Industry 4.0 and Global Businesses

A multidisciplinary investigation

Edited by Enis Yakut

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Industry 4.0 and Global Businesses: A Multidisciplinary Investigation

EDITED BY

ENIS YAKUT
Manisa Celal Bayar University, Turkey

United Kingdom – North America – Japan – India – Malaysia – China

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List of Contributors

Muhammet Enes Akpinar	Manisa Celal Bayar University, Turkey
Sezai Bahar	Manisa Celal Bayar University, Turkey
Erdi Bayram	Manisa Celal Bayar University, Turkey
Deniz Dirik	Manisa Celal Bayar University, Turkey
Selim Duramaz	Manisa Celal Bayar University, Turkey
Ümit Hasan Gözkonan	Manisa Celal Bayar University, Turkey
Tuna Can Güleç	Manisa Celal Bayar University, Turkey
Ismail Metin	Manisa Celal Bayar University, Turkey
Ramazan Nacar	Bursa Technical University, Turkey
Askın Özdağoğlu	Dokuz Eylül University, Turkey
Kadir Ozdemir	Şırnak University, Turkey
Ahmed Yusuf Sarihan	Bandırma Onyedi Eylül University, Turkey
Ayberk Şeker	Bursa Technical University, Turkey
Halil Şimdi	Sakarya University, Turkey
Hakan Tunahan	Sakarya University, Turkey
Sultan Nezihe Turhan	Galatasaray University, Turkey
Ayşe Dilşad Yakut	Ibn Haldun University, Turkey
Enis Yakut	Manisa Celal Bayar University, Turkey
Selim Baha Yıldız	Manisa Celal Bayar University, Turkey

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Enis Yakut

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Chapter 1

Industry 4.0 and the New World of Work

Deniz Dirik

Abstract

Industry 4.0 and its leading-edge components are transforming all aspects of human life with wide-ranging repercussions for managing production and workforce in the digital age. The traditional definitions of formal and informal employment are no longer applicable to our world, thanks to disruptions of various nature. The innovation landscape is radically altering the way work is done as well as where it is done, leading to an expansion of the gig economy with its freelancers, contract workers, agile workforce, or independent workforce who are constituting increasingly more temporary providers of labor. In addition to a tension between technological development and loss of jobs at the expense of individuals with lower set of skills, advancing technology is enabling new forms of organizing through facilitating new work arrangements. The new world of work is characterized by short-term contracts, fluidity, fragmentation, transience, temporariness, increased autonomy, and independence, on the one hand, and by precarity, financial instability, job uncertainty, and insecurity embedded in its very fabric, on the other, hence presenting both opportunities and challenges that need to be urgently addressed by researchers and policymakers. The inevitable tension between technology-driven developments in economy and labor markets is further exacerbated by the most recent pandemic and global economic recession, making scholarly and policy discussions all the more relevant.

Keywords: Industry 4.0 work arrangements; new world of work; gig economy; flexiwork; technological displacement; precarity

Introduction

> Science Finds, Industry Applies, Man Conforms.[1]

Industry 4.0 and Global Businesses, 1–17

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Work has and has always had many meanings for individuals beyond a simple pursuit of income that eventually boils down to an everyday drudgery. John W. Budd has defined work as a multidimensional concept incorporating social–psychological aspects, according to which work is defined *as purposeful human activity involving physical or mental exertion that is not undertaken solely for pleasure and that has economic or symbolic value* (2011, p. 2). According to his definition and conceptualization, work serves an inexhaustive list of at least 10 basic functions including work as a curse, a source of freedom, a commodity, occupational citizenship, a disutility, personal fulfillment, a social relation, caring for others, identity, and service, among others (Budd, 2011, p. 14). The various functions of work inevitably affect the nature of employment as individuals seek to satisfy these needs in their employment/industrial relations and work arrangements. The extent to which contemporary work satisfies these needs is inextricably linked with developments in various spheres of an individual's life, with technology occupying a foremost position among the plethora of other factors. The pivotal question addressed in this chapter is the role that technology plays with regard to the new world of work. Specifically, how do the most recent technological developments affect the way people organize and what are the ramifications of these new workforce arrangements?

As a highly pessimistic response to such pending inquiries, back in 1995, Jeremy Rifkin, in his seminal work titled *The End of Work*, announced the end of work at the dawn of the third industrial revolution. His arguments have repercussions for today's understanding of work and workplace characterized by Industry 4.0. Technology is changing the meaning of work for all we used to know about it. The structural transformations in work arrangements like reengineering, delayering, total quality management, post-Fordism, outsourcing, offshoring, and others are byproducts of technological advancement, and all of them imply some form of technological displacement of the workforce, creating efficiencies and greater output, on the one hand, while rendering some of the previous workforce redundant and unnecessary, on the other. By creating unemployment, these technology-driven work arrangements also infringe decades-old social contract that has promised every (wo)man an inalienable right to a decent job. Thanks to technological breakthroughs that change the very nature of work, the right to work (in a steady and secure position) is becoming a privilege reserved for a select number of elite knowledge workers.

In line with Rifkin's relatively pessimistic arguments with regard to the end of work, Yuval Noah Harari of the internationally bestselling books, *Homo Sapiens*, *Homo Deus*, and *21 Lessons for the 21st Century*, argue that human beings have physical and cognitive abilities, this latter of which (skills like learning, analyzing, communicating, and understanding) has long been considered to be a unique human capability hedged against machines and automation. However, artificial intelligence (AI) is outperforming humans across various work domains including those that demand high levels of intuition, an area hitherto thought as a human superpower over nature as well as technology (Harari, 2018, p. 23). By now, researchers and business leaders alike come to agree that most of the jobs involving specialization in a few number of routine and repetitive tasks will be

shortly automated (Harari, 2018, p. 24). In the long run, no single job seems to be insured against forces of automation, machine learning, and smart algorithms. Indeed, AI has incomparable advantages over humans, including connectivity and updateability, unlike human beings whose updateability requires reskilling and upskilling, both of which require time, energy, and investment.

In response to such apocalyptic arguments with regard to demise of work, the optimists contend that technology creates unemployment in the short run, but new employment opportunities emerge in some previously nonexistent area just as it did back in the twentieth century (when automation replaced manpower to leave millions jobless) that witnessed the irresistible rise of the service sector. The optimists have similarly high hopes for the near future, pointing to creation and emergence of new work areas and fancy titles every now and then. Along the same lines, they argue that technology would increase demand for employment in jobs requiring analytical skills and creativity while displacing only those routine, manual jobs. The human care industry, which includes nursing and caring for the elderly, is likely to remain an area dominated by humans at least in the short run. Jobs requiring creativity of some type like composing, creating, and choosing music and art will also continue to remain human privileges until a future in which AI can rally human ingenuity and an appreciation for age-transcending aesthetics (Harari, 2018, p. 24). In addition to outlooks about which jobs will survive the test of time, there are astounding projections by different organizations as to what percentage of today's five-year-olds will be employed in jobs that do not exist today, and in jobs that exist in another part of the world instead of where talent is located (Deloitte, 2018, p. 3). However, even if it has been possible to fill the unemployment vacuum left by automation and machines with new service jobs back in the past, fourth industrial revolution has not yet created a significantly large enough new sector to welcome those displaced by its constituents.

Whether technology leads to the end of work or it creates new employment areas seems to be an ongoing debate with both supporters and skeptics. However, it is evident that technology is transforming the way people organize to accomplish some objectives, the nature of the tasks and the range of skills that any job requires, the informal relationships among people, as well as many other aspects of work and employment. Actually, the way that technology disrupts the way work is organized is one of light-speed. Technology-driven changes across different occupations will require learning a new set of demanding skills, acquiring increasingly new depths of knowledge and expertise. According to the Future of Jobs Report (World Economic Forum, 2020, p. 8), almost 50% of the skills that employees need to effectively perform their tasks today will be obsolete within the following five years given the confluence of the 2020 global economic recession exacerbated by the pandemic (which created a brand-new *new normal*) and imperatives of the fourth industrial revolution. The report claims that while technology-enabled job creation will possibly surpass the extent of job displacement over the following five years, the global economic recession will mitigate the speed at which the number of jobs would otherwise be increasing (World Economic Forum, 2020, p. 3); a key finding that leads the researchers to claim that

the *future of work has already arrived*, thanks to the disruptive effect on employment of technological revolution compounded by the COVID-19 pandemic. This statement resonates with the famous claim that the science fiction writer William Gibson is attributed to having once said, *the future is already here; it is just not evenly distributed yet* (Kennedy, 2012). In this context, the relationship between employment, work, work arrangements, job creation, job displacement, and technological development continue to be significant topics drawing the attention of media, scholars, policymakers, as well as practitioners.

This chapter focuses on the influence of the most recent fusion between physical, digital, and biological spheres on work and new work arrangements with a specific emphasis on the so-called gig economy and its constituents. The rest of the chapter is organized as follows: The first part introduces the new world of work enabled by technological advancements and the new set of human skills in demand. The second part presents an overview of the new work ecosystem with a specific focus on constituents of the gig economy. And the third part discusses some skeptical arguments against these new work arrangements. The chapter concludes by raising even more questions than it claims to address.

An Overview of the New World of Work

> The pandemic has shown that a new hybrid way of working is possible at greater scale than imaged in previous years, yet business leaders remain uncertain about the productivity outcomes of the shift to remote or hybrid work. Overall, 78% of business leaders expect some negative impact of the current way of working on worker productivity, with 22% expecting a strong negative impact and only 15% believing that it will have no impact or a positive impact on productivity.
>
> (World Economic Forum, 2020, p. 18)

The traditional definitions of formal and informal employment are no longer applicable to our world, thanks to disruptions of various nature. The innovation landscape is radically altering the way work is done as well as where it is done, leading to an expansion of the gig economy with its freelancers, contract workers, agile workforce, or independent workforce who are constituting an increasingly more temporary providers of labor. Even in a world where the shift to a gig economy was relatively more controlled and at a slower pace, the transition would not be smooth. The outlook is grimmer under the twin forces of the global pandemic and technological transformation as of 2021. As the opening quote suggests, World Economic Forum's most recent report shows that not only the employees but also the employers are not quite readily handling the travails of a radical transition to a nontraditional employment ecosystem. This finding is corroborated by a recent Gallup survey which found that employees who are working remotely are less likely to think that someone cares about them at work;

they are recognized for their contributions; and they are less likely to feel their opinions matter (Herway & Hickman, 2020). Remote work is likely to have disengaging effects with up to as much as 17% less productivity and 24% higher turnover potential. How the new world of work is going to ameliorate the effects of the psychological trauma resulting from such spatial disengagement is a pending question.

The global economy is contracting with slower rates of growth recorded in world countries, with repercussions for manufacturers as demands for their goods are also declining. Industry 4.0 and its leading-edge components are transforming all aspects of manufacturing, with repercussions for managing workforce in the digital age. Some of the momentous challenges facing companies include talent shortfalls and mismatch between talent supply and demand, alarmingly low levels of employee engagement (85% are either unengaged or actively disengaged at work according to Gallup's, 2018 report), as well as the rise of the millennials (and later on, the digital natives – Generation Z) with their unique work values emphasizing communication, autonomy, flexibility, and mobility (Gorin, 2019). With an aging world population on the other hand, especially in the developed world, the need to align technology, digital skills, automation, and the workforce is becoming even more pressing.

According to International Labor Organization's (International Labor Organization, 2020, p. 14) recent report on global employment trends for youth, although young people (those aged 15 to 25 and approximately 1.3 billion as of today), are enthusiastic early adopters of new technologies, they are highly worried about the possibility of their jobs being replaced by the constituents of Industry 4.0 believing that these new technologies may not lead to the creation of new, better-paying jobs. Currently, a staggering 13.6% of the young people are unemployed across the globe, with regional variations and gendered segregation as ongoing twin challenges. But how is the future of work and the future workplace going to be like?

Technology comes with externalities, the most serious of which is possibly job displacement. People lose their jobs to technology, and some people the more so. By now, researchers and businesspeople seem to agree that there is no easy way to solve unskilled labor unemployment problem, at least from a fourth industrial revolution perspective (Bonekamp & Sure, 2015, p. 34). This is not the first and only time in human history when technological advancements have displaced employees from their jobs by either eliminating some jobs totally or creating new arrangements for which the current workforce is not prepared as per their competencies. At the height of the Great Depression in 1933, unemployment peaked over 15 million people in the United States (Rifkin, 1995, p. 25). Economists pointed to technology as the culprit for increasing the productivity, efficiency, and output which could not possibly have been outpaced by a corresponding demand in consumption. This collision inevitably led to greater unemployment, a deeper recession, and more bleak prospects for the future back then. Luckily (!) for our ancestors, previous three industrial revolutions influenced some social classes comparatively more severely while bypassing the dominant classes. However, the fourth industrial revolution has a supraclass fiber that defies socioeconomic

privileges as opposed to its predecessors. No one single job or worker is going to be immune to sweeping forces of fourth industrial revolution with its AI, humanoid robots, hyperconnected systems, and others (Bowles, 2014, p. 1; Brynjolfsson & McAfee, 2014, p. 318).

The technological workplace is calling for a new set of skills for the future of work including work readiness skills, soft skills, technical skills, and entrepreneurial skills (Deloitte, 2018, p. 11). The skills on high demand are inevitably the byproducts of the jobs that are in high demand (see Tables 1.1 and 1.2). Once such typology is Human Capital 4.0, a comprehensive model that incorporates a range of prominent job specifications including soft, hard, cognitive, emotional as well as digital skills (See Fig. 1.1). As Industry 4.0 is rummaging through traditional conception of work across industries, soft skills like sociability, communication, teamwork, adaptation, and cooperation are emerging as areas whereby humans can have a leverage over automation. These social skills are also crucial in settings when intercultural collaboration is required. The hard skills set include technical and professional competences and dexterity that are must-haves in the new world of work such as problem-solving methods, software design, human–machine interactions, and programming among others. The cognitive skills, comprising verbal/numerical/spatial aptitude, are particularly crucial in contexts characterized by high levels of task complexity and interconnectedness among systems. Cognitive skills are associated with intelligence, capacity to learn, and analytical capacity. Emotional intelligence (EI) is a skill that will help workers deal with the stress, fatigue, workload, anxiety, and motivational issues of the new workspace. EI skills include self-awareness,

Table 1.1. Changing Fabric of Skills on Demand.

1. Analytical thinking	9. Resilience, stress tolerance, and flexibility
2. Active learning and learning strategies	10. Reasoning, problem-solving, and ideation
3. Complex problem-solving	11. Emotional intelligence
4. Critical thinking and analysis	12. Troubleshooting and user experience
5. Creativity, originality, and initiative	13. Service orientation
6. Leadership and social influence	14. Systems analysis and evaluation
7. Technology use, monitoring, and control	15. Persuasion and negotiation
8. Technology design and programming	

Source: Future of Jobs Survey, 2020. World Economic Forum.

Table 1.2. Jobs in High versus Low Demand.

Increasing Demand	**Decreasing Demand**
1. Data analysts and scientists	1. Data entry clerks
2. AI and machine learning specialists	2. Administrative and executive secretaries
3. Big data specialists	3. Accountants, bookkeeping, and payroll clerks
4. Digital marketing and strategy specialists	4. Accountants and auditors
5. Process automation specialists	5. Assembly and factory workers
6. Business development professionals	6. Business services and administration managers
7. Digital transformation specialists	7. Client information and customer service workers
8. Information security analysts	8. General and operations manager
9. Software and applications developers	9. Mechanics and machinery repairers
10. Internet of things specialists	10. Material-recording and stock-keeping clerks
11. Project managers	11. Financial analysts
12. Business services and administration managers	12. Postal service clerks
13. Database and network professionals	13. Sales rep., wholesale and manuf., Tech., and sci. products
14. Robotics engineers	14. Relationship managers
15. Strategic advisors	15. Bank tellers and related clerks
16. Management and organization analysts	16. Door-to-door sales, news, and street vendors
17. FinTech engineers	17. Electronics and telecoms installers and repairers
18. Mechanics and machinery specialists	18. Human resources specialists
19. Organizational development specialists	19. Training and development specialists
20. Risk management specialists	20. Construction laborers

Source: Future of Jobs Survey, 2020. World Economic Forum.

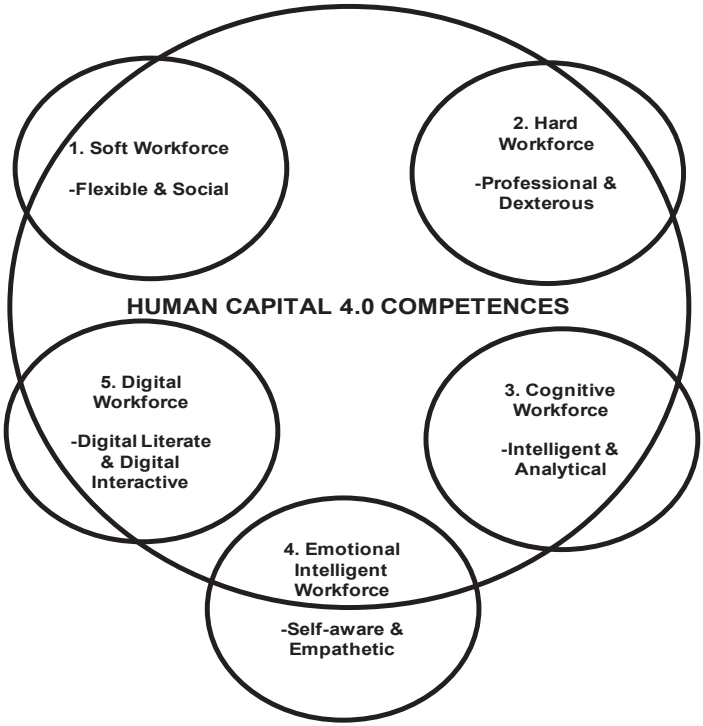

Fig. 1.1. Five Skills of Human Capital 4.0. *Source:* Flores et al. (2020, p. 696).

empathy, motivation, and positivity. Finally, digital literacy is a prerequisite for success in the techno-workspace, and these skills include a mastery of some aspects of the Industry 4.0 technologies like Internet of things, machine learning, digital security, augmented reality, and such (Flores, Xu, & Lu, 2020, p. 697).

In addition to this tension between technological development and loss of jobs at the expense of individuals with lower set of skills (e.g., blue collars, pink collars), technology brings about new forms of organizing and requires new work arrangements. In the first place, the technological office is a hyper-clean setting, increasingly less populated, silent, luminous, service-oriented, and at the high-end spectrum of technological infrastructure as compared to a nineteenth-century typical factory setting. As for the organizational structuring, it has a flatter, more decentralized, more autonomous, and more employee-oriented perspective to management–employee relations as compared to classical management approach. As for the employee rights and industrial relations, apart from some exceptions, it has an increasingly more market-minded perspective where