

4TH INDUSTRIAL REVOLUTION: THE CHALLENGE OF CHANGING HUMAN RESOURCES SKILLS

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ABSTRACT: *This paper comes to examine the intense reflection that arises around the issue of the fourth industrial revolution and the subsequent rapid changes. Changes that affect all areas of human existence, especially labour, drastically. Already from the beginning of the 21st century, international organizations (UN, UNESCO, OECD) are also keen to increase employability and develop relevant skills that can protect it.*

KEYWORDS: Changes, 4th Industrial Revolution, Skills, Employability

INTRODUCTION

Human development is all about freedom to realize the potential of every human life in every corner of the world. Over the past quarter – century there have been impressive changes on many fronts of human life with people living longer, more people rising out of extreme poverty and fewer people being malnourished, more children going to school. Though the gains have not been universal, and not all lives have been lifted. Millions of people seem to be unable to reach their full potential in life and work, mainly because they suffer deprivations in multiple dimensions of human development. Besides there are significant imbalances across countries, ethnic and racial groups, urban and rural areas, women and men (UN, 2016).

In addition, we are at the beginning of a new technological revolution, the fourth, which undoubtedly affects all areas of human life, bringing about rapid changes in people's way of living, working, communicating and interacting. People will need to redefine their skills and mindset in order to be able to handle these rapid technological changes. In order to be able to become active citizens, skills is the key driver of employability with the acquisition of knowledge and attitudes (Boaden, 1997; Dearing, 1997; Hillage and Pollard, 1999).

What are the appropriate skills, though? According to the OECD Survey (2013) of employability skills, roughly one third of workers are over or under qualified for their job, while one sixth report a mismatch between their existing skills and those qualified for their job. Skill gaps, skill shortages and skill mismatches can affect labour productivity and employability.

In view of the 4th Industrial Revolution, how much will this phenomenon intensify? How appropriate are the existing skills of both candidate professionals and professionals? How long will it take the corresponding international, national policies and agents of delivering and implementing the right skills to change or to be redefined? By exploring the past, we find out that depending on the work requirements the corresponding skills are also matched.

Theoretical underpinning

Contemporary changes and change management models

Since ancient times, Heraclitus had grasped the changing nature of the universe and marked movement and change as key ways of expressing it. The same was true of the Chinese thinkers as reflected in Tao Te Ching, the book of Changes: "*When you are in a deadlock, you have to change. If you change, you can overcome it.*" In addition, Darwin with his Evolutionary Theory (1859) argued that living organisms that survive are neither the strongest nor the smartest, but the one that responds more effectively to change.

What is however the definition of a change? Change can be a process of transformation of an individual or an organism, the differentiation of behaviour and function, the modification of an existing state, and the methodical movement from one point to another in a systematic and planned manner. In any case, it is an important element for the survival and development of a person, an organization or even a business (Deming, 1982).

The reasons and causes that impose a change can be economic, innovative, technological, organizational, demographic, while a change can be handled in different ways: positive or negative, voluntary and planned, universal or partial, voluntary or enforced, systematic, random, reactive, gradual (Dean, 1993; Montana and Charnov, 2002).

Through the review of the relevant literature, one could find that various change management models have been proposed. One typical model is that of Fullan's (2001), which distinguishes three basic stages. The first is about introducing a review of the current state of affairs that demands the need for change, taking the decision to start the process of change and developing devotion to it. The second stage is intended to implement the change. In particular, the change in practice is planned and applied, devotion is developed and maintained, progress and emerging problems are monitored and controlled. The third and final stage is to internalize the change. Thus, change is no longer considered to be new and becomes part of the normal way of working, acting and operating the individual, the organization or society.

Of equal interest is the Lewin model, according to which the effective course of change follows three stages in order to become permanent. The first stage is the one of unfreezing the existing situation, where the need for change is created. The second stage is that of moving to a new situation (changing), identifying new situations, internalizing new behavior and acquiring new expertise. The final stage is refreezing the new situation in order to become permanent. In this stage it is intended to stabilize the new situation and to avoid regression in the older situation (Cummings, Bridgman and Brown, 2016).

The existence of different stages shows that the change does not take place automatically. There is a need for a great effort in order to be established. In addition, at various evolutionary stages, negative emotions such as fear, frustration, anxiety, distress, loss of control, uncertainty often can emerge. As a result, people's resistance and negativity towards change are often projected.

Consequently, accepting, completing and implementing a change requires effort at many levels: individual, social, collective, political, educational. First of all, it must be understood that individuals have different values, beliefs, perceptions and experiences, so they have to be persuaded in many different ways about the benefits of change. It must also be a common vision, a change in the existing culture, anticipation and timely response to resistance to change, active participation, support and engagement of all involved, good practices, appropriate

logistical infrastructure, sufficient resources and the correct information, education and training of all people.

Technological changes: The four phases of the Industrial Revolution

Since Prometheus stole the fire of knowledge from the gods on Mount Olympus and bestowed it upon mankind, humans have not stopped fiddling with it and creating striking innovations all throughout their evolution. The history of technology is particularly broad. On the one hand, it concerns the process of invention, construction and use of objects, and on the other hand the exploration of the social, economic, political and ethical implications of the application of technology in our lives. Technology and science are intertwined in a strange way, as technology is seen as an application of scientific knowledge, but also a prerequisite of science.

Until the end of the 18th century there was no technology in the sense that we use it today. There was, however, only the technique, a set of arts and skills, which was transmitted by the craftsman to the apprentice. The end of the 18th century is linked to the first Industrial Revolution, a term originally used by the historian Arnold Toynbee (1889-1975), to describe what happened in England from 1760 to 1830. According to Eric Hobsbawm (1999), the first phase covers the period between 1780 and 1840. Among the key factors that led to the outbreak of the revolution were immigration and demographic. The basic technological dimensions of this revolution concern the mechanization of fabric production and the subsequent development of the textile industry, the development of the steel industry and the great impetus for transport by creating steam and steam. There is a new power source, steam, an element that points to the wider dimensions of the industrial revolution. On the one hand, it is linked to the development of the capitalist system and, on the other, to changes in social, economic and cultural structures. There is also a significant change in the nature of human labor. People are starting to move away from the earth. In new workplaces, workers work on a strict, exhausting schedule. The tasks they perform are usually monotonous and require high discipline and education.

The second phase of the industrial revolution mainly concerns the period between 1850 and 1914 and it is linked to the demographic development in western countries, urbanization and technological advances in communications. The urban landscape is determined by the railroad, creating new cities, turning small towns into industrial centers, multiplying the populations of the harbors. At the same time, Henry Ford puts everyone on the roads with internal-combustion engines: cars, buses, and trucks. Forms of energy increasingly used are electricity, gas and oil. Gradually the working class consciousness comes not only to England but also to continental Europe. New ideologies are emerging (Marxism), workers are united against employers, claiming better working conditions. Therefore, compulsory and free primary education is institutionalized, while the tertiary education is accessible (Gaganakis, 1999).

The Third Industrial Revolution commences in the second half of the 20th century and is connected with the development of technology and renewable energy sources, improved communication and increased productivity. The predominant form of energy is nuclear, and the development of electrical appliances and computers are a major development. The development and dissemination of digital skills is an important reference point for many national and international policies on education and training of human resources. Workers need more and more specialized knowledge, which increases the opportunities for information, communication and dialogue (OECD, 2015; Zinnbauer, 2007). However, despite the fact that 3,2 billion people worldwide use the internet, only 7% of households in the less developed countries have access to the Internet (International Telecommunication Union, 2015).

Continuing, the 4th Industrial Revolution relies on the technological and digital developments of the third phase and causes rapid changes in production systems, administration, management and governance. Billions of people are linked to mobile phones, the potential of which is unimaginable: unprecedented processing power, storage capacity, access to knowledge. What is more robotics, the Internet of Things, autonomous vehicles, artificial intelligence, 3-D printing, biotechnology, energy storage, nanotechnology bring about enormous possibilities. In addition, transport and communication costs will drop, new ecosystems, such as Environmental Informatics will develop, citizens will be empowered by using technology. It is argued that there will be great impact on business, government and people.

In particular, according to Klaus Schwab (2015), the Founder and Executive Chairman of the World Economic Forum, new ways of serving existing needs will be created. Well-established incumbents will be ousted by innovative competitors who have access to global digital platforms for research, development, marketing, sales, and distribution. Besides, major shifts will also occur, as growing transparency, consumer engagement, and new patterns of consumer behavior force companies to adapt the way they design, market, and deliver products and services. Last but not least, physical products and services will be enhanced with digital capabilities. As far as the government is concerned, citizens will have the chance to engage with public authorities more directly, as they will voice their opinions, coordinate their efforts and even supervise governments. On one hand they will increase their control over populations but on the other hand their central role of conducting policy will diminish because of redistribution and decentralization of power. Governments' survival will depend on the levels of transparency, effectiveness and efficiency they present. Regarding the impact on people, it is regarded that the fourth revolution will change not only what we do but also who we are. There will be significant changes regarding identity, privacy, ownership, work hours, leisure time, relationships, skills, consumption patterns, values, beliefs, moral and ethical boundaries (World Economic Forum, 2016).

How possible is it for us to handle the technological changes and in which ways?

Jack Ma argues that every technology brings about not only great jobs, new careers and success, but also serious problems. Needless to say that both the first and the second industrial revolutions were followed by the two World Wars. Besides, *“Scientific knowledge is creating opportunities and solutions, while at the same time fuelling disruptive waves of change in every sector. Unprecedented innovation in science and technology ... is raising fundamental questions about what it is to be human”* (OECD, 2018:3). These changes are inevitably rapid and often uncontrollable not only for the majority of people but also for the governments. We cannot be sure of their proper management, but we can, on the basis of existing theoretical and research data, guess what we have to do.

Already the official texts of international organizations point out the need for universal, collective, inclusive and transparent government frameworks capable of building confidence and adopting new advances. There is also a need for a global space where international organizations, technology companies, regulators, academia and civil society can connect to contribute to the development of all people. However, while universalism is the principle of the human development approach, though it is not enough. It is necessary to be translated into practice by identifying and breaking down barriers that exclude certain groups. Some universal policies need to be reoriented, since there are many disparities. Besides, even though human development is achieved, it does not mean that it is sustained. Progress may be slowed or even reversed. In such a context, people must be empowered even if policies and relevant actors fail

to deliver. They will get stronger when they demand their rights, raise their voice, seek to redress one situation. In addition, to foster inclusive development, policies should be inclusive, formulating an employment - led growth strategy with a focus on creating productive and rewarding employment opportunities in sectors where poor people live and work, enhancing inclusion in productive resources, taking high - impact multidimensional interventions (UN, 2016).

Regarding people they will be able to handle and cope with these changes to a great extent when they feel secure and confident about the necessity of this change. Under these particular circumstances, different professional groups need to redefine their work profile and strengthen it with skills that will allow them to respond to the mental, physical and emotional demands of the new labour market. Tackling these skills challenges will require significant policy efforts and systemic reforms in education and training of human capital from both public and private sources (Panagiotopoulos and Karanikola, 2017).

Training and education contribute significantly to increasing the efficiency and effectiveness of an organization and have a positive impact on the creation of a healthy working environment, increasing employee loyalty, reducing retirement (Bartlett, 2001; Schwepker, 2001). In addition, according to the OECD (2018: 3-4), *"education can make the difference whether people embrace the challenges they are confronted with or whether they are defeated by them."* What is more, *"education has a vital role to play in developing knowledge, skills, attitudes and values that enable people to contribute to and benefit from an inclusive and sustainable future. Learning to form clear and purposeful goals, working with others with different perspectives, finding untapped opportunities and identifying multiple solutions to big problems will be essential in coming years. Education needs to aim to do more than prepare young people for the world of work; it needs to equip students with the skills they need to become active, responsible and engaged citizens"*. In addition, the OECD Learning Framework 2030 (2018) has developed a learning compass, including right knowledge (cognitive, meta-cognitive, social, emotional, physical and practical) and attitudes (personal, local, societal, global).

Regarding the skills that the 21st century citizen must possess, on a first level, there are the basic skills such as numeracy, literacy and basic digital skills. Research shows the important benefits of these skills in the lives of adults, their families and their communities, as better socio-economic opportunities and employment opportunities are guaranteed (UNESCO Institute for Lifelong Learning, 2013; Vorhaus et al., 2011). On a second level, there are the key competences and the higher, more complex skills. Skills that open to personal fulfillment, development and prosperity, social inclusion, active citizenship and employment. Science and foreign languages are referred to as some of them. Transversal skills, including entrepreneurship, critical thinking, problem solving, learning to learn, financial literacy, innovation and creativity is another important category. The construction of these skills can contribute to the development of self-confidence, self-fulfillment, and personal efficiency and performance (Schuller et al., 2006). Similarly, Fullan (2016) refers to deep learning which involves the six Cs: character, collaboration, citizenship, communication, critical thinking and creativity (Fullan, 2016).

In addition, there is a strong demand for digital skills, since they are in lack in Europe at all levels. 20% Europeans have no digital skills at all, while almost half the EU population lacks basic digital skills. The number of unfilled vacancies for ICT professionals is expected to double to 756.000 by 2020. These skills are of great importance, since they increase the opportunities for information, communication and dialogue (OECD, 2015; Zinnbauer, 2007).

Therefore, the development of proper policies, adequate learning and training and delivery of appropriate skills can contribute to the management of the fourth industrial revolution and its impacts. It is often argued that the world today is a complex ecosystem of interconnections. In order to identify long-term opportunities and threats requiring effective policy responses, leaders need a holistic view of the issues of global change (Global Economic Forum).

DISCUSSION

Changes in our lives are inevitable and they are often universal and global. According to various change management models, we are in the process of being introduced. At this stage, there is a need to release from the past and analyze the need for change. Of great importance will be the implementation of appropriate national and international policies, as well as the development of appropriate supportive structures with the main objective of communicating, informing and developing dialogue on new trends and developments. The internalization of change requires a great deal of acceptance of developments but also the attempt to align with the new framework, which is becoming more and more complex and often threatening. We are all called upon to evolve and redefine our skillset and mindset to ensure basic rights, such as those of employment and employment. Training with the provision of appropriate skills, knowledge and attitudes is required to play an active role in finding, acquiring and maintaining a job. Proper and appropriate knowledge and skills will strengthen the workers' work profile so that they can cope with the new challenges of the fourth industrial revolution.

Future Research

The mankind is witnessing great changes and challenges. Technological developments concern citizens of all countries, developed and developing. Based on the international texts and policies there seems to be a willingness to manage technological and consequent changes on a global basis. At a first level, emphasis is placed on capturing the effects of the industrial revolution on key areas of human living. However, various questions arise. To what extent is the world community truly aware of the meaning of the fourth industrial revolution? To what extent are national policies willing or able to meet the demands of the industrial revolution? Will we manage to handle these changes so that they can finally be implemented and internalized? It is obvious that these questions need to be answered.

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