Analysis of the implementation of digital resources in the control of civil construction works

Elói Romão dos Santos Souza

ABSTRACT
Technological advances over the years have allowed the emergence of digital tools that aim to transform and optimize the production of various areas. According to Firjan (2016), the contemporary social body is going through the Fourth Industrial Revolution, a new way of producing, inserting technology in processes and products, promoting better control and management of the information present in the production chain.

Keywords: Production chain, Production.

1 INTRODUCTION

Technological advances over the years have allowed the emergence of digital tools that aim to transform and optimize the production of various areas. According to Firjan (2016), the contemporary social body is going through the Fourth Industrial Revolution, a new way of producing, inserting technology in processes and products, promoting better control and management of the information present in the production chain. Faced with the arrival of the Technological Revolution, the Civil Construction industry was encouraged to meet the new established production standard models, implementing digital resources in the development of constructions (PEREIRA & SIMONETTO, 2018). As a result, the increase in the use of technologies to promote greater security in the control of information involved in the sector and the improvement in construction techniques is notorious. In this scenario, of the technological innovations applied to Civil Construction, electronic devices such as *tablets*, drones and laser devices stand out. In relation to the programs used as a means of minimizing possible failures, the computational tools constituted by *Building Information Modeling* or Building Information Modeling (BIM) stand out, which emerge as facilitators of construction details through the visualization of 3D models, with consolidation and quick access to information about the work. These digital means, which consist of the implementation of the Technological Revolution experienced by the current time, bring greater productivity to the construction industry, make processes more efficient, reduce possible failures, as well as existing rework if they happen, in addition to being applicable to large and small enterprises (PORTUGAL, 2016). In addition, the use of resources such as 3D Printing, Artificial Intelligence (AI) and Augmented Reality devices is growing, given the effectiveness of these technologies in monitoring the execution of constructions. In this sense, the relevance of this work consists in the detailed analysis of the implementation of means of technology, which integrate the digital culture, on construction sites, as well as the benefits linked to some of these tools in the management and control of a work.

2 MATERIALS AND METHODS

This work consisted of an exploratory and descriptive bibliographic research aided by a case study. To the extent that articles in journals recently published (2015-2023) on the digital platforms Google Scholar and the *Scientific Electronic Library Online* – Scielo were searched, in order to provide greater contact with the topic addressed.

3 RESULTS

The accelerated and constant advancement of technology has caused movements in the most diverse sectors of the industrial field, impacting practically all areas of professional activity. Nowadays, the architecture, engineering and construction (AEC) industry is undergoing changes in its construction sites, ceasing to be a traditional environment and with its hierarchically constituted organization, becoming technological and autonomous sites (SCHIA et. al. 2019). Trying to understand this context and how the use of these digital tools optimizes production in civil construction, it is necessary to know the concepts of these new resources. Virtual Reality (VR) is a technology that is under a lot of discussion, as it is a simulation that aims to generate an environment that can be immersive by users, living the real world in a digitally controllable environment (LI et al., 2018). Another technology in which as VR develops, it also advances, is Augmented Reality (AR). It integrates virtual objects into the real world by generating these elements so that an augmented scene can be generated (LI et al., 2018). Applied in civil construction, the two technologies act in the presentation of the proposal to the client, offering him an experience in which a realistic contact with the project that is yet to be built is provided, that is, the user is inserted in the projection of the environment that will only materialize in the future. Another resource offered by the digital age that is on the rise is Artificial Intelligence (AI), which acts as a driver for the virtual transformation of industries, modifying the way operations are carried out within the production process (TEIXEIRA et, al., 2020). Continuing with the presentation of the technological means applicable to civil construction, *Unmanned Aerial Vehicles* (UAVs) are the terms referring to the so-called drones, characterized by an aircraft that is controlled by a pilot on the ground (TATUM; LIU, 2017). In the construction market, this resource is usable when it comes to surveys and measurements, offering a broader view of the site with images of the activities that are under development and those that have already been completed. On the agenda in the area of architecture, engineering and construction (AEC) since its inception, *Building Information Modeling* (BIM) is a work methodology that allows the integration of commands that brings appreciation of the product from its initial phase to completion. Therefore, it is a resource that allows the sector to reach high levels of productivity, making it more economical and compatible (LEUSIN, 2020). BIM is present in the market in several tools, where each *software* has its functionality and specific purpose for which it is intended, and it

is important to highlight that they can be used simultaneously in the same project. These are: Revit, AutoCAD Civil 3D, Infraworks, Navisworks, *Green Building Studio*, and Archibus. In addition, this modeling methodology has benefits in each dimension used, form (3D), time (4D), cost (5D), sustainability (6D) and management (7D). From this point of view, the company in question uses software to control the entry and exit of employees, where through a QR code it is possible to clock in, with facial recognition of the employee, avoiding possible fraud. In addition, the monitoring of activities takes place through drones, flying over the construction site and recording the construction processes in progress and those already completed, giving a broader view of how the construction is progressing. Along with this, the use of BIM projects allows a view of how the production of the work is going. Such tools prove to be effective in the control and management of works, enabling accurate decision-making and reducing costs and rework.

4 CONCLUSION

From what has been described, technological resources emerge as an ally of the construction industry, helping in the production of construction sites, increasing profits and reducing costs, eliminating losses. However, the application of these technologies still happens slowly, for this reason it is necessary for professionals in the field to realize that the use of these means guarantees the quality of the final result, increases customer satisfaction and allows technical growth.

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