



The impact of Industry 4.0 on Human Resources

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ABSTRACT^A

The constant advance of new technologies leads to modifications in the manufacturing industry that seeks to innovate in different tools to continue advancing parallel to the 4.0 revolution. The competition now shows a tendency to modify jobs and filter the selection of candidates to meet the needs of a company. Terms such as flexibility, optimization, efficiency, and value creation are key aspects to consider as essential skills in recruitment. This article aims to delve into the new skills required in professionals to adapt to the changes brought by this new stage of the industry.

a. Brief profile: DR TOSCANO has been a professor and researcher at various Higher Education Institutions in the area of business sciences for more than twenty years. In addition, DR TOSCANO in the Business field for more than twenty years has served as a Consultant, Executive Trainer, and Business Advisor in Senior Management, among others.

1. INTRODUCTION

A constant run through all eras: surpassing ourselves to progress. Make qualitative leaps that improve our quality of life. That constant materializes today in a global challenge that subverts certainties in the production of goods and services: the Fourth Industrial Revolution. (Basco, et al., 2018). Figure 1 shows the overall progress of each stage of innovation in industrial revolutions.

The concepts of industry 4.0 and smart manufacturing are relatively new and contemplate the introduction of digital technologies in the manufacturing industry. That is the incorporation into the manufacturing environment of technologies such as the internet of things, mobile computing, the cloud, big data, wireless sensor networks, embedded systems, and mobile devices, among others. (Ynzuna et al., 2017).

Industry 4.0 was presented for the first time at one of the most important fairs in the world: the Hannover fair in 2011, where the High Technology Strategy of a German executive was presented, where industrial production was described whose machines, processes, and products were digitally interconnected to achieve intelligent manufacturing. From that moment many countries and organizations began to adapt to this new industry to take advantage of the opportunities offered by this new promising scenario. (Guerra, 2020)

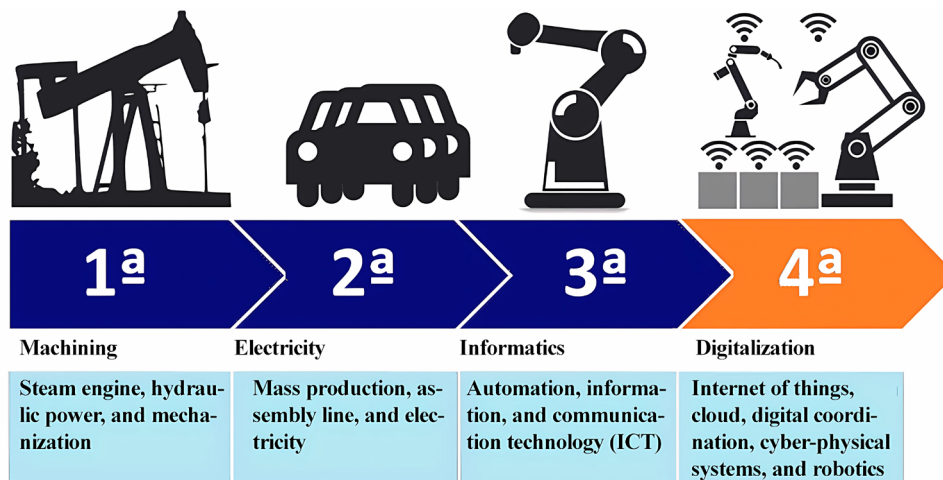


Figure 1: Innovations in Industrial Revolutions. Source: Bethlehem, V. S. (2022, 28 February). Fourth Industrial Revolution. Economics. <https://economipedia.com/definiciones/cuarta-revolucion-industrial.html>

2. DEVELOPMENT

2.1. Methodology for literature review

The methodology for this review article consisted of reviewing different scientific articles from the Google Scholar search engine and SciELO that were related to the fourth industrial revolution, skills, training, and talent.

From SciELO search engine obtained 92 documents related to the fourth industrial revolution, while Google Scholar shows 131,000 results. From this search it was filtered according to the following selection criteria:

Inclusion criteria (IC):

IC-1 Publication date between 2015 and 2022

IC-2 Research where concepts such as “talent”, “skills”, “training”, “industry 4.0”, “fourth industrial revolution”, and “competitiveness” could be identified in the summary or keywords.

IC-3 Research where the purpose or objective included the study of the relationship, influence, or impact of industry 4.0 on human capital.

IC-4 Research will analyze the gap between current human resources and talent needs related to the fourth industrial revolution.

Exclusion criteria (EC):

EC-1 Research published from 2015 and previous years.

EC-2 Research published in languages other than Spanish or English.

In total, 22 documents were reviewed in detail, of which 12 were selected, from which information related to the objective of this research and the inclusion criteria described above was obtained.

Below is shown in the following table how the documents were selected in the research:

No.	Magazine	Country	Reason for selection
1	Innova	Mexico	CI-1, CI-2, CI-4
2	Annals of Psychology	Spain	CI-1, CI-2, CI-3
3	Vinculatégica	Mexico	CI-1, CI-2, CI-4
4	RILCO	Argentina	CI-1, CI-3

No.	Magazine	Country	Reason for selection
5	International Journal of Good Conscience	Mexico	CI-1, CI-2, CI-3
6	Technical University of Ambato Faculty of Administrative Sciences	Ecuador	CI-1, CI-2, CI-4
7	Digital Research Journal	Spain	CI-1, CI-2, CI-3
8	Zaragoza University	Spain	CI-1, CI-2, CI-3
9	International Journal of Information Systems and Software Engineering for Big Companies (IJISEBC)	Spain	CI-1, CI-3
10	Comillas Pontifical Unit	Spain	CI-1, CI-3
11	University of Jaén Faculty of Social and Legal Sciences	Spain	CI-1, CI-2, CI-3
12	ECONSTOR	Germany	CI-1, CI-2, CI-3

Own elaboration

2.2. Review of the literature

2.2.1. Skills for the fourth industrial revolution

To embrace and understand the nature and magnitude of the next skills shift, a business-oriented approach was adopted and both intrinsic skills – e.g., gross motor skills and strength, creativity and empathy – and specific learned skills – advanced computing and programming, advanced data analytics and technology design were included. (Castellanos Rivero & Escott Mota) Strategic direction requires a more transparent understanding of currently available and interrelated technologies and concepts. (Pfohl, et al., 2015)

This new approach guides us to several types of skills, first those that cannot be copied by current technology such as creativity or teamwork that improve work methodologies in the industry. On the other hand, some drive existing digital development such as application design. Finally, there are transversal or global skills that must be developed by all types of workers.

According to studies by the World Economic Forum, these transversal skills will be: working with data to make decisions, solving complex problems, persuading, emotional intelligence, teaching others, creativity, mathematical thinking, communication, listening to ideas from others, and critical thinking. (Reséndiz-Prado, et al., 2020)

Today, new ways of working (e.g., remote work) and organizational dynamics (e.g., virtual teams) require well-trained leaders who facilitate, for example, workforce acceptance of such technologies. There are role differences between managers and their subordinates about the importance they attach to the skills they need to perform their jobs well. Therefore, leadership development is particularly important for organizations to ensure a successful and sustainable digital transformation and face complex work environments. (Peña-Jiménez, et al., 2021)

Table 2 shows the results of the study by Reséndiz-Prado et al., 2020. where the levels of coincidence of skills are listed based on different documents. It highlights digital skills, critical thinking, creativity, and problem-solving.

These changes require people to be in a permanent attitude of taking advantage and using every opportunity during life that comes their way to update, deepen and enrich the pool of knowledge and to adapt to a world in continuous change. (Echeverría, 2018)

Skills required in Industry 4.0 according to % match

Skills	%	Skills	%
Digital skills	100	Social and emotional skills	54
Analytical and critical thinking	92	Collaborative work	54
Creativity/ innovation	92	Leadership	46
Troubleshooting	77	Mathematical thinking	46
Learning skills	62	Management and communication skills	38

Source: (Reséndiz-Prado, et al., 2020)

2.2.2. Human Resources Management 4.0

In many companies, it is considered to manage human resources by divisions or departments and each department contains its objectives. Changes in the human resource framework tend to an agile methodology with a focus on working in small teams with short and medium-term objectives.

Agile adopts a way of working where results are privileged over hierarchies and bureaucracy. Contrary to traditional business models, here employees share the same goals and work flexibly to create products and services that positively impact the results of the organization. The methodology is concrete and proposes a set of values and principles that emphasize an iterative and collaborative process with small teams (seven members is ideal) that work in a series of short cycles in conditions of total transparency. From the start, teams incorporate feedback and include customer insights to deliver emerging solutions. (Cardozo, 2021)

For some time, it had already been pointed out of a change in traditional organizational structures towards more flexible structures, in it was considered that these organizations have a very particular way of doing things and that they gave positive data, having pyramidal structures,

but this occurred in environments of stability and little competition. These pyramidal structures are formal, and centralized and depend on standardized processes which leads to routine work. (War, 2020)

2.2.3. Recruitment and selection

Jobs have also undergone a major transformation due to ICT since the latter has favored the automation of jobs. ICT will have great relevance in the training field of workers since it offers different ways of being provided, ICT provides great autonomy and adaptability to be offered, a clear example can be e-learning. On the other hand, training is also important to reduce the Digital Divide that may exist between workers and thus increase their skills in new technologies. (Wheel, 2020) The increase in the level of training of workers would also open doors to new jobs, with better wages and benefits. (Change, 2021)

Organizations must adapt to the new Human Resources management tools towards the new industrial revolution 4.0 by redefining their structures and identifying which activities still require human effort. (Balarezo, 2020)

The use of non-traditional media such as certain social networks Facebook, LinkedIn, and Twitter should be promoted to review the profiles of recruited personnel and at the same time use a platform to have greater interaction with users and/or potential candidates to occupy a position considering the vacancy that is intended to be filled. In addition, for its control and monitoring, it could be done with the same tools offered by these social networks described to filter data, which allows for optimizing time and resources. (Balarezo, 2020)

According to the above, we can conclude that both jobs, recruitment, and selection methods must advance at the same time to have a better result. The worker must also take advantage of the different tools offered by this new demand to train and offer their resume in the best possible way.

The types of hiring have gone from the old model that structured permanent and temporary employees to a much more sophisticated one with collaboration formulas in autonomous, partial, associative work, etc.; remote or delocalized work will be allowed by varying the traditional concept of a work center or ordinary and extraordinary day. (Jaén, 2019)

2.2.4. 2.2.4 Financial compensation

It has led to the modification of the remuneration components encouraging the establishment of flexible remuneration systems, mainly due to the existing concern to attract and retain the most talented people by companies and the current economic situation. In this way, the remuneration is applied variably to the fulfillment of objectives, also gaining weight the

“emotional salary”, which covers all those benefits that the company provides to its workers and that for these translates as a motivational tool. (Garcia, 2021)

How the salary is constructed has also changed, companies must seek the economic and psychological well-being of the employee. The solution is not only to increase their salary but also to improve their entire environment such as mental health, rest days, or remote work.

3. CONCLUSIONS

The skills required for the fourth industrial revolution are varied and not only focused on ICT. It should be invested in the training of current personnel to keep the workforce current, but especially the direction of the industry must also be current to change the way of relating new skills and transform them into tools that allow the approach to intelligent industries with interconnected systems.

Due to the above, agile work teams are needed to facilitate communication. It is also recommended that the team is composed of different hierarchical levels and different divisions since it is in them that the projects are managed flexibly. The cascading working methods of how many companies currently work do not guarantee that the objectives and deliverables are clear to meet projects in the industry.

Consequently, recruitment and selection methods will be affected, initially, due to the means that now exist to generate a job and apply the profile of the worker. The job descriptions are updated with technologies required for industry 4.0 such as automation or robotics, also, aforementioned skills such as problem-solving and analytical thinking are added as key pieces to be selected.

Both companies and workers, especially those in human resources, will go through a transformation due to this incoming industrial revolution. It is important to recognize and reconstruct the needs of emerging jobs and the changes occurring in those that are indispensable for human resource management.

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