

## Fifth Industrial Revolution (New Perspectives)

**Sabah Hameed Ali, Hayder Ayad, Mithaq Taher Al Rubaie**

Al Bayan University

### **Abstract**

While we are rushing towards the future quickly and without stopping, there is a debate in the scientific community and business forums today about the upcoming industrial revolution and what it is related to, is it the revolution of artificial intelligence, or the revolution of nanotechnology, or the revolution of sustainability, or is it the revolution of the Internet of things, cloud computing and 3D printing? We believe that the Fifth Industrial Revolution will be the result of all these technologies. And through our research paper, we will address the concept of the industrial revolution in general and the major industrial revolutions in human history and their historical context. Then we will look at the Fourth Industrial Revolution, whose events we are living today, its most important technologies, and its future development. Then we will look at the future features of the upcoming Fifth Industrial Revolution and the controversy surrounding it from the point of view of several experts and the most important opportunities and challenges that are likely to emerge.

Keywords: Industrial, Revaluation, Perspectives

JELS: L00, O14

### **How To Cite:**

Ali, S.H., Ayad, H., Al Rubaie, M. T. (2022). Fifth Industrial Revolution (New Perspectives). *International Journal of Business, Management, and Economics*, 3(3). 196 - 212. DOI: <https://doi.org/10.47747/ijbme.v3i3.694>

## **1. Introduction**

The first three industrial revolutions brought to the world steam power, railways, electricity, the telephone, the radio, and television. Then came the era of digital transformation and the invention of computers and home computers. When technological development reached its climax and integrated the physical, digital, and biological worlds, we entered the Fourth Industrial Revolution era. This process of rapid technological development leads us to the question of what tomorrow will be? Are we on the cusp of a fifth industrial revolution? The answer to this question is, there is no doubt that this revolution will come, but what we are trying to do is diligence by anticipating its merits according to what the specialists have said. To start preparing for the future by finding the best ways to adapt to the massive transformations expected to bring in the social, economic, environmental, and political systems.

### **Research Importance**

The importance of the research stems from the topic of the study, which focuses on the matter and role of the industrial revolution as it is a pivotal player at the level of societies in the field of technological changes and how these changes are dealt with in a manner that serves the production process, whether in the area of goods or services, as well as from the opportunities it offers in the field of work and jobs that It is an essential part of the economic systems of the countries of the world.

## **2. Literature review**

### **2.1. Industrial Revolution Concept**

The concept of the industrial revolution includes the replacement of manual labor with automated/mechanical work, and then the transition from the production system in the workshops to the production system in the factories / industrial firm or the change, also from manual machines to the sizeable, automated industry, based on advanced devices. Thus, the machine announced the industrial revolution, and the computerized system in production is working continuously to reduce the volume of manual work and replace the human hand with automatic physical tools (Arabic Encyclopedia. Volume VII), and this includes, for example, today, robots, artificial intelligence, and others of advanced technologies. Therefore, as a start, the Industrial Revolution is the process of rapid change witnessed by the countries of Europe through their adoption of scientific research projects, which led them to move from the era of agriculture and handicrafts to the generation of an industry that depends on mechanization.

### *2.2. The Major Industrial Revolutions in Human History*

From the end of the seventeenth century to the present time, man has been using the term "revolution" to express the radical transformations in society, resulting from the outputs of human thought represented in innovation and technological innovation that touches all aspects of life, starting with the revolution of steam engines, railroads, and the spinning industry, textiles,

and finally with the revolution of computers and information, biotechnology and nanotechnology (Al-Iskandarani, M. S, 2010).

We will review the historical, approximate, and brief context of the industrial revolutions to avoid entering an institutional and academic dispute over the number of revolutions, and when one of them ended and when the other began, including the fifth revolution, the subject of our research paper, as shown in the table1 below.

Table 1. Industrial Revolutions over time

|                   | 1 <sup>st</sup><br>Industrial<br>Revolution | 2 <sup>nd</sup><br>Industrial<br>Revolution | 3 <sup>rd</sup><br>Industrial<br>Revolution | 4 <sup>th</sup><br>Industrial<br>Revolution | 5 <sup>th</sup><br>Industrial<br>Revolution? |
|-------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|----------------------------------------------|
| Date of emergence | End of 18 <sup>th</sup> Century             | End of 19 <sup>th</sup> Century             | Mid-20 <sup>th</sup> Century                | End of 20 <sup>th</sup> Century             | Mid-21 <sup>st</sup> Century?                |
| Country of origin | United Kingdom and France                   | Germany and United States                   | United States                               | United States and China                     | China and United States?                     |
| World population* | 0.8 to 1.1 billion                          | 1.5 to 1.8 billion                          | 2.5 to 3.3 billion                          | 4.4 to 5.7 billion                          | 8.5 to 11.1 billion?                         |

Source The Algorithmic Code of Ethics by Jerome Beranger; 2018.

The first industrial revolution was characterized by the invention of steam engines, which led to a qualitative leap in the economies of scale and industrial settlement. The second witnessed the discovery of electricity, oil, telephone, radio, and television communications and contributed to developing new products that changed production patterns and people's lives. Then came the third revolution, which is called the digital revolution. This led to technology from advancing electronic and mechanical analog devices to the digital technology available today. The most important inventions are the personal computer, the Internet, and information and communication technology.

### 2.3. The Fourth Industrial Revolution and Its Tools

The term “Fourth Industrial Revolution” was first used in 2017 by Mr. Schwab, CEO, and founder of the World Economic Forum, at the annual meeting of the World Economic Forum 2016. In his book, “The Fourth Industrial Revolution,” he referred to it as “a set of new technologies” merging the physical, digital, and biological worlds, which will affect all disciplines, economies, and industries comprehensively and profoundly, being unique for three reasons: speed, depth and breadth, and the interaction of systems (Schwab, K, 2016).

In addition, it has brought about wide-area technological changes that have enabled the world to communicate as if it were one village. In the aspects of information technology, robotics, and intelligent computers, as well as a boom in the manufacture of self-driving cars and crewless

aircraft [Drones], as well as nanotechnology, cloud computing, synthetic biology, and robotics, all of which will essentially replace any digital progress that has been made in the past sixty years.

#### *2.4. The Most Prominent Tools of the Fourth Industrial Revolution and Its Future*

##### *2.4.1. Nanotechnology*

The word nano is taken from the ancient Greek language and means “Nanos.” In science, nano means one part of a billion, meaning that one meter contains one billion parts of the nanometer. Accordingly, we can define nanotechnology as that advanced technology based on the rational and creative understanding and study of nanoscience and other basic sciences with the technological ability to synthesize nanomaterials and control their internal structure by restructuring and arranging the atoms and molecules that make them up, allowing for different and unique products to be employed in various applications (Al-Iskandarani, M. S, 2010).

The future: This promising technology heralds a massive leap in all branches of science, and many of the technologies that have developed recently or almost all depend on nanotechnology. Who made anything we can imagine, so some expected that the next nano discoveries would be the expected fifth industrial revolution?

##### *2.4.2. Artificial intelligence*

Artificial intelligence (AI) is a simulation of human intelligence processes by machines, especially computer systems. These processes include learning (obtaining information and rules for using data), reasoning (using rules to reach approximate or definite conclusions), and self-correcting. Artificial intelligence will produce a generation of fast-learning machines capable of speaking and seeing, and understanding gestures, which will lead to a massive boom in all sectors that use it, where artificial intelligence is now a big part of our reality. In factories, in the field of intelligent transportation, even in the medical area, in short, artificial intelligence (AI) is everywhere.

The future: According to the approved statistics of the Bughin et al, 2017 investment in artificial intelligence (AI) is proliferating. And digital leaders like Google spent between \$20 billion to \$30 billion on AI in 2016, with 90% of this money going to research, development, and publishing and 10% to AI acquisition (Bughin et al, 2017).

According to the International Data Corporation World Economic Forum, by 2019, 40% of digital transformation initiatives will deploy some form of AI variation. By 2021, 75% of enterprise applications will use AI, with spending increasing to an estimated \$52.2 billion.

##### *2.4.3. Internet of Things – IOT*

The Internet of Things is an extensive network of different systems such as computers, mobile phones, car systems, elevator systems, and other various systems that exist in our daily lives. These systems are quickly and seamlessly integrated through the Internet to be able to exchange information between them. The internet is the source of the data rather than the task being done by humans (Charter et al., 2017). This means that these different tools and devices can connect to

the Internet and link to each other, allowing the exchange of information between them by sending and receiving. But the term has recently expanded to include all fields, as it includes the so-called wearable devices such as smartwatches, smart clothes, concepts of smart cities, smart homes, intelligent buildings, devices that provide us with medical and health information, and related to the provision of intelligent transportation systems and many more. We can say that anything that has a processing unit, and an Internet connection feature can be installed; it falls under the concept of the “Internet of Things.”

The future: There is no doubt that the most crucial variable that will support the Internet of Things in its development and expansion of its connectivity is the transition to 5G technology. According to the McKinsey Institute, more than nine billion devices worldwide can currently communicate with each other via the Internet. This number will rise to one trillion devices in the next decade (Manyika et al., 2013). Also, the value or revenues of the Internet of Things market will rise to a record about 56 billion dollars at the end of 2018. It is expected that in the year 2025, every car will be connected to the Internet in the context of the development in the communications and information technology markets and the expansion of the concept of the “Internet of Things” (Global). Digital Report. 2018). Despite all these achievements, the Internet of Things is still only in its infancy. It is expected to revolutionize the way we use various devices and the various services associated with them.

#### 2.4.4. The Self-Driving Car

They are ordinary cars, but they are equipped with maps and technologies that help drive. The passenger only has to tell them where he wants to go, and they have the rest of the matter, as they are similar to a robot and contain many sensors that help in the driving process (Methaq et al., 2017).

The future: Experts working in significant car companies began researching, studying, and testing to develop ordinary cars into self-driving cars since the late eighties of the last century, such as Tesla, Ford, Toyota, and the giant Google. And by the end of 2019, Spinoff Waymo, Uber, and GM, all of which are affiliated with Google, plan to deploy fleets of self-driving cars in various US cities to provide on-demand rides for passengers. The fare for these cars is expected to be much cheaper than taking a regular Uber or Lyft taxi. The research also predicted that nearly 10 million cars with self-driving features would be on the road by 2020 (Business Insider. 2018).

#### 2.4.5. Mobile phones

Today's mobile or mobile phones have evolved to include many additional features, such as web browsers, games, cameras, video players, and even navigation systems through the presence of millions of applications. Many companies now rely on applications to support their activities, from business planning and development to social media and customer relationship management. As customers spend more and more time on social media, mobile apps allow business owners to create and enhance a relationship with them.

One of the main app offerings is its low price point, where in the past, companies had to buy expensive software to get things done that you can now delegate to an app for a dollar or two.

Even small businesses, in particular, can take advantage of the lower cost of these applications without having to get lower quality than before. Smartphone apps are, without a doubt, one of the most important inventions in recent times, and since the launch of the Apple App Store in 2008, around 2.2 million apps have made their way onto the platform. Today, the Google Play Store alone offers about 3.6 million applications, according to the global statistical website Statista.

The future: According to a major report by the Groupe Speciale Mobile Association, the so-called mobile economy contributed \$2.4 trillion to the international economy in 2013, accounting for about 3.6% of global GDP. This number includes more than 10 million jobs and has contributed at least \$336 billion in public funding in the United States alone. Not only that, but the size of the mobile economy is growing at a robust pace, with estimates that it could contribute up to 4.8% to global GDP by 2023. Moving to 5G technology is expected to contribute \$2.2 trillion over 15 years coming. Also, globally, the penetration of smartphones has doubled dramatically. In 2010, it was estimated that about 20% of the world's population used smartphones, while by 2018, that figure was 67%. It is expected to become 71% of the world's population by 2025 (Groupe Speciale Mobile Association, 2014).

#### 2.4.6. Bitcoin and Blockchain

Bitcoin is an entirely electronic currency that is traded online only without any physical presence. It is the first decentralized digital currency, as it is a system that operates without a central repository. That is, it differs from traditional currencies by the absence of a significant regulatory body behind it. It is dealt with directly between users without an intermediary through encryption and blockchain (Xu, et al 2018).

The total value of Bitcoin in the Blockchain is estimated at \$20 billion, or 0.025 percent of the global GDP, or \$80 billion trillion (Schwab, K.2017).

As for the blockchain, it is considered as the so-called ledger, which is a database or a new method for organizing data in an electronic record system for processing and recording transactions, allowing all relevant parties to track information over a secure network that does not require third-party verification such as banks or central trading systems such as the system SWIFT is widely used worldwide. More specifically, it maintains tamper-resistant lists of ever-growing data records and allows for the secure exchange of valuables such as money, shares, or data access rights. Contrary to the traditional trading systems, they do not need an intermediary or a central registration system to follow up the exchange movement. Instead, all parties deal directly with each other, and they have many public and private issues that are used according to business requirements (Sarmah, 2018).

The Future: According to the Bitcoin Market magazine website, although the popularity of Bitcoin (the digital currency) has boomed in 2017, the actual number of Bitcoin users globally is still tiny compared to users of other payment systems such as Paypal credit cards or Visa. By the year 2018, Nearly 32 million bitcoin wallets had been created globally. 2.3 million people use bitcoin to make payments, while 4.8 million users hold bitcoin to facilitate speculative trading in cryptocurrency to make a profit. However, the number of Bitcoin or other digital currencies users is expected to grow exponentially in the next few years (Henry, et al ., 2019).

As for the blockchain, IBM has conducted a study in this aspect, where it collected data from 200 banks in 16 countries to determine the most need for blockchain innovations and said that it is expected that 65% of banks will have blockchain projects within three years, with the lead This orientation by large banks with more than 100 thousand employees. It is also expected that about 15% of the largest global banks will switch to launching commercial Blockchain products in 2017 (IBM., 2016, Chowdhury, et al 2021). Although Blockchain technology appeared mainly in the context of digital currencies, it is used within 64 applications currently in more than 200 A world-class company thanks to the high degree of security and reliability in which it operates, in addition to simplifying and speeding up transactions (Manyika et al., .2013).

#### 2.4.7. Smart Clothes

The working mechanism of these clothes is related to the fact that they contain electronic chips connected to smartphones via Bluetooth technology. Which in turn sends signals to the desired place or application. Recently, another type of clothing has also appeared, made mainly of electronic textiles that can generate self-electric energy from the human body without the need for chips or batteries to generate electric power. According to research conducted by the University of Texas at Dallas by Professor Carter Haines and his team in 2017, they found the possibility of generating energy through chest movement resulting from breathing, as each only 31 milligrams of carbon nanotube yarn that makes up the fabric of these clothes can generate electrical power—required to transmit a 2 KB data packet over a 100-meter radius every 10 seconds to the Internet of Things. It is expected that this technology could be developed to generate electricity by sensing from natural external sources, such as the movement of sea waves, for example. (Haines. C., 2017).

In addition, there is also a vast Google project called "Jacquard" to develop fabrics suitable for bright clothes of all kinds. However, everything related to this technology is only the beginning of vast and promising future projects that will be recorded by the facts of the Fifth Industrial Revolution.

#### 2.4.8. Implantable Technologies

Implantable technologies are not new. Pacemakers implanted in the chest of heart patients and hearing aids for the hard of hearing have been around since the late fifties of the last century. Still, the enormous digital technological development that the world witnessed was reflected in this aspect in a big way. Transplant operations have become diversified according to their function. They are once implanting electronic chips in the body, supported by near-field communication technology, or it is the cultivation of artificial organs to replace a damaged organ in the human body such as a prosthetic leg or hand, or the implantation of electrodes in the human brain to improve memory and increase intelligence. And to many other innovations, some of which have been tried, and some are still in the research process.

The future: There is no doubt that the technologies implanted in the body will blur the boundaries between the human body and technology. Perhaps soon, we will see the human being as half human and half god, and this is what the technology giant Google is seeking through many projects that it has not mentioned in detail so far.

## 2.5. The Fifth Industrial Revolution

Man's first passion has always been to explore the future and what it involves, so the question of what after the fourth industrial revolution? It was a legitimate question, and no matter how much it was asked by many specialists, especially if we consider the shrinking time distances incrementally for technological development between each industrial revolution and the other. While the period between the first and second industrial revolutions lasted nearly 90 years, it was reduced to 44 years between the second and third revolutions. And to about 31 years between the third and fourth, which means that the future is happening faster than we can imagine and that the fifth revolution may knock on our doors within the next ten years. Therefore, during this short time, we must know what is required of us, whether to prepare for jobs that do not currently exist, define using technologies that have not been invented, or solve problems that we have not identified yet.

Despite that, and although we do not know what the Fifth Industrial Revolution will bring, according to the logic of the cumulative construction of the revolutions that preceded it, it will depend, like the Fourth Revolution, on data, digital devices, and artificial intelligence, and the virtual space will be its playground. According to the state of the art research papers, managing director of Epic Erp, the Fifth Industrial Revolution will crush barriers between natural and virtual worlds. New technologies will be more advanced than anything we've known before, faster and more scalable, and built globally. People will have greater access to hardware, where vast amounts of data can be extracted and processed intelligently to improve efficiency and productivity while creating new business opportunities. Scanlon adds that the future is happening now, and we must face challenges if we are to succeed in the next revolution (Leahy, et al 2019). Proceeding from the text of Scanlon's phrase "the future is happening now," we have to anticipate the details of this future according to the facts of now.

## 2.6. The Expectations

We cannot consider that the Fifth Industrial Revolution will be limited to one specific invention to determine what it is. Still, there are several predictions by some specialists or experts, which are based on what emerged from the reality of the revolutions that preceded it. We will summarize the most logical and common ones as follows:

### 2.6.1. Expect the Fifth Industrial Revolution to be about trust and values.

The large and complex transformations caused by rapid technological development raise many ethical challenges, including data privacy and trust problems because it can be manipulated to serve the interests of certain parties, a proposition that was deliberated and adopted at the World Economic Forum in Davos held earlier this year (world economic forum 2016). Drafting some negative terms to denote the problem, including trust deficit, a crisis of trust, and loss of confidence in technology, and he cited the most erroneous incident, which is the privacy violation scandal in Facebook, which leaked the data of 50 million subscribers for the benefit of Cambridge Analytica during the US presidential election, which represented a blatant challenge to ethics profession and maintained the trust of users. There is also another takeaway that touches the ethical and value aspect, such as the manipulation of the human genome through innovations

in biology (the science of genetic engineering and genetics). The same happened with the Chinese in the notorious eugenic movement in the early twentieth century, which moved from experiments on the animal genome to humans. As well as the ethical problems that resulted from the use of artificial intelligence as a substitute for humans in some areas, which is expected to dominate most places in the next few years, is also considered a significant challenge, and the recent uproar about accidents caused using self-driving cars and those who Responsibility in the event of accidents? An indication of that importance. Based on all these ethical challenges and many more, especially in the field of equality and social responsibility resulting from the use of excessive digital technology, there is no doubt that we need global solutions and frameworks, or perhaps a “new digital social contract” to preserve the moral system that was formed over time and distinguished humans from other creatures, It is logical that the compass of the next industrial revolution should be directed towards it to consolidate the basic rule that serves man and achieves justice and prosperity for him in every technological development he seeks.

#### 2.6.2. The second expectation of the Fifth Industrial Revolution to be, the AI revolution

This prediction was issued by several researchers, led by Professor George Muir, in his article Artificial Intelligence / The Fifth Industrial Revolution (Muir, G.2018). Muir expected that the use of artificial intelligence and robotics would change the social and economic situation of all humankind and change the way we work. From 9-5, typical jobs will disappear. He also predicts that AI will replace more than 50 percent of the tasks we do today over the next five years. There is no doubt that artificial intelligence has been present in many things around us and for more than half a century. Still, the critical and expected transformation of artificial intelligence in the fifth industrial revolution is that it will move to taking tasks away from humans and leaving them in the hands of machines that can think, learn, evaluate and make decisions independently without No human intervention. But this transformation will generate a serious problem that was previously a rich material for science fiction films. Still, it will soon become a reality due to the logical development of use, which is that these machines will become a choice, not a march! Who will be responsible for her actions, and what are the controls that will govern her behavior?

#### 2.6.3. Revolution of Saving the Planet

It is the third prediction in the series of expectations that we are reviewing. The World Economic Forum also launched under the slogan "The Fifth Industrial Revolution, a revolution to save the planet." Salesforce Founder and World Economic Forum Co-CEO Marc Benioff believe that sustainability takes on greater importance with the growing awareness that sooner or later, our resources will be exhausted and that only technology can provide an alternative (world economic forum.2019). Added to the depletion of natural resources, environmental pollution, and global warming, which led to rising temperatures and changed our ecosystems.

#### 2.6.4. The Fifth Industrial Revolution is The Nanotechnology Revolution

Under this title, many users of this technology and those who believe in its capabilities expected that it would be the next revolution, including Dr. Nasser Afifi, who wrote a book under this title

as well, in which he says that thirty years ago, as soon as scientists had the right tools, such as the scanning tunneling microscope (STM) and microscope The atomic force (AFM), capable of ultra-fine microscopic vision, gave birth to the era of nanotechnology. Through these techniques, scientists could control and control individual atoms and molecules, which was considered fantastic progress in nanotechnology. Scientists and engineers today have been able to find a wide range of ways to produce what has been termed as nanomaterials, which did not exist before, taking advantage of the characteristics and properties of individual atoms and molecules that are not similar to their original material separated from them, and mixing them with another non-material in different proportions to produce new materials that have qualities Different, such as being more powerful or lighter weight (Maynard, 2015). Today, nanotechnology plays a crucial leading role in reviving the global trade market by offering its goods and products, which are increasing day by day. Today, about 1,860 companies belonging to twenty-seven countries of the world produce various nano-goods and products, the volume of sales in 2007 amounting to about \$146 billion. As for the number of patents on topics related to nanomaterials between 2000 and 2007, it reached 44,867 patents (Al-Iskandarani, M. S, 2010).

### **3. Research Method**

Based on the statement of the problem, and the data that is supposed to be collected from literature. The research can be considered as descriptive research.

### **4. Discussion**

#### *4.1. Challenges and Opportunities*

Two and a half centuries ago, i.e., since the first technological revolution in the seventies of the nineteenth century and the subsequent revolutions, recurring aspects of human societies emerged from replacing new technologies with previous ones, which are termed challenges and opportunities. In the following, we will try to summarize some common challenges and opportunities. The purpose of mentioning it is to find the best ways to deal with its consequences, adapt to its effects and mitigate it, and seize its best future opportunities.

##### *4.1.1. Challenges*

###### *A. The Challenges of Jobs and Unemployment*

What the Fourth Industrial Revolution brought us from the change like business and jobs due to technological progress led to many traditional jobs. It is expected that the automation of most jobs will continue until the arrival of the Fifth Industrial Revolution, which will lead to a decline in demand for traditional employment, as it is estimated that Between 400 million and 800 million people will be displaced by automation by 2030 worldwide (Manyika et al .2017). All of these will need to find new jobs.

According to the jobs report issued by the World Economic Forum for the year 2016. It is expected that the period from 2015 to 2020 will witness the disappearance of about five million administrative and office jobs, about 6.1 million jobs in the field of manufacturing and

production, about half a million jobs in the construction and extractive industries, and 151 A thousand jobs in the field of education, sports, games and entertainment, about 109 thousand jobs in the area of law and 40 thousand jobs in the field of maintenance (World Economic Forum.2016). It is clear that the challenge is very significant in this aspect, but the picture is not that bleak, and there are inadequate opportunities that can compensate for some of the jobs that were lost. We will address them when we address the options available later.

## B. Environmental Challenges

Climate change is one of the significant challenges created by the continuous technological development from the first industrial revolution until today. Massive industrialization, the rapid development of technologies, increasing urbanization, excessive deforestation, limitless resource depletion, desertification, rapid population growth, water scarcity, food insecurity, etc., impede the natural ecological balance of the earth.

Also, the rapid migration of people for a better chance and accumulation in one place, leaving the other, creates pressure on one part of the land while the development of the other parts lags. These challenges have led to environmental imbalances and inequalities in global growth, which have led to social inequality at the international level and the outbreak of conflicts, social tensions, and violent extremism. We will explain the two most important types of challenges facing the environment today:

### i. Electronic Waste

Rapid innovation and cost reduction have led to a significant increase in production and easy access to electronic products and digital technology. An increase in electronic devices and equipment by people has inadvertently led to a rise in electronic and electrical waste.

If we want to count the number of electrical goods produced annually, we will face difficulty. Still, considering the devices connected to the Internet, the number of them will become more than human beings, no doubt. It is expected that the number will be between 2550 billion by the year 2020. E-waste is now the fastest growing waste in the world. Some of its forms have grown exponentially and have been described by the United Nations as a tsunami of e-waste. It is estimated that this influx of waste reached 48.5 million in 2018, and this number is expected to nearly triple globally unless a shift to a circular economy is made. Primarily since societies today only deal with 20% of this e-waste appropriately, there is little data on what happens to the rest, which mostly ends up in landfills or is disposed of by informal workers in poor conditions. However, e-waste is worth at least \$62.5 billion annually, which is more than most countries GDP. Furthermore, 123 countries have a GDP lower than the global pile of e-waste (world economic forum. 2019).

## ii. Energy Consumption

The excessive use of electronic devices and equipment, as we mentioned above, and living in a permanently connected life (On life) requires unimaginable large amounts of energy, which contribute significantly to the increase in emissions that cause our current environmental crisis. Statistics indicate that in 2012, data warehouses worldwide consumed about 30 billion watts of electricity annually, which is roughly equivalent to the output of 30 nuclear plants. According to statistics, in the year 2000, data centers consumed 0.6 percent of the world's electricity, and this figure rose to 1 percent in 2005. In 2007, information and communication technology accounted for 830 million tons of carbon dioxide or about 2 percent. It is estimated that this percentage will increase to about 6 percent annually, or 1.43 billion tons, until 2020 if the situation remains as it is (Jha and Topol, 2016).

## C. Challenging Inequality and Monopoly

The relationship between technology, inequality, and monopoly is not a matter of the day. Instead, it accompanies all industrial revolutions - but it may be more severe this time due to high technological development and rapid transition - where technology, according to specialists and experts, has always been considered a threat to social stability through several facets. There is technological inequality between Countries or even within a single country (between rural and city) due to the digital divide. This also results in a slowdown in growth levels, especially in emerging countries, due to the lack of ICT infrastructure, due to weak investments in technology and development.

The rapid transition also produces vast, autonomous monopolies that achieve fantastic profits. Companies such as Amazon, which dominated the retail market; Uber, which overlooks the transportation market; and Google, which swallowed the digital content market unchallenged, led to the concentration of wealth in very few people. Hands and eliminate competition. In a report by Oxfam for the year 2019, it describes the gap between these wealthy people and the rest of the world as "obscene," as the information explained that in 2016 the total owned by nine people was equivalent to what owned by 3.6 billion people who make up the poorest half of humanity (World Economic Forum,(2019).

The process of concentrating wealth and power in the hands of a small number of people invites us to think about the dangerous future roles that these technological giants can play and their ability to usurp the traditional role of the state as the rule-maker, regulator, and implementer, and what this process can pose from the significant challenges to all societies at the global level.

## D. Education

Despite the enormous changes like work and the type of skills and knowledge required. We do not find any significant difference in the education system itself. Although it is costly to the beneficiaries, it remains practical in its basic structure, content, and practices that do not correspond to the magnitude of these changes. The process of lifelong education that everyone is

calling for today, which has become an urgent necessity, is one of the means of adapting to a rapidly developing work environment; not much is being done to make it a practical reality. On the other hand, the advantage of the availability of this tremendous amount of information and the ease of access to it, which enhances the learning process and contributes to its development, turns today into a factor of the challenge unless it undergoes a process of sorting out the fake from the real. Also, weak cooperation between the private sector, academia, and policymakers to develop customized, relevant, and adaptable curricula will be another added challenge in the educational reality. Also, the validity of the reluctance of many companies to take the initiative in supporting the skills of the current workforce in continuous learning and lifelong learning, from the principle of social responsibility and for the benefit of both parties increases the level of challenges in the educational aspect, whose development benefits everyone.

#### 4.1.2. Opportunities

Just as we talked about the challenges expected to be faced in many aspects, such as jobs and unemployment, the environment, inequality, monopoly, education, and many other challenges that space did not allow to mention all of them, there are also solutions to these challenges. They can be turned into essential and promising opportunities with the help of technology as well. We'll try to get through it quickly.

On the practical side, today, there is a growing concern about whether there will be enough jobs for workers, as we talked about the challenges of employment and unemployment due to the changing nature of employment and the adoption of automation. But going back to history and the similar difficulties that occurred with all previous industrial revolutions, we see that such fears may be accurate. Still, over time, labor markets have adapted to changes in demand for workers due to these technological disruptions. But workers everywhere are also required to rethink traditional notions of where they work, how they work, and what talents and abilities they bring to this job to speed up the adaptation process. To explore the most critical future opportunities for work, we will use the McKinsey International Foundation report for the year 2017, which expected that the volume of job creation in the future because of the impact of automation on the workforce would vary significantly by country, and depending on four factors: wage level, demand growth, demographics, and economic sectors and professions. She believes that 8 to 9 percent of labor demand in 2030 will be for new occupations that did not exist before. Seventy-five million to 375 million people may need to switch occupational categories and learn new skills. It is possible to create 250 million to 280 million new jobs in the health sector, with up to 50 million to 85 million additional jobs in education. Jobs related to the development and diffusion of new technologies may also grow and, by 2030, become from 20 million to 50 million jobs globally. And 200 million jobs in buildings and infrastructure by 2030 (Manyika et al., 2017).

In the transportation sector, the coming industrial revolution promises us a limitless future in transportation in general. The invention of the pilot and the self-driving car, which has already begun to be manufactured and tested, will improve reality in a positive and significant way, as it will reduce deaths caused by road accidents and high insurance costs, in addition to reducing bottlenecks. Traffic and pollution, primarily if cars are powered by electric power, significantly

reduce carbon emissions. And let us also not forget to talk about the booms that this sector witnessed in the past few years, with the presence of the Internet taxi, which enabled people to order cars that transport them while sitting in their homes without having to go to the street at any time they want and to any place they want, such as Uber, Raft and similar means of transportation. Non-traditional local.

Technology is considered a significant source of continuous environmental deterioration in the ecological field by generating unintended and undesirable side effects. It has enabled the considerable expansion of production and consumption. The environment is expected to contribute to finding solutions to problems that have always been intractable before. Perhaps the most important of which is access to clean and cheap energy, which showed its beginnings in the early twenty-first century, and as we enter the era of the Fifth Industrial Revolution, it is expected that we will also reach the end of the period of using fossil fuels, which contributed mainly to polluting the air of our cities.

By going to the exploration of opportunities in the field of education, it is expected that the rapid technological development and innovations witnessed by the digital devices, computing devices, and networks sector will significantly contribute to the ease of access to information and distance learning in any part of the world and to create an advanced participatory and interactive learning environment. Also, the gradual development of technologies and scientific innovations will lead to the creation of new educational disciplines and new skills, which usher at the end to opening more fields to obtain better opportunities. The Fifth Industrial Revolution is also expected to eliminate the traditional paper-based education and turn it into a fully digital one.

The Sharing economy or the cooperative economy depends on “the sharing of unused assets or services and making them available through electronic markets, innovative phone applications with the help of GPS services or other technology-based platforms. As Jeremy Rifkin, the American thinker described it, equality and monopoly will reduce the cost margins of marginal goods and services to nearly zero (Rifkin, 2014). Still, despite this, the challenge remains excellent in this aspect, especially for those who do not have the means to access these platforms or those who do not have the technical capabilities to stand up to the tech giants who invaded.

E-currencies and blockchain technology are also expected to change the reality of the financial sector in terms of abolishing the role of intermediaries and banks and perhaps even canceling the supervisory role and tax collection for the state, as their effects are still not well known due to their recent use.

Advances in medical sciences and neurosciences are expected to lead to a healthier life, increase human lifespan, and expand human beings' intellectual and mental capabilities.

On the agricultural side, it is also expected that larger quantities of crops can be produced with the help of bioengineering and with the help of artificial intelligence-powered machines, which provide the possibility to measure the number of crops and detect weeds or pests. And the future is open to more opportunities, the nature of which we cannot imagine without a doubt.

## 5. Conclusion

Addressing the subject of the Fifth Industrial Revolution today and exploring its nature is only a way to describe a group of continuous and imminent transformations in the systems that surround us and lead to a brilliant society, which will later be known as the society of the Fifth Industrial Revolution. which will be his next few years of the most exciting period of human creativity and achievement.

The expectations that we mentioned about the nature and nature of the Fifth Industrial Revolution, from our point of view, were not an imagined prediction but rather stemmed from one of the most scathing criticisms leveled at the previous four industrial revolutions and the policies associated with them, which is the failure to solve the most pressing issues that still face modern societies overall. It poses challenges, such as environmental pollution, climate change, disruption of consumer confidence in technology, inequality, machine control over jobs, and other issues mentioned in the preceding context.

We had discussed the most prominent technologies of the Fourth Industrial Revolution and its future, as these. Other technologies will be of importance in the reality of the Fifth Industrial Revolution. This is confirmed by the McKinsey International Institute, which expects that by 2025 there will be twelve technologies he called new, such as artificial intelligence, the Internet of things, and cloud technology. Renewable energy, self-driving vehicles, etc... will change the economic and social landscape, the way of work and life, and even the value system itself (Manyika et al., 2013).

On the other hand, these technologies, combined with their combination, will create significant opportunities to significantly improve the efficiency of businesses and institutions, help renew the natural environment through better asset management, and get rid of all the damage caused by previous industrial revolutions. It will also create new challenges, some of which are expected, and some are not yet known. But wherever we end up, whether in terms of problems and challenges to be solved, or opportunities that are perhaps highly innovative that require a lot of flexibility and speed to exploit, we aim through our modest research paper to draw attention to this vital topic that calls from all researchers and academics to do more research and investigation for everything related to it from many and varied aspects.

## References

- Al-Iskandarani, M. S, (2010), "Nanotechnology for a better tomorrow," Knowledge World, Kuwait.
- Al-Rubaie, Mithaq, et al., (2017), "The Fourth Industrial Revolution: Opportunities and Challenges" Participation in the Second International Scientific Conference of the College of Business - Amman Arab University, Al-Warraq Publishing, and Distribution Corporation, Amman, Jordan.

- Bughin, J., Hazan, E., Ramaswamy, S., Chui, M., Allas, T., Dahlstrom, P., ... & Trench, M. (2017). Artificial intelligence: the next digital frontier.
- Business Insider,(2018), Available at : [Business Insider](#) .
- Chowdhury, M. , Suchana, K. , Alam, S. and Khan, M. (2021) Blockchain Application in Banking System. *Journal of Software Engineering and Applications*, **14**, 298-311.
- Groupe Speciale Mobile Association. (2014). The mobile economy 2014. *London: GSMA*.
- Haines, C. (2017),Study entitled "No Batteries Required: Energy-Harvesting Yarns Generate Electricity",University of Texas at Dallas,Available at : [Study](#).
- Henry, C. S., Huynh, K. P., & Nicholls, G. (2019). Bitcoin awareness and usage in Canada: An update. *The Journal of Investing*, 28(3), 21-31.
- IBM,(2016),Study entitled " Leading the pack in blockchain banking ", Available at :[IBM](#).
- Jha, S., & Topol, E. J. (2016). Adapting to artificial intelligence: radiologists and pathologists as information specialists. *Jama*, 316(22), 2353-2354.
- Leahy, S. M., Holland, C., & Ward, F. (2019). The digital frontier: Envisioning future technologies impact on the classroom. *Futures*, 113, 102422.
- Manyika, J., Chui, M., Bughin, J., Dobbs, R., Bisson, P., & Marrs, A. (2013). *Disruptive technologies: Advances that will transform life, business, and the global economy* (Vol. 180, pp. 17-21). San Francisco, CA: McKinsey Global Institute.
- Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P., ... & Sanghvi, S. (2017). Jobs lost, jobs gained: Workforce transitions in a time of automation. *McKinsey Global Institute*, 150.
- Maynard, A. D. (2015). Navigating the fourth industrial revolution. *Nature nanotechnology*, 10(12), 1005-1006.
- Muir, G,(2018), "AI – The Fifth Industrial Revolution",Accessed on Feb. 05.2019, from here:[Article](#) .
- Rifkin, J. (2014). *The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism*. St. Martin's Press.
- Sarmah, S. S. (2018). Understanding blockchain technology. *Computer Science and Engineering*, 8(2), 23-29.
- Schwab, K. (2017). *The fourth industrial revolution*. Portfolio Penguin.
- The Arabic Encyclopedia, Volume Seven, The Industrial Revolution, you can link to it from here: Arabic Encyclopedia.
- World Economic Forum,(2016),” The Future of Jobs”, Available at: [World Economic Forum](#).
- World Economic Forum,(2019), World Economic Forum Annual Meeting, Accessed on Feb. 03.2019, from here :[World Economic Forum](#).

World Economic Forum,(2019),” A New Circular Vision for Electronics”, Available at :World Economic Forum.

Xu, M., David, J. M., & Kim, S. H. (2018). The fourth industrial revolution: Opportunities and challenges. *International journal of financial research*, 9(2), 90-95.

### **Copyrights**

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>)