

The Fourth Industrial Revolution

Subjects: **Economics**

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According to Schwab, the word, “revolution”, refers to a radical change, and revolutions occur in the world when new technologies and novel ways of perceiving the world come about, with changes in the economic systems and the social structures of the world. As was noted before, the 4IR is defined as: “Revolution that is blurring the lines between the physical, the digital, and the biological worlds. Massive advances in artificial intelligence (AI), Internet of Things (IoT), robotics, 3D printing, quantum computing, genetic engineering, and various other technologies”. One of the easiest ways of understanding the 4IR is to start gathering knowledge about the First Industrial Revolution, the Second Industrial Revolution, and then the Third Industrial Revolution.

Fourth Industrial Revolution

stakeholder capitalism

sustainable development

1. New Developments and Technologies Driving the Fourth Industrial Revolution

The new developments and technologies are a collection of the technologies that are driving the 4IR today, as explained by Schwab ^[1]. This list of new developments and technologies that are driving the 4IR helps in understanding the Fourth Industrial Revolution are shown in **Figure 1** below.

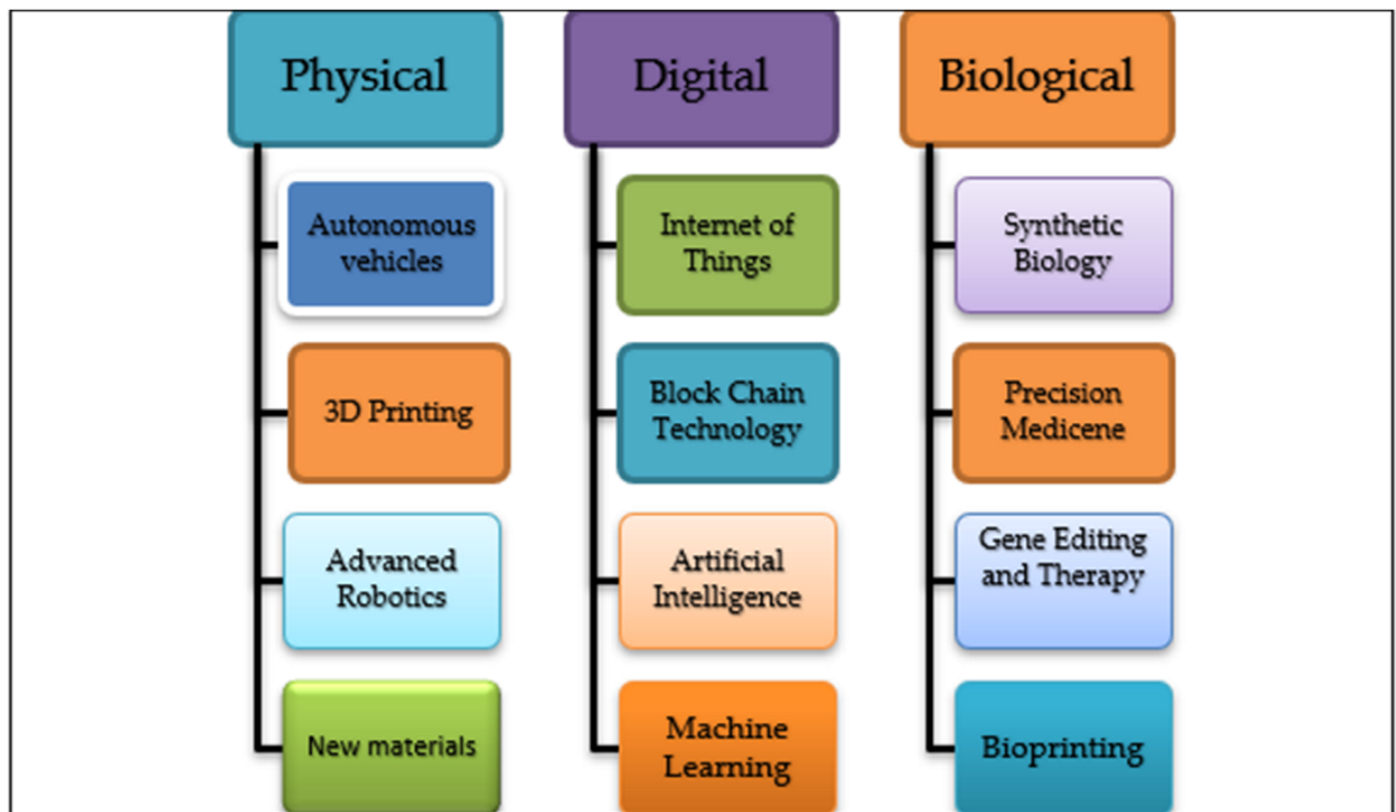


Figure 1. New developments and technologies driving the Fourth Industrial Revolution. Source: the researcher's analysis.

The above is a summary of the technology that will drive the Fourth Industrial Revolution in the 21st century. As was noted before, the Fourth Industrial Revolution comes with opportunities that will transform the lives of people, but it also comes with its challenges. As Schwab ^[1] explains, the scientific breakthroughs and the new technologies all ride on the power of digitization. The rise in computing power has allowed for activities such as gene sequencing and the massive application of artificial intelligence. Though Schwab ^[1] chose to group the technologies into three groups (the physical, digital, and biological spheres), these developments and technologies are highly interrelated, and they highly depend on one another. As was noted before, the 4IR comes with opportunities that will transform the lives of people, but it also comes with its challenges.

2. The Challenges of the Fourth Industrial Revolution

A section on the challenges is included in order to attain a sense of the purpose and direction of this paper. Xu et al. ^[2] state: "We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. People do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academic and civil society." It is believed that the Fourth Industrial Revolution will come with benefits, but there are also several key challenges that are associated with this revolution ^{[2][3]}.

These challenges are outlined in **Figure 2** below.

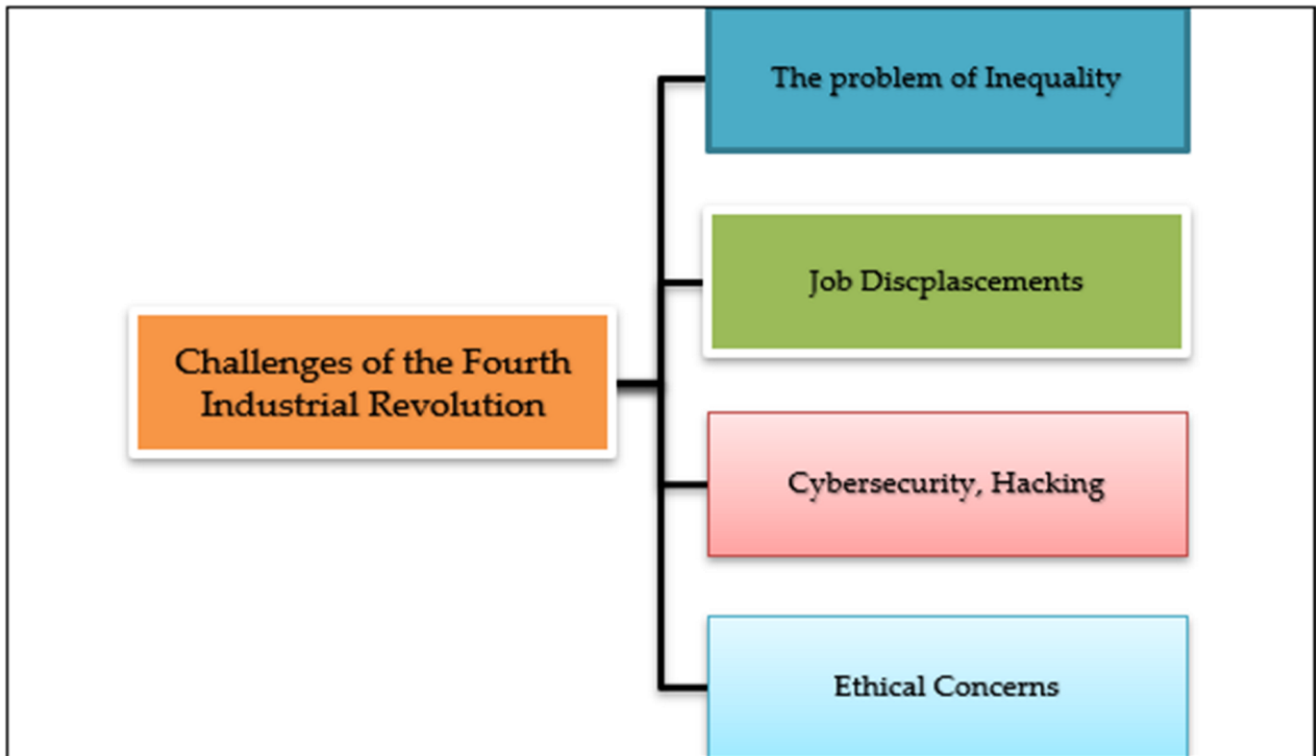


Figure 2. Challenges that are related to the Fourth Industrial Revolution. Source: the researcher's analysis.

Figure 2 above outlines the challenges that are associated with the technological developments of the Fourth Industrial Revolution. These challenges include issues that are related to inequality, job displacements, cybersecurity, and ethical concerns as shown in **Figure 2** below.

2.1. Inequality

Schwab ^[4] believes that the revolution will yield greater inequality, particularly in terms of its potential to disrupt the labor markets. It is believed that automation will be substituted for labor across economies, and the net effect from the displacement of workers by machines will be a massive increase in the gap between the returns to capital and the returns to labor. The people who will be able to create ideas and innovations will stand to gain more compared to the holders of labor and those with capital who do not fully utilize it through innovation. This may also result in a situation where low skills will attract low pay, while high skills will result in high wages. In this revolution, the people with ideas will be scarce resources, and not the workers or investors ^[2].

2.2. Loss of Jobs

Apart from the challenges of inequality, which is caused by job displacements, the loss of jobs will be a huge problem in the Fourth Industrial Revolution. The quest for talent will give rise to a job market that may become increasingly segregated ^{[2][5]}. Low-skilled and low-wage jobs will be replaced by computers and digitization ^[2]. There is also the general belief that higher-paid jobs, which require more skills, will be less likely to be replaced by

computers and digitization [4][1][6]. The fears with regard to the impact of technology on jobs is not a new phenomenon. In 1931, the economist, John Maynard Keynes, warned of widespread technological unemployment. He argued that the discovery of other means of economizing the use of labor may outrun the speed at which people find new uses for labor [4]. However, this proved to be wrong; but the question remains: What if this time, it is true? The debate on the loss of jobs has been on the cards because of the widespread evidence of the losses of jobs for bookkeepers, cashiers, and telephone operators [4]. The reasons are put forward in the following statement: “Why the new technology revolution will provoke more upheaval than the previous industrial revolutions are its speed, breadth, and depth. Everything is happening at a much faster pace than ever before so many radical changes are occurring simultaneously, and there is a complete transformation of entire systems” [4][1].

2.3. Challenges Related to Cybersecurity and Hacking, among Others

Moreover, in addition to the problems of “job displacement in the fourth industrial revolution, are many other challenges, such as cybersecurity, hacking and risk assessment among others” [2]. People are generally encouraged to be alert, especially when human life becomes “extensively connected to various devices, from cell phones, cars, and light switches to home security cameras, and smart speakers” [7][2]. The fact that all things will be connected on the Internet of things will increase the vulnerabilities that are present in any given network [7][2]. As a result, greater cybersecurity will be required in the Fourth Industrial Revolution. Organizations will need to map their networks and assess the risks and critical factors that are related to security. Xu et al. [2] believe that, “company assessments should examine accessibility to systems, such as possible threats from internal sources, from disgruntled employees to internal human error, and external sources including hackers and cyber terrorists”.

2.4. Challenges Related to Ethical Concerns

Lastly, the Fourth Industrial Revolution will feature technologies such as artificial intelligence, automation, robotics, and genetic engineering, and, as a result, new ethical concerns are emerging. Many debates have taken place with regard to genetic engineering and the use of tools and research technologies. However, the prevention of genetic diseases by genetic engineering is desirable. On the other hand, the question remains as to what guidelines, regulations, or ethical boundaries should be established in order to avoid the over manipulation of genetics for desirable traits [7]. Concerns about over manipulation exist in situations where artificial intelligence and robots that are capable of machine learning are becoming smarter and more independent, but they have the limitation of lacking the important feature of moral reasoning. This limits their ability to come up with ethical decisions in complex situations [2]. The other problem concerns whose moral standards robots should adopt, since moral values are different from one individual to another across nations. As a result, there is uncertainty as to which moral framework to adopt, which is one of the difficulties and limitations of ascribing moral values to artificial systems [8][9].

References

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