

Guest Editorial: Technology Management in Digital Transformation Era

AS THE Fourth Industrial Revolution emerged and universally applied, digitalization has become a necessity and driving force for almost all organizations in today's world while engineering and technology management has constituted the basic tools for organizations to gain competitive advantage and survive. The era has dramatically affected almost all institutions and organizations in a wide range from strategic effects and operational efficiency, business models to employee competencies, and provided a multitude of new opportunities as well as challenges.

The main objective of this special issue is to address new approaches, frameworks, methods, and advances in existing techniques, which shed light on the current situation and future of engineering and technology management in the digital age. The special issue discusses the latest developments in engineering and technology management, which play an important role in digitalization, especially in the business world, academic environment, and social life, as well as emerging technologies, methodologies, and techniques in the era.

The special issue invited an extended version of high-quality papers from the Engineering and Technology Management Summit organized jointly by Istanbul Technical University and Bahcesehir University, on October 2019, as well as regular papers from experts and academicians in business and academic environments.

Venter and Grobbelaar [A1] deal with the technology management capabilities (TMC) perspective and technology platforms. In their article entitled "A technology management capabilities framework for technology platforms," the authors propose a management tool to design, develop, and implement a technology platform and its surrounding ecosystem by adopting the TMC in a management framework.

The study "A novel proactive-reactive scheduling approach for the quay crane scheduling problem: A VUCA perspective," by Chargui et al. [A2], proposes an approach based on a novel quay crane scheduling problem reliability assessment formula. The authors have employed a proactive iterated local search (ILS) algorithm incorporated with the reliability formula, an exact method, and real-time reactive simulations for solving the quay crane scheduling problem.

The study entitled "A digital strategy development framework for supply chains" emphasizes the necessity of a unique strategy

formulation process for the digitalization of manufacturing supply chains [A3]. In their article, Ho et al. formulate a novel strategy development framework for digital supply chains.

The paper, "An orchestration framework for digital innovation: Lessons from the healthcare industry," by Satwekar et al., deals with the digital innovation management process [A4]. By focusing on the healthcare industry, the authors develop a framework in the pursuit of digital innovations in a phase-appropriate and incremental setup.

Lis et al. [A5] address data governance based on a case study in their paper entitled "An investigation of antecedents for data governance adoption in the rail industry – Findings from a case study at Thales." The authors focus on antecedents in the adoption of data by using IT governance and organizational theory and propose a new antecedent considering the dynamics of engagements in the respective ecosystem setting.

The study "Solar energy investment valuation with intuitionistic fuzzy trinomial lattice real option model" uses a fuzzy logic approach for the evaluation of investments [A6]. Ugurlu et al. develop an intuitionistic fuzzy trinomial lattice real option valuation model and a solar energy investment project.

The paper "The impact of return disposal on order variance in a hybrid manufacturing and remanufacturing system" by Ata and Corum studies the impact of return disposal on production order variance in a hybrid production system with both manufacturing and remanufacturing options [A7]. Using discrete event simulation, push- and pull-disposal inventory control strategies are compared in terms of production order variance, which causes the bullwhip effect.

The paper "A novel technology intelligence tool based on utility mining," by Altuntas and Sezer, highlights the limited technological intelligence tools for the usage of companies to achieve sustainable development in today's digital age [A8]. The authors developed a novel technology intelligence tool using patent analysis and utility mining.

The research paper "Technology management in the age of digital technologies" by Cetindamar and Phaal focuses on the impact of digital technologies on the technology management area [A9]. By searching digital-technology-based changes, the authors propose an expanded technology management framework for future theoretical and applied research in the area.

The article, entitled "A policy design framework on the roles of S&T Universities in innovation ecosystem" by Yildirim and Tuncalp, highlights the importance of university-based innovation and entrepreneurship ecosystems in establishing links

between the actors of triple helix ecosystems in the era of digital transformation [A10]. In the study, the authors develop a policy design framework that offers actions to improve S&T universities' engagement and contribution to innovation and entrepreneurship ecosystems to handle the challenges of digital transformation.

The paper "Quantum computing at an inflection point: Are we ready for a new paradigm" by Bhasin and Tripathi, evaluates the tipping points of the quantum computers in the organization, the barrier to adoption, and a mitigation strategy [A11]. The study involves an extensive literature review of the current state and future application expectations from quantum computers, and it discusses the barriers to adopt quantum computing.

In the paper, "Detecting product review spammers using principles of Big Data" by Rout et al., a rating-based model has been studied under the light of large-scale datasets using the Hadoop and Spark frameworks [A12]. Scale effects have been identified and mitigated to provide better context to large review systems. An improved computational framework has been presented to compute the overall spamcity of reviewers using exponential smoothing.

We hope that the special issue provides valuable theoretical and practical insights into technology and engineering management area in the digital transformation era. We would like to express our appreciation to all reviewers for their valuable and timely work that contributed to the selection of high-quality articles and the improvement of the quality of the manuscripts. We also would like to thank the Editor-in-Chief, Prof. Tugrul Daim for the opportunity provided to us to publish this special issue.

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APPENDIX: RELATED ARTICLES

- [A1] S. Venter and S. Grobbelaar, "A technology management capabilities framework for technology platforms," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2558–2573, Jul. 2023, doi: [10.1109/TEM.2022.3172720](https://doi.org/10.1109/TEM.2022.3172720).
- [A2] K. Chargui, T. Zouadi, V. R. Sreedharan, A. E. Fallahi, and M. Reghioui, "A novel proactive–reactive scheduling approach for the quay crane scheduling problem: A VUCA perspective," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2594–2607, Jul. 2023, doi: [10.1109/TEM.2022.3151842](https://doi.org/10.1109/TEM.2022.3151842).

- [A3] W. R. Ho, N. Tsolakis, T. Dawes, M. Dora, and M. Kumar, "A digital strategy development framework for supply chains," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2493–2506, Jul. 2023, doi: [10.1109/TEM.2021.3131605](https://doi.org/10.1109/TEM.2021.3131605).
- [A4] A. Satwekar, T. Volpentesta, P. Spagnoletti, and M. Rossi, "An orchestration framework for digital innovation: Lessons from the healthcare industry," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2465–2479, Jul. 2023, doi: [10.1109/TEM.2022.3167259](https://doi.org/10.1109/TEM.2022.3167259).
- [A5] D. Lis, M. Arber, M. Spindler, and B. Otto, "An investigation of antecedents for data governance adoption in the rail industry . Findings from a case study at Thales," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2528–2545, Jul. 2023, doi: [10.1109/TEM.2022.3166109](https://doi.org/10.1109/TEM.2022.3166109).
- [A6] H. Y. Ersen, O. Tas, and U. Ugurlu, "Solar energy investment valuation with intuitionistic fuzzy trinomial lattice real option model," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2584–2593, Jul. 2023, doi: [10.1109/TEM.2022.3153960](https://doi.org/10.1109/TEM.2022.3153960).
- [A7] M. Ata and A. Corum, "The impact of return disposal on order variance in a hybrid manufacturing and remanufacturing system," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2574–2583, Jul. 2023, doi: [10.1109/TEM.2021.3127755](https://doi.org/10.1109/TEM.2021.3127755).
- [A8] S. Altuntas and M. Sezer, "A novel technology intelligence tool based on utility mining," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2480–2492, Jul. 2023, doi: [10.1109/TEM.2021.3101582](https://doi.org/10.1109/TEM.2021.3101582).
- [A9] D. Cetindamar and R. Phaal, "Technology management in the age of digital Technologies," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2507–2515, Jul. 2023, doi: [10.1109/TEM.2021.3101196](https://doi.org/10.1109/TEM.2021.3101196).
- [A10] N. Yıldırım and D. Tunçalp, "A policy design framework on the roles of S&T Universities in innovation ecosystem," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2608–2625, Jul. 2023, doi: [10.1109/TEM.2021.3106834](https://doi.org/10.1109/TEM.2021.3106834).
- [A11] A. Bhasin and M. Tripathi, "Quantum computing at an inflection point: Are we ready for a new paradigm," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2546–2557, Jul. 2023, doi: [10.1109/TEM.2021.3103904](https://doi.org/10.1109/TEM.2021.3103904).
- [A12] J. K. Rout, A. Dalmia, S. K. Rath, B. K. Mohanta, S. Ramasubbareddy, and A. H. Gandomi, "Detecting product review spammers using principles of Big Data," *IEEE Trans. Eng. Manage.*, vol. 70, no. 7, pp. 2516–2527, Jul. 2023, doi: [10.1109/TEM.2021.3097805](https://doi.org/10.1109/TEM.2021.3097805).