

# The Application of New Technologies to Promote the Dissemination of Training Content in the Railway Field in the Context of Informational Economy

Pablo Papaleo<sup>1</sup>, Matias Zitello<sup>2</sup>

<sup>1</sup>Railway Management and Technology, Railway Operator State Society / Technical Training Area – Argentine Trains Operations, Autonomous City of Buenos Aires, Argentina

<sup>2</sup>Railway Operator State Society / Technical Training Area – Argentine Trains Operations, Autonomous City of Buenos Aires, Argentina

## Email address:

pablo.papaleo@trenesargentinos.gob.ar (Pablo Papaleo), matias.zitello@trenesargentinos.gob.ar (Matias Zitello)

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**Abstract:** The work is a descriptive analysis of a training and technical training area of an Argentine railway company, taking the period 2019/2022 considering the conditions of pre-pandemic, pandemic and its flexibility. These events will serve to understand and contextualize the changes that have occurred in the area, focusing on the incorporation of new technologies in the delivery of technical content. It forms a different approach from previous works, focusing on this occasion on the effects of the implementation of incorporating new technologies in a railway field and seeking to generate value within the framework of informational economies. The application of new technologies implemented to enhance the dissemination of training content focused on the use of synchronous and asynchronous platforms, allowed to increase and deepen the training activity for railway workers, evidencing its impact on key indicators such as "the number of people trained" and "the number of total training hours developed" in the aforementioned period. This approach will allow analyzing the relevance of recognizing new external information, assimilating and applying it, identifying that useful knowledge and generating new knowledge as the potential articulation of laying the foundations. For the first guidelines of open innovation, seeking to answer the following questions: ¿does the application of new technologies improve training performance? Was it possible to transmit more content in terms of training and education? Through these, we will describe and analyze the scope with the implementation of platforms, allowing to achieve the basic guidelines of an informational economy; this will be through the statistical support prepared and confirmed by the area. We will finish it with the conclusions reached at the end of this period, outlining actions to be developed in the short and medium term.

**Keywords:** Training, Virtuality, Digitization, Platforms, Railway

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## 1. Introduction

The following work is a descriptive analysis of the evolution of activities and results of a training and technical training area of an Argentine railway company, taking as a time frame the period between 2019 and 2022, considering pre-pandemic conditions, pandemic and the way out of it. The analysis is based on understanding and contextualizing the changes that have occurred within the area, emphasizing the incorporation of new technologies in the delivery of technical content, and their impact in terms of informational digital economies. This work conforms and proposes a

different approach with respect to previous productions on the subject of reference, since it seeks to make visible the effects of the implementation and incorporation of new technologies in the railway field, and the derived generation of value within the framework of informational economies.

The development focuses on the implementation of new technologies that made it possible to promote the dissemination of training content, mainly on certain forms of work and the incorporation of new forms of management in specific situations, supported by processes and techniques such as the use of synchronous and asynchronous platforms., allowing to increase and deepen the training activities for

railway workers. The impact of informational economies is measured through key indicators such as "number of people trained" and "number of total hours of training developed." This focus and approach puts us in context to analyze relevant aspects, such as recognizing new external information, assimilating and applying it [1], identifying useful knowledge and generating new knowledge [3] and the potential articulation of laying the foundations for the first guidelines of an open innovation [8]. Basically we seek to answer the following questions:

- 1) Does the application of new technologies improve the performance of training?
- 2) Was it possible to transmit a greater content in terms of training and formation through the new applied technologies?

Based on these research questions, we will analyze and describe the scope with the implementation of platforms, allowing to reach the basic guidelines of an informational economy; and this will be possible using the statistical support prepared and conformed by the area. We will finish our development with the conclusions of the analysis of the period covered, reaching consolidation by the year 2022, outlining actions to be promoted in the short and medium term to promote the results of training and training through informational economies.

## 2. Materials and Methods

Based on the activities carried out and surveyed, the tables were drawn up that make it possible to visualize the profound changes that the area went through in the period between 2019 and 2022. Before the manifestation of the COVID-19 pandemic, the training managed and provided they were dictated 100% face-to-face. The resistance to the use and management of digital bibliographic material, both from the participants and from the guilds, generated the printing of large volumes of documents to comply with the delivery demanded for them. Therefore, the use of platforms in general, and Google Drive in particular, was sent to fulfill the function of being a bibliographic repository. This led to the intention of creating an ad-hoc library of railway material, with the purpose of being a space for consultation, being available to the entire railway community.

The situation and context were radically modified as of Decree DNU 297/2020 (National Executive Power) that established Preventive and Mandatory Isolation (ASPO) from March 19, 2020, contemplating its subsequent extensions, where the population began a confinement preventive and obligatory. This measure implied working remotely without having a similar experience, being an extraordinary situation that demanded extraordinary measures, also considering the economic and social conditions, having a direct impact on our work, bringing down all the training in a short time.

The forced introduction of digital technologies in all areas, and considering its democratizing feature for those people who were far away, mutated to "bring closer" to those who wanted to learn -or were forced to do so-, in the midst of the

isolation forced by the pandemic. Said instance was a turning point in our internal management culture, implying an action that surpassed certain previous organizational directives, as well as applying a self-management imprint and content development to the area, taking training as the core, and fundamentally considering the need to qualify staff in the development of their career. Being a technical area that carried out and managed face-to-face activities with external providers, or with schools exclusively dependent on trade unions, it demanded on our part to energize and strengthen communication resources that were not used on a regular basis<sup>1</sup>.

## 3. Results

Next, we observe in figure 1 the "number of trainings - accumulated per year" as was the development during 2019 until 2022 of a specific part of the technical training delivered through open calls with the authorization of the head of each worker registered to participate.

During 2019 there were a total of 35 activities carried out, being face-to-face, giving a total of 1,266 people trained, considering that some were carried out by the area in the company's auditorium, located in Retiro (CABA). Taking the year 2020, only 4 activities could be carried out between the months of January and March, contemplating that the ASPO was later implemented. Between the months of April to August it was a period of appropriation and learning of technological resources that allowed the elaboration of activities from September to December, being the pandemic period called "beginning of training digitization", reaching a total of 13 activities developed, and totaling 487 people trained. The analysis carried out gives us a drop of 61.53% compared to the previous year in terms of scope. Said period, in terms of learning and the search for the best option in the development of training, paid off since, despite the drastic situation experienced, the development of content specific to the area in terms of offer also began, starting to the "Formative Training" for the area.

Having acquired some familiarity with technological resources in the course of 2020, as well as in the development of training proposals, prompted us to consolidate and be able to propose some technical topics for 2021, and the development of a line of work called "innovation and training". Characterized by preparing conferences to disseminate certain topics considered relevant to the railway field, for example, the incorporation of digitization processes and artificial intelligence to the railway operation, the implementation of embedded signaling systems, the application of renewable energies to the railway field, and the implementation of certain non-destructive testing techniques in rolling stock and infrastructure, to name a few.

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<sup>1</sup>A more exhaustive development of this can be found in "Evolution of railway technical training and training in the context of the COVID-19 Pandemic. Experiences and perspectives in Argentina 2020-2023".

This line of work allowed us to make available to railway workers from different parts of the country the possibility of approaching certain topics unknown to some, or considered distant and impossible to think about and apply in our country, being exposed both by national researchers from the scientific and technological system, as well as international leaders in advanced technology topics, artificial intelligence, Big Data and innovation applied to the railway system. We call this period "training digitalization progress", where a total of 29 activities could be developed, reaching a total of 1178 trained people, and giving us a rise of 141.89% compared to the previous period, and only 6, 95% below the pre-pandemic period, as can be seen in Figure 3. These numbers supported us in the prospective carried out at the end of 2020 and beginning of 2021, in the confidence in the line of work implemented, as well as in the proposed contents in training activities.

To finish with the analysis of the impact in terms of the application of digital technologies in our area, we call the last sub-period "consolidation of training digitization", contemplating this stage of pandemic exit due primarily to vaccination of the population, allowing mechanisms more lax in terms of care and sharing public and closed spaces between people. This stage, of deepening and methodological diversification, gave us the possibility of articulating face-to-

face and virtual instances, being able to develop a total of 68 activities, achieving a total of 2,439 people trained, providing an increase of 107.05% compared to the previous period, but 92.65% compared to the pre-pandemic period. As we can see in figure 3 "Consolidated - Accumulated by year" in a clearer way the consolidation of the training instance, and find ourselves in 2022 retracing the guidelines of a hybrid modality (blended learning) incorporating what was apprehended in said period to enhance the training provided. Analyzing this figure as the previous ones, we have grown by 92% comparing the baseline (2019), evidencing the "Formative Digitization" as an exogenous variable that "triggers" the implementation of the new methodology as the choice of the support used to carry out the videoconferences. One aspect to highlight within the scope achieved is to be able to fulfill and materialize the federalist nature of the training activities in the new stage, something that was not possible before the pandemic, due to lack of resources that were later developed. The implementation of digitization in a field such as the railway generated profound changes, considering that there is no precedent for a methodological evolution and scope of the training of these characteristics in the Argentine railway, overcoming previous conditions to be able to carry out the proposed training objectives.

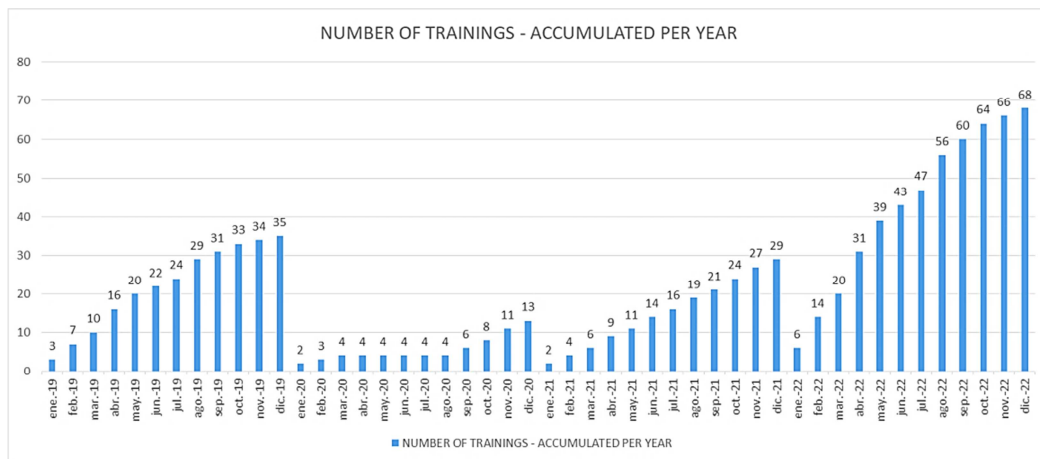


Figure 1. The "number of trainings - accumulated per year".

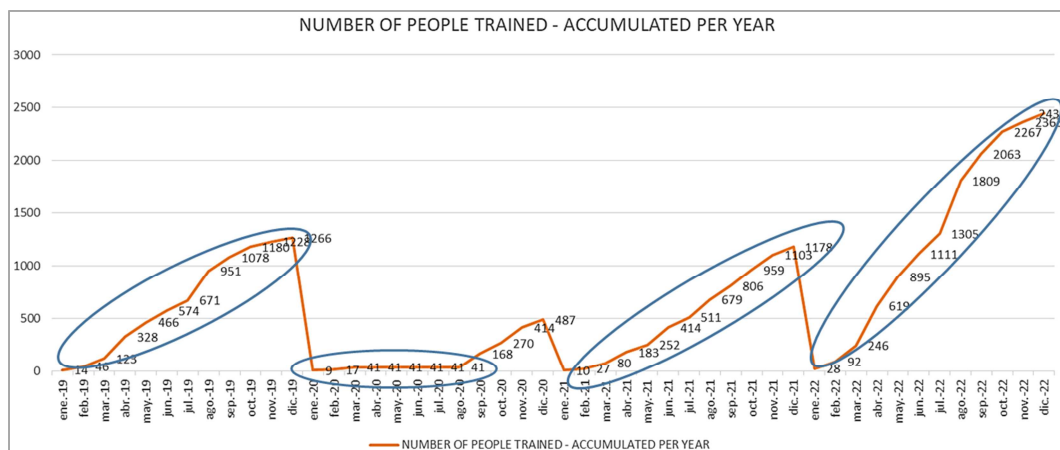


Figure 2. The "number of people trained - accumulated per year".

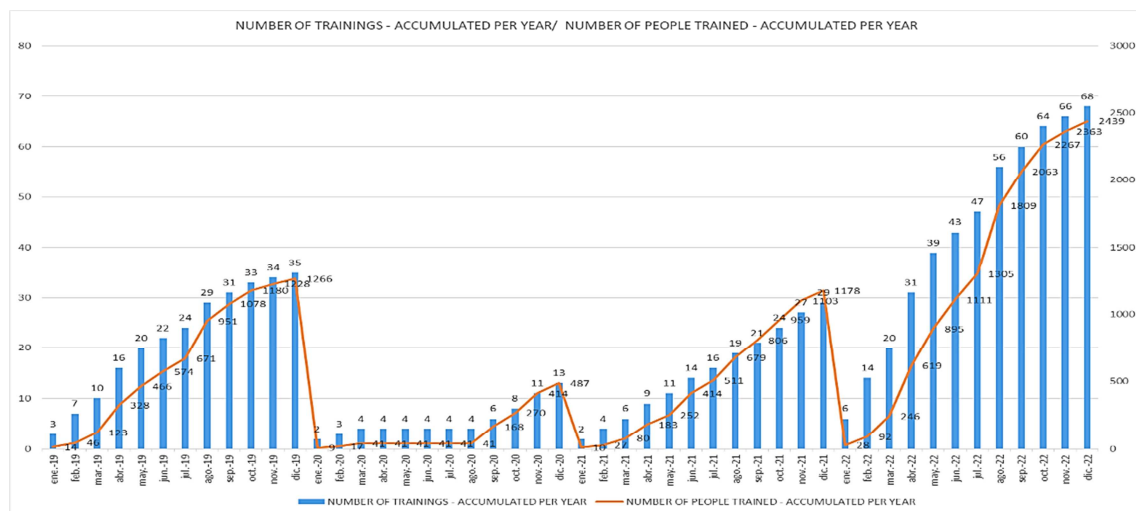


Figure 3. The "Consolidated - Accumulated by year".

## 4. Conclusions

Having gone through the periods that we have called pre-pandemic, and pandemic of progress and pandemic of consolidation of training digitization has left us all lessons of various kinds in general, but in our case, the ability to adapt to change and provide a prompt response in terms of area. The transition from being a mediating area of services to converting ourselves as a core of content generation and mediation was a significant change based on the acquisition, incorporation and implementation of new technologies. This condition is manifested in the results obtained in 2020 itself, with a full restriction and a compulsive virtuality that demanded "learning to unlearn in order to learn". Based on the results obtained towards the end of the same year, we obtained a satisfactory balance, as well as the strength to deepen certain lines of work and themes considered not viable at other times of evolution. The beginning of 2021 found us in a more consolidated instance, allowing us to develop a line of work in terms of dissemination and awareness of issues framed in "innovation and training", which until then were unprecedented in the field of railway technical training, being These were carried out together with exhibitors from the national scientific and technological system, having a correlate in the high level of participation that accompanied the proposals in said year.

And 2022 found us entrenched in that line, but also considering the end of a "full virtuality" to move to a "hybrid" instance, considering the scope achieved during 2021, giving the possibility of providing training or awareness days railway workers from the interior of our country, which during the pre-pandemic instance was not considered as a possibility. These observed results show us the relevance of the proposed and implemented development [2], as well as the need and demand to expand certain analyzes in terms of prospective, developments and future implementations in training, considering the great advances made in recent times in terms of digitization as well as

artificial intelligence. The journey traveled as members of an organization that is part of the transportation system, requires us to rethink, together with the educational system, establishing a minimum framework of immediate approach to allow the development of talent more quickly [4-7]. Going through a transition period of these characteristics demands the intervention and participation of all the actors, due to the eventual repercussions on employment and working conditions, as well as in the development of strategies that consider the introduction of new technologies and organizational models (including the data protection, safety and health of the workers) [9-16], and even promoting the development of certain socio-labour and even socio-emotional skills, considering an increasingly deep and frequent interrelationship between machines and humans.

Finally, it is necessary to consider advancing and deepening a model of "continuous training" in the workplace, as an educational and professional training system that is consistent with current times, contemplating probable futures. Also in the preparation of minimum strategic transition consensus for workers in those sectors that could be immediately affected by automation and digitization, including an analysis and forecast of changes in job profiles, as well as the identification of new employment opportunities, associated with the forecast of future skills needs for occupational tasks, in a dynamic scenario that demands a close approach, in the face of a future that becomes present.

## ORCID

Pablo Papaleo: <https://orcid.org/0000-0003-1271-4353>

Matias Zitello: <https://orcid.org/0000-0001-8378-3677>

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