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Digital transition in the workplace: an approach to the recent Airbus experience in Spain

La transición digital en los centros de trabajo: un acercamiento a la reciente experiencia de Airbus en España

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ABSTRACT

The current presentation approaches a case study of Airbus Spain (2021) in the framework of the digital transition in the workplace researching (Eurofound-European Comission): *Anticipating and managing the impact of change; digitisation in the workplace.* Recent Eurofound studies identified three main vectors of change in the European big companies: 3D printing, Internet of things (IoT) and Augmented & Virtual Reality (AR/VR). Airbus has based its technological change in 3D printing, with deep implications in its work processes, training and demanded skills. Our objective is to analyze the experience of the social actors involved in these processes applying qualitative methods (key informants interviews). Our conclusions point out an increase in the autonomy and responsibility of the employees, and a positive impact on job quality, reducing work hazards, improving the physical and social environment, reducing the intensity of physical work and improving career prospects.

RESUMEN

La presente comunicación aborda un estudio de caso de Airbus España (2021) en el marco de las investigacioness sobre la transición digital en el lugar de trabajo (Eurofound-Comisión Europea): *Anticipating and managing the impact of change; digitisation in the workplace.* Recent Eurofound studies identified three main vectors of change in the European big companies: 3D printing, Internet of things (IoT) and Augmented & Virtual Reality (AR/VR). Airbus ha basado su cambio tecnológico en la impresión 3D, con profundas implicaciones en sus procesos de trabajo, la formación y las competencias demandadas. Nuestro objetivo es analizar la experiencia de los actores sociales involucrados en estos procesos aplicando métodos cualitativos (entrevistas a informantes clave). Nuestras conclusiones señalan un aumento de la autonomía y responsabilidad de los empleados, así como a un impacto positivo en la calidad del trabajo: mejoras en riesgos laborales, el entorno físico y social, en la intensidad del trabajo físico, además de potenciar las perspectivas de carrera.

Keywords: future of work; Eurofound; organisational change; 3D printing; aerospace sector.

Palabras clave: futuro del trabajo; Eurofound; cambio organizacional; 3D printing; sector aeroespacial.

1. Reference framework: conceptual framework, brief theoretical framework

To guide our analysis and understand in detail how technological change affects the nature of work, we adopt Eurofound's conceptual framework, as first posited by Fernández-Macías (2018).

Eurofound's conceptual framework blends together two core dimensions, two cross-cutting dimensions, and some contextual elements. The two core dimensions are: *work organisation* and *job quality*; the two cross-cutting dimensions are *employee participation* and *social dialogue*. The adoption of a new technology and the strategies surrounding its deployment affect the two core dimensions by changing the business model, whereas employee participation and social dialogue can both influence and be influenced by the introduction of a new technology. Employee participation and social dialogue are crucial in the workplace as they underlie workplace innovation and shape working conditions. Contextual factors or company's specificities, may drive or hinder the technology adoption process and should also be taken into account when performing the analysis.

Below, a detailed description of all the elements in the framework:

- ***Work organisation*** refers to "how work is planned, organised and managed – via production processes, job design, task allocation, rules, procedures, communication, responsibilities, management and supervisory styles, work scheduling, work pace, career development, decision-making processes, interpersonal and interdepartmental relationships"[1]. It encompasses what tasks are performed, who performs them and how they are performed in the process of making a product or providing a service. The framework of reference is the JRC-Eurofound task framework elaborated by Fernández-Macías and Bisello (2020), which provides a complete taxonomy to differentiate between the "what" and the "how" of work activity[2]:
    - *What*: content of tasks – physical (strength, dexterity and navigation), intellectual (information processing, problem solving, and their sub-categories), social tasks (serving/attending, teaching/training/coaching, selling/influencing, managing/coordinating, and caring);

[1] https://www.eurofound.europa.eu/observatories/eurwork/about-eurwork/work-organisation.

[2] For a thorough description and explanation of the rationale please refer to Fernández-Macías and Bisello, 2020)

- *How*: methods of work organisation (autonomy, teamwork, routine) and tools used at work (digital, non-digital, others).

- ***Job quality*** covers all the characteristics (both positive and negative) of work and employment that have shown an empirical relationship with health and well-being. A multidimensional perspective is necessary to construct job quality indicators (Muñoz de Bustillo et al. 2011). So, job quality can be measured through seven indicators[3]:
  - Physical environment;
  - Work intensity;
  - Working time quality;
  - Social environment;
  - Skills and discretion;
  - Prospects;
  - Earnings.

The two cross-cutting dimensions of employee participation and social dialogue are defined as follows:

- **Employee participation** refers to the "involvement of employees in management decision-making in the workplace, either in relation to wider company issues (workplace social dialogue) or in their immediate job (task discretion)".[4]
- **Social dialogue** can be defined as negotiations, consultations, joint actions, discussions and information-sharing involving employers and workers.[5]

Among the contextual factors, we should include conditions of employment, such as the contractual and social conditions of the work, which relates to issues of stability, opportunities for development and pay; these elements, in turn, depend on the institutional framework and labour regulation, with the effect of technology being more indirect.

2. Objective and methods

The main objective of this article is to investigate the impact of the digitisation of processes on tasks, work organisation, working and employment conditions, and industrial relations in Spain, by focusing on the adoption of one or two, preferably combined, of the three drivers of the digitisation of processes, namely 3D printing, IoT, and Virtual/Augmented Reality.

[3] https://www.eurofound.europa.eu/topic/job-quality.
[4] https://www.eurofound.europa.eu/topic/participation-at-work
[5] https://www.eurofound.europa.eu/topic/social-dialogue

For the purposes of this study, we selected establishments which adopted the first two technologies: 3D printing and IoT. This is due to the fact that 3D printing technology and, above all, the Internet of Things have become more widespread in Spain compared to AR/VR, as the lack of available data suggests. These two technologies are also more likely to be presented in combination with other projects for automation, innovation and digitisation of workplaces.

In particular, this article aims to answer the following research questions:

- Did the selected technologies bring changes to:
    - the business model;
    - employment and working conditions;
    - work organisation;
    - tasks and occupations;
- If so, which were the changes and which were the driving mechanisms?
- How did the technologies affect/were affected by employee participation and social dialogue/industrial relations?
- Did management adopt specific strategies to manage the digital transition and, if so, were employees involved in the process?
- Which were the main drivers/barriers to the adoption of the selected technology?

Given our need to understand potential causal links and pathways through which these technologies affects the nature of work, we present results of in **depth interviews** carried out with employees, employee representatives and managers in Airbus.

3. Type of entity and ownership structure

Airbus is a French aerospace company with extensive military capabilities and, currently, the world's leading aircraft manufacturer. The entity was founded in 1970 through a consortium of several French institutions. The project was undertaken with the clear aim of countering the dominance of the sector, at that stage, held by the United States through competitors such as Boeing and McDonell Douglas. Three decades later, the company experienced an important turning point (2001), when it was acquired by EADS -European Aeronautic Defence & Space- (80% of the shares) and BAE Systems (20%). Five years later (2006), BAE Systems sold its shares to EADS itself, which became the sole owner of the airline. The entity is renamed Airbus in 2014 for purely commercial reasons and, following various agreements, its shareholding will be distributed as 95.78% Airbus SE and 4.22% Airbus Defence & Space (2021 data). The company has a total of seven subsidiaries: Airbus Group, Airbus Military, Airbus Executive and Private Aviation, Navblue, Stelia Aerospace and Testla.

Airbus has a broad presence around the world, although its activity is particularly strong in Europe, with France, Germany and Spain - in that order - being the countries with the strongest presence. In the case of Spain, Airbus was introduced through its merger with the local entity CASA (Construcciones Aeronáuticas S.A.) in 2000.

The company employs more than 134,000 workers worldwide, of which almost half are located in Europe (63,000). Among them, 12,700 work in Spain, distributed in seven sites, located in different parts of the centre and south of the Iberian Peninsula. Production processes are closely linked to the rest of Europe.

3.1 Activities and geographic location

Airbus' activities in Spain focus on three main products: commercial aircraft, helicopters and military and aerospace aircraft. The geographic distribution of the activity has its most important nucleus in the vicinity of Madrid, where the sites of Getafe, Illescas, Barajas and Tres Cantos are grouped. The rest of the activity is distributed in different points in the south of the peninsula: San Pablo-Seville, Tablada-Seville, Puerto Real (all of them in Andalusia), as well as Albacete (in the southeast of Castilla-La Mancha).

3.2 Company size and workforce composition

Airbus' 12,700 employees throughout Spain are distributed across different activities and locations, as shown below:

- Commercial aircraft: stabilisers are assembled for all Airbus series, as well as other major components. The activity employs more than 3,500 workers distributed between Getafe (2,100), Illescas (900) and Puerto Real (500).
- Military and aerospace aircraft: aircraft for defence and space activity are also manufactured, constituting the strongest sector in terms of workforce: 8700 employees. The core of these activities is concentrated in Getafe (3800 workers), although there is also an important presence in the headquarters in Seville (San Pablo and Tablada: 2800). The rest of the activity is distributed between the sites in Puerto Real (390) and the two locations most oriented to aerospace production: Barajas (1200) and Tres Cantos (440).
- Helicopters: airframes for the complete Airbus series are produced, employing more than 500 workers between Albacete (370) and Getafe (130).

In short, we are talking about a large workforce of more than 12,700 employees, to which we must add some 57,000 indirect jobs. Apart from quantity issues, we should highlight quality: Airbus has a high proportion of permanent contracts (84%) and a very high rate of youth employment (41%). Staff salaries are particularly high, with an average 2.3 times higher than the average Spanish salary.

Considering the three technologies that are the focus of this study (IoT, Augmented Reality and 3D printing), Airbus stands out for its applications in 3D printing. Actually, this technology has only recently started to be used in the Spanish sites (2018), arriving relatively late to the market. This is due to the difficulties faced by the company in introducing relevant changes, which company managers summarise in two: (1) bureaucratic procedures and lengthy protocols, which are necessarily complex when providing services in the field of Defence (military world), (2) in addition to the need to make extensive changes in the set of processes to adapt to such a new technology.

This new development affects a large part of the production process, as the company acquires autonomy for the design of the parts, which, after the relevant tests and application of protocols, are assembled on the lines. As a result, its impact on the workforce as a whole is very broad, affecting both the performance of the white collar (design, printing, decision-making) and the blue collar (process execution and printing). Therefore, in a short period, there have been significant impacts on their autonomy, tasks and training needs. Currently, most of the workforce is affected by aspects indirectly related to 3D: adaptation of production processes, control of times, less dependence on external suppliers and use of plastic (the dominant material in this technology). On the other hand, a small proportion of the workforce - difficult to specify according to management - is affected more directly: decision-making, design and printing.

Secondly, the recent evolution of the company in IoT applications is affecting the performance of the workforce. The fundamental changes are associated with the management of information, as added below:

- It can be shared in real time from every point of work.
- Response times are significantly reduced.
- It avoids dependence on third parties (improving the autonomy of the worker).
- It allows the available information to be exploited and analysed, as well as improving decision-making processes.

Some of the most significant examples of IoT technology applications at Airbus include:

- Electronic toolbox: basic IoT applications that optimise time management by identifying potential gaps between available tools and their location, improving efficiency in the production chain. This technology is particularly useful for manual workers. It has been used in Spain for barely a year, with considerable success.
- Hololens: mixed reality systems that are applied in piloting systems, as well as in the training of workers at different levels. It has been in use for just over a year.
- Oxygen level detectors in piloting: IoT application that enhances flight safety.

These recent developments at Airbus are significantly affecting the working conditions and ways of working of both operators (blue collar), and technicians and managers (white collar).

3.3 Employee representation

Employee representation in the company is based on four main levels:

- Local works councils (headquarters).
- Works councils at national level.
- Inter-company committee (Spain).
- Inter-company committee (Europe).

Trade union participation is complex and diverse, as befits the weight of the sector and the size of the workforce in Spain, although CC.OO. has become the dominant mass union in the Airbus case. In general, the unions have active participation and strong influence on company policy, with relevance for blue collar workers, while the white collars are mainly organised around the internal splits. Their bargaining clout is based on their shown potential to stop production. The main lines of conflict are fear of job destruction and the age gap generated in both segments (blue and white collar).

3.4 Results

The contribution of new technologies to the recent evolution of Airbus in Spain has been decisive in keeping the company at the leading edge of the sector. In the last decade, changes have been marked by the development of Additive Layer Manufacturer (ALM, from now on) and 3D Printing. These are essential technologies today for the manufacture of ships in the aerospace and defence industry. In addition, significant improvements have been made in the field of IoT, boosting their communication systems, as well as their ability to generate and analyse their own data.

- **Motivations for introducing the technology**

The motivation of the company's management to enter fully into the new ALM and 3D Printing developments stems from the pure necessity to adapt to the technologies that will dominate the production process scenario in the aerospace industry in the coming decades (Airbus is not the market pioneer in this field, it has simply adapted). Through these organisational efforts and financial investments, Airbus aims to: (1) Internalise a large part of the production, avoiding dependence on third parties and facilitating the autonomy of the teams themselves; (2) Reduce times, thanks to the short cycles that 3D Printing allows: (3) to promote design and creativity within the work team, facilitating agile production systems that allow them to create for themselves; (4) to promote cost reduction, both in the manufacture of parts (frequent use of plastics) and in other costs associated with the process (storage, transport and supply of spare parts); and (5) to invest in a technology that has a relatively short payback cycle.

- **About the spaces where the new technologies are developed**

The main activity of ALM and 3D printing takes place in the workshops in Getafe and Illescas, although the activity is already carried out locally in the remaining 7 sites where aircrafts are manufactured in Spain, given the distribution of hundreds of printers (with different sizes and technological levels), as well as the training and familiarisation of the staff involved in the factory, both in white and blue collar positions. The process is articulated through an intense exchange of information in a network, in which the designs of the parts are distributed and can be generated in the production centre itself. In addition, there is an intense exchange between the Spanish sites and other Airbus sites around the world. In Spain, parts are designed for the US and Germany, and designs from the rest of Europe are also exploited. The processes are highly flexible, allowing offshoring, as the design site, the printing order site (often remote) and the final printing of a given part can be separated. Furthermore, the use of IoT is widespread in all Spanish sites and is vital for streamlining production processes.

- **Process development: chronology**

The process of implementing ALM and 3D Printing dates back to 2015, with the development of the first prototypes, although the strategy for its development had already been in the pipeline since 2012. Prototyping and certification phases in the sector are slow, so 3D printers did not start to be used –within the production process– until more recently (2018).

In the three years from the start of their use to the present (2018-2020), expectations have been exceeded. Managers highlight the short amortisation cycle of the printers (months in some cases), as well as the trend towards cost reduction: the price of the most accessible printers is steadily falling. The technicians report the rapid adaptation of the staff to a technology that allows great versatility and autonomy, and the blue collars now have the possibility of intervening in a creative and self-taught process, which has been reducing dependence on external suppliers. The difficulties encountered in its development are unavoidable (bureaucracy and adaptation of human capital), but the process is fed back by its results, so the idea has spread among the staff that only a continuous adaptive attitude to this technological line is possible.

A view to the immediate future leads managers and technicians to continue their commitment in this direction. Further investments in ALM and 3D printing will promote the reduction of process times and costs, allowing Airbus to remain at the international forefront of the industry. This line is seen as a must in order not to miss the boat. At the same time, from a HR perspective, talented and trained personnel will be recruited and the adaptation of the workforce -at all levels- to the new changes will be intensified.

- **Initial expectations for the introduction of the technology**

Airbus cannot be considered a pioneer in the introduction of these new technologies since, in a way, the commitment to them was made when their implementation in the industry was already a reality. Above all, the pressure of the international market itself led the company to a process that was considered unavoidable. Moreover, in the case of ALM/3D printing, the implementation was relatively slow, as the development of protocols and the obtaining of certifications are complicated, both by the requirements of the military sector and the aerospace industry. In any case, the prevailing opinion in the workforce is that the commitment was late but very decisive from the moment it was launched. In addition, the demands of enhancing internal communication systems in the aerospace industry have led the company to a continuous process of IoT implementation and improvement over the last decade.

The protagonists describe the first steps in the adoption of ALM and 3D printing as a complex process, described by a hill curve at the beginning: the enthusiasm of the initial novelties and improvements gave way to the inevitable problems (technical and bureaucratic). Once these were overcome -in the first 3 years (period 2015-2018)- developments have reached a satisfactory rhythm, as the first difficulties were overcome and a certain degree of familiarisation of the staff with this emerging technology was reached.

- **Technology development strategy and deployment adjustments**

The new technology strategy was defined before 2015 - which was officially the starting point. In the three preceding years, intensive work was already underway on the implementation of 3D printing. In 2015, a large network of technicians was set up to act as an advisory group for 3D, providing input to management. Some business test cases development were promoted, starting with small printers to produce plastic parts that could replace aluminium. Given the success of the test phase, it did not take long to transfer these innovations to production (2018). In this first approach cycle, the technical staff involved in the technological developments went through the Airbus Training Centre in Hamburg (Germany) to receive appropriate training. Gradually, the knowledge of the internal network was strengthened, acquiring autonomy and organising its own training centre in Spain.

We must highlight a top-down implementation process at ALM, in which the company's management exercised control from the outset. However, participation was opened up to the group and, finally, the intervention of the workers has been decisive, both in terms of advice at the most technical levels, and of proposals made by common employees on part modifications, namely suggestions that can only be adequately visualised from the lowest levels. The technical staff themselves point out that there has never been such fluid communication with management as when this technological revolution arrived, both parties made an important effort and the feedback generated at this stage has been considered a key factor.

Sources:

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