

Editorial

Special Issue on Industrial Management and Engineering in the Fourth Industrial Revolution

Sergio Gallego-García ^{1,*}  and Manuel García-García ^{2,*}

¹ Industrial Engineering Technologies of the International School of Doctorate, National Distance Education University (UNED), 28040 Madrid, Spain

² Department of Construction and Fabrication Engineering, National Distance Education University (UNED), 28040 Madrid, Spain

* Correspondence: sgallego118@alumno.uned.es (S.G.-G.); mggarcia@ind.uned.es (M.G.-G.); Tel.: +34-682-880-591 (S.G.-G.)

The topic of the Special Issue, Industrial Management and Engineering, covers the research and practical background that has shaped our society since the beginning of the first industrial revolution. The impacts of the industrial revolutions have improved our human wellbeing in levels that were not thinkable even decades ago. Moreover, this research field is and will be of great importance for the sustainable development of the fourth industrial revolution while moving towards a holistic consideration of the human factor in organizations in a fifth industrial wave while considering the increasing uncertainties in global value chains.

To address these developments, this Special Issue aimed to collect and present integrated approaches to increase organizational capabilities and apply new industrial engineering methods and technologies to deal with current and future challenges. As a result, the fourth industrial revolution is analyzed as an opportunity for researchers and practitioners to generate concepts, methods, tools, and systems from the design to the end of the product and service life cycles to increase organizational competitiveness and to secure viability in the long term. These developments seek to provide a toolbox for this purpose, considering the human factor as a core element with the goal is to increase the efficiency of manufacturing and assembly companies, as well as service organizations and their related environments. Furthermore, the Special Issue presents a cutting-edge application of techniques for validating and developing the models and systems ranging from digital twin design, simulation, data analytics, generation, and management of multiple databases, as well as the deployment of quality management techniques. In the next paragraph a short review for each contribution is presented.

Gallego-García et al. [1] presented a method for enabling procurement planning adapted to suppliers' behavior and the related risks for procurement based on the appropriate selection of procurement order quantities. Reschke and Gallego-García [2] developed a holistic model that serves as the basis for the integral management and control of manufacturing systems in digital twin models. Groten and Gallego-García [3] developed a systematic improvement model for the integration of relevant improvement strategies for the design and optimization of manufacturing organizations that serves as basis for the sustainable integration of relevant improvement strategies with Industry 4.0 technologies. Winkler et al. [4] reported the modeling of manufacturing organizations for optimizing their design, management, control, and continuous improvement by considering all functions and their assignment to specific areas and employees enabling the identification of improvement potentials leading the way towards the fifth industrial revolution with the integration of the human factor in Industry 4.0 environments, based on a detailed review of the industrial revolutions. Winkler et al. [5] proposed a management model for increasing the satisfaction level of society that mobility needs applied to air mobility and service-oriented on-demand air mobility by modeling the aircraft units between different vertiports within a



Citation: Gallego-García, S.; García-García, M. Special Issue on Industrial Management and Engineering in the Fourth Industrial Revolution. *Appl. Sci.* **2022**, *12*, 7866. <https://doi.org/10.3390/app12157866>

Received: 2 August 2022

Accepted: 4 August 2022

Published: 5 August 2022

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given region, considering mobility needs, capacity constraints, maintenance, and charging needs. Gallego-García et al. [6] extended the basic integration framework of [3] to increase the long-term sustainability of manufacturing organizations, thanks to a novel model for the integration of improvement strategies, such as lean manufacturing and six sigma, among others, and Industry 4.0 related technologies, while deriving an optimized sequence model for Industry 4.0 technologies, the GUVET-Model, as well as for the dynamic evaluation for defining optimization alternatives aligned with organizational goals. Gejo-García et al. [7] applied and simulated the conceptual model of [2] to manufacturing systems for their management and control, considering all the related areas, flows and factors in digital twin models for optimized regulation of process stability and quality with maintenance strategies for future industrial service-related business models. Gejo-García et al. [8] developed a novel methodology for project management applicable for self-protection plans for public buildings, based on the best practices of technologies, systems, and methods. Florescu and Barabas [9] proposed a conceptual approach to correlate the lean management system with the innovative technologies of Industry 4.0 and then applying it for the optimization of a flexible production system by means of simulation. Retuerta-Martínez et al. [10] proposed a model for designing and implementing self-protection plans for public buildings to enhance the adaptability of self-protection plans for elderly residences. Finally, Gallego-García et al. [11] generated a Dynamic Innovation Information System (DIIS) for optimized planning and decision making thanks to the dynamic evaluation of innovations over their life cycle, applying a methodology for digital ecosystems in the fourth industrial revolution and an innovation management model based on the viable system model that aims to lead to a new management era with adaptability mechanisms oriented to organizational goals.

As a result, a total of eleven papers in various fields of industrial management and engineering are presented in this Special Issue, including supply chain management [1,4,11], manufacturing and assembly systems [2,4,7], production management [1,3], information management [1,5,11], business transformation [3,4,6,9,11], industry 4.0 related technologies [3,4,6,7,9,11], service management [2,5,8,10], human factor engineering [4,8,10], strategic management [4,6,11], sustainability [4,6,8,10,11], and project management [3,6,8,11]. Regarding the sectors in which the papers addressed the topics: many of them developed generic conceptual approaches [1–6,8–11] and then applied in different sectors, such as metallurgical [7], aviation [5], health [8,10], construction [8], component manufacturer [1,9], industrial services [2], or in generic case studies applicable to any organization [3,4,6,11].

To sum up, the Special Issue exposes how matching industrial and service capabilities and society needs is challenging for organizations. In this context, the set of research contributions contribute to overcoming current and future challenges for organizations and society by focusing on new models, methods, systems, and technologies that enable the continuous improvement of industrial and service organizations within the fourth industrial revolution and towards a greater human factor consideration in a fifth industrial revolution. In this context, the Special Issue has served as a platform to promote the internationalization of results in this field of great relevance and importance around the world; even more when considering the recent uncertainties from supply shortages, pandemics, disasters, economic, energy crises, etc. Therefore, the Special Issue provides a scientific advancement to current practical and research areas while also fulfilling the aims initially proposed. In addition, it has already attracted great attention with almost 10,000 Special Issue's views, with several papers with more than 1000 full-text views, as well as with various papers that have already been cited several times. Finally, to further develop the Special Issue's topic, we encourage the scientific community to address current and future challenges with new models, methods, systems, and technologies.

Author Contributions: Conceptualization, M.G.-G. and S.G.-G.; methodology, M.G.-G. and S.G.-G.; validation, S.G.-G.; formal analysis, S.G.-G.; investigation, S.G.-G.; writing—original draft preparation, S.G.-G.; writing—review and editing, S.G.-G.; visualization, S.G.-G.; supervision, M.G.-G. and S.G.-G. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Acknowledgments: We would like to express our gratitude to all the staff and people involved in this Special Issue.

Conflicts of Interest: The authors declare no conflict of interest.

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