International Monetary Fund
IOT:	Internet of Things
IVR:	Interactive Voice Response
NLP:	Natural Language Processing
OECD:	Organization of Economic Cooperation and Development
PLC:	Programmable Logic Controllers
R&D:	Research and Development
RFID:	Radio Frequency Identification
STEM:	Science, Technology, Engineering and Mathematics
UAV:	Unmanned Aerial Vehicle
UBI:	Universal Basic Income
UI:	User Interface
UN:	United Nations
WEF:	World Economic Forum

INTRODUCTION

1.1. Background and Context

A turning point in the Fourth Industrial Revolution is reached with the speed at which technology is developing in the fields of automation and artificial intelligence. Unlike the revolutions brought by steam, electricity and computers, subjected revolution uses cloud-based technology, digital connectivity and sophisticated data analytics to provoke significant changes in a variety of industries (Md. Sazzadur Rahman, 2023) With their sophisticated algorithms, AI systems of today handle difficult jobs that were formerly the exclusive domain of human intelligence, like picture recognition, natural language processing and complicated decision-making. Intelligent automation has now been widely integrated in everything from manufacturing and transportation to healthcare and banking sectors (Crispin Coombsa, 2020).

Technological developments have historically brought with the two aspects: possibilities and problems. For instance, while the 19th-century modernization of the agricultural industry displaced many workers, it also created urban industrial centers that created new job opportunities (Food and Agriculture Organization of the United Nations, 2017). Comparably, the development of computing technology in the 20th century allowed for the automation of repetitive chores and increased productivity, hence redefining economic systems. The depth and speed of the present technological developments, however, provide special difficulties with difficult to predict and far-reaching consequences (Montealegre & Cascio, 2016).

Particularly the spread of AI and automation presents a serious threat to the labour economy, particularly by replacing repetitive and regular jobs. In the next decades, The Brookings Institution research from 2019 projected that one-quarter of American employment may be automated, with disproportionately negative consequences for lower- and middle-class workers in the retail, manufacturing and hospitality industries (Maxim & Muro, 2019). But these technologies might also create whole new employment categories, such as cybersecurity analysts, AI experts and data scientists (Stropoli, 2023).

In addition to these changes to the nature of jobs, automation and artificial intelligence are changing the conventional relationships between companies and employees as well. A fundamental change in employment relationships is represented by the emergence of the gig economy, which is driven by digital platforms that link freelancers with short-term engagements (Shaji, 2024). The people working as freelancers, gigs and contract workers make up this new workforce, known as the "Cybertariat," and it can be argued that they frequently lack the benefits that traditional employees enjoy. Although such arrangements may be flexible, they also come with drawbacks including unstable income, no job stability and restricted access to pensions and healthcare (Huws, The making of a Cybertariat? Virtual work in a real world, 2009).

Redistribution of income adds still another level of complexity to ongoing debate. While AI-enhanced industries drive highly skilled individuals into higher pay bands, lower-skilled people see their pay either flatten or decline. Effective integration of AI and automation gives companies significant competitive advantages, which frequently results in industry consolidation and a higher concentration of wealth within a limited number of tech companies and their important stakeholders (Daniel, 2023). This trend raises questions about growing economic inequality and social stability by threatening to squeeze the middle class, which has historically been the stabilizing factor in industrialized economies. (Pressman, 2007)

Furthermore, it follows from the global reach of technical innovation, that these disturbances are not limited to only one area. Rising markets are similarly vulnerable as they incorporate more automated procedures into their industrial frameworks, even if developed economies suffer more immediate effects (Dakduk, Van der Woude, & Alarcon Nieto, 2024). Taking up these global issues calls for all-encompassing policy solutions that take into account different labour laws, economic situations and cultural values.

The need of fully comprehending how AI and automation are changing the global workforce and income distribution is highlighted by this convergence of trends, which also aims to investigate the emergence of the Cybertariat and guarantee that technological developments benefit society at large scale (Rahmani & Zohuri, 2024).

1.2. Statement of the Problem

It can be argued that AI and automation integrated into the corporate setting are transforming conventional labour methods by improving productivity, efficiency and operating cost reduction. These developments, however, also bring about significant turbulence that put the stability of the economy and labour markets in jeopardy. Displacement of jobs is a major worry, particularly in industries where automation might easily replace routine tasks. According to the recent study of McKinsey Global Institute research, by 2030 automation may result in the loss of up to 800 million jobs worldwide (Manyika, et al., 2017).

Even if technological advancements can open up new career paths, the new positions frequently call for more specialized knowledge, greater schooling and more advanced abilities. Workers with basic skills may face a severe obstacle from this development since they could find it hard to get or afford the training and upskilling, they need (Shen & Zhang, 2024). As a result, More and more skills are becoming in demand than there are available, which presents serious employment issues such as long-term unemployment or unstable employment with low-paying positions. Artificial intelligence and automation, then, may exacerbate economic disparities by dividing the workforce into a lower-paid, less advantaged segment and a high-earning, technologically adopted elite (International Labour Organization, 2023).

Conventional job connections in the economy are also changing arguably as the gig economy grows. Digital platforms like TaskRabbit and Uber provide people with new options to make money by using their individual talents and flexibility. Still, a large number of those working these gigs are members of the "Cybertariat," a group defined by unstable employment, no regular benefits and few labour safeguards (Singh & Bhushan, 2023). Often, these workers are not eligible for benefits like retirement plans and healthcare, which are usually offered by more conventional work arrangements.

The income distribution is thus getting more obvious, with those in lower wage categories suffering financial difficulties while the highest echelons—particularly in tech-related fields—enjoy large pay rises. The higher income groups still gain from high-paying

specialized technology jobs, but this gap is made worse by AI technologies taking over jobs that were formerly done by less skilled humans (Farahani & Ghasemi, 2024). The 'winner-take-all' economic that results from this concentration of wealth in the hands of those who possess or control AI technologies lowers competitive variety in some markets (Manen, et al., 2019).

Moreover, economic division shows itself spatially in addition to wealth. Rich in IT businesses, research institutes and venture capital, places like Silicon Valley thrive while conventional industry-dependent towns suffer. Local economic instability and social disintegration might result from this unequal growth (Kushida, 2024).

All things considered, the dualistic character of AI and automation brings with its' serious chances for economic growth and employment creation, but it also carries with it the dangers of worker displacement, income inequality and compromised job security. Managing these issues, calls for a systematic approach to creating an inclusive and fair job environment as well as a deep awareness of the revolutionary impact of these technologies on the labour market (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014).

1.3. Research Questions and Investigation Topics

This study mainly aims to examine how automation and AI are changing labour dynamics and income distribution with a special attention on the rise of the "Cybertariat" in the evolving economic environment. In that regard our main study question is to investigate how automation and artificial intelligence will revolutionize the labour market and the economy. This research will explore a number of relevant sub-questions that to advance our knowledge of the primary problem in order to fully address this research question.

The first sub research area is to determine which occupations are most susceptible to these changes and which new fields or occupations are arising as a result of these emerging technological breakthroughs by evaluating how automation and AI are changing the nature of jobs across different sectors, skill levels and geographic regions. Consequently,

this research tries to look at the changing skill needs and the required training or educational programs for the employees who need to move into these new positions.

Another focus of this research is to look how AI applications are affecting payment diversities among various skill levels and how this results to promoting wealth concentration within the tech industry and its large corporations who implements these technologies. In that regard, this study examines how these adjustments affect economic inequality more broadly.

Another major focus of this study is the analysis of the term "Cybertariat," which is a new class transformation in the labour market. The main attribute of this class is their dependence on digital platforms for income without the stability provided by traditional employment. This part of the study examines how benefits, salary stability and job security for the "Cybertariat" establishes compared to those of traditional labour positions.

The emergence of gig and platform work is an inseparable part and one of the key components of the Cybertariat. In that regard this study tries to evaluate how these formations change the labour market and thus impacts people's financial security like job stability, steady income and access to necessary benefits such as retirement plans, unemployment insurance and healthcare.

In order to re-establish the mentioned job securities, this research will also assess both present and suggested legislation meant to resolve the problems which is caused by automation and AI. The study will point up how to establish good labour protection, limit income inequality and job security laws and provide recommendations for their enhancements.

Finally, this study will focus on the ethical applications of AI and automation technologies by examining businesses implications. The aim of this search is to understand how these applications can be achieved ethically to promote the wellbeing of the labour force.

By answering these questions, the study tries to provide a thorough answer to how automation and AI are changing the global economy and labour market. With this inclusive approach, the study tries to point out the required legislative and educational

actions to ensure that the advantages of these technologies are maximized for society at large.

1.4. Significance of the Study

Automation and AI have great promise to revolutionize the workforce and the world economy. Shareholders from labour representatives to company executives to government representatives are expected to understand these changes (Kamalov, Calonge, & Gurrib, 2023). There are various reasons this study is important:

Through the analysis of the impact of AI and automation on several industries, this study highlights important new developments that impact the gig economy, job dynamics and creation. This study tries to identify the most automated jobs and the new ones that are most likely to appear, giving educators, legislators and the workforce vital insight for tactical adaptation (Balasubramanian, 2023) .

Rapid technological advancement threatens to widen the already widening income gap (Alonso, Kothari, & Rehman, 2020). This paper tries to explore how automation and AI influence income distribution by identifying the ways in which these technologies promote wealth creation and payment inequality. Understanding the nature of these effects will help to develop particular laws and programs meant to promote fair economic growth (Usardi & Drut, 2024).

Automation induced changes in the job market make it imperative that safety nets and labour laws keep up with them (Steinhoff, 2021). The study's findings may be found helpful in developing laws that protect workers' rights and offer fair access to benefits including pension plans, health insurance and unemployment assistance. In order to prepare employees for new job demands, this study also provides suggestions for retraining initiatives and educational improvements (Butson & Spronken-Smith, 2024).

The increase of "Cybertariat" workers in the labour force changing stability and labour market frameworks (Gill, 2009). This study will hopefully shed light on the social and economic consequences of precarious and gig-based jobs and help supporting labour

organizations in their efforts to improve working conditions and assisting legislators in creating inclusive safety nets (Withefold, 2015).

As a small number of companies come to dominate technology, corporate governance and accountability must be reevaluated (Montagnani & Passador, 2022). This paper tries to investigate how companies should apply AI applications with morality concerns and making automation procedures fair to make sure that technology progress does not harm society. This study expects to give insights to businesses in matching their activities to more general social gains.

Automation and artificial intelligence affect computer science as well as economics and sociology (Joyce, et al., 2021). This study is hoped to be a tool for encouraging multidisciplinary collaboration, allowing legislators to work with technologists on legislation and assisting educators in matching curriculum to need for practical skills.

Since the technology disruption affects people everywhere, the results of this study hopes to influence worldwide conversations on how to handle job shifts and economic inequality (Joyce, et al., 2021). This study aims to provide comparative studies to show flexible and scalable approaches appropriate for different local contexts.

1.5. Scope and Limitations

1.5.1. Scope

The purpose of this study is to investigate how automation and AI affect income distribution and the development of the work force into the so-called "Cybertariat." (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014). The main emphasis will be on industrialized countries where AI technology penetration is the greatest and most well documented.

The research assesses how artificial intelligence and automation are changing important industries including manufacturing, logistics, healthcare and finance (Bughin, et al., 2017). Automation has significantly changed the workforce in sectors like retail,

transportation and customer service, hence they will receive special attention (Murillo, Macinnes, & Renda, 2024).

This study examines how work is evolving, focusing especially on the emergence of platform labour and the gig economy. Study evaluates how these elements help the "Cybertariat" to arise and look at the difficulties and changing skill sets needed by gig and freelance workers (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014).

This paper attempts to investigate how automation and artificial intelligence are changing the way that money is distributed and causing wage polarization, which is a factor in larger economic inequality (Benanav, 2019). The way these dynamics support the wealth creation of IT companies and highly qualified employees will be along the topic of discussions.

Current and planned policy initiatives should mean to lessen the effects of income inequality and labour dislocation. In order to offset technological disturbances, this study suggests doable plans for retraining the workforce, changing regulations and improving social safety zones (Murillo, Macinnes, & Renda, 2024).

To offer insights relevant to current outlook of economy, the study includes comparison assessments with developing markets even though it is mostly focused on established countries (Fuchs, History and class consciousness 2.0: Georg Lukács in the age of digital capitalism and big data, 2020).

1.5.2. Limitations

Though extensive, this study has a number of constraints that affect the depth and breadth of its findings:

The reliance of this study on data from reports, surveys and case studies—all of which might differ greatly in quality and detail—is its first drawback. Particularly, information on gig or informal works are jumbled or inconsistent, which unfortunately hides the whole impact of automation on unusual work arrangements.

Since AI and automation are developing quickly, trends and projections may rapidly become out of date when new technologies come out and old ones change, thus changing how they affect the job market (Posada, 2007).

The study is limited to technologically developed economies; variations in labour laws, economic systems and social safeguards throughout regions make the results less applicable to less developed or emerging nations. In that regard, the study is constrained in reaching universally acknowledged results by the variations in labour markets throughout the world.

AI, automation and their outcome as income inequality, interact in complex ways shaped by a number of political, social and economic issues. Drawing straight correlations is complicated when one has to separate the impact of technical developments from other contributing variables (Dubber, Frank, & Sunit, 2020).

Depending on geographical variations, implementation methods and shareholders' approval, the suggested policy solutions may not be as successful as intended. Moreover, never-ending political or economic obstacles could oppose some proposed policies.

LITERATURE REVIEW

2.1. Historical Context of Technological Disruption

The labour market has been continuously changed through the written history by technological breakthroughs, which have also changed the dynamics of employment, income distribution and productivity as well (Eğilmez, 2018). Every wave of technical advancement has brought with it both possibilities and difficulties that have required economic adjustments.

Labour is considered an integral part of humanity and it can be traced to beginning of agricultural revolution (Harari, Unstoppable us Volume 1: How humans took over the world, 2022), but due to limitations of this thesis, our main focus will be on the Industrial Revolution since we can find the first traces of automation in the industry Revolution (Harari, Homo Deus: A brief history of tomorrow, 2017). The Industrial Revolution is considered to occur in the late 18th and early 19th centuries. The use of steam power and mechanization throughout this period transformed agriculture, transportation and textile manufacture (Foster, 1977). While previously labour-intensive jobs were not considered possible to be automated, innovations like the spinning Jenny and the mechanized loom resulted a substantial loss of jobs for people like weavers and spinners who were considered skilled people before (Styles, 2020). The Luddites, English textile workers who rebelled against machines they thought endangered their means of work, also lose their importance at this time (Styles, 2020).

Next milestone was assembly line manufacturing, driven by electricity and the internal combustion engine, the Second Industrial Revolution was the next technological boom that happened in the late 19th and early 20th centuries. The activities of Henry Ford's car manufacturing factory lead the trend toward mass manufacturing that occurred during this time, especially in the consumer products industry (Nye, 2013). These shifts gave workers deeply specialized and repetitious jobs, which sparked the formation of labour unions fighting for safe working conditions and fair pay (Gall, 2024).

Computer technology emerged in the beginning of the Third Industrial Revolution in the mid-20th century (Mohajan, 2021). With the automation of repetitive administrative chores increased by this revolution, productivity increased dramatically and the global distribution of goods and services was made possible with these implemented technologies (Rifkin, 2013). In their famous researches, Hitt and Brynjolfsson have emphasized how important computers are to improving company operations by organizing mass communication and data processing (Hitt & Brynjolfsson, 1997). In the other hand it can be argued that this technical progress also resulted in fewer traditional jobs like data entry, secretarial work and handwritten records (Strassmann, 1985).

Some scholars don't find a necessity to distinguish third and fourth era of industrial revolution by believing that we are still in the third era (Rifkin, 2013), but this study agrees with the scholars who argues that automation and AI are driving the Fourth Industrial Revolution (Schwab, The fourth industrial revolution, 2016). The convergence of technologies including robotics, machine learning and the Internet of Things (IoT) are considered as main elements of this stage which also distinguish this era from emergence of computers. Advancements in AI starts to automate previously seemed impossible jobs like financial analysis, legal research and medical diagnosis (Taherdoost & Madanchian, 2024). In that regard this continuous transformation is diminishing the conventional professional positions and escalating problems like income inequality and worker polarization as Autor, Levy and Murnane have emphasized in their research (Autor, Levy, & Murnane, The skill content of recent technological change: An empirical exploration, 2003).

In summary, it is safe to argue that employment has been created and destroyed with every new era by technological disruptions. Nonetheless, workers and economies have to adjust more quickly than in the past due to the current speed of technological developments. Knowing these past trends is essential to creating proactive policies that can reduce possible negative impacts which will be discussed in the next chapters.

2.2. Conceptual Framework: AI, Automation and the 'Cybertariat'

As it is stated previously, the rapid development of automation and AI is changing labour dynamics and economic paradigms. In that regards Ursula Huws come up with the term "Cybertariat," and his work accurately captures the erratic and divided character of work in the digital age (Huws, The making of a Cybertariat? Virtual work in a real world, 2009). Understanding how modern technological developments re-shaping labour markets are worldwide depends on this paradigm.

Automation and artificial intelligence are speeding up the commodification of work by making companies more capable with sophisticated algorithms, predictive models and vast data analytics (Huws, iCapitalism and the Cybertariat: Contradictions of the digital economy, 2015). In that regard, ordinary jobs are being especially transformed by these technologies, which mostly impact middle-skilled workers (Autor, Levy, & Murnane, The skill content of recent technological change: An empirical exploration, 2003). Especially, advanced robotics in industry, manufacturing and logistics and algorithms in customer services are performing more work while previously those sectors needed physical skill or mental effort (Vries, Gentile, Miroudot, & Wacker, 2020).

In their 2011 book "Race Against the Machine," Erik Brynjolfsson and Andrew McAfee explored how, although people with lower or intermediate skills confront growing employment polarization, highly skilled workers typically gain disproportionately from technological developments. In industries where technology rules, this tendency feeds a "winner-take-all" economic model in which wealth creation is directly correlated with technological competence (Brynjolfsson & McAfee, Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy, 2012).

Platforms like Uber, TaskRabbit and Upwork bring a new labour paradigm with their contractual work without the formalities of traditional employment. Huws emphasized in his study dated 2014 how these platforms view labour as a commodity, with workers being only resources that are turned on or off according to changing demand (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014). According to

Christopher Deeming, the concept of the "precariat" — workers with uncertain incomes and little career advancement — is gaining significance by the fact that many gig workers find themselves without standard employment benefits like healthcare, retirement savings, or paid leave (Deeming, 2012).

The term "Cybertariat" refers to those who make their living via digital platforms but do not have the advantages and security of traditional employment. According to Huws this group is defined by unstable work circumstances, fluctuating wages and reliance on algorithmic processes that determine job availability (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014). To find steady work, Uber drivers, for instance, must keep up good client ratings, which adds a great deal of psychological strain (Apouey & Stabile, 2022).

In his 2014 study of the worldwide effects of digital labour platforms, Sassen explains how multinational companies use labour that is distributed around the world to save expenses and improve operational flexibility thanks to everchanging ability of AI algorithms (Sassen, 2014). With workers being interchangeable and competing globally, this strategy creates a global "Cybertariat" which drives down payment and working conditions (Brynjolfsson & McAfee, Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy, 2012).

This study believes that the term 'Cybertariat' clarifies the vulnerability and division of labour in the digital world today. The need to create moral guidelines and laws that protect the 'Cybertariat' from abuse and advancing a fairer economic construction is critical as AI and automation continue to transform the nature of labour.

2.3. Existing Research on Income Distribution

There are studies conducted by scholars which show how income distribution and technology developments interact in the larger framework regarding economic inequality. As AI and automation increase their existence in daily life, they will keep modifying the society in subtle ways regarding mobility, wealth concentration and wage systems.

According to the article published in American Economic Review in 2006, the labour market can be divided into high-wage, skilled employment and low-wage, unskilled occupations by technological advancement (Autor, Katz, & Kearney, The polarization of the U. S. labor market, 2006), the study also shows a noticeable reduction in middle-skill jobs. Building on this, Autor demonstrates how technological automation hurts middle-wage jobs which are dependent on regular tasks (Autor & Houseman, Do temporary-help jobs improve labor market outcomes for low-skilled workers? Evidence from "Work First", 2010).

Geographic variation in this kind of occupational polarization was proposed by Goos, Manning and Salomons in their article dated 2014. According to their findings, wage inequality increased in both high- and low-skilled jobs throughout Europe between 1993 to 2010 (Goos, Manning, & Salomons, 2014). Also according to the 2017 report by Frey and Osborne, 47% of American jobs are highly vulnerable to automation, especially those requiring less education and involving regular work (Frey & Osborne, 2017).

At this point it is worth mentioning the superstar effect proposed by Sherwin Rosen. In order to characterize how top performers in any sector disproportionately gain from technology breakthroughs, Rosen came up with Superstar effect. By considering how firms like Amazon, Apple, Google and Microsoft growing their dominance and scaling effectively while maintaining very steady prices, this effect is particularly noticeable in the tech sector (Rosen, 1981).

Another contribution to the hypotheses of this study comes from James Bessen in his article dated 2019. In his investigation of how technical advancements have given technology-oriented companies more market dominance, found that labour's share of income has decreased while wealth concentration inside these companies has increased (Bessen, Automation and jobs: when technology boosts employment, 2019).

The middle-class stability is arguably threatened by the automation-related loss of middle-class jobs. In their "Second Machine Age," book dated 2014, Brynjolfsson and McAfee noted the changing of steady routine employment, to either low-wage, service-oriented occupations or to high-skill, well-paying ones. The decline of the middle class caused by this change is escalating economic insecurity and inequality (Brynjolfsson &

McAfee, The second machine age: Work, progress, and prosperity in a time of brilliant technologies, 2014).

According to research conducted Mishel, Bivens, Gould and Shierholz in 2012, technological improvements have contributed to middle-class wage stagnation in the United States by limiting wage growth for the labour masses while enabling corporate profits and CEO compensations to increase beyond comparison (Mishel, Bivens, & Shierholz, The state of working America (An economic policy institute book), 2012).

Geographic disparities are further raised by automation and this phenomenon increases the growth in tech-rich places while traditional manufacturing or routinely job-dependent communities shrink. Autor and Dorn proposed that, cities with strong educational systems and IT industries draw talent and investment while less developed places suffer economically. This shift adds up to political division and social instability (Autor & Dorn, The growth of low-skill service jobs and the polarization of the US labor market, 2013).

Furthermore Rodriguez-Pose examines how this differentiation leads to a vicious cycle. Their study revealed that the geographic locations where technological advancement applications lacks in comparison to surrounding areas are frequently serve as hotbeds for populist movements that resist globalization and tech-driven economic models (Andrés, 2018).

The publicized studies highlight how automation and AI changes the income distribution, benefiting to highly trained individuals and tech companies while decreasing payment rates in regular and low-skilled jobs. This process weakens the middle class's stability which is crucial to a welfare state and concentrates the wealth among a small number of people, resulting in economic polarization. To guarantee that technical developments benefit a larger segment of society, addressing these issues needs inclusive economic plans and comprehensive policies which considers below mentioned key points.

2.4. Labour Market Shifts in the Digital Age

AI and automation are reshaping the workforce, bringing benefits as well as problems to the labour market in many different sectors. Since the fourth industrial revolution is taking place so quickly, researchers have seen significant changes in job patterns.

Even though automation has increased productivity in the manufacturing sector, automation and robotics have also caused huge loss of jobs. According to Acemoglu and Restrepo's estimate in their research dated 2020, every industrial robot that is introduced into the manufacturing sector replaces around 6.2 workers and lowers salaries by around 0.7% (Acemoğlu & Restrepo, Robots and jobs: Evidence from US labor markets, 2020). Autor, Dorn and Hanson looked at how growing automation had weakened the American manufacturing sector and how middle-class employment losses worse, especially in job areas consist of routine tasks (Autor, Dorn, & Hanson, Untangling trade and technology: Evidence from local labour markets, 2015). The gap between high and less skilled workers has grown, so repetitive jobs impacted more.

Systems driven by artificial intelligence have completely changed customer service, healthcare and financial industries as well. According to Frey and Osborne, regular & repetitive tasks which make up almost 80% of occupations in the industries and service sectors are extremely susceptible to automation. As trading, investment management and customer service grow more computerized, traditional secretarial positions and financial analysts' occupations are less and less necessary (Frey & Osborne, 2017).

Digital platforms like Uber, DoorDash, Upwork, Fiverr and Shopfy have helped to popularize the gig economy since they provide flexible job options. Due to fragmented labour arrangements, the gig workers are now more vulnerable to fluctuating incomes and a lack of standard benefits. As noted by Kalleberg and Vallas, gig workers often experience job instability, do not have health insurance and do not have retirement plans, which contributes to employment insecurity (Kalleberg & Vallas, Precarious work (Research in the Sociology of Work 31, 2018). Also as De Stefano noted, these new labour forms fade the boundaries between work and home life, forcing the workforce to be "on-duty 24-7" in order to make ends meet (De Stefano, The rise of the 'Just-in-Time

Workforce': On-Demand work, crowd work and Labour protection in the 'Gig-Economy', 2016).

Employers now should obtain new and different talents because of the rise of AI and automation applications. An increasing need exists for employees with sophisticated technological abilities and the capacity to handle difficult, non-routine issues since the routine jobs are becoming mechanized. According to the study of Bessen dated 2017, workers must adopt lifelong learning due to changing required skillsets in order to remain competitive (Bessen, AI and jobs: the role of demand, 2017). In addition to the study of Bessen, World Economic Forum estimates that the changing needs of the global labour market will result of 44% of workers to retrain and obtain new skillsets by 2025. This emphasizes the significance of curriculum alignment between educational institutions and training programs with industrial needs. In that regard Goldin and Katz state that since the workers were ill-prepared for technology advancements impacting the job market, the slow rate of educational gains in the U.S. workforce results to wage disparity and decreased social mobility (Goldin & F. Katz, 2008).

Many employment positions are destined to be outsourced to areas with reduced labour costs thanks to the digital era. Digital interconnection has enabled a "globotics upheaval" that Baldwin characterized as mechanization or outsourcing of regular activity which damages both industrialized and developing nations (Baldwin R. , 2018). As many manufacturing jobs have migrated to nations with lower salaries, notably Vietnam and Bangladesh, India has emerged as a global hub for IT services and business process outsourcing. While generating jobs in developing nations, this offshore has resulted in large job losses in the West (Autor, Dorn, & Hanson, Untangling trade and technology: Evidence from local labour markets, 2015).

In summary, the changes in the labour market presents great complications in the digital era. While technological breakthroughs have increased productivity and opened up new job opportunities at high-tech industries, they have also resulted in job polarization, unstable employment and growing inequality.

AI AND AUTOMATION IMPACT ON LABOUR

3.1. Job Displacement and Creation

3.1.1. Job Displacement

The job displacement caused by AI and automation is a major concern affecting various industries and regions but there is an even more disturbing possibility that causes alarms and led to this study. According to some studies, while previous technological revolutions also resulted in job losses and the creation of new opportunities, the current revolution of AI-driven displacement seems unprecedented regarding breadth and speed so this shift impacts to a wide array of job categories simultaneously (Daniel, 2023) but some studies believes that the effects will remain in job shifting but won't extend to mass unemployment (Shaji, 2024).

It is safe to argue that technological advancements have historically led to the displacement of workers in specific and general occupations (Mokyr, The lever of riches: Technological creativity and economic progress, 1990). The mechanization of agriculture in the 18th century significantly reduced the need for farm labour (Allen R. C., 2009). In addition to the previous argument, the industrial revolution shifted employment from artisan crafts to factory-based manufacturing. Innovations such as steam engines, mechanized looms and assembly line productions transformed economies. In that regard As Mokyr, Vickers and Ziebarth argued that technological disruptions historically lead to short-term job displacements but also increased long-term economic growth and the creation of new employment opportunities (Mokyr, Vickers, & Ziebarth, The history of technological anxiety and the future of economic growth: Is this time different?, 2015).

As stated before, job displacement driven by automation largely affects workers in routine, repetitive roles across industries. As an example, Frey and Osbourne predicted that automation could eliminate 47% of U.S. jobs in the coming decades (Frey & Osborne, 2017). In that regard, manufacturing employees, clerical positions in offices, customer service representatives and logistics workers are expected to be heavily affected.

In the manufacturing industry, significant job losses have already occurred due to the automation. Robots and automated production lines in factories perform repetitive and labour-intensive tasks more efficiently than human workers. As previously stated, Acemoglu and Restrepo found that each new robot in the U.S. manufacturing sector displaced an average of 6.2 workers, leading to a 0.7% decline in wages (Acemoğlu & Restrepo, Robots and jobs: Evidence from US labor markets, 2020). As a further example, the Rust Belt states in US, which historically relied on manufacturing regarding main source of income, continue to experience rising unemployment and underemployment as factories automate production but the only thing that improve is reduced pollution (Kahn, 1999).

In the service sector, automation technologies like chatbots which mimics casual human to human conversations, self-checkout kiosks and digital assistants with their knowledge of vast libraries, are rapidly replacing human labour in customer service and retail with their enhanced and improved capacity (Lohr, 2023). In their study Frey and Osborne noted that jobs such as cashiers, salespeople and telemarketers are at high risk and 86% of jobs in accommodation and food services has potential to being automated (Frey & Osborne, 2017).

McKinsey & Company projected that the transportation and logistics sectors are undergoing substantial changes with the advent of autonomous vehicles, drones and automated warehouses. Self-driving trucks are predicted to replace the large number of long-haul truckers. The adoption of autonomous vehicles could affect 1.7 million truck drivers in the U.S. alone (Manyika, et al., 2017). In addition to autonomous vehicles, according to Laber, Thamma, & Kirby, automated sorting and fulfillment centers are increasing in number and the success of smart warehouse is expected to inspire further investment in this area (Laber, Thamma, & Kirby, 2020).

In finance, AI-based algorithms are increasingly managing high-frequency trading, investment management and fraud detection. Mentioned trading algorithms are currently presented to potential customers as a viable solution for their financial assistance requirements (Deloitte, n.d.). On the other hand, financial focused AI detection algorithms effectively distinguish fraud and legitimate credit card transactions with an astonishing

accuracy and all the major credit card payment processing networks are effectively using these algorithms (Agrawal, Gans, & Goldfarb, 2018). Traditional financial roles such as clerical work and data analysis are being automated by machine learning systems as well. Brynjolfsson and McAfee (2014) documented that even middle-skilled workers like accountants aren't safe from automation and face the risk of displacement due to the rapid rise of intelligent systems (Brynjolfsson & McAfee, 2014).

Beyond the immediate loss of employment danger, the current job displacement induced by automation is suspected to have wider socioeconomic consequences in the societies. Workers who lose their jobs often face long period of unemployment, especially when the workers lack the skills necessary to transition into new, high-tech roles (Acemoğlu & Restrepo, Robots and jobs: Evidence from US labor markets, 2020). This displacement leads to income stagnation, reduced social mobility and increased economic inequality in the households. 2019 dated study which is published by ILO indicates that technological disruption tends to affect low- and middle-income workers, increasing existing inequalities (International Labour Organization, 2019).

It appears that while AI and automation increase the economic growth and productivity, the displacement of routine jobs presents a challenge to governments. A comprehensive approach involving re-training programs, educational reforms and robust social safety nets are essential to mitigate the impact on displaced workers and help to smooth the transition into the new technological era.

3.1.2. Job Creation

This section of the study is more optimistic about the future than the rest of the study and tries to promote new employment creations resulted by the emerging technologies. While many traditional branches of employment have been lost as a result of AI and automation, some newly established and some existing sectors have seen new prospects and new occupations.

Through the historical perspective we can observe that new technological waves in the past created whole new sectors of the economy and job market. For instance, mass

migration to cities fueled the expansion of manufacturing while technological improvements in agriculture reduced the demand for farm labour (Clark, 2009). We can observe a similar trend during the transformation which we are in. Millions of new occupational positions in software development, digital marketing and information technology are created by the era of the internet. New positions are creating day by day which were unthinkable only a few decades before (Mokyr, 1990) (Allen R. C., 2009) (Bessen, 2019).

AI is helping to formation of new sectors and services in the current automation era with new skill sets requirements in technological industry. Machine learning engineers, data scientists and AI experts are the positions in great demand in the tech sector, which is also leading and shaping form of this revolution. So it can be argued that the high skilled labour force is shaping the emerging automation systems (Autor D. , Why are there still so many jobs? The history and future of workplace automation, 2015). Also as noted by Brynjolfsson and McAfee, the quick adoption of AI across many industries has greatly expanded the employment opportunities for high skilled engineers and developers who create and manage intelligent systems (Brynjolfsson & McAfee, The second machine age: Work, progress, and prosperity in a time of brilliant technologies, 2014). Furthermore, data visualization experts and user interface (UI) designers whose main ability is to convert technical data and applications into readable and understandable visuals are high in demand. Additionally Cyber-security experts who are working to make AI and autonomous applications more resilient to tempering, abuse and online attacks are high in demand for employment (West D. , 2018).

E-commerce, logistics and digital marketing industries are the other sectors who are thriving with technological industry as well. Marketing professionals who are fluent in digital platforms are in high demand since more companies use AI-enabled analytic tool for their marketing strategies and since these digital platforms are becoming more indispensable skilled marketing professionals are expected to be more active in labour force (Davenport, Guha, Grewal, & Bresgott, 2019). Logistics sector also needs employees with e-commerce businesses knowledge to oversee automated fulfillment centers and delivery networks (Manyika, et al., 2017)

Emerging enterprises like TaskRabbit, Upwork, Uber -who are also the major leaders of gig economy formation- give workers flexible revenue streams. Many people now operate as freelancers or gig workers, applying their talents to projects as needed. As we warned previously, while this kind of work provides independence and flexibility, benefits and job stability are frequently lacking (Kalleberg & Vallas, Precarious work (Research in the Sociology of Work 31, 2018). De Stefano also warns the people that these kind of employment should be regulated firmly in order to protect the well-being of labour force (De Stefano, The rise of the 'Just-in-Time Workforce': On-Demand work, crowd work and Labour protection in the 'Gig-Economy', 2016).

Automation has also created a new line of occupation for the upkeep and support of these systems. Since the industry sector operates heavily on robots and automated lines - electronics and automotive sectors can be considered leading branches of these industry-, repair and overseeing experts of these machines are significantly required. The International Federation of Robotics (IFR) stated that technicians and support personnel are needed due to growth of industrial robotics (International Federation of Robotics, 2019).

AI is completely changing medicine by newly used medication discovery powered by AI by analyzing complex the interactions of molecules, individualized treatment plans used by the algorithms which tweaks the treatment in accordance with patient's lifestyle (Jiang, Jiang, Zhi, & Dong, 2017) and diagnostics in the healthcare industry with new medical image analyzing instruments (Davenport & Kalakota, 2019). Pathologists and radiologists use machine learning algorithms to examine medical photos and identify anomalies. As Topol noted, the use of AI in healthcare is generating new jobs in telemedicine, software development and data administration (Topol, 2019).

Creative employment also benefits contrary to the worries which automation will make creative employment obsolete. AI is enabling new genres of art, entertainment and education with emerging technology. Music and digital art which are produced by AI call for a new generation of creative technologists who can identify and evaluate them (Anantrasirichai & Bull, 2022).

As more institutions and training programs accepting AI-driven learning in their curriculum, educators who specialize in online learning and digital content creation are also gaining new grounds (Woolf, Lane, Chaudhri, & Kolodner, 2013)

Even if automation and AI have caused a great deal of job displacement, they arguably opened up new opportunities in high-tech sectors and beyond. Many new careers are developing, from AI experts to gig workers and creative technologists with arguably better pay and working conditions for skilled workers. But because these new jobs call for different abilities, it is imperative that both workers and educational institutions adjust to quickly to the changing needs of the workforce.

3.2. Changing Skill Requirements

3.2.1. Shift Toward Non-Routine Skills

An important development in the labour market which is brought by automation is the tendency of automation to move towards non-routine tasks. Throughout the last 20 years, this tendency has been documented and is observable in a number of industries. This improvement deserves attention, since achieving non-routine problem-solving capacity requires higher degrees of problem-solving, creativity and interpersonal skills than for routine tasks that consist of clear guidelines and procedures.

Autor, Levy and Murnane first proposed in their article that the work can simply be classified as routine or non-routine. Repeated, standardized processes can be exampled by readily automated data entry and assembly line production. By contrast, non-routine jobs call for judgment, flexibility and emotional intelligence; they also include strategic thinking, problem-solving creativity and relationship management (Autor, Levy, & Murnane, 2003) (Goos, Manning, & Salomons, 2014).

In that regard we can observe that the emerging routine work automation has reduced the number of these jobs, consequently moving labour demand to positions that require non-routine abilities. As an example, automated customer service lines and self-checkout technologies are progressively taking the position of telemarketers and cashiers. In the

meanwhile, there is greater need for positions like data scientists, creative strategists and healthcare experts (Bessen, AI and jobs: the role of demand, 2017).

High level problem-solving, strategic thinking and creativity can be seen as examples of non-routine cognitive processes. Since these jobs are more complicated and require human intuition, automating them is considered difficult in the near future (Arntz, Gregory, & Zierahn, 2016).

In order to obtain creative solutions to the problems of non-routine problems, research scientists in natural science, IT, engineering and medicine need to be proficient problem solvers. Although automation has the ability to impact research to some degree, scientific discovery is unpredictable so the scientific research which can be considered as one of the most complex problem-solving activities is still immune from automation (Arntz, Gregory, & Zierahn, 2016).

The creative arts -writing, marketing, design, music, sculpture etc.- require a great deal of imagination and intuition to be formed. In that regard even though AI has advanced in producing original materials, human involvement is still essential to creating visually and artistically appealing stories and designs that appeal to viewers (The Economist, 2021).

Non repetitive manual jobs which require agility, flexibility and people skills are also considered to be uncertain regarding automation implementation in the near future due to dynamic or unpredictable settings of the nature of those jobs. Some examples of non-repetitive jobs will be discussed in this chapter.

Jobs like nursing, personal caregiving and emergency personnel, who are providing emotional support and adjusting to various patient needs are considered unlikely to be replaced by automation in the near future (Shaw & Glover, 2024). In addition, according to the WEF report dated 2020 As people age, healthcare jobs will only increase, which requires for specialized knowledge in both physical and mental healthcare (Schwab & Zahidi, The future of jobs report, 2020).

Although robots are capable of repetitive jobs like welding, mounting or screwing, non-routine manual jobs like plumbing, maintenance and construction is considered hard to automate due to the need to function in unstructured settings and necessity to adjust to

various building designs or repairs. These jobs are less likely to be automated soon because, as Bessen pointed out, these jobs require considerable dexterity and on-the-spot problem-solving abilities so by the limitation of current technology it's impractical to design autonomous processes who can achieve these kind of work. (Bessen, Automation and jobs: when technology boosts employment, 2019)

Another line of work who are resilient to automation is the workforce that requires high inter-personality skills. Some common examples of the mentioned line of work are teachers, social workers, therapists and human resource managers. These skills are in high demand because of the increasing value of teamwork, collaboration and emotional intelligence in existing and emerging sectors (Deming, 2017).

Strategic decision-making, conflict resolution and team management are expected to be elements of important leadership. As the companies get more data oriented, Bill Bishop states that good managers should lead their teams by combining analytical abilities with empathy (Bill, 2022).

Strong customer relationships and persuasion skills are still essential components of effective sales and marketing tactics. Even though artificial AI technologies facilitate the analysis of consumer data, as stated by Davenport, Guha Grewal and Bregott in their article dated 2019, human engagement is still essential to provide an engaging customer experience (Davenport, Guha, Grewal, & Bresgott, 2019).

The majority of non-routine jobs among work-force are getting more noticeable as AI and automation diminish the need for routine jobs. Since non-routine cognitive, physical, are less vulnerable to automation, professionals in these fields are expected to prosper in the changing job market. But as stated before, education and training programs must be promoted and restructured in order to provide the workforce the abilities required for these new positions.

3.2.2. The Role of STEM Education

Professionals with backgrounds in mathematics, statistics and computer programming are considered more eligible with the increasing application of machine learning and data

science in businesses. In that regard, the request for mathematical and technological abilities are expected to increase since the companies are getting more dependent to data-driven insights for decision-making processes in order to remain competitive (Goldin & F. Katz, 2008).

As a fact the automated production lines, industrial robots and automated production lines need numerous mechanical, electrical and software engineers in order to operate smoothly (Chui, Manyika, & Miremadi, 2016). In that regard IFR estimates that the requirement for industrial robots and relevant equipment will increase worldwide with the need for qualified engineers to set up and maintain these systems (International Federation of Robotics, 2019)

Integration of AI in healthcare creates new job positions to those whose educational backgrounds extends to a combination medicine and related technology. In order to create individualized treatment plans which are supported by AI algorithms, more experts are needed with genetics, telemedicine and bioinformatics (Topol, 2019).

New positions which need a combination of technological and medical expertise are being created by the integration of AI in healthcare (Davenport & Kalakota, 2019). Experts in telemedicine, genetics and bioinformatics are more and more needed to create newly emerging individualized treatment plans and support AI model-based drug discoveries (Topol, 2019; Davenport & Kalakota, 2019).

Unfortunately, STEM education is not equally available to all groups among society. Especially women and minorities in societies have lack of access to STEM education which results under-representation of these groups in the labour force. In that perspective focused initiatives for encouraging, mentoring and scholarship need to be funded to increase diversity of society in regard of STEM education (Williams, Phillips, & Hall, 2014).

It can be argued that many educational courses lack the ability to provide their pupils with sufficient STEM skills in their curriculums. More experiential learning, problem-solving and group projects should be included to modern education systems (Honey, Pearson, & Schweingruber, 2014).

Since technology is developing so quickly, lifelong learning is becoming more important. To stay relevant and eligible in the workforce, mid-career workers need to improve their skill levels to adapt. Worker adaptations to technology changes can be established by online courses, boot camps and employer-led training programs (Chia, 2022).

As a result of this chapter, it is safe to argue that STEM education is crucial for labour force to succeed and adapt to AI driven economic developments. In that regard accessibility, up to date curriculum and lifetime learning should be the main goals of the policy makers to overcome these limitations. By bringing educational institutions up to the previously-mentioned standards, the labour force can gain the required technical and multidisciplinary skills necessary to be successful in this revolution.

3.3. Sectoral Impact Analysis

3.3.1. Manufacturing

As stated often, automation and AI have major impact on manufacturing. By being a key engine of employment and economic progress in history, automation brings revolutionary changes in the manufacturing industry that both beneficiary and difficult.

Manufacturing automation began with the industrial revolution, when steam engines, automated looms and eventually Henry Ford's assembly line transformed the output. These technical developments reduced the need for physical labour in repetitious jobs and increased the production considerably (Rosenberg, 1994). By the spread of computerization in the middle of the 20th century, computer numerical control (CNC) machines and programmable logic controllers (PLCs) further automated complex procedures, moving workers into positions requiring greater technical expertise with the help of real time control systems (RCSs) (Albus & Barbera, 2005)

It is safe to argue that the automation rose to new heights by recent developments in robotics and artificial intelligence. Sophisticated jobs can be completed by intelligent systems and the mentioned industrial robots are achieving these results more consistently and efficiently than by human labour (Manyika, et al., 2017).

The use of industrial robots has greatly increased production efficiency, at the expense of worker displacement. Robots are extensively utilized for jobs including welding, painting and precision assembly in the automotive and electronics industries, where this tendency is particularly noticeable (Graetz & Michaels, 2018).

Another point to note is the Internet of Things (IoT) which leads to the emergence of "smart factories," that allow producers to collect and evaluate real-time data from linked machinery in order to quicken the production processes. When predictive maintenance and self-diagnosing machines increase in proportion of the factories, this technology lessens the requirement for personnel to monitor and repair equipment (Porter & Heppelmann, 2015).

Machine vision systems beat human inspectors in fault detection thanks to their broad range of sensors which obtain useful data from the machines in real time so both preventions made possible and possible breakdowns are reduced by the proactive intervention of these systems. So, AI algorithms are being used in quality control and replacing conventional machinery inspection labour. As a result, the necessity for data scientists and machine learning engineers to create and manage these systems increases as the demand for manual inspection workers decreases (Service innovation and smart analytics for Industry 4.0 and big data environment, 2014).

According to Boston Consulting Group report dated 2012, a further effect of automation can be observed as the tendency of moving back manufacturing to industrialized nations again. Production is now more economical because of the developments in robotics and artificial intelligence, which has reduced the need on cheap overseas labour (Sirkin, Zinser, Hohner, & Rose, 2012).

A further study regarding reshoring is discussed in detail in the OECD publishing article written by De Backer, Menon, James and Moussieg. According to the study, due to automation and growing foreign manufacturing costs, major U.S. manufacturers are planning to reshoring portions of their output. Nevertheless, in relevant to our study, the use of highly automated production lines by these reshored industries is still expected to restrict the development of new jobs (Backer, Menon, James, & Moussiegt, 2016).

We shouldn’t rule out the effect of Covid 19 on reshoring efforts. Global supply chain weaknesses revealed by the COVID-19 epidemic forced manufacturers to change their manufacturing plans and the businesses started to use a "China plus one" approach increasingly. The aim is to expanding their supply chains outside of China and making automation investments to improve efficiency and resilience (Azhgaliyeva, Beirne, Rahut, & Yao, 2023) (Baldwin & Evenett, 2020).

There is a mixed impact of automation on industrial labour. It reduced demand for low- and middle-skilled workers while it increased productivity and global competitiveness (Autor & Dorn, 2013).

Automation has caused a job polarization which can be described as while highly trained technical positions in robotics, data science and systems engineering are increasing in proportion, low-skilled assembly jobs are declining. In industrialized economies. (Goos, Manning, & Salomons, 2014) Autor and Dorn pointed to this polarization as a major contributing cause to the growing pay inequality (Autor & Dorn, 2013).

Specialized technical skills are in greater demand since manufacturing becomes increasingly automated. Due to the changing and deepening nature of manufacturing, workers today need to be proficient in programming, machine learning and equipment maintenance. In order to support displaced workers into new positions, substantial funding for education and training programs are required (Frey & Osborne, 2017)

Automation and AI integration into the production processes has completely changed worker dynamics and production processes especially in manufacturing. Traditional labour roles have been diminished by modern technology, so it is safe to argue that there are some issues to address regarding job displacement and skill needs. Retraining programs and industry collaborations for the education of skilled personnel are crucial to aid the workforce to adjust to the ever-changing manufacturing environment.

3.3.2. Services

AI and automation caused considerable changes to the services sector -which include retail, banking, healthcare and customer service- as well. Since the companies in the retail

sector start to rely on to intelligent systems in order to simplify processes and save expenses, common jobs in services sectors are quickly automated and consequently more specialized positions are emerging with project based and flexible contracted terms -as a Cybertariat- which contributes to our main hypothesis.

Retailers adopted automated inventory control, customer data analysis and self-checkout systems widely. You can find the mentioned self-checkout kiosk even in local grocery stores which eliminates the need for cashiers considerably, an article in Prism dated 2022 addresses this issue and describes how these emerging technologies are causing trouble for labour (Pereira, 2022).

Behind the shop is also not immune to the effects of automation. By monitoring stock levels using sensors and artificial intelligence algorithms, automated inventory management systems reduce human stock-taking and improve supply chains (Barile, Polese, & Sarno, 2018). According to the McKinsey research dated 2017, these technical developments are expected to automate up to 30% of retail occupations by 2030 (Manyika, et al., 2017).

Marketing strategies of retail industry are also shaped by AI algorithms. In that perspective, consumer data is obtained and processed with AI-based data analytics to organize and execute customized marketing plans and recommendations tailored by individuals (Davenport, Guha, Grewal, & Bresgott, 2019). With the mentioned transformation, human resources of retail companies are looking for the personnel who can navigate in vast consumer data and complex analyses which are prepared by algorithms (Xpheno Specialist Staffing, 2023).

Another main service industry which relies heavily on AI and automation is the banking and financial industries. These systems are used generally for trading, credit scoring, fraud detection and customer services (Agrawal, Gans, & Goldfarb, 2018). High-frequency trading is made possible by algorithms which allows financial companies to make millisecond-based investment decisions so both the response timing of these transactions are reduced so institution who puts these algorithms into practice have a competitive edge and total volume of the transactions are increased (Alridge & Krawciw, 2017).

Another practical usage of AI algorithms for retail services are the Banking and financial service. Main retail service of bank is the evaluation of credit risks which was previously done by the experience and intuition of loan officers. According to Agrawal, Gans and Goldfarb, emerging prediction abilities of these algorithms regarding the financial situation and prediction of individuals' evaluation of the application of loan users are determined much more efficiently and accurately than the loan officers (Agrawal, Gans, & Goldfarb, 2018).

Algorithms manage these evaluations by cross referencing the data of individuals to predictions patterns of previous customers to determine possible behaviors of the candidates (Agrawal, Gans, & Goldfarb, 2018). While algorithms predicts the possible outcomes of loans, robotic portfolio management algorithms enable robotic advisors to offer investment guidance which was given by actual advisors, while chatbots provide automated customer service, answering common questions quicker than human representatives so AI's ability to make accurate predictions transforms various roles of labour in finance and consequently 20–25% of occupations are expected to be automated over the next decade (Agrawal, Gans, & Goldfarb, 2018).

For the reasons explained previously; in order to remain competitive with their peers, retail sector companies are relying increasingly on flexible contracts in terms of employment. These flexible employment options are consequently contributing to the establishment of "Cybertariat" in labour force across economy (Major & Compson, 2021).

Healthcare industry is another service sector which undergoes major changes and developments by AI and automation processes in terms of treatment planning, diagnosing and administration. Medical photos are analyzed by AI-powered diagnostic tools help to spot anomalies and design treatments for the patients (Ghorashi, Ismail, Ghosh, Sidawy, & Javan, 2023). As an example to the power of these algorithms, machine learning systems, predict and identify heart illness from CT images better than human doctors can (Orozco, Maaniity, Benjamins, & Niemi, 2019). Additionally due to the COVID-19 pandemic, the use of telehealth systems increased exponentially because of the necessity of staying at home (Garfan, et al., 2021). In addition to previous developments, automated

systems track patient appointments, handle insurance claims and keep an eye on health data, which in combination decreases the amount of administrative work for medical personnel as well (Lee, Friedman, Cukor, & Ahern, 2003). These developments have moved telemedicine specialists and data analysts into positions in healthcare sector (Keesara, Jonas, & Schulman, 2020).

The final service sector that will be mentioned in this study is telecommunications, utilities and travel assistance services. These sectors are benefiting from automated customer care and support systems like chatbots and virtual assistants to handle the vast majority of customers. Complex and automated response of chatbots regarding billing, ticketing and technical assistance questions in real time reduces personnel costs of the subject companies significantly (Turpin, 2023). As an example, the research conducted by Grand View Research, projects that companies who are looking to improve customer engagement will invest $9.4 billion worldwide to chatbot industry by 2030 (Grand View Research, 2021).

In Addition to chatbots, interactive voice response (IVR) systems which uses synthesized voices instead of text started to appear in the sector because of recent developments in voice synthesizing technology (Itorobong, Azeta, & Daramola, 2017). Automated call centers direct consumers through a series of questions and determine if the call needs to be routed to a specialist agent. With the aid of these technologies call centers handle larger numbers of questions and fewer human agents are required as a result (Gans, Koole, & Mandelbaum, 2003)

As stated above, the services sector changed substantially by AI and automation in the last decade and caused similar changes to the labour force who are responsible for running these retail sectors. There are now more chances in the horizon for the people due to the capacity of emerging technologies to handle repetitive chores which was considered impossible until recently. The effect of these changes to conventional service jobs emphasizes how important to implement strong training programs to assist employees in moving into new positions.

3.3.3. Finance

Our next sector discussed is Finance, which is altered considerably by emerging Automation and AI technologies. These technologies altered employment needs and workflow procedures of the sector. Automation is started to be used in most of the major elements of Finance such as risk management, trading and customer service since AI algorithms can rapidly and accurately evaluate enormous volumes of financial data. As expected, this tendency raised productivity but also replaced routine occupations with new ones that call for specialized knowledge.

The first discussion of this study is the effects of algorithmic trading on the stock markets. It is observed that the stock markets undergone a serious disruption when algorithmic trading first appeared, since the mentioned trades were executed by initial algorithms according to preset standards, such price, volume, or other market factors (Broogard, Hendershott, Hunt, & Ysusi, 2014).

In recent years, these algorithms have become sophisticated and high-frequency trading (HFT) is now making up a sizable amount of the world's trading activity by utilizing sophisticated algorithms to execute transactions in milliseconds. In that regard, computer servers have taken the place of traditional and iconic trading floors, when quantitative analysts and data scientists, who create, oversee and improve these trading algorithms displaced numerous dealers (Alridge & Krawciw, 2017). According to the article of Economist dated 2019 more than half of all equities traded in the US are done not by humans but by algorithms executed by super computers (Economist, 2019).

Another innovation introduced to finance is the Robo-advisors which can be described as internet sites or mobile services which offer portfolio management and investing guidance with the utilization of automated algorithms (Brenner & Meyll, 2020). Usually, customers are expected to fill in some initial information like their time horizon, risk tolerance and financial objectives before the algorithms create a customized investing portfolio. These generic and inexpensive tools offer societies a guidance of investment to the lover members of society who couldn’t afford such services just a decade ago and transform the wealth management in general (Cardillo & Chiappini, 2024).

According to the projections of WEF dated 2020, growing use of robotic advisors may lower demand for human financial advisors and wealth managers by thirty percent in the next decade (Schwab & Zahidi, The future of jobs report, 2020).

Another application of AI and automation in finance is fraud detection. These systems find and control relevant fraud risk in lending, insurance and investing by analyzing market patterns, financial history and consumer data in order to identify fraudulent transactions or credit applications. These models which are trained by machine learning algorithms are used by banks and insurance companies to identify odd transaction patterns that may be signs of fraud (Van Liebergen, 2017). Millions of transactions are continuously analyzed by these systems in real time and when a possibly suspect conduct is found then investigators are notified (Tarantino & Cernauskas, 2009)

Chatbots and virtual assistants utilized in customer services of financial institutions is another novelty of AI. These virtual assistants are powered by natural language processing (NLP) which is a main sub-division of AI (Surdeanu & Valenzuela-Escarcega, 2024). These assistant systems aid customer services by answering frequently asked questions regarding account balances, transaction history and payment deadlines (Orzeszko & Piotrowski, 2023). In addition to answering frequent questions, these assistants help achieve customers to conduct online banking operations and use mobile apps without having to go to a real branch (Gran & Foreman, 2022). Increase of these assistants raised demand for mobile app developers, cybersecurity experts and digital marketing experts while lowering demand for bank tellers and branch managers (Wilson, Daugherty, & Bianzino, 2018).

The final element of this chapter regarding the impact of automation to finance is Regulatory Technology (RegTech) which has emerged as a result of the growing compliance need of financial institutions. Emerged softwares designed for automated compliance processes help banks and other financial companies to make sure that their operations follow the always shifting regulatory environment. Mentioned RegTech solutions work by looking for patterns in real time transactions while comparing those actions with previous ones flagged as breach to the regulations (Arner, Barberis, & Buckley, 2017).

AI and automation are replacing mundane jobs and altering the financial industry with opening up new opportunities in specialized fields like data analytics, risk analysis and mobile banking. Replacing these positions is taking place by contract based and flexible labour which is another sign of the rise of Cybertariat.

3.3.4. Transportation and Logistics

Just like any other major sector which requires the labour force to operate, AI and automation developments are bringing revolutionary changes in the transportation and logistics industry. Drones, automated warehouses and driverless cars are just a few of the many emerging technologies which give their investors a competitive edge by cutting operating expenses and generating new efficiency. But it should not be forgotten that they also cause difficulties for the workers, particularly for those doing regular duties (Arbib & Seba, 2017).

The first and most important transformation regarding transportation is the emergence of autonomous vehicles (Alfonso, 2020). In the first glance, this change allows companies in the sector to reduce labour expenses and increase efficiency (Bharadiya, Artificial intelligence in transportationsSystems: A critical review, 2023). Companies like Waymo and Uber seem to profit these emerging automation technologies by the expense of transportation labour. As we mentioned earlier, emerging automation technologies allow these companies to initiate flexible employment models and contribute to gig economy (Apouey & Stabile, 2022). According to the study of McKinsey & Company, if the current automation technologies can be implemented with its whole potential, operating costs would decline 45 percent and create around 85 to 125 billion USD in the US hauling industry (Murnane & Neuhaus, 2018).

When long hauling labour is compromised, taxi drivers are also expected to hurt from autonomous driving technology as well. Uber and Lyft are the first companies among many who are making significant investments in self-driving technology in order to cut labour expenses (Hawkins, 2022). Even though autonomous taxis which is expected to operate completely autonomous, are still in the experimental stage, their introduction could have a big effect on driver jobs, especially in metropoles (Hawkins, 2022).

The third aspect of logistics, which emerged with AI, is the usage of drones in delivery. Using drones in transport is expected to change delivery especially in last-mile deliveries (Borghetti, et al., 2022). Drones are planned to be used to deliver things swiftly, particularly in crowded metropolitan centers or difficult-to-reach locations with conventional roads (Borghetti, et al., 2022). Drones have been used in trials by businesses including Amazon, UPS and Zipline for consumer products, groceries and medical supplies deliveries (Vazhavelil & Sonowal, 2021). According to the Logistic Trend Radar issued by DHL Trend Research, unmanned aerial vehicles (UAVs) are expected to be one of the main components of the last point to point transportation in 5 years (Busch, Heutger, & Kueckelhaus, 2020).

Another expanding area of logistics in respect of AI is warehouse automation. Combination of robots and AI controls determines the best possible picking, packing point for inventory controls while the conveyor systems powered by automated picking robots simplifies picking and sorting operations in these warehouses (Wurman, D'Andrea, & Mountz, 2008). Big online retail companies like amazon utilizes these achievements to further cut down human labour from warehouse management (Day, 2024). For that regard, subjected company Amazon provides insights to their customers in their web site about amazon where they share how their automation systems are increasing their robotic inventory by adding new and more capable robots for the processes (Dresser, 2023). Real time stock level tracking systems are also becoming the main norm in emerging smart warehouses by their superiority regarding reducing the errors and eliminating the necessity to manual counts (Robert, 2006). Instead of printed barcodes remaining from the 3rd industrial revolution, these systems utilize radio frequency identification (RFID) tags in order to operate properly (Robert, 2006). By combining real time inventory counting capability with automized robots which handle the commodity, these warehouses require minimal to no personnel which proves our point regarding how the AI is displacing labour force (Boysen, De Koster, & Weidinger, 2019).

By analyzing traffic patterns, delivery schedules and weather, AI powered autonomous vehicles can achieve the shortest and most fuel efficient routes and help businesses regarding fleet management and route plannings (Pendleton, et al., 2017). Predictive

maintenance systems powered by these algorithms can track the condition of vehicles and can foresee any mechanical problems before they happen, so reduces the downtime and increases the expected lifetime of these units. These management systems also take traffic data into account and plan accordingly so using these systems in busy metropoles would be an adding factor to exiting benefits (Filho, et al., 2020).

Emerging AI applications are changing the transportation and logistics sectors just as the previously mentioned subjects. While lowering the costs and increasing efficiency can be considered as the contributions of these technologies, as stated previously, they are also on the verge of displacing large portions of the labour and destabilizing the existing work force to change into Cybertariat. Quick monitoring and proactive policies are needed to protect the existing labour force.

3.4. Geographical Disparities

3.4.1. Urban-Rural Divide

Since the first cities are established in the Middle East following the Agricultural Revolution, there is an observable gap between urban and rural communities in regards of economic prosperity, technology adoption and investment rate (Childe, 1958). Recent increase technological advancements seem to have a complicated effect on the mentioned gap between rural and urban communities in terms of labour markets and income distribution (Jiang, Li, & Si, 2022).

In the first instance it can be seen that the urban areas, particularly where large concentration of technology companies and educational institutions embrace AI and automation technologies quite faster. The places where previously mentioned IT, finance, logistics and healthcare industries exist adopts the emerging technologies relatively faster. In that regard, rural areas lag behind urban societies and achieve slower economic growth. In the first instance, this lag seems to be caused by the lack of necessary infrastructure and investment (Glaeser, Resseger, & Tobio, 2009).

In addition, Glaeser, Resseger and Tobio (2009) also point out that the access to venture money, talent pools and functional research facilities make possible the cities like Silicon Valley, New York and London prosper. On the other side, due to their smaller economies and lower educational levels, rural areas in the United States are less likely to gain from technology developments in the long run (Muro, Maxim, & Whiton, 2019).

In that regard it can be said that robotics has caused employment displacement in rural areas as well, whereas job creation in metropolitan areas frequently concentrates on high-skill jobs. As previously mentioned, the job polarization which is reinforced by the new occupations that automation creates in data science, AI development, cybersecurity and digital marketing occurs mostly in metropolitan regions (Autor & Dorn, 2013). By contrast, according to the estimation of Mckinsey&Company report estimates that up to 25% of jobs in rural America could be lost in the next decade in rural communities which are dependent on agriculture, manufacturing and mining (Manyika, et al., 2017).

As a part of infrastructure, digital connectivity and broadband internet access needs special attention due to their importance upon more traditional but yet important infrastructure elements. In the first instance broadband internet seems to be a ladder which closes the gap between rural and urban areas by connecting rural population to economic activities by the emerging job opportunities which don't require physical appearance in order to be performed. (Jiang, Li, & Si, 2022). Even though internet makes it possible to connect different geographies, we should keep in mind that mentioned broadband access is not always possible for rural areas therefore impacts as a double below to these geographies both by lacking of broadband connection and physical jobs at the same time (Jiang, Li, & Si, 2022). According to Federal Communications Commission, almost 14 million rural Americans do not have consistent broadband connectivity while in the urban population this number is 1.3 million (Federal Communications Commission, 2019). Expectantly, venture capital investment is also drawn to urban tech hub cities; in fact, majority of venture capital is concentrated in cities like San Francisco, Beijing and New York (Florida & Mellander, 2016).

As mentioned briefly, the urban-rural gap is made worse further by differences in education. Expectedly, STEM graduated and skilled professionals are produced in urban

regions with top-tier universities and technological institutes compared to typical community education institutes of rural geographies. These graduates are able to embrace new technology and adapt better to economic changes so they improves the economic prosperity of these locations better (Glaeser & Gottlieb, 2008).

By contrast, the term "brain drain" which can be described as migration of skilled and educated people to more developed locations plague rural areas as they battle to keep young, educated people and draw high-tech experts (Ye & Yu, 2021).

As a final word regarding rural urban gap, in order to offset already deepened economic disparity regarding labour force, it will take focused legislative actions to close the technology adoption and economic growth gap between urban and rural areas. Investing to digital infrastructure -especially in connectivity-, training and skill development is essential to make rural areas competing in an economy that is becoming more automated considering the decreasing contribution of agriculture and mining to economy. Filling this vacuum will help with more equal distribution of the advantages of automation and AI into labour.

3.4.2. Global Disparities

AI and automation reshape the market conditions as well in global scale with unique patterns which are arising from workforce skill variations, technological adoption levels and economic frameworks. These variations caused differences in economies of nations from industrialized and emerging ones just like they did on the inside of countries (Feijóo, et al., 2020).

Main cause of this differentiation can be considered as the level of acceptance and availability of AI and automation technologies among countries. Due to their developed technical infrastructure, relatively qualified labour force and their ability to invest more on research& development thanks to their already accumulated surplus, advanced economies like the US, Germany and Japan benefits more from the adoption of these technologies therefore increasing the gap (OECD, 2019). On the other hand, underfunding in R&D due to low surplus, not enough qualified education systems and a

lack of required infrastructure cause emerging nations to fall behind in the adoption of technology and consequently causes them to suffer further economically. According to the World Bank study performed in 2019, in high income countries, 83% of companies already utilized basic automation tools while in low-income nations this rate is around %38 (World Bank, 2019).

The effects of automation vary with the own dynamics of the labour force in each country. Developed economies with their service-based structures have different problems than developing states who are dependent on basic manufacturing and relatively labour intensive agriculture (Matthess & Kunkel, 2020). Occupations which consist of routinely done jobs in retail, finance and industry are becoming rapidly automated in developed nations (White, Lacey, & Ardanaz- Badia, 2019). By contrast, labour intensive industries like agriculture and textiles are losing a large portion of labour jobs in developing countries, especially in Asia and Latin America continents. According to the study of ILO, more than half of Southeast Asian employment are expected to be affected by automation (International Labour Organization, 2017).

One of the main differences in adjusting to AI is considered to be caused by variations in educational systems between geographies. Due to higher budgets of developed countries caused by expendable surplus, these countries provide easier access to their population for better STEM education so this cycle provides steady stream of data scientists, engineers and IT professionals who are better equipped to be employed in job opportunities caused by emerging technologies (Fadlelmula, Sellami, Abdelkader, & Umer, 2022). As a top example, United States, Europe and Japan have made a considerable investment in technological education to make sure that their populations will be ready to the transformation caused by AI (Anderson, Raine, & Beveridge, 2023).

The World Economic Forum in 2020 provides data for the above-mentioned trend in 2020 study. According to the findings, United States, Europe and Japan are making substantial investments in technical education to guarantee that their labour force have a chance to adapt to the economies which will soon to be expected to be driven by AI (Schwab & Zahidi, The future of jobs report, 2020). By contrast, vocational traditional training which are concentrated on skills which are appropriate for manufacturing and agriculture is

frequently used in emerging nations. When automation reaches a broad level of usage in these sectors, people with less technical training have a lot of trouble moving into high-tech jobs (Manyika, et al., 2017)

Global inequality of adapting AI into better use of labour force doesn't seem to be overcome easily due to complexity of previously mentioned boundaries so we will continue to see this gap. Some countries will continue to struggle with mentioned obstacles, while others will prosper because of their trained labour and technical breakthroughs and it is going to take coordinated international initiatives to encourage countries to spend more in infrastructure, education and legislative frameworks for all regions to gain from the emerging digital economy.

INCOME DISTRIBUTION AND INEQUALITY

4.1. Effects on Wages Across Industries

As one of the main arguments of this study, integration of AI and automation has fundamentally changed and will continue to change the payment scales in majority of sectors. These emerging technologies have produced a paradox whereby highly qualified tech-driven sector specialists see a considerable increase in their salary while people in ordinary tasks either stagnate or see losses. Dealing with income inequalities and guaranteeing equitable economic development start with the awareness of these changes.

The first and foremost part of the labour force that affects from this shift is high tech sectors. Because of the growing need for specialized skills in high-tech sectors, especially in software development and data science whose growth has coincided with late 20th century and early 21st century, pay growth has been strong. With jobs like software engineers and data scientists leading the way, the U.S. Bureau of Labour Statistics reports that the median annual pay for computer and mathematics occupations was much above the national average (U.S. Bureau of Labor Statistics, 2024). It should also be noted that these sectors are the founder of modern algorithmic AI systems (Busquim, Villamizar, & Kalinowski, 2024). It can be argued that as companies will depend more on data-driven decision-making, the need for these positions will keep growing (Sahay, 2018).

Increased production of information in economy and its reliance naturally emerged its own safety in the form of cybersecurity (Keck, Gillani, Dermish, Grossman, & Friederike, 2022). In that perspective, the cybersecurity industry has witnessed a significant pay rise in line with the increasing relevance of protecting digital infrastructure established by economy. According to the WEF 2023 dated Global Cyber Security insight report, there are more than 3 million cybersecurity experts' shortfall worldwide, which increase rates while companies are fighting for limited talents (Bueerman & Doyle, 2023). This trend is a projection of the tendency of change toward highly technical employment receiving top dollar (International Information System Security Certification Consortium, 2021).

Some parts of the financial sector also benefit from this chance particularly with the growing influences of automation and AI in investing and risk management (Maple, et al., 2023). Compared to their colleagues in conventional professions, financial analysts who especially focus on quantitative finance and algorithmic trading are getting better pay. In that perspective, WEF in 2020 observes that the growing complexity and data-intensity of contemporary financial markets, which call for strong analytical abilities and technical knowledge accelerates this trend (Schwab & Zahidi, The future of jobs report, 2020).

On the other side of the spectrum, we should also point out that the automation has hurt many previously mentioned conventional sectors, whose employees suffered from wage stagnation. Particularly for routine, middle range skill employment, the broad applications of industrial robots and automated manufacturing lines has decreased the requirement for hand labour. According to the study of Autor and Dorn, areas which are mostly dependent on manufacturing are experiencing noticeable wage stagnation in response to the loss of manufacturing employment (Autor & Dorn, The growth of low-skill service jobs and the polarization of the US labor market, 2013). With keeping these in mind, we can argue that the middle-class earnings have been profoundly affected by this change, which also causes more general economic disparity (Acemoğlu & Restrepo, The race between man and machine: Implications of technology for growth, factor shares, and employment, 2018).

Automation is also causing similar changes and difficulties for retail and customer service industries as well. Self-checkout kiosks and artificial intelligence-driven customer support bots are among automated systems which are lowering demand for low-skill employment, hence driving down salaries. By emphasizing further aggravation of pay gaps and job uncertainty, we can example Frey and Osborne's 2017 dated study which calculates that a significant portion of employment in these industries are highly susceptible to automation (Frey & Osborne, 2017).

As a middle of the spectrum, the healthcare industry shows a more complicated picture with both benefits and drawbacks caused by AI and automation. While professions in telemedicine and digital health have experienced notable pay rise due to their increasing

proportion in the industry, traditional jobs like nursing have seen just small gains (Haleem, Javaid, Singh, & Suman, 2021). Since the healthcare sector embraces more AI-enabled solutions like any other sector, these roles which call for clinical knowledge and technological skills are becoming ever more valuable (Topol, 2019). Furthermore, the evolution of medical technologies like wearable health devices and AI-driven diagnostic tools has opened new opportunities for engineers and data scientists focused in healthcare industry (Matheny, Israni, Ahmed, & Whicher, 2020).

The effects of AI and automation to wages vary greatly among sectors. In relation to the demand for advanced technical abilities, high-tech industries such software development, data science and cybersecurity are seeing substantial salary increases in addition with recently established new line of works. By contrast, this trend is causing payment stagnation or losses in routine employment in manufacturing, retail and customer service sectors. We believe this trend will deepen by AI's vertical expansion toward these sectors.

4.2. Skill-Based Wage Inequality

The invasion of AI and automation to many sectors has greatly increased the salary differences between low and high-skilled workers. As mentioned briefly in the previous chapter, the rising need for people with specific capabilities in high-tech industries such as data science, artificial intelligence development and advanced engineering drives this gap. In their study dated 2014, Brynjolfsson and McAfee state that IT professions demand further payment increases than standard employees because of their large contributions to data analytics and machine learning applications across many sectors. The study also notes that AI specialist which is a sub and multidisciplinary category of software engineering have 40% higher median salary compared to traditional software developers which shows us that inequality increases further in the high end of the technological transformation (Brynjolfsson & McAfee, The second machine age: Work, progress, and prosperity in a time of brilliant technologies, 2014).

On the other side of the spectrum, routine jobs including data entry and assembly line work are progressively vulnerable to automation, which results in pay stagnation or drop in these industries. In that perspective, Frey and Osborne claim that almost half of the

occupations in sectors classified as routine task-oriented are under danger of becoming automated. Their analysis also predicts %20 potential decline in wages for these roles over the next decade due to increased role of automation (Frey & Osborne, 2017).

Educational level also affects the wage difference, particularly in STEM skill required areas. The study of Goldin and Katz published in 2008 has stated that people with advanced STEM degrees typically achieve better salaries than those without such degrees (Goldin & F. Katz, 2008). This gap is anticipated to expand as automation develops, which emphasizes the need for STEM education in raising individuals for technologically driven, highly paid employment. 2019 dated report of European Commission report also emphasizes that the quick speed of technological development requests constant learning and upskilling. It is believed that almost half of all jobs will need some kind of retraining to keep pace with new technical needs (Goos, et al., 2019).

Skill based polarization of the job market is further complicating the payment structure. Lowest- and highest-skill employment are expanding while middle to middle low skill positions are declining. So, we can suggest that middle-skill employment in sectors like manufacturing and administrative support positions where automation is likely to have an impact is declining (Autor & Dorn, The growth of low-skill service jobs and the polarization of the US labor market, 2013). This change not only lowers the current job counts and narrows wide range middle labour class but also causes labour market to be filled with low-wage jobs in service-oriented sectors and high-wage roles in tech-driven sectors (Dachs, 2018).

Moreover, previously discussed regional variations are indirectly influencing labour wage distribution by both providing better education so enhancing STEM abilities can be achieved by individuals and also by attracting a lot of gifted individuals to Tech-centric urban areas like San Francisco and London. This change increases the differences even more and generates an interlock between geography and skill-based labour (Glaeser & Gottlieb, 2008).

4.3. Concentration of Wealth in Tech Sectors

The rapid adoption of AI has not only changed sectors but also shifted the economic environment drastically and caused concentration of wealth in the IT industry. The worldwide reach of these companies, market supremacy and creative ability to establish big technological businesses have created this concentration and caused more economic inequality (Bharadiya, Thomas, & Ahmed, Rise of artificial intelligence in business and industry, 2023).

Often referred to as "Big Tech", major technological corporations like Apple, Alphabet (former Google), Microsoft, Amazon and Meta (former Facebook) have used AI algorithms to acquire formerly unheard dominance over leading economic sectors (Fanti, Guarascio, & Moggi, 2022). These businesses have profited from their capacity to gather, examine and use enormous volumes of data and consequently gained important understanding of customer behavior and industry trends (Krafft, et al., 2021). Their dominance can be seen in their significant market shares in e-commerce, social media, cloud computing and digital advertising among other sectors (Webb, 2019). As an example, according to the Wall Street Journal article, combined market value of the five biggest tech companies exceeds $7,5 trillion in 2019 and they grow more than %50 comparing to previous year (Dapena, 2023).

The market dominance of these Tech Giants is further reinforced by network effects and scaling of economy. Platforms like Amazon and Google profit from network effects, where the value of their services rises as more people join, therefore sustaining their expansion and market control (Menell, 2019) (Kenney & Zysman, 2020). This cycle also solidifies their market share and enable them to reinvest their profits into further innovation and expansion, often by the acquisition of emerging competitors (Manne & Hurwitz, 2018) (Brühl, 2023).

Moreover, concentration of wealth in the tech industry can be observed by executive pay and stock ownership trends (Allen J. P., 2017). In that regard the stock market has experienced notable increases particularly in tech equities, which disproportionately favors the wealthiest sections of the population (Norris, Kochhar, Suphaphiphat, Ricka,

& Tsounta, 2015). According to the study of Piketty, the richest 10% of American families own more than 80% of the stock market, so the income created by the increasing stock prices of tech companies mostly benefits the already wealthy section of the population (Piketty, 2014). Since the benefits of the expansion in the tech industry are not shared equally, this dynamic has increased wealth disparity (Jaumotte, Lall, & Papageorgiou, 2013). According to the article of The Wall Street Journal, the founders and executives of these companies have also seen their own wealth skyrocket with stock-based payment and equity holdings (Brown, 2021). As another example, we can observe on the Forbes Billionaires List that the founders of firms including Amazon, Microsoft and Meta are among the richest people on Earth, therefore this highlights the connection between the concentration of personal wealth and the expansion of the technology sector. It should also be noted that 7 individuals of the top ten is directly founded and owns tech companies while the other 3 is heavily invested in technology (McGivern, 2024).

It can be seen that the tech giants have grown further by mergers and acquisitions and further unite their market strength (Rossi, Tarba, & Raviv, 2013). These mentioned big tech companies have methodically purchased possible rivals and included emerging startups into their current business practices (Suo, Yang, & Ji, 2023). As famous examples; Facebook’s purchases of Instagram and WhatsApp and Google's purchases of YouTube and Waze, have not only decreased competition but also increased the corporations' impact in relevant industries (Cunningham, Ederer, & Ma, 2021). By allowing tech companies to take more of the value chain, this vertical integration also helps them to solidify their market leadership and make them market cartels (Ong & Toh, 2023).

Tax dodging tactics of these giant corporations should also be mentioned in this study. Many of these businesses avoid their tax obligations by using complex worldwide tax plans, often by moving income to lower-tax countries (Dillon, 2017). According to the 2024 dated OECD Corporate Tax Statistics Report, large corporations are evading Tax by preferential tax regimes, base erosion and profit shifting (BEPS) and reducing effective average tax rates strategies (EATS) (OECD, 2024). We can argue that this was possible

by the free flow of money which is mainly established by neoliberal Political decisions (Cobham & Janský, 2018).

These businesses preserve their favorable policies further by major lobbying campaigns which help them to control regulatory surroundings to their advantage (Drutman, 2015). According to the 2020 dated article of Open Secrets, tech giants Facebook and Amazon were the only corporations in the top ten lobby spenders list in 2020 while other remaining 8 were sectoral associations which shows how influential these giants are. According to the article, these two corporations solely paid over $38 million on lobbying in the United States in 2020 which is enabling them to keep favorable legislative conditions, supporting their expansion and wealth concentration (Hillstorm, 2021).

The concentration of wealth in the tech industry highlights more general economic consequences in terms of artificial intelligence and automation (Piton, 2023). Although these technologies have driven economic development and creativity, they have also widened wealth disparity and generated concerns over fair taxes, regulatory control and market competitiveness (Acemoğlu & Restrepo, The wrong kind of AI? Artificial intelligence and the future of labor demand, 2019). Dealing with these problems demands a coordinated worldwide effort to change tax laws, improve antitrust laws and thus creation of a fairer distribution of economic gains, so ensuring that the advantages of technical developments are shared more generally across society (Edelberg, Lee, Estep, & Bober, 2021).

4.4. Implications for Middle-Class Stability

Often considered as the basis of industrialized economies, the middle class is under danger as AI and automation applications are widely embraced. This study argues that these technologies have caused job polarization with a considerable move toward high-skill, high-paying occupations and a reduction in conventional middle-income roles (Ford, 2015). For many households, this reorganization is expected to be created more economic uncertainty, therefore aggravating income disparity and jeopardizing social stability (West D. , 2018).

Technological developments have undermined many middle-income employments, particularly in manufacturing and administrative fields. Once essential to middle-class stability, these jobs are being automated or outsourced more and more and leaves a gap in the market which is difficult for displaced people to cover (Autor & Dorn, The growth of low-skill service jobs and the polarization of the US labor market, 2013). Furthermore, the emergence of low-paying service jobs has further helped to shrink the middle class since many workers find themselves in unstable jobs with little chance for promotion (Frey & Osborne, 2017).

Controversially, for individuals with the required knowledge and abilities, the rising need for highly skilled professionals in technology, finance and healthcare has resulted in notable pay increase (Manyika, et al., 2017). But as Goldin and Katz point out, these positions generally call for advanced education and specialized knowledge, which are not readily available to everybody and therefore expand the disparity between high- and low-income workers (Goldin & F. Katz, 2008). This payment disparity caused a deepening in the already existed stagnation of real earnings for middle-class workers; despite the increases in production so consequently the middle-class wages have stayed essentially same since the 1970s (Mishel, Bivens, & Shierholz, The state of working America (An economic policy institute book), 2012).

Particularly as the emerging gig economy expands, economic uncertainty has evolved into a major concern for middle class (Katz & Krueger, 2016). With that perspective, Kalleberg underlines how gig workers are exposed to economic shocks since they often lack basic benefits such as healthcare and retirement plans (Kalleberg & Vallas, Precarious work (Research in the Sociology of Work 31, 2018). Many middle-class families find themselves battling to keep their quality of living since unstable work has left little to no savings to rely on during economic downturns (Warren & Warren, 2003).

The loss of middle-class stability also has broad consequences for social mobility and educational access as well. Many American families are unable to raise their financial situation over generations, so social mobility in the country has stagnated (Chetty, Hendren, Kline, & Saez, 2014). This study believes in line with Autor that rising educational expenses and insufficient support for vocational training (which have left

many workers unprepared for the needs of the digital economy) help to explain some of this inertia among middle class (Autor D. , Work of the past, work of the future, 2019).

Loss of middle-class stability causes significant social and political ramifications as well, which fuels already growing polarization and erodes institutional confidence (Milanovic & Branko, 2016). It can be argued that wage stagnation and economic uncertainty have driven social division. These processes are therefore believed to be fundamental drivers to the emergence of populist groups and anti-globalization sentiment in many industrialized nations (Pose, 2018). As an example, according to the 2024 dated report of Pew Research Center, considerable number of Americans believe that the government mostly serves the interests of a rich elite which reflects the rising views of inequality and unfairness (Pew Research Center, 2024).

As a conclusion to Income Distribution and Inequality, we can argue that the fast development of AI and automation technologies has drastically changed income distribution, therefore aggravates already existing inequality by separating highly trained, highly paid individuals from those in low-skilled, low-paying jobs (Autor & Dorn, The growth of low-skill service jobs and the polarization of the US labor market, 2013). In that regard the economic gap widens as conventional middle-income employment fades and pay polarization deepens, leaving many workers susceptible to financial instability (Alonso, Kothari, & Rehman, 2020). Implementing thorough rules that aids lifelong learning, guarantees fair labour practices and equitable access to education would help to overcome these problems. Such steps are crucial for creating a more inclusive economy where the advantages of technology development can be distributed more generally over society (Schwab, The fourth industrial revolution, 2016).

THE CYBERTARIAT: TRANSFORMATION OF THE LABOUR FORCE

5.1. Definition and Characteristics of the "Cybertariat"

The term "Cybertariat." can be referred as an increasing portion of the workforce which is molded by the emergence of digital platforms and AI-driven job management systems (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014). This labour has a unique position in the modern economy, different from regular employees and independent contractors by their involvement with gig-based, remote and algorithmically controlled labour systems. This new workforce has particular difficulties in terms of employment stability, economic security and professional growth (Scholz, Uberworked and underpaid: How workers are disrupting the digital economy, 2017).

Digital platforms have helped the gig economy grow quickly by offering workers chances for flexible, temporary employment across a range of industries (Sundararajan, 2016). Platforms as Upwork, Fiverr and TaskRabbit let freelancers and gig workers worldwide promote their talents (Codagnone & Martens, 2016). This strategy provides flexibility for both employer and the worker but also results income instability for workers since these individuals usually lack long-term contracts and must constantly hunt out customers to keep their revenue sources from failing (Kalleberg, Precarious lives: Job insecurity and well-being in rich democracies, 2018).

The emergence of ride-hailing and delivery companies like Uber, Lyft and DoorDash has further disrupted the transportation sector for both hauling and taxi services (Rosenblat, Uberland: How algorithms are rewriting the rules of work, 2018). Workers in these positions are subject to platform-imposed policies and ratings systems that greatly impact their capacity to find employment even though they are independent contractors (Vallas & Schor, 2020). Although this dynamic gives the users some degree of flexibility, it leaves them with limited negotiating leverage, so the users have to rely on to the mercy of platforms for their livelihood (De Stefano, The rise of the 'Just-in-Time Workforce': On-Demand work, crowd work and Labour protection in the 'Gig-Economy', 2016). As seen

by the history of capitalism, relying on employers for their best interest never unravels favorable results for labour force (Harvey, 2010).

The movement toward remote work which is accelerated by developments in communication technologies and the COVID-19 epidemic has given another layer of complexity to the Cybertariat class (Benanav, 2019). Geographic freedom which is provided by remote work opportunities lets employees do their jobs from desired places, so new labour markets are created free from geographical limitations (Capelli, 2021). So, the remote work ability, has the power to lower geographic disparities by allowing employees in rural or less developed areas to access employment opportunities which are usually found in metropolitan centers (Sostero, Milasi, Hurley, Macias, & Bisello, 2023). In the first glimpse, this looks like an improvement for disadvantaged labour, but this change also erases the lines separating jobs from personal life (Gregg, 2011). As an example, the 2020 dated Eurofound research found major difficulties for the work-life balance since the lack of separation between home and offices can result in longer working hours and higher stress (Ahrendt, et al., 2020).

We should also discuss the fundamental elements to the establishment of the term Cybertariat which can be summarized as digital surveillance and algorithmic administration (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014). With the help of digital instruments that have emerged, employers have the opportunity to track workers' output and monitor them, therefore compromising their autonomy and creates ongoing pressure. According to the 2017 dated study of Ajunwa, Crawford and Schultz, such monitoring methods can be intrusive and frequently lack openness so leaving employees unclear about how their performance is being assessed and exploited (Ajunwa, Crawford, & Schultz, 2017). Many gig workers also are under constant control by algorithms that use mainly customer ratings data as performance criteria to decide the workers' access to work. This arrangement can lead to unmanageable workloads and income volatility, consequently, aggravates the inherently unstable character of gig employment (Lee M. K., 2015).

As final words to the definition of "Cybertariat", we can present that this is a new labour force distinguished by its interaction with gig-based, distant and digitally mediated work

(Fuchs, Digital labour and Karl Marx, 2013). Although these employees usually described by their autonomy and flexibility, they also have great difficulties with job security, salary stability and the widespread character of digital monitoring (Wood, Graham, Lehdonvirta, & Hjorth, 2018). Developing regulations (which will be discussed in upcoming chapters) to establish Cybertariat workers' rights and creating fair compensation within the digital economy depends on an awareness of these traits.

5.2. Economic Vulnerability and Precarity

Since the gig-based and platform-mediated work is inherently unstable, Cybertariat workers are quite vulnerable and economically precarious. Additionally, many workers who are working with these conditions find that the promised freedom and autonomy of digital platforms come at the price of job security, consistent income and access to social safeguard (Standing, 2011) s.

The gig economy's structure produces erratic and unstable income patterns, so workers usually have no set contracts or scheduled hours (Heeks, 2017). Many gig workers depend on constant job availability, which is usually decided by platform algorithms that give workers with better ratings or productivity scores first priority (De Stefano, The rise of the 'Just-in-Time Workforce': On-Demand work, crowd work and Labour protection in the 'Gig-Economy', 2016). According to the 2016 dated survey of Pew Research Center, almost one third of of gig workers said that their work hours were erratic and they reported being financially unstable, which points that this system produces strong competition and variable pay (Smith, 2016). Gig workers also often pay hidden expenses that reduce their net income like insurance, maintenance and platform fees (Farrell & Greig, 2016). For example, according to the 2018 dated Economic Policy Institute report, Uber drivers' median hourly pay following expenditures were as low as $9.21, far lower than the minimum wage in many jurisdictions (Mishel, Uber and the labor market, 2018).

Cybertariat workers, some of whom are independent contractors, usually lack access to standard employment benefits such as healthcare, pension plans and paid leave which are aggravating their financial vulnerability. So it can be said that, without social protections, gig workers who are typically have little to no safety net in case of illness, injury, or job

loss are more likely to experience extreme economic volatility (Kalleberg, Precarious lives: Job insecurity and well-being in rich democracies, 2018). Additionally, many government support programs like unemployment benefits also depend on a history of consistent employment which gig workers sometimes cannot offer (Steward & Stanford, 2017). So we can argue that this lack of government support makes it challenging for these employees and against fundamental principles of welfare state since it's too hard for these workers to bounce back from financial losses or make long-term career development investments (De Stefano, The rise of the 'Just-in-Time Workforce': On-Demand work, crowd work and Labour protection in the 'Gig-Economy', 2016).

Major psychological stress and mental health problems which have occurred by financial weaknesses are another aspect of struggle of the gig labour (Wood, Lehdonvirta, & Graham, 2018). This psychological strain results from the uncertainty about future earnings and necessity to keep high production and good ratings. For instance, to get certain ride requests, ride-hailing drivers have to maintain excellent client ratings, which causes worry, exhaustion and a feeling of helplessness (Rosenblat & Stark, Algorithmic labor and Information asymmetries: A case study of Uber's drivers, 2016). In that perspective, Wood and his colleagues believe that the mental health issues of workers are caused by the high-stress character of gig work and erratic workloads (Wood, Graham, Lehdonvirta, & Hjorth, 2018). The solitary nature of gig and remote work can also cause loneliness and isolates workers from social support thus aggravates these mental health issues (Huws, Where did online platforms come From? The virtualization of work organization and the new policy challenges it raises, 2017). Distant workers, who lack strong social networks often battle with isolation and this factor may initiate more mental health problems (Wang, Liu, Qian, & Parker, 2021).

5.3. Skill Gaps and Limited Career Mobility

The emergence of the Cybertariat class exposes major skill gaps and limited career mobility for many gig economy workers. Although some small portion of the positions call for specific deep knowledge, most are repetitive jobs with minimal chances for promotion, therefore keeping workers in unstable employment with little possibility for

economic mobility (Kalleberg, Good jobs, bad jobs: The rise of polarized and precarious employment systems in the United States, 1970s-2000s, 2011).

As described above, many gig economy occupations consist in low-skill chores such as ride-hailing, food delivery and personal errands. These occupations provide little opportunity for career progression or skill development due to their repeating and routinized nature (Pesole, Urzi Brancati, Macias, Vázquez, & Biagi, 2018). According to the data in 2021 dated report of International Labour Organization, it can be argued that gig workers are caught in a loop of low-skilled labour with no chance to move into more safe, higher paying jobs (International Labour Organization, 2021). Since employees on most platforms have to rely on their own resources to pick up new skills, the lack of training courses aggravates this problem. According to the study of Autor, workers greatly depend on employer-provided training for acquiring skills required for upward mobility (Autor D. H., Why do temporary help firms provide free general skills training?, 2001).

The majority of Cybertariat workers lack the abilities that needed for highly paid digital employment (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014). The increasing speed of technical development has generated a dire need for knowledge in software engineering, AI and data science but many gig workers meantime, lack the required technical knowledge and training, which limits their capacity to enter these profitable professions (Manyika, et al., 2017). According to the estimations, automation will cause almost half of jobs to require reskilling in the next decade but many gig workers lack the financial and academical means to pursue the required training (Schwab & Zahidi, The future of jobs report, 2020) (Smith, 2016). Educational inequality increases this skills gap even further since the displaced workers typically have major obstacles to pursue higher education, so this prevents their ability to move to high-paying jobs. Goldin and Katz are arguing in their 2008 dated article that, these educational obstacles support economic disparity by ensnaring individuals in low-paying employment with little chance for progress (Goldin & F. Katz, 2008).

Traditional job practices in general have organized career paths that let employees progress via skill development and promotions, but the gig economy mostly lacks such paths. Gig workers generally find themselves in positions without defined promotion

systems, such as ride-hailing or food delivery, where there is minimal chance for progression independent of experience or output (Friedman, 2014). This lack of development keeps employees from transferring into higher-paying jobs in time. Furthermore, the scattered nature of gig labour presents difficulties for employees who are trying to compile a consistent work history proving their credentials to possible companies (Kalleberg, Precarious lives: Job insecurity and well-being in rich democracies, 2018). In that perspective, De Stefano emphasizes how absence of continuous employment records or defined career paths makes many gig workers difficult to transition their talents into more official and professional works (De Stefano, The rise of the 'Just-in-Time Workforce': On-Demand work, crowd work and Labour protection in the 'Gig-Economy', 2016).

The Cybertariat class experiences a fundamental problem in the labour market which is the limited career mobility and skill gaps. Many gig workers are subject to economic uncertainty since they are caught in low-skilled, repetitious jobs without official routes for progress or training (Vallas & Schor, 2020). Dealing with these issues requests appropriate regulatory responses which ensures proper training opportunities that enable employees to pick the skills required for steady, well-paying employment in the digital economy (Manyika, et al., 2017).

POLICY IMPLICATIONS

6.1. Redefining Employment Classifications

The emergence of gig-based and platform mediated work has showed the inadequacy of conventional job categories as "employee" and "independent contractor." These categories usually ignore the particular circumstances of Cybertariat employees, so a redefining the emerging roles adequately is necessary to understand the aspects of the transformation which labour force is currently undergoing (Cherry, 2016).

The creation of a hybrid worker status which balances flexibility and essential worker benefits could be a way forward. This transitional classification would preserve essential and important rights of workers including healthcare, unemployment insurance and paid leave without grouping gig workers as full employees (Prassl, 2018). In her 2014 dated book, Huws supports such a structure due to the importance of modifying labour rules to fit the reality of contemporary employment (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014). Similar ideas have started being applied in European nations. Italy's "parasubordinate" categorization and the Germany's "Mini-job" category provide instances of how gig workers could get some labour protections while still self-employed (De Stefano & Aloisi, Fundamental labour rights, platform work and Human-Rights protection of non-standard workers, 2018).

In the US, California's Assembly Bill 5 (AB5) which is approved in 2019 shows a more direct approach to reclassification. By use of the "ABC test," AB5 ascertains whether employees should be categorized as such, therefore ensuring that those who fall short of the requirements receive labour protections including minimum pay and benefits (Wang, Lin, & Han, 2023). While AB5 aimed to give gig workers their rights, it can be seen that gig companies fiercely opposed it, claiming the new bill would restrict workers' flexibility and increases running expenses (Sundararajan, 2016). The reaction resulted in Proposition 22, which spared some gig companies from AB5's obligations yet still gave workers some advantages (Sherer & Poydock, 2023)

Countries all across the globe are investigating different ways to classify gig workers (Steward & Stanford, 2017). In order to establish appropriate contracts and pay, Work Ombudsman of Australia has developed suggestions for using current labour laws to gig workers. Legislation passed by the state of New South Wales in 2021 which gives couriers and delivery drivers extra rights while maintaining their contractor status (Healy, Nicholson, & Pekarek, 2017). Another example though not yet fully embraced is Ontario's "Changing Workplaces Review" which advises to expand safeguards to gig workers in Canada (Mitchell & Murray, 2017).

This study believes that employment categorization is ultimately necessary to protect gig workers while maintaining their freedom (Aloisi, 2022). Hybrid categories and reforms like California's AB5 law present possible models for adaptability in many labour markets in the US and Europe (Wardhana, Herlina, Bangsawan, & Tuori, 2020). Policymakers have to maintain a balance between worker rights and the changing needs of the digital economy to make sure that gig workers are not left behind (Steward & Stanford, 2017).

6.2. Universal Basic Income (UBI) and Social Safety Nets

Guarding gig and platform workers from the economic instability and lack of benefits that define their employment conditions depends on extending the required social safety nets. Alarmingly, many Cybertariat employees are left out of healthcare, unemployment insurance and retirement plans by considering them as independent contractors, so it is essential to establish creative policies to provide them with necessary protections (Kessler, 2018).

One strategy that can give gig workers a financial safety net is universal basic income (UBI) which can be described as a guaranteed minimum income independent of employment status (Standing, Basic income: And how we can make it happen, 2017). UBI pilot projects which are Finland's 2017–2018 endeavor and the California trial in Stockton demonstrated the possible advantages of this approach. Though they had little effect on employment rates, these initiatives claimed benefits in well-being and economic security (Jauhiainen, Kangas, Simanainen, & Ylikännö, 2021) (West, Baker, Samra, & Coltrera, 2021). In that perspective, Van Parijs and Vanderborght argues that UBI is

shown to lower economic uncertainty for gig workers, thus enabling them to thrive free from concern for financial instability (Parijs & Vanderborght, 2017).

The term “Portable benefits” which means a social benefitting platform that designed to accompany the workers across several companies and platforms is another candidate to help employees access to fundamental safeguards. According to Harris and Krueger, gig platforms can be persuaded to participate in portable benefits platforms to help creating a benefits fund for gig workers including paid leave, healthcare and retirement plans (Harris & Krueger, 2015). Although some states like Washington have started to look at legislative structures to promote portable benefits, these projects are still under development (Rolf, Clark, & Bryant, Portable benefits in the 21st Century, 2016).

As shown previously, extending social security initiatives to encompass Cybertariat employees is quite important. Unfortunately, many social security systems exclude gig workers because of their erratic employment schedule. Changing these standards to acknowledge the particular circumstances of platform work will help to increase access to disability insurance and unemployment benefits (Spasova, Bouget, Ghailani, & Vanhercke, 2017). As an example, loosening eligibility criteria for unemployment insurance is considered in the UK in order to accommodate part-time workers and those in irregular employment (Sundararajan, 2016). Denmark's flexicurity model presents still another viewpoint to combining labour market flexibility with social protections like unemployment benefits and training programs (Bredgaard & Flemming, 2007).

In order to decrease the financial uncertainty of gig and platform workers, establishment of social safety net expansion seems essential. Policies including UBI, portable benefits and enlarged social security applications are expected to give Cybertariat a consistent financial basis and guarantee their protection in a job market that is erratic (Rolf, The fight for fifteen: The right wage for a working america, 2016).

6.3. Labour Rights and Regulatory Responses

The emergence of AI and automation fundamentally changed the labour economy, often to the disadvantage of gig and platform workers. Although these practices improve

efficiency, these technologies have also resulted in new kinds of exploitation and economic instability, therefore stressing the need of strong labour rights and legislative remedies (De Stefano, "Negotiating the algorithm" automation, artificial intelligence and labour protection, 2018).

As stated previously in the study, gig workers are usually left without basic labour protections including minimum pay rules, overtime entitlements and collective bargaining powers and often labeled as independent contractors. This grouping makes them susceptible to AI-driven management systems which give efficiency higher priority than worker welfare of the labour class (Cherry, 2016). In order to reflect the reality of gig employment and guarantee that workers receive sufficient rights labour laws should be changed and adapted to emerging dynamics (Huws, Labor in the global digital economy: The Cybertariat comes of age, 2014).

Different governments have embraced different regulatory strategies to handle these problems (Defossez, 2022). In addition to previously mentioned AB 5 and Proposition 22, the Spanish government passed the "Riders Law" in 2021 and changed the legal definition of delivery workers from independent contractors to employees. This law gave workers some labour rights including minimum pay, paid time off and unionizing rights (Waeyaert, Lenaerts, & Gillis, 2022). The legislation marks a major change toward acknowledging the rights of gig workers in a labour context under expanding artificial intelligence management. With that momentum European Parliament voted amendments on European Commission’s platform worker directive on gave more rights to the platform workers (Cybertariats) more rights but there is no doubt that a long way of progress has to be made before the Cybertariat can breathe a sigh of relief. (Bérastégui, 2023)

The controversial El Khomri law in France which is passed in 2016 included a new employment contract especially for gig economy workers, giving them access to some social rights and allowing businesses some freedom. The regulation also considers the power disparities produced by AI driven management systems by encouraging social discourse and collective bargaining between gig workers and platforms. On the other hand, the law caused huge protests among unions and student organizations due to some of its employers favoring conducts (Gills, Lenaerts, & Waeyaert, 2022).

Some legislative actions have concentrated on strengthening rights of gig workers by unionization and collective bargaining. Digital unions are expected to ease the organizational difficulties of Gig workers, enable their collective bargaining for better wages and working conditions by the digital networks. Digital unions, can enable employees to question algorithmic management policies by offering a collective voice that helps to offset the predominance of AI in deciding job conditions and reverse the effects of the decisions of company driven AI by using the outcome of Digital Union's AI which runs by the transparent data (Lee M. K., 2015).

The Fair Work Commission of Australia has moved to acknowledge some gig workers as employees and by that providing access to fundamental labour rights to Cybertariat by including minimum pay and job security. This strategy shows how authorities might modify current systems to fit the special difficulties presented by gig work and AI (Healy, Nicholson, & Pekarek, 2017).

The negative consequences of AI and automation on labour, demands appropriate legislative reactions and enhanced labour rights for gig workers (Del Castillo, 2020). These solutions should be, including but not limited to changing employment categories, improving openness, endorsing group bargaining and making sure that employees have their saying in AI-driven workplaces. Solving these problems will help legislators build a fairer labour market and safeguard every employee (De Stefano & Taes, Algorithmic management and collective bargaining, 2022).

6.4. Corporate Responsibility and Fair AI Practices

Corporate responsibility for establishing fair and ethical AI practices becomes vital as AI and automation starts to drive the economy more progressively. It can be said that companies hold great power through AI-driven platforms, which can control worker assignments, salaries and working conditions. This capacity calls for a dedication of corporate responsibility that guarantees transparent, fair and worker wellbeing prioritized deployment of AI technologies (Mittelstadt, Allo, Taddeo, Wachter, & Floridi, 2016).

Algorithmic transparency is one of the fundamental issues with AI-driven systems. The AI systems in today's world frequently make important judgments on job allocation, performance appraisal and pay rates so the opacity of these algorithms might result in unfair treatment of people. Due to the need for openness in algorithmic decision-making, society should force businesses to reveal how their AI systems work in order to stop biased or arbitrary outcomes. By this way companies can establish trust with their employees and create a fairer workplace by using open AI methods (Pasquale, 2015).

Systemic AI biases are also a crucial part regarding the ethical usage of AI applications. Algorithms are at risk of producing discriminating results which is caused by the training data that may reflect the immanent society prejudices (Barocas, Hardt, & Narayanan, 2023). As an example, it has been stated that facial recognition technologies have been shown to have greater error rates for individuals of color, which could cause possible discrimination in AI-driven recruiting procedures (Buolamwini & Gebru, 2018). Companies have to aggressively remove bias in their AI systems by routinely reviewing algorithms and guaranteeing fair and representative data use.

This study believes that the main consideration for the application of AI should be to improve rather than to compromise workers' rights. In that perspective, AI could help to maximize work schedules, lower fatigue and generate more significant job prospects (Brynjolfsson & McAfee, The second machine age: Work, progress, and prosperity in a time of brilliant technologies, 2014). AI can be applied, for instance, to automate repetitive operations not by competing with workers but by freeing employees to concentrate on higher value activities requiring human ingenuity and problem-solving. When used deliberately, AI can increase human capacities, hence enhance the work experience (Daugherty & James, 2018).

It is also the responsibility of companies to minimize the possible negative effects of AI on employment stability. As we stated broadly, many jobs are prone to be mechanized as technology develops, consequently causing a general displacement of workers (Binns, 2018). This study believes that funding for reskilling and upskilling initiatives that equip employees for the evolving employment environment should be a burden of emerging companies who are the cause of the disturbance (Manyika, et al., 2017). As an example

that this could be achieved, the executives of AT&T, has instituted a "Future Ready" program which gives staff members access to sort of online courses and training skills in developing technologies for them to be competitive in this fast changing sector (Kerr, Fuller, & Kreitzberg, 2020) but our ability to make this transition as a responsibility for the whole society will determine the outcome of the transformation of AI.

Another responsibility of the technology implemented corporations is to interact with general society initiatives to help the nature of employment to go forward. These interactions should include working with governments, labour groups and other players to create moral guidelines for AI application (Calo & Citron, 2021). Microsoft, for instance, has teamed with the UN to investigate how AI may be used to solve world problems and guarantee respect for human rights. These partnerships can help to advance social welfare and defend worker rights during the adoption of AI into Labour force (Ferres & Weeks, 2024).

The final point of ethical usage of AI is the surveillance of employees by utilizing the opportunities of emerging AI techniques. Misconduct of surveillance has two major consequences which are violation of the privacy of the employees and decreasing productivity due to overuse of surveillance (Moore, 2018). Overuse of AI-driven surveillance systems might lead to a hostile workplace and it might cause stress among workers and lower their autonomy. Companies have to come up with a balance between respect for privacy and dignity of employees and the use of AI for production (Ajunwa, Crawford, & Schultz, 2017).

Consequently, corporations have a great responsibility to society that these technologies are applied responsibly as AI and the automation derived from it keeps changing the labour market (Ferres & Weeks, 2024). These companies can help to build a fairer and just future for employment by pledging openness, tackling prejudice, improving worker rights, investing in reskilling and interacting with more general society initiatives but we cannot expect them to make these changes all by themselves. These changes have to be demanded by the whole society including workers, students and law makers (West D. , 2018).

CONCLUSION

This study tries to explore the significant impact of emerging AI and automation on labour force and evolution of the labour class into "Cybertariat". Notable changes can be observed in labour markets and these changes stress the need for flexible policies and creative ideas.

There are two aspects of differentiation in income distribution. On the macro state, the tech companies are positively dissociating in economy and the owners of those corporations are obtaining majority of wealth, so this trend undermines the rest of the sectors thus undermines the total economy. Consequently, wealth concentration in the tech industry has become more concentrated; So, we can argue that a few powerful corporations control a significant portion of economic development, therefore aggravating income disparity.

The other impact is on the labour force itself. Highly trained workers in technology, data science and cybersecurity are experiencing increasing earnings due to their specific talents. So, AI and its subsequent automation technologies have increased the wage gaps across sectors. Professionals in the tech sectors, especially with AI and data science related employees with advanced STEM degrees, earn noticeably more than those without specialized training so skill-based pay inequality is on the rise. This shows the rising value of technical knowledge in our technologically advanced economy.

On the other hand, the employees in industries that are dependent on repetitive tasks like manufacturing and customer service face pay stagnation or decrease as these activities get further mechanized. According to the estimations, almost half of American employment are under danger of automation especially those involving repetitive work.

As the majority of conventional middle class is employed in manufacturing, service, administration and sales sectors which are progressively automated, the stability of the middle class is likely under jeopardy. This has resulted in wage stagnation and economic uncertainty for many families.

Cybertariat can be defined as a Gig-based, platform-mediated and digitally dependent workforce. With the algorithmic management systems that can be opaque and arbitrary, these low-wage, repetitive workers who engage in ride-hailing and food delivery often find themselves underpaid.

Economic vulnerability and precarity within the Cybertariat is rather common due to lack of consistent contracts, perks and government backing laws. Limited access to healthcare, unemployment insurance and retirement savings aggravate this and leaves many workers without a financial safety net during recessionary times.

The biggest observable obstacles are skill shortages and limited career mobility since most of the Cybertariat workers stay caught in low paying and low skill occupations with no chances for progress in their career. Many gig workers lack reasonably accessible training courses, which makes it challenging to move into highly skilled, highly paid positions. As an emphasis on the crucial need of lifelong learning, it is estimated that about half of workers will need reskilling.

Redefinition of employment classifications is crucial in order to address these challenges. Traditional classifications do not take the diverse nature of gig-based and platform-mediated work into account. In response, various countries have sought to redefine these categories to try and give the gig workers essential labour protection.

Expanding social safety nets, such as UBI and portable benefits, is essential for reducing economic insecurity among gig workers. UBI is advocated as a means to provide financial stability, while more hybrid benefits funds are also offered for a consistent healthcare and retirement plans across multiple platforms.

Supporting lifelong learning and reskilling is vital for helping transition of Cybertariat into high-demand roles. Public-private partnerships, subsidized training programs and online learning platforms offer viable avenues for skill development.

Promoting the voice of workers by digital unions and platform cooperatives can empower the gig workers and help to advocate fair pay and better working conditions. Enhancing regulatory oversight is crucial for protecting the rights of gig workers. Transparent

algorithms, data privacy standards and fair classification systems are vital for ensuring that workers are not subjected to unjust or exploitative practices.

As a final note, this research emphasizes the transformative impact of AI and automation on income distribution and labour markets and highlights the urgent need for integrated policies to provide an equitable sharing to the benefits of technological advancements.

Since all researches have some limitations inheritable to the nature of studies, this study also acknowledges several limits regarding the research material, application of study and inherent limitations. Initially, the study mostly depends on secondary data and already published material, which might not completely reflect the most recent advances in AI technologies. The fast-changing character of technology means that some conclusions could become obsolete faster than they could be identified. In another words, technical developments can exceed researchers' capacity to completely grasp their consequences.

Due to the limitations on founding clear data and proper sorting and analyzing of the information, which is caused by the general focus developed countries, study is partially limited to the quantitative abilities of western economies so the unique behaviors of emerging markets which are affected by local economic structures, regulatory systems and degrees of technological advancement might be left behind. Additionally, this study suspects that the further application of previously discussed methods (which can only be described as digital Taylorism if exercised any further) might affect some internally closed economies worse than we can expect but the idea could only be an unsupported suggestion. So, for the geographical aspect, we can say that the limitation of political economy ironically prevents the universality of this research.

Although the study analyzes the emergence of the Cybertariat, it is not possible to investigate all the experiences inside this vast class completely. From highly trained freelancers to low-paying, unstable employment, the gig economy represents a broad spectrum of labour configurations. Because of this variety within the Cybertariat, broad generalizations could ignore significant subtleties. The gig economy consists of notable variations so the worker experiences will differ greatly based on industry, education and skill level.

Furthermore, since the study mostly relies on quantitative data this could result in underrepresentation of the qualitative elements of worker experiences. Although broad patterns can be seen by statistical data, it could not completely reflect the actual experiences of employees. Richer insights into how employees negotiate the difficulties presented by AI could come from ethnographic studies or in-depth interviews.

Policy recommendations in the paper are derived from current models and frameworks, which might not be exactly relevant to the particular difficulties presented by the gig economy and AI-driven labour markets. So, the ongoing confrontations and disputes are hard to analyze since these discussions are still in progress so we cannot know the outcome of these frictions.

As a final words, even if this study provides insightful analysis of how AI and automation affect labour markets, its shortcomings emphasize the need for further research combining multidisciplinary approaches, geographical inclusion and qualitative and broad worker experiences to completely grasp the changing scene of employment.

Several areas demand more research to better grasp the effects of AI and automation on income distribution and the change of the labour force due to the constraints which are noted previously in this study.

First, longitudinal studies that are tracking the long-term consequences of AI across many sectors and areas should be the next address of investigations. Focusing on long-term effects would offer better and broader understanding of how these technologies affect labour markets over time. Establishing sensible policy responses depends on an awareness of the time aspect of technological disturbance.

More in-depth qualitative studies are required to investigate the actual experiences of the Cybertariat workers. Interviews and ethnographic researches can provide complex viewpoints on how employees negotiate the difficulties presented by algorithmic management and economic precarity. These studies can be a key to achieving more all-encompassing policy actions by including subjective experiences of workers.

Future studies should look at how AI and automation affect lower-income geographies and developing nations, where their adoption might have distinct effects. Comparative

researches which are conducted in many different geographical settings across the globe could highlight the several yet undiscovered conclusions of how emerging technology affects the world employment markets. Creating internationally relevant policies might depend on an awareness of these variations.

Research on the success of legislative actions whose aim is to minimize the negative consequences of AI and automation is also much needed. The future researches should further investigate the feasibility of projects including previously mentioned portable benefits, UBI and reskilling programs through several labour environments. Evidence-based evaluations of these laws can create more focused and successful treatments of the problems.

Ultimately, due to the multidisciplinary nature of the problems that are presented by AI and automation, interdisciplinary studies which combine ideas and solutions from computer science, sociology and economics would grasp the situation better. Working together across several disciplines can produce more creative ideas that consider the several dimensions of technological disruption in the labour market.

Future studies should concentrate on long term research, qualitative analyses, geographic variety, policy efficacy and multidisciplinary approaches to offer a more complete knowledge of the changing labour environment which is molded by AI and automation.

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