Elife Kart

https://orcid.org/0000-0001-9917-3507
Akdeniz University, Türkiye;
e-mail: elifekart@hotmail.com

Emin Baki Adas

https://orcid.org/0000-0002-9360-5804
Aydin Adnan Menderes University, Türkiye;
e-mail: eminadas@adu.edu.tr

New Technologies and Labor Market: A Look into the Future of Jobs and Employment

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This article aims to discuss the impacts of new digital technologies on labor market and critically looks into whether these technological developments present a promise or a threat to the laboring classes and society in general. The article, through a critical evaluation of the findings presented in several reports of international organizations such as ILO, OECD, and The World Economic Forum (WEF), explores the ways in which digital technologies are transforming the nature of work, affecting job tasks, skills, and the distribution of work across the labor market. Embedded in the new capitalist accumulation regime, it will be argued that a "new crisis" seems to be more realistic prospect from the perspective of laboring classes as new technologies are becoming major force in accelerating the 'destruction of stability', 'discontinuity of skills', 'temporality of inclusion', 'permanence of exclusion' and 'risk of mass unemployment'.

Keywords: new digital technologies, labor market, destruction of stability, discontinuity of skills, risk of mass unemployment.

Introduction

We are said that we live in the midst of a new technological revolution. New digital technologies such as robotics, artificial intelligence (AI), Internet of Things (IoT), autonomous vehicles etc. possess multiple possibilities as well as uncertainties in terms of their effects on

economy, society, politics and culture [*Ihde*, 1999, p. 44]. Although technology from simple tools to the complex machineries has always been part of human history, the nature of new technologies and scale of their penetration into all spheres of our lives make new technological development transformative in terms of how we perceive reality, how we interact, socialize and work [*Verbeek, Slob*, 2006, p. 397–398; *Acemoglu, Restrepo*, 2020; *Kurt*, 2019]. The most striking effects and obvious manifestations of these new digital technologies are being materialized in the labor market. Indeed, there is a growing body of literature that explores the ways in which these digital technologies are transforming the nature of work, affecting job tasks, skills, and the distribution of work across the workforce.

Marxian theory has long argued that the development and implementation of new technologies cannot be simply conceived as "tools", "objects", or "things" added into society and used for various purposes. Marx argued that technology has never been neutral but is driven by capitalist interests to increase productivity and control of labor force in its pursuits of greater profit and reproduction of existing power structures. The process of making the labor power subjected to the capital, which is covered by new digital technologies such as the internet, wearable devices, the Internet of Things and big data, encompasses a production and labor process in which the ideas, emotions, and all the forms of social relationships and interactions are also incorporated into the production process by capital. Different forms of labor, which include immaterial labor that encompasses analytical, cognitive, intellectual, aesthetic and linguistic processes, or affective labor and its component parts, reveal the scope and limits of the control that capitalist accumulation regime tries to exert over the labor force (see: [*Hardt*, 1999; *Lazzarato*, 2005; *Fortunati*, 2007]). The fact that the labor becomes invisible in the production process is another important dimension of the issue that should be highlighted here. In an increasingly digitalized capitalism, the new forms of subjecting labor to capital contain methods of "taking hold" of the overall characteristics of the labor force. Furthermore, the presence of "language and communication in both the production field and the distribution of goods and services" [*Lecercle*, 2009, p. 13] and the inclusion of cognitive characteristics of the labor force in post-Fordist production, or the "crisis of measurability" of labor [*Ibid*, p. 44] is brought along. While some scholars, critical of Marxian perspective, have pointed out that historically technological progress has not significantly increased unemployment in the past [*Autor* 2015; *Frey*, 2019], they nevertheless acknowledge that new technologies will cause labor displacements, especially in high-routine occupational categories.

With the above considerations in mind, this article focuses on examining the transformative effects of digital technological development on jobs, employment and skills in the labor market. To uncover the new trends and potential outlooks in the current situation of the labor market, we critically examine the findings of studies conducted by pro-capitalist international organizations such as the Organization for Economic Cooperation and Development (OECD), the World Economic Forum (WEF), and the International Labour Organization (ILO). Understanding the transformative effects of technological development incorporated into production and labor processes will not only help us to understand the current deepening structural problems in the labor market but also contribute to develop an understanding of the potential "threats" and "risks" that are most likely to concern all of humanity in the near future. The article discusses whether the process can be seen as "a promise or a new crisis" from the perspective of the labor force. Within this framework of questioning, the transformative effects of new digital technological products and applications that are incorporated into the economy and production process are analyzed in the

context of following concepts of the: 'destruction of stability', 'discontinuity of skills', 'temporality of inclusion', 'permanence of exclusion', and the "risk of mass unemployment"

New Technologies and its Transformative Effects on Labor Market

In today's socio-economic order, it will only be possible to understand the economic, social, ecological problems and risks, which are appeared as 'unemployment', 'deep poverty', 'data breaches', 'privacy violations', 'discrimination', 'aging population', 'global warming', 'climate change' and 'resource depletion', only within the context of the production and reproduction conditions of the current capitalist accumulation regime. When it is looked from the framework of these interrelated structural problems, it is seen that technological development is yet far from promising hopes to include all social segments, on the contrary, it in fact brings in more 'uncertainty', 'unpredictability', 'inequality' and 'risk'. Precisely for this reason, the ways in which robotic technology and some applications, such as artificial intelligence that makes inferences from big data, are used in the production process should be taken into account together with their functions in providing the profit and productivity that the capital expects in an extremely competitive global environment. Eventually, the way the capital conceives of technological innovations as economic objects of the profit and transforms technological products and applications that create quality, speed, efficiency, and productivity into their competitive advantages, proves that technological developments are not accidental or "neutral". It should be noted here that the technological products and applications are not independent of the production and labor processes, on the contrary, there is a close relationship between the two that affects and determines one another.

One of the transformative effects of technological development in the labor market is appeared in the form of 'job polarization' and 'job instability'. The integration of new technological products and applications into the production process within the framework of companies' profit expectations has further exacerbated the phenomena of 'deskilling' and 'polarization' in the labor market. The technological advancements incorporated into the economy have caused some job types to disappear and some to become unskilled. The expansion of the ability to benefit from technological innovations leads to increased productivity, but wage increases continue to lag behind the productivity increase. The incorporation or inclusion of computers and machines in the production process also significantly reduces the participation of labor force in the job market and accelerates the process of displacement. Polarization in the labor market is also an indicator of the process of devaluation and weakening of organized labor. The development of artificial intelligence and robotics technologies [*Berg et al.*, 2018] that lead to a new industrial revolution continue to pose a threat to certain jobs and occupations. In a 2019 study by the OECD, while employment in the service sector has grown by 27% over the last 20 years, employment in the manufacturing sector has declined by 20%. However, the proportion of high-skilled / skilled jobs has also increased by 25% over the last 20 years. According to this report, which also considers assessments of the potential future of jobs, it is expected that existing jobs will decrease by 14% over the next 15 to 20 years. The report also highlights the possibility that 32% of jobs may change due to automation in individual tasks. Polarization also emerges in the competition between companies to maximize profits and increase market dominance, with a growing gap between companies that develop digital technologies and those that cannot keep pace with the speed of digitalization.

"Job polarization" is not a new phenomenon in essence, but the literature on employment, job, and wage polarization primarily focuses on occupations. The reallocation of different occupations within sectors, as well as the labor force shifts between sectors, also contribute to the polarization of the labor market. It should be noted that this is directly related to the increase in employment in the service sector and the decrease in employment in the manufacturing industry. Job polarization is closely related to sectoral transitions, which lead to the re-definition of jobs and occupations [*Bárány, Siegel*, 2018, p. 39]. Job and wage polarization reflects the simultaneous growth of employment and wages in high-skilled and high-waged occupations and low-skilled and low-waged occupations [*Acemoglu, Autor*, 2011, p. 15–16]. This also affects the increase in wage gaps. In other words, employment and occupational polarization lead to a wage polarization. While the relative growth of employment in high-wage occupations is increasing, the relative growth of wages and employment in low-wage occupations, as well as in some middle-wage occupations, is also increasing. On the other hand, employment growth is concentrated in both low and high-waged jobs, while middle-waged workers are disadvantaged both in terms of employment and average wage growth compared to low and high-waged workers. This is due to the increase in demand for high-skilled jobs and the decrease in demand for routine middle-skilled jobs as a result of new technologies, while most routine middle-skilled jobs are becoming automated [*Acemoglu, Autor*, 2011; *Autor*, 2015; *Bárány, Siegel*, 2018; *Dwyer, Wright*, 2019; *Maillard*, 2021]. The polarization in the labor market is undoubtedly in a mutual interaction with the transformative effects of technological development. The increasing automation [*Riis*, 2009, p. 129] of technology is emerging as a key driving force behind polarization.

The different rate of digitalization among companies also affects the quality of employment and level of wages [*OECD*, 2019, p. 14–15]. Computers-based machines are gradually replacing workers who perform routine task-intensive jobs. This situation also reduces demand for blue-collar production workers and white-collar office, office support, and administrative support positions and, more generally, reduces jobs that require middle skills [*Autor*, 2014, p. 17]. The OECD [*OECD*, 2019, p. 65–66] study indicates that polarization in the labor market, along with the loss of middle-skilled jobs, has led to growing wage inequality and this trend is likely to continue in the future. In the labor market, jobs requiring middle skills are increasingly being excluded, while the proportion of jobs requiring low and high skills is increasing. In this context, the polarization of jobs is seen to be more closely related to the erosion of the middle class in developed economies. Polarization is a phenomenon related to technological development and globalization, as the routine nature of middle-skilled jobs are more prone to automation and subcontracting. This makes it relatively easier to conditions under which jobs can be performed with the help of a machine or outside of the country in which they are located. As research reports and assessments show, a process is rapidly underway in which certain jobs are being carried out by robots, new jobs, tasks and roles are being defined. This shows that as long as the production and widespread use of new digital technological products and applications continue, polarization will deepen as a structural problem in the labor market. This also means 'instability of the labor market'.

The 'instability of work' and 'job polarization' are also closely related to the transformation of skills. In other words, it is closely related to the 'discontinuity of skills' in the sense of 'skill instability' or in the sense of skills that are 'constantly' changing, renewing and lacking a long-term outlook within the context of technological development. The expanding cognitive scope of machines is making the boundary between machines and non-ma-

chine (in the sense of intellectual human capital) increasingly vague. Almost every process or technique and software can now be considered as part of a machine [*Ford*, 2009, p. 137]. Automation, machines, and robots that perform complex human tasks are taking over the majority of jobs in the "routine" category in the production process. This also indicates that the need for labor in routine-category jobs and occupations is declining / will decline. As expected, technological advancements will continue to impact jobs that require low-skilled abilities. What is more interesting is that non-routine jobs will eventually be categorized as routine. Software automation, prediction-based algorithms, and artificial intelligence are rapidly developing. Future developments are likely to pose similar threats that will include high-skilled and relatively high-paid jobs as well [*Ford*, 2015, p. 59; *Ford*, 2009, p. 73]. This is because "robot capital" has a different content than traditional capital in terms of its replaceability with manpower [*Berg et al.*, 2018]. It is strongly likely that these technological developments will accelerate the exclusion of labor from the labor market.

The automatic execution of a large number of tasks is gradually reducing dependence on labor. For example, when viewed through robot technology, the use of robots is now becoming widespread beyond the manufacturing sector. The employment of robots as sales personnel in supermarkets and the transition of many companies to cashier-free operations are indications of this change. As is known, robot technology is a technology that aims to provide "cheap labor" by being faster, cheaper and free of charge, with the capacity to work "without rest" and "without complaint" [*Rhee*, 2018, p. 18]. Companies' tendency towards robot technology and some artificial intelligence applications is due to labor savings provided by these technologies. For example, the World Economic Forum (WEF) (2018) identified four technological advances that impacted the period of 2018–2022 as high-speed mobile internet, artificial intelligence, big data analytics, and cloud technology. Now, automatic trading algorithms are responsible for at least half, and perhaps 70% of stock transactions [*Ford*, 2015, p. 113]. The growing presence of the use of robots in areas such as elderly care (*Ibid.*, 155) and house cleaning, as well as in military vehicles, is noteworthy. For example, in 2012, the iRobot company had sold over 5 000 defense and security robots, including surveillance, reconnaissance, and bomb disposal mobile robots, and in 2013, iRobot had also sold over ten million robots that could perform household tasks [*Rhee*, 2018, p. 94–95]. In a study on the impact of industrial robots on employment and wages in six European Union countries that make up 85.5% of the European industrial robot market [*Chiacchio et al.*, 2018], it was found that each robot per thousand workers reduced employment by 0.16% to 0.20%. In another study of the impact of industrial robots on US labor markets [*Acemoglu, Restrepo*, 2020], it was shown that each robot per thousand workers reduced employment by 0.2% and wages by 0.42%.

It is predicted that especially industrial robots will rapidly become widespread in the next few decades and will take on tasks previously performed by labor force. This significant change is inevitably accompanied by concerns about the future of jobs and wages, as there is a risk of workers being directly displaced by robots. An even more interesting issue is related to the "artificial intelligence research" [*Ford*, 2015, p. 231–232]. The ability to conduct artificial intelligence research determines the companies' ability to advantage themselves in the existing intense competition conditions, through access to technological innovations or new products and applications. The concept of "competition" will increase the widespread use of the mentioned technologies. In this case, technological innovations will continue to exist as a threat to the jobs that require high wages and high skills as well. This may lead to feeding the "mass unemployment risk" and deepening the existing 'instability of job'. This issue of

"declining job stability" has become a common theme in discussions about the probable future of jobs as stated in the OECD [*OECD*, 2019, p. 93] report. The results of the reports to be examined in more detail below offer some important clues about the institutionalization of 'instability of job' on a global scale and about its tendency towards becoming a structural problem.

The WEF [*WEF*, 2020b, p. 5] report shows that tasks, jobs and skills will undergo a dramatic transformation by 2025. As a result of technological integration, 43% of companies are expected to reduce half of their workforce, 41% plan to increase task-based contracts and 34% plan to increase their workforce within the framework of technological integration. It is predicted that, by 2025, the time spent by manpower and machines in existing jobs will be equal. The report states that 85 million jobs will disappear by 2025 and 97 million new roles compatible with the new distribution of jobs between manpower, machines and algorithms will emerge. The same study from WEF also highlights data on the connection between technological development and "changing skills". A proportion of the 84% of companies have rapidly digitized their work processes. Another significant finding presented in the report is that the companies expect 40% of their employees to renew their skills in a way that they are able to adapt to technological development within a period of less than six months. This shows that skill gaps will increase in the very near future depending on the new skills in demand. The report indicates that the predictions are already beginning to materialize for the majority of white-collar online workers. The report findings reveal that tomorrow's jobs will surpass the jobs that have disappeared and that, unlike the previous years, job losses are accelerating and the rate of creating new jobs is quite slow. Another point indicated by the findings is a gradual decrease in employment capacity. Based on research reports from institutions [*WEF*, 2018; 2020b; *OECD*, 2019; *ILO*, 2021a; 2022], it is apparent that a significant transformation is taking place in job markets in a global scale.

The main reason for this transformation is that the boundaries between the works that manpower and algorithms and machines carry out is rapidly shifting towards new technologies. This situation makes explicit the risks of 'temporality of inclusion' to and 'permanence of exclusion' from the labor market more than the opportunities that technological products and applications will provide in terms of creating new jobs and employment and thereby increasing social welfare, or in other words, more than the "promises". For example, a study conducted by Carl Benedikt Frey and Michael A. Osborne [*Frey, Osborne*, 2017] found that approximately 47% of total employment in the US is in the high-risk category. It is expected that jobs in about 47% of the professions in the risk category (such as office and administrative support workers, workers in production occupations, workers in transportation and logistics occupations) can be automated within ten to twenty years. Furthermore, the increasing pace of technological development also implies the reassignment of creative and socially intelligent tasks. The condition for being included in the labor market only depends on the labor force acquiring "creative" and "social skills" for themselves. The World Economic Forum's 2018 research pointed to the possibility of changes in the geography of value chains, distribution and production. The research data shows that almost 50% of companies' predictions were that automation will lead to reductions in the labor force. Therefore, emphasis is placed on the good management of the technological development process. If technological development is well managed, there is an expectation that living conditions will improve for all segments. Otherwise, as seen in the World Economic Forum [*WEF*, 2018; 2020b, p. 27] reports, emerging "polarization", "inequality" and "skill gap" problems in the labor market will continue to pose a threat for all.

The proper management of the technological development process actually encompasses the issue of technological compatibility or integration. Although the technological compatibility or integration is a necessary condition both for companies and the workforce, it does not have the same meaning for capital and labor. The use of new technological products and applications in the production process can provide companies some new opportunities to reduce costs, save from the labor power, create competitive advantages for themselves, and thus maximize their expectations of profit and efficiency. For the labor force, on the other side, technological integration requires the continuous renewal of skills within the framework of new tasks and roles defined as compatible with technological development. As can be seen from the results of the following reports, this situation can be observed from the goals set by the companies within the framework of technological adaptation and the skill groups that the demand is expected to increase. For example, a report by the World Economic Forum [*WEF*, 2020b] shows that a significant progress has been made in adapting to technological developments in the past two years. Cloud computing, big data, and e-commerce are representative of priority areas. However, it should be noted that the technological adaptation and compatibility varies from sector to sector. Similar finding is also available in the OECD's 2019 study. As can be seen from the findings of the WEF's [*WEF*, 2020b, p. 27] research, artificial intelligence emerges mainly in the areas of digital information and communication, financial services, health services, and transportation services. The use of big data, the Internet of Things, and non-humanoid robots is most prominent in the mining sector, while encryption technology is prominent in the government and public sectors. Findings regarding the goals set by companies in the context of technological adaptation are as follows: Changing the content of value chains (55%), increasing automation and reducing current employment (43%), including the workforce in technological integration (34%), and increasing task-based contracts (41%). The skill groups expected to increase in demand by 2025 are categorized as: critical thinking and analysis, problem solving, self-management, working with people, management and communication of activities, technology use and development, basic literacies, and physical skills [*WEF*, 2020b, p. 36]. The increasing importance of cognitive skills for the economy as a whole and for the issue of inclusion into the labor market is also demonstrated by similar parallels in the results of the aforementioned ILO [*ILO*, 2020; 2021a; 2021b; 2022] and OECD [*OECD*, 2019] research reports.

Another fundamental issue affecting the economy and labor market in the global world, due to technological development, is the "development inequalities" which is conceptualized as "digital divide". The effects of digital transformation manifest in the form of "productivity", "efficiency" and "profit" in sustainable development areas. Digitalization, defined in connection with the use of digital technologies and digitalized data, creates innovation in organizational regulations, business processes, and products on one hand and increases productivity and the quality of work on the other hand. However, the main problem here is the unavailability of these opportunities provided by digital technologies to all countries and the labor force. The digital divide problem stems from inequalities in investment opportunities and access to technological possibilities and technological knowledge deficiencies. What is referred to by digital divide or development inequalities is countries and labor forces that cannot adapt to the existing digital economy. Thus, while digital transformation enables the creation of new jobs on one hand, it also 'destructs' some existing jobs on the other. Not only do some jobs disappear, but a large number of existing jobs also undergo transformation with digitalization [*ILO*, 2021b, p. 9]. The results of the ILO [*Ibid.*] report show that a large number of existing jobs will be replaced by technology and demand

for new skills will increase. In the evaluations of this report, the transition to a digital future is emphasized as a social and political choice and the importance of a consistent and comprehensive policy approach is emphasized in this context. A similar approach is observed in the OECD [*OECD*, 2019, p. 23] study, where the "future of work" is considered in relation to the political decisions of the countries and some risk situations.

According to these predictions, digitalization can increase productivity, efficiency, quality and social well-being, and reduce existing risks if the right political approaches are implemented. The report also highlights the existence of real risks and provides data on how the majority of people imagine their future, framed within problems of "mass technological unemployment", "job insecurity", "working with very little or no bargaining power" and "skill gap arising from aging population". Similar issues are emphasized in a study by Resul Kurt [*Kurt*, 2019] examining the potential impacts of Industry 4.0 technology on the labor market. The study points out that technological development or Industry 4.0 technology will lead to "technological unemployment" by transforming the employment structure, showing that new structural problems will arise in terms of unemployment and work relations. Automation and robotic production will deeply impact unskilled labor force, and technological development will cause significant reductions in the labor force of vulnerable sections of society such as women, migrants, youth and the elderly. On the other hand, Industry 4.0 technology will cause critical transformations in employment relationships not only in industrialized countries but also in non-industrialized countries. The same study predicts that the effects of the transformation will be more critical and disruptive for developing countries, since these countries have not yet completed their industrial transformations, not transformed their education systems to produce qualified labor force and not yet established an economy based on high value-added products. The source of all these problems also lies in the fact that technological development makes most industries more capital-intensive and less labor-intensive [*Ford*, 2009, p. 131; *OECD*, 2019, p. 71].

The transition from low-production and labor-intensive applications to capital and cognitive / digital skills-intensive applications determines the essence of economic development [*OECD*, 2019, p. 71]. It is clear that new technological products and applications offer the capacity to expand the ability to gain advantages in intense competition conditions by providing capital to save from the labor power. Indeed, access to more production opportunities with fewer labor forces will undoubtedly increase the use of new technologies. This situation shows that employment will be limited to certain areas with limited demand for a small number of highly skilled workers. Depending on the technological progress focused on skills or the trajectory of technological development, the declining capacity of employment in the framework of "included" and "excluded" skills can give a worrying level of concern about the risk of reaching unemployment to be "mass unemployment".

As indicated above, the transformative effects of technological development in the labor market are manifested as "skills gap" and "skills shortage". "Skills gap" refers to the situation where the skill level of a worker or group of workers is lower than the appropriate skill level required by the job(s) or the skills do not match the job requirements. "Skills shortage" means that some skills are insufficient due to the nature of the current job(s) [*ILO*, 2021b, p. 13]. The roles, tasks, and skills in demand are constantly being redefined in the global competition led by the rise of digital technological applications or the trajectory of technological development. For example, according to the findings of WEF [*WEF*, 2018], 54% of workers will need to acquire new skills or update their existing skills by 2022. By looking at the ILO [*ILO*, 2021b, p. 59] report, it is seen that digital skills that are continuously rede-

fined due to technological development indicate a new dimension of skills in general. The report discusses the skills required in the digital age, including social, emotional, cognitive, and metacognitive skills that are transferable across different professions. These skills include traditional foundational skills such as literacy and arithmetic, as well as digital literacy and arithmetic, and basic environmental awareness. Digital skills often intersect with other skills and can be a prerequisite for or a result of other skills. Digital skills are primarily focused on computer and internet skills and currently also include their mobile applications. It is clear that these skills will continue to evolve to encompass digital technologies. The report defines digital skills starting from the "basic literacy skills" required to access technology, to the "transversal ICT skills" that enable the meaningful use of technology in daily life and the workplace, to the "intermediate and advanced skills" that provide expertise on how current digital technologies will evolve and how new ones will be created. Basic digital skills and transversal ICT skills are the easiest ones to be transferred to other jobs, while intermediate and advanced digital skills are less transferable and more sector and profession-specific. In the digital economy, it is expected that the workforce in different sectors and professions will be able to use digital and non-digital skills together. The ILO, which focuses on the future of skills in the digitalizing economy, also makes similar conclusions in its report [ILO, 2021b, p. 60]. The report lists skills as that the *foundational skills* such as mathematical skills, literacy, environmental literacy, and research literacy; *basic digital literacy* that involves accessing and using digital technologies, which is required for work in minimum levels in digital societies and economies; *cognitive and metacognitive skills* related to analytical and critical thinking, creative and innovative thinking, problem solving, and decision making; *technic/occupation-specific skills*; *intermediate and advanced digital skills* related to programming and network management, digital media and design, artificial intelligence, cyber security, and mobile application development; and finally *social and emotional skills* related to emotional intelligence, communication and collaboration, conflict management and resolution. This classification also gives clues as to what kinds of labor force will be 'included in the labor market' and which ones will be 'excluded from the labor market' by companies. The advancement of technology today is making many jobs, including routine middle-class or white-collar jobs, more automated, with robots and intelligent machines taking over jobs that require higher skills. In this case, it can be predicted that the relatively high-skilled labor force will have to shift more towards the jobs that will not require high skills. Another possibility is that, 'exclusion from the labor market' will also expand towards the labor force capable of using the new products and practices of technology as well as in jobs requiring relatively higher qualifications. In this context, "lifelong learning" strategy which is presented as an alternative solution [*OECD*, 2021] or the requirement of acquiring more skills to adapt to technological development demonstrates 'the continuity of skills' in the labor market.

As seen in the ILO [*ILO*, 2022, p. 17] report, the young employment of the digital economy is characterized by the increasing share of highly educated and skilled employees. It is expected that 24 million new jobs will be created globally by 2030 and 6.4 million of these jobs will be held by young people. Based on this prediction, the gains in youth employment will primarily occur in the construction, information and communication technology sectors. The most widespread employment is expected to be in the distribution and retail sectors. For example, Enzo Weber's [*Weber*, 2016] study shows that 490 000 jobs will be lost in 63 economic sectors and 54 occupational fields in the German labor market (due to decrease in machine and facility control and maintenance professions in the manufactur-

ing sector), and 430 000 new jobs will be created within ten years (due to increases in service professions, especially in information and scientific professions). Therefore, acquiring competencies such as conceptual thinking, abstraction and communication skills will be important for the labor force. Similar findings can be found when the WEF [*WEF*, 2020a, p. 4] report is reviewed. The report emphasizes that future occupations will be shaped along the axis of demand for digital and human factors, and care economy, product development, data and artificial intelligence, engineering and cloud computing, green economy, people and culture, sales, marketing and content are shown as the future occupational groups. When analyzed by percentage, it is stated that 37% of the expected jobs in the next three years will be in the maintenance economy; 17% in sales, marketing and content; 16% in data and artificial intelligence; 12% in engineering and cloud computing; and 8% in people and culture. To put it briefly, the findings show that future jobs will rapidly evolve towards jobs that require cooperation and compatibility with new technologies. This is why the "invent yourself anew command" actually emerges as a systematic feature of today's capitalism's destructiveness [*Marazzi*, 2017, p. 10].

The idea that technology creates new job areas is generally accepted, but it is seen that new jobs created by technological developments often disappear as a result of the same developments [*Ford*, 2009]. This means that "the capitalist form of digitalization" [*Fuchs*, 2015] turns a skill or ability into a temporary benefit rather than a lifetime gain [*Sennett*, 2011]. The capitalist accumulation regime that focused on the "new" skills includes not only physical labor forms but also immaterial labor that create non-physical products such as knowledge, ideas, communication, and relationships. For this reason, in today's capitalism, that incorporates all these elements into the production process, new skills do not last long. The different components of immaterial labor, "pointing to cultural and informational production processes" [*Ye et al.*, 2010, p. 4], have spread to many areas of employment in terms of informatic, emotional, communicative, and cultural labor force. This distribution is not equal on an international scale and also contains variations in terms of gender and race. The aim of the US to gather high-value immaterial labor within its own borders and move low-qualified labor outside its region [*Hardt*, 1999] is an explanatory example. Therefore, the problems that can be conceptualized as "inequality", "discrimination" and the 'destruction of stability' reveal rather a destructive effect of technological developments.

The rise of digital labor platforms is another tangible manifestation of the transformative effects of technological advancements on the labor market. The ILO [*ILO*, 2021a, p. 18–19) report shows that in the last 10 years, the interaction and exchange of 'data' and information between individuals, businesses and tools have increased significantly. Digital labor platforms offer some opportunities, particularly for the disadvantaged groups and businesses, for instance, by providing access to job and income generating opportunities for migrants, young people, people with disabilities, and women. It also enables some businesses to reach a wider spatial arena, thus increasing their activities and productivity. According to the ILO [*ILO*, 2021a, p. 20], there has been an increase in demand and supply of online internet-based freelance and micro-task jobs since 2017. While it is acknowledged that digital labor platforms offer some concrete benefits to a specific section of the labor force, it is important to acknowledge the significant risks and costs they bring with them. These risks refer to the issues of "job and income stability", "working conditions", "social security", "skill utilization", and "collective bargaining rights". The ILO's 2020 study also highlights the risks associated with the "uncertainty" and "unpredictability" of digital labor platforms. These risks, of course, contain the informalization of freelance work and insecurity faced

by freelance workers in the labor market [*Merkel*, 2019, p. 23–24]. Another reflection of the risk associated with these platforms is the "discrimination" towards the labor force that cannot adapt to the complexity of the digital labor market. More importantly, the positive aspects of these platforms mask or make "mass unemployment" invisible [*Gill*, 2014, p. 159]. At this point, the analysis based on the findings show that it will be the best way to understand both the "promises" and "threats / risks" of technology is to keep in mind the positive dimensions of technology defined in terms of productivity, quality, and speed in production and economy, while taking into account the warning that the most significant existential risks of the century stem from expected technological developments [*Bostrom*, 2009, p. 195]. This is because all technological products and applications are embedded in production and reproduction relationships in a capitalist accumulation regime.

Conclusion: Is it "a Promise or a New Crisis"?

Capitalism, today, reproduces the unlimited capital accumulation with its chronic tendency, by including the material and immaterial components of labor through new technological products and applications, and similarly, it gradually expands the limits of its 'destructive' domination on a global scale through the opportunities made possible by technological development. The findings and assessments above reveal that technological development, in terms of increased speed, quality, productivity, and efficiency renews the conditions of profit and efficiency for capital. The implementation of new technological products and applications reduces costs, saves on labor and creates a competitive advantage for companies. However, the transformative impact of technological development on the labor market presents new challenges, risks, and threats such as 'job polarization', 'job instability', 'skill instability', 'temporality of inclusion' into the labor market, and 'permanence of exclusion' from the labor market, 'inequality', 'discrimination', 'skills gap', 'skills shortage', 'developmental inequalities', and finally the 'risk of mass unemployment'. As long as the technological development is not designed and implemented in an understanding that encompasses the benefits of all social segments, it can be argued that the potential future of labor will also feature deeper manifestations of these fundamental problems. Hence, when addressing the problems created by technological development, it is important to focus on the relationship between new technological applications and the entire social structure, in order to uncover what is beneficial for all social segments.

Inclusive applications of industry 4.0 technology, which includes digital transformation, robotic technologies, big data, artificial intelligence, and the Internet of Things technologies, are increasing the weight of capital and technology-intensive sectors and creating a more capital-intensive production and labor process. It is clearly visible from the findings of reports that technological products and applications added to the production process are in increase in terms of their physical and cognitive capacities. Jobs, tasks, roles, and skills are 'constantly' re-determined and the existing ones are transformed with the integration of each new technological product and application. Findings from the reports discussed in this paper indicate that the trend towards including digital and cognitive skills in the job market is increasing. This will inevitably result in a deeper polarization between low-skill jobs with low wages and high-skill jobs with relatively high wages. In addition to that, the physical and cognitive capacities of new technological products and applications are increased. This shows that the inclusion or exclusion of the labor force in the job market will

be determined according to the nature of technological development. The condition for the labor force to be included or integrated into the job market is the ability to renew their skills in the framework of the constantly re-determined jobs, professions, roles and tasks. The issue of adapting to technological development manifests in the labor market as the form of 'permanent exclusion from the job market' and 'temporary inclusion into the job market'. It seems possible to conceptualize the jobs and skills that are compatible with technological development but since they are not containing 'long-term' elements, as the 'instability of skills' or the 'discontinuity of skills'.

The findings and evaluations of the reports show that the use of new technologies is increasingly including jobs that require higher wages and higher qualifications. Artificial intelligence applications that are expected to be more effective than the human brain in strategic thinking and scientific analysis can be considered in this context. The increasing use of technological products and applications in existing jobs that replace labor, firstly indicates the risk of 'displacement'. In other words, it implies the gradual decrease in the dependence of capital on labor or the labor force. The findings and evaluations show that routine and automation-sensitive jobs, professions and skills that do not require high cognitive skills will largely disappear, and the tasks in these jobs will be transferred to automation. Hence, 'inequalities' and 'polarization' in the labor market will deepen for those of unskilled or low-skilled labor forces, minorities, women, migrants, youth and elderly population, who do not have access to digital technology and the skills required by these technologies. This is related to the limited employment caused by the capacity of today's technological products and applications. From the current and expected jobs, professions and skills included in the labor market, it can be observed that the scope of employment is increasingly narrowing for labor force in terms of some skills being excluded from the job market and some skills being included. This also indicates a threat of complete elimination of the need for labor in some professions and job types. The likelihood of this threat makes it more necessary to think about 'the risk of mass unemployment'. As mentioned at the beginning of this paper, not ignoring the 'new' and 'worrying' problems of technological development will contribute to the production of more effective consequences for humanity and ecology. In conclusion, the structural problems and the predicted potential problems, which were conceptualized in this paper as the 'destruction of stability', 'discontinuity of skills' and the "risk of mass unemployment", show that the transformative effects of technological development in the labor market can be read as a "new crisis" rather than a "promise" for the current state of the workforce. That is why it is of great importance to think about the current situation and the possible future of the labor market. Doing so will reveal the consequences of technological development for humanity more clearly and holistically. As a matter of fact, in a capitalist accumulation regime, capital expands the limits of its domination by subordinating technological development to itself, by including not only the labor market but also the ecology.

This also shows that those who approach technological development from an optimistic perspective are faced with a dilemma with regards to current structural issues; combining market principles with aspirations towards building a sustainable society is actually not a realistic approach [*Jelsma*, 2006, p. 221]. Therefore, making rational decisions becomes increasingly important. This can only be possible by describing the future more realistically; this description should include both personal or local short-term futures and more distant global futures [*Bostrom*, 2009, p. 187]. As predicted, if new technologies continue to make the unemployment issue more widespread, the threat to economic security would be reflected in more staggering dimensions. This economic security threat will also make

it increasingly difficult to deal politically with the risks posed by climate change. When the impacts of climate change on agriculture and food are closely examined, it can be predicted that many developing countries will be more affected by the destructive consequences of climate change such as drought and rising food prices. The interrelated risks that emerge as unemployment, economic insecurity, inequality, and drought will inevitably trigger social and political instability [*Ford*, 2015, p. 283–284]. Mass unemployment together with wages falling below subsistence level will inevitably cause a decline in consumer demands, fall in profits and ultimately result in economic crisis or even economic collapse [*Ford*, 2009, p. 237]. In this regard, policies that include long-term perspectives such as climate change, national and international security, economic development, nuclear waste, biological diversity, protection of natural resources, population policies, and funding for scientific and technological research should not rely on implicit assumptions about humanity's future-related arguments, but require that these assumptions be made explicit and subjected to critical analysis in order to address the major challenges threatening humanity in a responsible manner [*Bostrom*, 2009, p. 187]. The future will likely to contain increasingly uncertain and much more complex challenges. Therefore, an approach to understanding the consequences of technological developments produced for all humanity should also encourage more thinking about the potential to create social well-being.

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Новые технологии и рынок труда: взгляд в будущее рабочих мест и увольнения

Элифе Карт

Университет Акдениз,
Анталия, Турция;
e-mail: elifekart@hotmail.com

Эмин Баки Адас

Университет Аднана Мендереса,
Турция;
e-mail: eminadas@adu.edu.tr

Цель данной статьи — прокомментировать влияние новых цифровых технологий на рынок труда и критически рассмотреть, представляют ли новые технологии угрозу для трудящихся классов и общества в целом или же обладают положительными перспективами. В статье проанализированы материалы нескольких докладов международных организаций, таких как МОТ, ОЭСР и Всемирный экономический форум (ВЭФ). В этих докладах исследуются пути, по которым цифровые технологии изменяют характер труда, влияя на рабочие задачи, навыки и трансформацию рынка труда. В рамках нового режима капиталистического накопления «новый кризис» представляется более реалистичной перспективой с точки зрения трудящихся классов, поскольку новые технологии становятся основной силой, ускоряющей «разрушение стабильности», «разрыв навыков», «временную включенность», «постоянство исключенности» и «риск массовой безработицы».

Ключевые слова: новые цифровые технологии, рынок труда, разрушение стабильности, разрыв навыков, риск массовой безработицы.