

## The effect of the fourth industrial revolution on changing production requirements (Economic - Technical - Human)

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### Introduction:

Since the beginning of the twenty-first century, the influence of modern technologies and machines that support artificial intelligence (AI) technologies has strongly influenced the world of industry and production, and computers, programs, and algorithms through which they operate have become an active role in simplifying daily life, and it is impossible to imagine how they can be managed Most affairs of daily life without them .., here is a necessary question: Is it impossible to imagine that most of the steps in the productive process can be managed without the use of manpower? As it is known that the IT economy characterized by vertical growth is replacing the economy of production and the huge industry based on horizontal growth.

With the increasing spread of reliance on information technology, it is worth answering several worrying questions:

- What will the work and production environment look like in the future? How long does it take to get there?
- Will the world of future work be a world in which people spend less time earning a living?
- Is group unemployment, collective poverty and social distortions also a potential scenario for the new world? It becomes a world in which robots, smart systems and algorithms play an increasingly central role.

It is certain that the new technological developments will have a fundamental impact on the global labor market during the next few years, not only on industrial jobs but on the essence of human tasks in the services sector, which are considered to be "non-interferable and adjustable" parameters such as (economic structures, labor relations, and descriptions Employment, working time models, wages and salaries) that will also undergo major changes.

In addition to companies, employees, and associations, education and legislative systems will face new challenges resulting from continuous technological progress .., the gap between reality and the legal framework increases, while the digitization of the labor market has a wide impact on intellectual property, information technology, product responsibility, competition, and labor and employment laws.

The research also aims to provide an overview of the fundamental transformation of the labor market, the organization of work and the specific consequences of labor relations, as well as looking at issues of protecting privacy of work and data.

### Research problem:

The research problem lies in the necessity of realizing, adapting and dealing with the variables that affect the production process with all its components (economically - legislative - stages of production - work environment - individuals, administrators, workers - ... etc.). Which results from the fourth industrial revolution.

**Research objective:**

Highlighting the importance and maximization of the role of keeping pace with global technological developments, especially in production processes and the safe transition from the current situation to benefiting from the developments resulting from the fourth industrial revolution.

**Research imposition:**

If the variables resulting from the fourth industrial revolution are not defined and work to absorb them through making qualitative big changes in the various elements of the production process and the stages of preparation and education that precede it and the laws and legislations it regulates, this leads to raising the efficiency of the productive process and keeping pace with changes in the local, regional and global market.

**Research Methodology:**

The research follows the descriptive analytical method, through collecting, analyzing and devising information in order to achieve the goal of the research.

**Research topic:**

First: the concept of the term second machine age, "Internet of Things - the fourth industrial revolution"

To arrive at the optimal interpretation of this term, a historical look must be taken of the previous industrial revolutions and the most important characteristics of each of them:

**The first industrial revolution:**

The first industrial revolution is known as the beginning of the industrial age, around the year 1800 AD. Where goods and services were produced by machines for the first time alongside the first railways, coal mining and heavy industries, where the steam engine was the primary invention of the first industrial revolution; Steam engines have replaced many workers, resulting in social unrest, and at the end of the eighteenth century steam engines were first introduced in factories in the United Kingdom and were a major driving force for industrialization.

**The second industrial revolution**

The second industrial revolution began at the end of the nineteenth century with the emergence of electricity, and the emergence of product assembly lines had the equivalent of using the steam engine in the first industrial revolution, which was used for the first time in the automotive industry.

Where the emergence of modern digital technologies helped to speed up and automate production processes, another distinction has emerged, which is production with separate steps that are implemented by workers specialized in the fields concerned. The serial numbering of the production appeared and the manufactured goods were transported to different continents for the first time around the world.

**The third industrial revolution "digitization"**

The third industrial revolution began in the seventies of the last century and was characterized by the increasing spread of information technology and the proliferation of personal computers and the Internet in practical life, and this contributed to global access to information and the

automation of the steps of production processes more broadly, where human labor was replaced by machines in frequent serial production.

#### **The Fourth Industrial Revolution:**

This term (CPS - Cyber Physical System) means the technical integration of electronic physical systems in production processes and logistical services with the use of "Internet of Things" to link services and production processes, and this contributes to adding new value, including the preparation of business models, and the continuous development of the form of outputs, And business development and organization processes.

The term (CPS) that was based on the Fourth Industrial Revolution can be clarified as the network communication between people, machines, products, and information and communication technology systems.

Over the next few years, it is expected that there will be more than 50 billion connected devices worldwide, which makes the behavior of these systems appear to be smart.

The introduction of artificial intelligence in both the services sector and the production sector is the most important thing that distinguishes the fourth industrial revolution from the third .., and this is particularly evident in the field of production through four elements:

The first element: almost complete control of production in an automated manner due to the use of machines that depend on its operation on artificial intelligence, and the orientation towards the automation of the entire production process, and the role of the human element becomes restricted to observing the production processes only., Up to the smart factory, which is a production facility that plays its role With very few human elements or without them.

The second component: real-time production, where the smart system calculates the optimum production capacity of the facility, and this leads to a short period of production operations and avoid unexplained layoffs, diagnosing technical faults and analyzing the causes of their occurrence and self-repair in most cases and avoiding repetition of their occurrence, in addition to the accuracy of coordination between Production and demand information of raw materials according to the actual volume of production required strictly.

This smart system is also distinguished by relying on the stock of materials and raw materials to the minimum and its ability to give pre-indications of demand for it if it falls below the specified level, and the same applies to the final production stores, the smart system works on machines depending on the size of the stock and the requests received and the expected general demand in the form of Fully automatic, which reduces storage costs and problems.

The third component: the decentralization of production, as the system and communication between components is the basis of self-organization and includes a connected network of manufacturing units that may not exist in one place and through the system, purchase and operation orders are processed automatically.

The fourth component: individualization of production until one batch of the unit, and this means that the smart system can receive individual requests from clients within certain limits, respond to them and make the necessary adjustments to some parts and components in the production stages without the need to stop operations or the system and human intervention, and as a result Save the lost time in the process of changing, dismantling and installing components, as the smart factory adds and deletes some components in the context of optimal distribution throughout the entire process and with optimal adaptation and coordination with other stages of production.

In order to achieve the optimum benefit from the application of the Fourth Industrial Revolution to production processes, components of production processes such as (machinery - operating methods - programs - building structures - foundational structure - ..... etc.) must be developed through their independent communication with the system and at the same time Coordination among them through the unity of the system that represents the mind and that controls artificial intelligence similar to the human mind.

Among the most important applications demonstrated on the realism of the Fourth Industrial Revolution:

- In the field of smart production (robots - smart factories - driverless cars - drones - 3D printers - ... and others).
- In the field of smart services (network platforms Facebook or Amazon Mechanical Turk, Uber and Airbnb on-demand service providers, or sharing services, such as car sharing, Spotify and Netflix).

Second: The impact of the new technological revolution on the labor market and the components of the productive process.

Significant impacts are expected to occur on both the blue collar (workers) and white collar (engineers and administrators) as a result of relying on new technologies in production processes, as it has become possible to replace administrators with a set of smart programs and algorithms that can implement a third of the current jobs performed by administrators. With time, individual jobs will disappear completely and new types of jobs will appear according to the new changes.

The concerned authorities and governments seek not to lose any of the jobs suddenly, but rather a gradual transition takes place. For example, government agencies in Egypt have rushed to go towards establishing technological universities to keep pace with the new specifications of the graduate who accompanies the change in the nature of jobs from one industry to another according to technological changes.

Second / 1: the advantages of using robots and smart algorithms as one of the most important components in the new systems.

- In industrial sectors in western countries with high labor costs, automation and the use of production robots lead to a huge saving in the cost of labor and thus the total cost of products. For example, the cost of one hour of production in the German auto industry is more than 40 euros, while the use of the robot costs between 5 euros and 8 euros per hour. So the production robot is cheaper than a worker in China. In addition, he will not become ill, have children, be stripped from work, or be entitled to annual leave, etc.
- The smart computer system does not depend on external factors as it works reliably and consistently, 24 hours / 7 days, and it can work in danger areas. And with accuracy and efficiency that does not compare with the accuracy and efficiency of man.
- It can be largely unified and synchronized, which leads to improved efficiency, better oversight of performance, and greater transparency in the company, as well as in the decision-making process, independent systems can be guided by objective criteria, and thus can make decisions self.
- Smart systems perform ideally difficult, repetitive, and monotonous business, as well as the usual data analysis and unloading activities in the services sector where algorithms collect data automatically, transfer data from buyers' systems to sellers, and find solutions to customer

problems by setting up an interactive interface between sellers and buyers, no longer existing Businesses are required to manually enter data into the IT system, which allows workers more free time that they can use in creative or individual leisure activities.

Robots and smart devices can also support life-saving functions. Examples include robots used in medical diagnostics that are characterized by high accuracy, or to assess dangerous objects using the remote control and built-in camera systems (Figure 3) that make it possible Defusing a bomb without having to approach it. For example, Gas Inspector Robot, a inspection robot equipped with remote gas sensing technology, can check technical facilities in hard-to-reach areas without endangering humans, such as detecting leaks in gas pipelines above and below ground.

Second / 2: The skills and characteristics that workers must acquire to integrate into the new system.

Due to the large and varied number of alternatives offered by the application of artificial intelligence to support the production processes of programs and machines, the characteristics related to the required labor will change in the future. There will be no need for employees or workers who perform simple or repetitive actions, and the role of the human element will be limited to the observation of machines as the control mechanism ... The car industry with multiple stages and chains is currently an example of the fully interconnected automation of production processes.

As demand for workers decreases, demand for companies with highly qualified workers increases. But better education alone will not help the applicant to occupy jobs. The individual characteristics of the applicant and how they relate to the nature of the institution have become more important. For example, additional qualifications for an “accountant” will be of great benefit, because - over time - there is a ninety-eight percent chance that the accountant's work can be replaced by a program Intelligent.

In this way, talented creative people in mathematics and science are better equipped for the new job market. Although not every future worker will be required to be an IT programmer, he must have a basic understanding of analytical and technical issues. The operators should be able to create a unit equipped with support machines and algorithms, to comfortably navigate the Internet and to move safely in social networks. To do this it is necessary to know and be familiar with how the infrastructure works.

Also, the worker in the future must be able to critically examine machines and programs, so the demand will increase for those who can work in complex strategic fields. The role of the worker will not only be the supervision of machines, but also their coordination as they should, as well as coordination of interactive interfaces between humans and machines.

The following are some of the additional features that must be met in future employees:

- Creativity and flexibility will be one of the most important features in the future, and critical thinking and problem-solving by those in charge of business is the most important condition. Flexible working hours and standby duties will be the rule and no longer an exception in the labor market.
- Those in charge will be asked to focus not only on one of the key areas of practice, but also on undertaking multifaceted, and sometimes very complex, tasks as required to perform as part of a team.

• Those in charge are expected to obtain informal qualifications. They develop, for example, the ability to act independently, build networks, organize themselves and their teams with an emphasis on goals, and think abstractly.

From the foregoing, the focus on how to find creative solutions to problems will be one of the most important requirements for skill in carrying out business that can be replaced by a smart system or program, but business relationships and decision-making between people in the future will be of great importance even if the facts are previously collected by programs

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