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Editorial

Special Issue "Smart Manufacturing Systems for Industry 5.0: Challenges and Opportunities"

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In recent years, the focus on digital transformation has begun to push companies and society towards an epochal change that will require a complete overhaul of the culture, operations, technologies and value delivery of individual companies and of the entire society worldwide. The advent of the smart society augurs profound transformations in many industrial sectors, with applications from areas as disparate as economics and education. In this regard, Sułkowski et al. [1] analyze the impact of technology on changes in higher education, providing an indication of the model of future paths of education under the Economy 5.0 trend. Their results made it possible to design an explanatory study among students based on the CAWI methodology. The proposed model has uses for universities and training institutions in the field of the professionalization of the management of teaching and organizational processes. From this point of view, digital technologies will be a driving factor for the future of society 5.0. In fact, technological digitalization is profoundly influencing global society and all industrial sectors, as succinctly defined by D'Orazio et al. [2]. In their article, technological progress is analyzed from a specific point of view. In particular, the study analyze the synergies between the technological world of Industry 4.0 and the purely organizational and managerial domain of world-class manufacturing, a model of operational excellence. The objective is to relate the driving dimensions of the world-class manufacturing (WCM) system to the technological macrocategories of Industry 4.0. As stated by Cioffi et al. [3], the term "digital transformation" is by no means a recent trend, constituting the terrain of study and debate for years. The digital revolution is now our "present", belonging to the future no longer. Virtually any digital technology can play a role in an organization's digital transformation strategy. There are many different tooling processes that digital manufacturing utilizes, such as artificial intelligence, automation and robotics, additive technology, and human–machine interaction, as elaborated by Ortiz-Barrios et al. [4]. These tools are unleashing innovations that will change the nature of manufacturing itself. Thus, Alogla et al. define the key tasks of the digital transformation as promoting research into innovation, sustainable solutions, and sustainable lifestyles in a new digitalized society and business sector, as well as facilitating them via financial measures and social measures [5]. In this scenario, industry and academic leaders agree that digital-manufacturing technologies will transform every link in the manufacturing value chain, from research and development, supply chains, and factory operations to marketing, sales, and service provision. Furthermore, recently, a number of have identified several connections between smart manufacturing and sustainability. In that regard, Adrita et al. [6] presents a methodology for the identification of automation opportunities and elimination of manual processes via digitized data analyses. The method uses a hybrid combination of lean six sigma (LSS), CRISP-DM framework, and "pre-automation" sequence, techniques which address the gaps in each individual methodology and enable the identification and analysis of optimization processes in terms of automation. Emerging academic research is concerned with how the principles, practices, and enabling technologies of Industry 4.0 might unlock the potentials of circular economy

(CE) and sustainable manufacturing. Thus, finding the most appropriate conception of each reconfigurable piece of equipment that composes an eco-smart manufacturing system is challenging because every system is unique in the context of an enterprise's business model and technological focus as defined by Brad et al. [7]. Digitalization and the use of big data are seen as key enablers of increased sustainability and the implementation of a circular economy. In particular, the article by Castro-Martin [8] discusses how connectivity facilitates the development of smart manufacturing capabilities through the incorporation of I4.0 principles and resources that in turn improve the computing capacity available to machine controls and edge devices. The correct way to think about digital transformation is to continuously adapt to a constantly changing environment. Zhou et al. defined the goal of such effort as being to develop a technical and operational foundation in order to evolve and respond as best as possible to local or global events, market conditions and to unpredictable and ever-changing customer expectations [9]. In addition, studies like the work of Xue et al. [10] highlight that companies adopt integrated and innovative methodologies to make cultural and operational changes that better adapt to the changing demands of digital transformation. In their paper, the construction of an intelligent risk prevention system for the marine silk road is analyzed. Conversely, Neira-Rodado et al. [11] proposed a smart product design process through the implementation of a Fuzzy Kano-AHP-DEMATEL-QFD approach. It is important to note that in the context of digitalization, the human-centric design of cyber–physical production systems (CPPS) is a very promising field of research, as illustrated analyzed by Longo et al. [12]. Their paper argues that a value-oriented and ethical mode of technology engineering in Industry 5.0 is an urgent and sensitive topic, as demonstrated by a survey administered to industry leaders from different companies. The value-sensitive design (VSD) approach is proposed as a principled framework to illustrate how technologies enable human–machine symbiosis in the factory of the future can be designed to embody elicited human values and to illustrate actionable steps that engineers and designers can take into account in their design projects. Therefore, it is believed that the analysis of the productivity and reliability of the machining line in the context of human–centric design will be the frontier of future research as defined by Barosz et al. [13]. It is clear that for any digital transformation to be truly efficient, it is not enough to adopt new technologies. Transformation should occur in all aspects of an organization in order to achieve optimal impact. Digital transformation implies a redesign of processes and must be accompanied by a change in management process. It is reasonable to think that there will still be much to study and investigate in the field of digital transformation. The future will help us understand the details of this "great" transformation, value and competitiveness for all productive and service sectors.

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