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The Effect of COVID-19 Pandemic and the Development of Technology and Robots on Jobs

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ABSTRACT

Background: The prevalence of COVID-19 has had a devastating economic impact on countries, leading to reduction of many jobs. Earlier, the advent of technology and robotics had been the source of much concern and analysis about the future of jobs. The present study aims to investigate the effects of the COVID-19 pandemic and the emergence and development of technology and robots on jobs and compare them with each other.

Methods: The present study was conducted qualitatively. Data collection was done by holding two expert panels. The experts were purposefully selected from different universities in Iran. Findings from the expert panel were analyzed using the content analysis technique. Erlingsson's approach was used for content analysis.

Results: The effects of the advent of technology and robots and the effects of the COVID-19 outbreak on jobs were examined from seven aspects, including economic, social, political, the impact on developed and developing countries, health, education, and workforce skills. The effects of the advent of technology and robots on jobs can vary depending on the two scenarios of interaction or substitution. The effects of the COVID-19 outbreak on jobs can also be in line with different scenarios with the emergence of technology and robots in some respects.

Conclusion: The possible conformity of economic and social systems in gradual changes faces fewer challenges, while conditions like pandemics have few opportunities to adapt to new situations. Increasing flexibility with a preemptive approach and not just based on the existing scenarios are necessary to deal with these situations.

Key words: Robot, COVID-19, Coronavirus, Future, Job

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Introduction

In December 2019, new pneumonia was recognized in Wuhan, Hubei province, China. Investigating the history of patients showed that they had visited a local seafood market, a market trading variety of live animals, so the disease was determined as a novel zoonotic (animal-to-human) disease (1). On January 30, 2020, the World Health Organization (WHO) declared new pneumonia caused by the virus an internationally public Health Emergency (2), and on February 12, 2020, it was nominated as 2019 coronavirus disease or COVID-19 (3). The infectious disease quickly became a pandemic, with 214,468,601 cases reported worldwide on 27 August 2021 (4, 5).

The vast outbreak of infectious disease exacerbated the economic costs of the health system in various dimensions of prevention, treatment, and control. It also reduces employment, production, social interactions and disrupts economic activities, traveling, tourism, and foreign investments (6). To better control of COVID-19 disease, the governments took various approaches like closing jobs, entertainment, and sports, and restricting travel, limiting the disease's spread, but these had dire economic consequences (7, 8). Unfortunately, this outbreak was too rapid that most businesses could not adapt themselves to the new conditions and causing unemployment to increase. COVID-19 has had a more severe impact than the 2008 global recession crisis (9), causing a deep recession and the loss of millions of jobs (10). The International Labor Organization estimated that an international outbreak of the pandemic reduced working hours by 5.6 % in the first quarter of 2020, equivalent to 160 million full-time jobs (including 48 hours per week) (11).

On the other hand, the effect of the advancement of technology and robots on jobs is controversial that seems to be affected by their management (12). Robotics in the workplace can have significant negative and positive effects on work (13). Applying robots in jobs can be limited to just increasing the accuracy and focus of the performer or causing workforce replacement (14). There are two main views on the impact of robots and the growth of technology, especially artificial intelligence, on the future of jobs. The first view is the complete replacement of robots with humans, and the second is the emergence of new business models based on human-robot interaction, in which, along with the disappearance of old jobs, new jobs are created (15). Based on these two perspectives, two main scenarios are formed. The first believes that robots will overtake humans in both physical and cognitive skills. The second is human-robot interaction to increase productivity, efficiency, quality, and speed of work, which necessitates a need to strengthen some skills of human resources.

What is clear is that the only worrying factor for current and future jobs is not only the growth of technology and artificial intelligence, and the study of the future of jobs requires attention to more complex and systematic dimensions. The present study investigates the effects of both the COVID-19 pandemic and the emergence and development of technology and robots on occupations and compares them with each other.

Materials and Methods

The present study was qualitative. Data collection was performed by holding a panel of experts in two stages. The average time of expert panels varied around 90 minutes. All conversations recorded with taking permission from participants. The study was conducted from April to October 2020. The experts were faculty members who were purposefully selected from well-known Iranian universities and specialized in economics, politics, sociology, health, education, and entrepreneurship. The experts were nine, and their opinions were gathered in a panel format of experts and virtual. With permission, note-taking was done during the meeting by two researchers. All participants in the present study were informed about the study's purpose, and their informed consent was obtained.

In the first stage, experts determined the dimensions of the occupations affected by the coronavirus outbreak. The results of this panel were extracted by performing content analysis, and

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thus the desired dimensions for entering the second stage of the panel of experts were determined. Erlingsson's approach was used for content analysis (16). The first step in this approach is to read the interviews to understand the whole. At this stage, you get an idea of the main points that your participants are expressing. Then researcher to start dividing the text into smaller parts. The next step is formulating codes and then grouping these codes into categories.

In the second stage, which was held one week after the first panel, the researchers provided the resulting dimensions to the experts, respectively, and the experts explained the determined dimensions and compared it with the effects of technology and robots on jobs. The results of the second stage were analyzed using the content analysis technique.

The present study is a part of a comprehensive project related to the future of jobs, which was approved at Kerman University of Medical Sciences with the code of ethics IR.KMU.REC. 1399.299.

Results

The first panel of experts showed that the effects of COVID-19 pandemic on jobs from 7 different economic, social, political, impacts on developed and developing countries, health, education, and workforce skills can be considered. Table1 presents the results of the discussion and study of the effects of the COVID-19 outbreak and the effects of the emergence of technology and robots on jobs in terms of the specified dimensions.

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Table 1. The effects of the COVID-19 outbreak and the emergence of technology and robots on jobs

	The effects of technology and robots on jobs		The effects of COVID-19 on jobs
	Scenario one (maximum job replacement by robots)	**Scenario two (human-robot collaboration and interaction increase)**	
Economical	The emergence of new economic models, such as universal income, is followed by the statement that human power has a lesser role in business models and is more of a consumer	Increase productivity and quality of services, reduce the cost of goods and services Increase innovation	The recession of many businesses, while the prosperity of some businesses, such as online stores
Social	Decreasing human interaction and social communication, decreased self-confidence and sense of usefulness in society	Accepting robots as a new member of society alongside human communication	Reducing social interactions through health protocols and physical distance as a result of changing business environment
Political	Increasing the political and governance power of technology organizations instead of governments	Increasing the political power of countries with technology	Internationally extensive damage to countries that experienced high disease outbreak. Dependence of the political power of vaccine-producing countries on vaccine performance Countries trying to get vaccines to improve the business environment
Influence of developed and developing countries	Given that the owners of new technologies are from developed countries, in this scenario the gap between developed and developing countries increases sharply	Developing countries are stepping up their efforts to keep up with the latest technology and artificial intelligence, and the latest models of knowledge and technology transfer are being used	The severity and weakness of the challenges in developed and developing countries are almost the same, and the developed countries suffered far more because of the dynamism of their economies
Health	Social health: Sedentary, and reduction of social vitality and indicators of spiritual health with more intensity Health services: Increasing the quality of medical, diagnostic and preventive services by using macro data analysis and artificial intelligence and reducing justice in access to health services	Social health: Decreased mobility, social vitality and less intense spiritual health indicators Health services: Using robots to provide health services, increase quality, reduce medical errors and reduce risks for human health service providers	Social health: Reduced mobility, increased obesity and depression, divorce, domestic violence, child abuse, and spousal abuse Health services: Increasing pressure on health care staff and the desire of health systems to use robot technology and artificial intelligence to effectively control the epidemic
Education	Reducing the demand for lifelong learning and learning Increasing demand for advanced knowledge training in high-tech fields	Increasing on-the-job training courses, lifelong learning, new and dynamic definition of skills required by human resources and increasing demand for training services	Increasing distance learning Primary education suffered the most because countries were unable to establish a proper structure for educating children in accordance with health protocols
Manpower skills	Isolation of manpower and demand reduction for learning, so that a minimum number of manpower are employed in occupations	Increasing the need to improve human resource skills, retraining programs, lifelong learning and skills development	Pay more attention to the cognitive skills of the workforce that make up less than half of the population

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Discussion

Time and place are two main factors that regulate the effect intensity of COVID-19 prevalence and robots on jobs. Rapid alternations in a short time and simultaneous outbreaks in all countries have eliminated the opportunity to correct or replace the business models. This elimination can have various economic, social, and political aspects. It has had different security, mental health, and social vitality effects on service jobs expulsion provided by the lower class of society, or on the bankruptcy of large corporations in economic equations. The spread of COVID-19 also has caused the physical separation of humans called physical distancing, initially named social distancing changed to physical distancing to reduce its negative burden as humans are inherently social (17). Observing the physical distancing caused damage to many jobs. Although many occupations, such as mask manufacturers, health and medical equipment, and internet businesses have flourished in a year from the COVID-19 outbreak, this outbreak had been a great threat to the power of countries in various political, economic, and social fields.

Meanwhile, some countries censored their prevalence data, and some competed in producing vaccines. The COVID-19 has burdened the tasks of the medical staff and caused burnout and death of many of them significantly (18).

However, in both scenarios of technology and robots effects on the jobs, whether by the complete elimination of manpower or by human-machine interaction, the changes will be originated from high-tech countries and spread to others, and also continuously occur over time. It enables the appropriate economic, social, educational, and political compatibilities possible. In recent years, the workforce has always been worried to be replaced by technology or robotics, but the experience of COVID-19 has shown that pandemic outbreaks can be more deadly than any factor in stopping or damaging jobs. The key for further pandemics or any phenomena causing the same situation, worldwide or regional, is to redesign the systems and structures more flexible. On the other hand, the ability to assume different types of future helps to deal with such challenges successfully. If we were in the past, we would expect the technology progresses and achievement to help human to control the pandemic with less injuries and less time consuming.

Conclusion

The possible conformity of economic and social systems in gradual changes faces fewer challenges, while conditions like pandemics have few opportunities to adapt to new situations. To deal with these situations, it is required to increase flexibility with a preemptive approach based on the existing scenarios.

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Conflict of interests

The authors declared that they have no conflict of interests.

Authors' contributions

Dehnavieh R, Yazdi Feyzabadi V, Poursheikhali S, and Noori Hekmat S designed research; Ghasemi Moghadam M and Kazemi M conducted research; Masoud A analyzed data; and Masoud A and Poursheikhali S wrote the paper. Masoud A had primary responsibility for the final content. All authors read and approved the final manuscript.

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