

The Impact of Technology in the World of Work

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Abstract— *Technology influences the individual's daily life and relationships, society and work. This article aims to understand how technological advances affect these relationships in the work environment, addressing the worker, the organization and the work itself. It also seeks to understand the causes and consequences of the use of technology by people in the various environments, the relationship between technological evolution, people and the organizational / labor environment and its influence in reducing employment. For the development of the article, a qualitative, descriptive bibliographic research was carried out through scientific articles in academic sites and journals. Initially, a history of technological evolution was presented from the beginning to the present day. Then, he discussed the technological advances and their effects for the worker, for the organization and for work. The conclusion indicates that technological progress has no deadline to end, as long as the human being has the capacity to innovate in all spheres of human thought and will also result in structural unemployment, with the extinction of some professions and the emergence of others necessary for its implementation and continuity.*

Keywords— *Technological advancement, Development, Organization, Human Resources, Worker.*

I. INTRODUCTION

The world and society are undergoing several and constant transformations caused mainly by the introduction of technology, which has been evolving continuously at every moment and which is part of and influences the daily lives of organizations and the population. Technological innovation developed in parallel with the Industrial Revolution, due to competition between capitals, which had as one of its characteristics the great discoveries and inventions in all fields of knowledge, having among its objectives to bring comfort and well-being to mankind, however, as a negative factor we can mention the degradation of the environment due to the unrestrained consumption of natural resources to obtain the raw material, the increase in the generation of garbage and

waste and the precarious work with the use of technology [1, 2, 3].

Technology is about the knowledge used to improve human ability and allow them to do things that previously could not be done, or to improve the way they do it.. Digital technology is the main factor of changes in the 21st century, including changing the nature of work itself, mainly due to innovation and technological advances with the introduction of automation, made possible by technology such as robotics and Artificial Intelligence (AI) in manufacturing and management processes, with the objective of generating greater productivity, efficiency, profitability, safety, among others [1, 2, 4, 5].

Technological evolution is a human response to overcome the adversities that happen in your daily life.

Thus, technological advancement has corroborated so that human tasks became easier and easier, gradually reducing the need for human effort for some tasks and activities, this when it does not suppress the individual's need to perform certain activities. However, it brought some negative impacts that were brought to light after the First Industrial Revolution, such as structural unemployment and the degradation of the environment, also caused the polarization in the labor market with the conflict between high and low qualification jobs; unemployment versus underemployment [1, 3, 6, 7, 8].

The knowledge of technologies becomes a differential for the worker when seeking a placement in an organization in relation to the people who have little or no knowledge about them, because the knowledge of technology and the monitoring of its evolution makes people more qualified to exercise certain functions, it conditions it to become eligible for a job in the labor market, not making it obsolete in relation to technological advances, which is not new in the dominant capitalist regime in the world and this condition has occurred since the First Revolution Industrial, which was the period in which work specializations were created [1, 9, 10, 11, 12].

The objective of the present work is to verify the impact of technology on the worker and his work environment, checking if this condition influences people's employability and structural unemployment.

The introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

The objective of the work was to verify the impact of technology on the work environment, seeking to understand the causes and consequences of its use by organizations and whether this condition causes unemployment, in addition to the impact for individuals.

II. METHODOLOGY

The present work was carried out from a bibliographic review with themes related to work, technology and its impacts on the work environment.

The research was carried out in stages to achieve the proposed objective. The first stage included an exploratory research, followed by the collection of information and finally, the data analysis was carried out.

The research had an exploratory character, because it aims to provide a certain familiarity with the studied theme, collaborating for the improvement of ideas, so that

a greater understanding about the different aspects related to the theme occurs [13].

A bibliographic search was carried out to allow data collection, using as a tool the consultation of scientific articles, dissertations, conclusion papers, theses and specialized sites on the subject, with the help of materials published in scientific events, magazines, newspapers, books and other media [13].

III. HISTORICAL AND CONCEPTUAL ASPECTS

The word technology is defined etymologically by two words of Greek origin, the first being technical word is derived from the Greek *tekhne* which means "craft, technique, art" and *logy* which is derived from the Greek *logos* which means "study of something". It is a study of technical and scientific knowledge in the various research areas. In its primitive form, one can mention the discovery of fire, the wheel, writing, instruments and tools [14, 15].

In the beginning of civilization, humans needed to hunt or collect food for their survival. In order for these activities to be facilitated in their daily routine, there was a need to create the first tools and utensils. From sticks, to shovels and reaching tractors to facilitate handling with the land, later on producing food not only for their subsistence, but also for all humanity with the excess of production generated, which contributed to the emergence and development of modern agriculture, with the use of technology to reduce costs and increase productivity [16].

The workforce is being reduced over time due to technological developments, which replace some activities that were previously performed by humans and were gradually replaced by the mechanized system as can be seen in Fig. 1.

% of American workforce in agriculture, 1840-2000

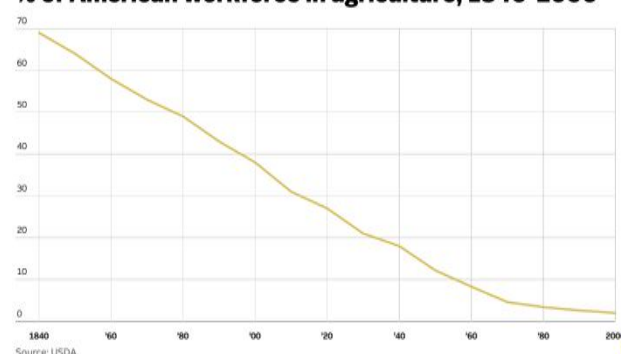


Fig.1: American agricultural workforce

Source: Grey (2014)

The graph in Figure 1 shows the gradual reduction of the workforce in the field from the technological inventions that have occurred since the advent of the Industrial Revolution, with a tendency to zero out the human need in activities, especially manual ones.

Currently, one of the reasons for organizations is to be profitable, aiming to perpetuate themselves in the market and generate dividends for their owners, and one of the ways to achieve this is through the use of technology, which will directly impact the worker, reducing their contingent and consequently generating unemployment, and sometimes the machine will replace it, and this condition will tend to reduce costs and labor charges arising from labor.

Technological development has directly impacted the modes of production of civilizations through the ages is illustrated in Figure 1. [17]

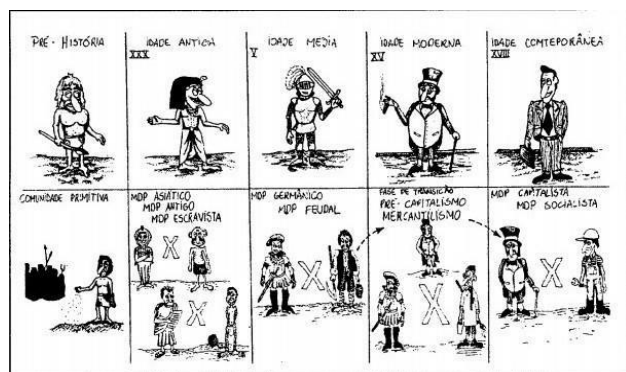


Fig.2: The evolution of the creation of forms of work

Source: Santos (1999)

Historically, the evolution of work, shown in Fig. 2, has the following steps:

In Prehistory, man transformed the existing raw material and within its reach into products and instruments essential only for his survival and the work performed was done and conducted collectively and in a community. It was known as the age of language and fire. One of the discoveries was the fire changed the way of acting and thinking, because it was a multifunctional technology because it provided light, transmitted security because the animals feared approaching, gave comfort in the cold period transmitting heat to those who were nearby, served to cook the foods. The language served for cooperation between people and became a skill of the human species, facilitating teamwork [5, 15, 16, 18].

In the Ancient Age, the means of production was made by enslaved people, whereas in Asia, the mode of production also used the labor of the peasants, and the final result of production was owned by the state. In the Middle

Ages, the means of production was feudal and the labor used was through serfs (peasants). In the Modern Age, which was the era of pre-capitalism, part with the end of mercantilism predominated and the other part of production occurring at the beginning of the feudal system and the beginning of capitalist relations. In the Contemporary Age, the capitalist and socialist modes of production took place and part of the end of mercantilism still predominated. For capitalist production, wage labor was used and in socialist production, production was collective or public [15, 16, 18].

In the First Industrial Revolution (1760-1860), technical and scientific development took place, with the emergence of the steam engine, which was used in the extraction of minerals, in the textile industry and in the manufacture of other goods that before that time was carried out in a handmade and manual, mainly in homes, which contributed to replace in this way, the physical work performed by people [19, 20, 21, 22].

The Second Industrial Revolution (1860-1900) occurred with the acceleration of the industrialization process having, among other consequences, the substitution of coal for oil derivatives, the use of electricity to move machines, to light cities (which contributed to the production of electricity) large scale) and reduce the communication time of people with the telegraph and the replacement of people with machines [19, 21, 22].

The Third Industrial Revolution started after the Second World War, because the countries that were devastated, needed more machines, resources and labor to be able to structure themselves and leverage progress. It represents a productive restructuring or a new world order arising from the result of the war in which the world was divided into two parts, one being commanded by the United States of America (USA) which had capitalism as its premise and on the other side the Union of Republics Soviet Socialists (USSR) that had socialism as its political model, hence generating between both powers what was commonly called the Cold War. During this period the rapid integration of markets occurred and among the achievements are nuclear energy, information technology and microelectronics [19, 21, 22, 23].

The main consequences of the Industrial Revolution are as follows:

Table 1 - Consequences of the Industrial Revolution

STRENGTHS	NEGATIVE POINTS
Acceleration of the production pace	Unemployment
Price reduction	Exploitation of the proletariat and social inequality
Transporting more goods and people in a short time	Pollution
Rapid economic growth	Urban concentration, increasing cases of disease.
New production techniques	

Source: Gonçalves (1994)

Table 1 shows that one of the consequences of the Industrial Revolution is unemployment, which has a high rate worldwide, the extinction of some professions and increased demand for other activities incorporated in new technologies, which shows that the character technological advances presents this bias. Employment is the biggest income generator of people [1, 24].

The Table 2 presents some characteristics of the Industrial Revolution:

Table 2: Characteristics of the Industrial Revolution

1st INDUSTRIAL REVOLUTION	2st INDUSTRIAL REVOLUTION	3st INDUSTRIAL REVOLUTION
Increase in work income; Productivity increase; Scientific reason entry; Man is transformed into an appendix of machines; Urbanized societies; Changing animal dependency.	Economy closed to an increasing number of unskilled workers; Intellectual capabilities must be expanded; Replacement of human labor in production and services by machines; New forms of distribution and generation of energy and	Development of digital systems, communication; Scientific revolutions: microelectronics, microbiology (genetic engineering), energy revolution (nuclear energy); Service economy (lean and highly specialized;

	communication.	Globalized economy, instantaneous by the revolution of information links).
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Source: Santos (1999); Davis (2016)

The Fourth Industrial Revolution does not mean a struggle between human beings and machines, but the incorporation of technology in society, being a reflection of humanity's desires and choices and which generates gains for the consumer and improves daily life, generating impacts on the market workplaces and their environments worldwide, regardless of political or economic regime [8, 21, 25, 22, 23, 26].

The definition given by Schwab (2015, p. 1) is as follows: "it is characterized by the fusion of technologies that is blurring the lines between the physical, digital and biological spheres [...] which is evolving at an exponential rate and not linear".

The interpreted the Fourth Industrial Revolution as follows: "It fosters artificial intelligence, robotics, 3D printing, drones, nanotechnology, biotechnology, storage of data and energy, autonomous vehicles, new materials, the Internet of things, etc. ". [13, p. 1]

The main jobs that are most susceptible to exposure to technological advances and will cause unemployment are: jobs that require low levels of education, occupations that do not involve complex social interaction and occupations related to routine manual tasks [4, 22, 28] .

The condition of unemployment, mainly in the functions closest to the manual or the use of physical force, reduces the negotiating force of the worker with the boss, showing the perverse face of capitalism, in which the bosses have enough strength to withdraw social advances and pay a wage with enough value only to support the worker, as organizations aim to increase the return on invested capital [1, 4, 8, 25, 29].

Just as technologies are innovating and better adhering to the demands of society and the market, workers also need to update themselves and employ new skills and competences, so that they are within the requirements of the labor market. For this reason, some competences were debated at the World Economic Forum in Davos, those of 2015 discussed with the proposals for the year 2020 [4, 8, 21, 26].

Table 3 - Conclusions of the World Economic Forum in Davos

2015	2020
Troubleshooting complex problems	Troubleshooting complex problems
Critical thinking	Critical thinking
Creativity	Creativity
People management	People management
Coordinate with others	Coordinate with others
Emotional intelligence	Quality control
Decision making and discernment	Decision making and discernment
Service orientation	Service orientation
Negotiation	Negotiation
Cognitive flexibility	Know hear

Source: Schwab (2015)

Comparing the competences that were designated by the 2015 World Economic Forum, and the future proposals for the year 2020, in general, they are very equivalent, but the replacement of “emotional intelligence” by “quality control” stands out, this that is, the ideal condition of the manufactured product or the like overrides the individual's ability to identify his emotions. Another altered item was “cognitive flexibility”, which was replaced by “knowing how to listen”, proposing that a greater importance to expand thinking is listening to what others have to add, instead of generating an alternative for solving something immediately. . The other to be heard may be the market, employees, competitors and customers. These skills demanded of workers generate changes in their profile, so that they can adapt to a qualification that is necessary and sufficient to enter the labor market, and that has the ability to follow the changes that have occurred in this context [21, 26].

IV. ADVANCES AND EFFECTS OF TECHNOLOGY

The introduction of technology produces several benefits for users, organizations, the labor market and society, such as: the use of new methods; efficiency with the use of machines in some services and activities; facilities in solving everyday problems such as communication among others. On the other hand, the advancement of technology can also bring losses both for the labor market, making labor short after the implementation of technology, and for the environment,

increasing the production of debris and reducing natural resources, such as Petroleum [9, 10, 22, 23, 26, 30].

Technological advancement has the power to eliminate some manual and intellectual jobs, starting to demand from workers a new profile based on new attitudes, specializations, skills, competences, dynamism, versatility, multifunctions and that has the capacity to accompany technological evolution, in addition to the emergence of new functions that use more intellectual capacity and a high degree of qualification, these conditions provided the elimination of some professions such as the telegraph operator. Technological advances affect not only the worker and the work environment, but also public policies due to the new needs generated due to the technological impact on inequality and wage polarization [1, 7, 9, 10, 11, 20, 30, 31]

Functional unemployment generated by technological developments may be related, among other reasons, to automation and technological illiteracy and its concentration is usually related to people with low schooling and / or little or no qualifications. Technological advancement also generates waste, new types of waste and directs people to seek power and capital, however, it does not eliminate accidents or known or new occupational diseases [1, 9, 10, 11, 20, 30, 31].

Unemployment due to technological advances is not new and is not just due to the replacement of men by the machine. The restructuring caused by technology in the production models directly affects the workforce, forcing formal workers to seek more specializations, in order to be able to perform various functions, that is, the worker must be multifunctional. When the worker does not prepare or does not properly qualify for a position or function, he runs the risk of being replaced by another more qualified worker or by a machine, or else the market does not generate this type of job anymore or closes the job of work intended for that unskilled or semi-skilled worker. In the capitalist world, the technological innovations that arise and are used in the market, lead to a desire to generate more wealth in less time and as a result, workers must qualify or they will be unemployed or underemployed in favor of machines and the need of the market [7, 9, 10, 11, 32, 33].

The exacerbated use of technology became more significant after the emergence of capitalism and with that came other factors tied, such as unrestrained consumption, the lack of concern with environmental issues and the lack of control of man before society. Man seeks to update, facilitate and advance, but does not recognize the limits, which brings harm not only to society but also to the environment in which he lives [9, 10, 34].

In the work environment, a structural change occurs as a result of the transformations arising from technological development, which can interfere positively or negatively in economic activities, as well as modify the type of labor required for its implementation and continuity [6].

The relationship of people with technology has two biases, because, at the same time that they change people's way of life, people are obliged to adapt to technological products and / or services, as currently happens with the cell phone and its functions which have become indispensable for people [7, 35, 36].

Technology impacts people in relation to their forms of communication, the demand for new skills, competences and attitudes, affects people's level of privacy, changes the ways of accessing information [10, 11, 30, 33, 34].

Technology can be a problem for people who need to deal with it, exerting a negative impact or technological stress on the individual and among these problems there is Technostress in which the individual has difficulty in dealing with or accepting new ones. technologies in a healthy way. This condition can impact a person's attitudes, thoughts and behavior [7, 12, 34]. These reactions are more noticeable in older people, in accommodated people, in the illiterate, in the semi-literate or with little education among other groups.

The difficulties highlighted by workers in automated services are: "explaining the activities they perform as a profession; painful working conditions; the lack of autonomy and instability in relation to working time ". [35, p. 14]

Technology impacts organizations and influences decision-making regarding its implementation / implementation, as it causes several problems for the universe of companies, generating fears and resistance in its employees, changing group relationships, requiring adaptation in the production and management system, will influence in productivity and logistics, it will require some changes from partners and consumers, it will affect the level of employment and remuneration, it can have consequences for the environment, it will affect the availability of products and / or services. Each affected part will affect the other part and the influence of one will also influence the other in whole or in part [9, 10, 11, 30, 36].

Technology is a fundamental item for the survival of organizations, because it reduces costs, increases productivity gains, increases competitiveness, improves process control and reduces the manpower in some essential activities or not, which demand the need for speed in solving problems. It also aims to improve the effectiveness and efficiency of the organization, serves to

respond to the wishes of its customers and the market and becomes a differential in relation to its competitors, serving as a vital component for its survival in the market, due to the high existing competitiveness between organizations and transformations arising from the rapidity with which humanity progresses [7, 19, 36].

Technological advancement accelerated from the First Industrial Revolution and continues today, with society progressing and needing material goods with better quality and with the most advanced technology and organizations that do not follow this maxim, will tend to become obsolete . The Industrial Revolution had as its pillar the replacement of the worker by the machine, having a great impact on the collective process and on labor relations. There was also an evolution in production methods and techniques, in addition to changes in society, culture, management, labor relations and politics [7, 20, 36].

The machinery did not exterminate with the work that people performed in their homes, however, some activities employed people in factories to perform these functions, aiming to increase production on a scale.

V. CONCLUSION

The evolution of humanity has always been related to the pursuit of well-being and to achieve it, it sought elements that added conditions to develop techniques and products that would provide time for leisure and entertainment, minimize the forces for carrying out work and, above all, guarantee a improvement in quality of life.

Technological advancement presents substantial changes in the world economy, in organizations and in social and work environments. It also contributes to the advancement of administration, accounting, geography, physics, medicine, biology and other fields of knowledge

In terms of definition, technology is a study of knowledge together with the skills necessary to produce something that produces results in any area of knowledge.

Technological advancement is a factor that generates unemployment for some manual and manual activities, however, it generates other new professions where individuals must seek new learning, in addition to seeking to develop new skills, competences and attitude.

The technologies at the level at which they are presented cannot go backwards and their evolution is a real factor, being perceived that the future tends to increase structural unemployment even more with the use of new technological advances, which are presented at an exponential speed and the organizations with some technologies are aware that in the evolution their product

will soon become obsolete in a short period of time, with the real occurrence being that some products devalue before their completion and others at startup.

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