Guest editorial: Digital Transformation Strategy and Impacts During Emergency Situations

1. Introduction

The contemporary world faces highly complex and disruptive situations and events affecting people, organizations, and society (Gümüsay et al., 2020). For instance, natural disasters and epidemic outbreaks are challenging organizations at all levels, and these are reacting to such external constraints by constantly developing and implementing unprecedented strategies (Fosso Wamba et al., 2021; Queiroz, Fosso Wamba, et al., 2022). Such contexts can generate emergencies, which are related to events or conditions that offer a potential risk to living beings, the environment, organizations, and society (Fosso Wamba et al., 2021).

In this regard, to face such situations, one of the top-notch arsenals that are taking the attention of organizations and institutions today is digital transformation (DT). The DT is a widespread concept that refers to the digitization of activities and the digitalization enabling improvements in the business processes model by integrating cutting-edge information and communication technologies (ICTs), people, and organizations (Queiroz & Wamba, 2022).

In this respect, DT is capturing the attention of decision-makers and organizations worldwide. In this vein, decision-makers have understood that DT is a vital weapon to fight against disruptive situations and events while minimizing their impacts on society. Besides, organizations are triggering DT to improve their business process and performance, create business value in challenging times, and gain competitive advantage (AlNuaimi et al., 2022; Baptista et al., 2020).

1.1. Aims and Scope of the Special Issue

Although the advances in the DT literature and related fields, more light must be thrown on the importance, strategies, and capabilities of DT during emergencies (Fosso Wamba et al., 2021). For instance, little is known about its interplay with various problematic contexts, such as pandemic/epidemic outbreaks, war risks, acts of terrorism, biological and nuclear accidents, emergencies at sea, flooding, tornados, tsunami, drought, food insecurity, etc.

In line with the interdisciplinarity of the Industrial Management & Data Systems (IMDS) journal, this Special Issue (SI) was focused on exploring the digital transformation phenomenon from different angles, with particular attention on the interplay between

operations management, supply chain, and information systems related fields, during emergencies and environmental uncertainty contexts. Thus, this SI aims to inspire debate and discussion with scholars, practitioners, and decision-makers working on governments by reporting the finest science and valuable practical and policy insights to advance the literature, practices, and policy formulation.

2. Selected papers in this special issue

After a competitive process involving various rounds, senior reviewers, associate editors, editors-in-chief, and authors from academia and industry, 15 papers were selected for this special issue. Table 1 summarizes the papers covering several emergency and uncertainties contexts by exploring different features of the digital transformation phenomenon.

The paper of Dohale et al. (2022) investigates how Industry 4.0 technologies can support an organization's competitive advantage and simultaneously mitigate the damage of emergency disruptions. They interviewed experts and text mining extraction to propose a novel framework to help implement the Industry 4.0 manufacturing strategy. The proposed framework can support practitioners in their Industry 4.0 strategies, considering normal and emergency situations contexts.

The work by Guan et al. (2022) explores the role of digital technology in Research and Development (R&D) investment and performance, considering organizational resilience during COVID-19. The authors analyzed Chinese firms listed in the Shanghai and Shenzhen markets. Using the regression analysis technique, they showed that resistance to the pandemic outbreak resulted from the prior R&D investment. Accordingly, R&D's higher prior investment creates higher levels of digital technology, supporting the firm's resilience. Also, the paper highlights the differences between the size of the firms considering the advantage of strategic flexibility to technological changes. Furthermore, they report the mediation effect of digital technologies in the relationship between R&D investment and firm performance.

The study of Yang (2022) examines the changes in the ICT industry and global value chains (GVC), considering the pre and post-COVID-19 pandemic. The author analyzes the causalities between ICT imports and exports of goods and composite indexes powered by the Korean government. The article reports three main changes in the ICT industry of Korea, considering the post-COVID-19 (i. the exponential growth of contact-free technologies and non-face-to-face; ii. Reconfiguration of the GVC due to the changes from the USA and China relationship; and iii. The GVC of the ICTs operates in a flexible model, affected by the country's competition and cooperation dynamics).

The next paper is from Zhan et al. (2022). The authors study manufacturing servitization taking into account the digital economy context and dynamic capabilities. Their research framework considered contingency factors such as firm ownership, lifecycle stage, and uncertainty. By applying the fuzzy-set qualitative comparative analysis (fsQCA) approach, they analyzed a longitudinal dataset of China-listed manufacturing firms associated with servitization. They highlight different configurations of the manufacturing servitization performance. Accordingly, the success of the servitization because of the digital economy relies on the interplay between dynamic capabilities and contingency factors.

The work by Dubey (2022) investigates the potential of digital technologies to support the emergency supply chain, considering visibility and collaboration. Also, the author explores the moderating effect of crisis leadership. Supported by the contingent resource-based view, the author proposes a conceptual model tested employing the PLS-SEM approach, using data from Indian NGOs. The paper results show that when moderated by crisis leadership, digital technologies significantly affect information visibility and collaboration in humanitarian emergency supply chain operations.

In the article by Lee et al. (2022), a digital transformation-driven framework is proposed. The authors explore the public health risk response context and how digital technologies can support innovative systematic governance. They used complex systems in emergency management and interpretive research to develop the framework. The authors used a case study in China to exemplify the framework. The proposed framework, namely "Expected digital-enabled emergency management," can support key stakeholders' emergency governance, response, integration, collaboration, and engagement.

The study by Nigam et al. (2022) examines consumers' impulse purchasing behavior during the COVID-19 pandemic. The authors highlight the behavior of consumers in shopping for products at home and the implications to retailers managing the offline and omnichannel. They explore blockchain's role in supporting retailers' sales, considering permission marketing for impulse products. The authors adopt a qualitative approach through interviews with consumers and retailers. By a thematic analysis, they present three themes: i. conscious impulse from customers; ii. the unconscious impulse from customers; and iii. retailer's viable solution. Finally, the authors point out that retailers can use blockchain for permission marketing strategies.

The paper from Lu et al. (2022) investigates if intelligent manufacturing improves the performance of firms, taking into account ambidextrous capabilities. The authors collected data from 2,091 manufacturers of Chinese listed companies. Using the practice-based view and a quantitative approach, they report the positive effect of intelligent manufacturing on

performance. Also, the paper shows that intelligent manufacturing can empower the firms' capabilities, considering ambidextrous, exploit, and explore capabilities. Besides, they show that exploring capability can generate different effects on the firm performance in the short and long terms.

From an innovation theory perspective, Hashimy et al. (2022) examine the adoption of blockchain determinants in the context of Spanish public goods firms. The authors integrate the technological, environmental, and organizational (TOE) framework with the technology acceptance model (TAM) to develop a conceptual framework. The study employs a structural equation model (SEM) to test the model. On the one hand, the study reveals the positive influence that top management support, relative advantage, competitive pressure, and competence play on the blockchain adoption intention. On the other hand, the authors report the negative effect the intention to adopt exerts on adoption.

The paper by Tan et al. (2022) explores the semiconductor industry through the connection between blockchain visibility, supply chain integration, and supply chain performance. They developed a research model tested using PLS-SEM, with data collected between Malaysia's operations and supply chain managers. The results show the importance of supply chain integration as a mediator in the relationship between blockchain visibility and supply chain performance. In addition, by an importance-performance matrix analysis, the authors highlight the minor role that IT plays in the model.

The study of Rauniyar et al. (2022) investigates strategies to supply chain risk reduction founded on innovation and blockchain-enabled digital transformation. The authors adopt a qualitative approach by performing interviews with supply chain practitioners. Using a thematic analysis procedure, they identify different types of risks, such as information, cybersecurity, operational, financial, catastrophic, political, and economical. The authors propose a framework for supply chain risk mitigation through integrating innovation and blockchain.

Maroufkhani et al. (2022) examine the determinants of big data analytics adoption considering small and medium-sized enterprises (SMEs) context. The authors develop a research model based on the TOE framework. To test the model, they employ the PLS-SEM approach to analyze data collected between Iranian SMEs. The results reveal that top management support plays an important mediation effect. Moreover, the study points out the moderation effect that environmental factors exert on big data analytics adoption.

The article by Zhang et al. (2021) explores the effectiveness of drones in emergency situations. The authors used a hybrid-multi-criteria approach by integrating the fuzzy analytical hierarchy process (AHP), fuzzy analytical network process (ANP), fuzzy Decision-Making Trial and Evaluation Laboratory (DEMATEL), and Best Worst. Also, they propose a

novel ensemble ranking technique. They tested the models considering firefighting operations in high-rise buildings and the role of logistics support. The paper highlights the importance of quantifying the drone's utilities and capabilities in disaster recovery and logistics help in emergency situations.

The study by Johnson et al. (2021) proposes an artificial intelligence solution to support the government and agencies in medical emergency response related to opioid overdose. The authors apply design science research to develop an AI framework to predict the survival rates of opioid overdose. The study shows that the proposed solution can help different actors from the government and industry map, identify and plan effective responses and policies to this emergency situation.

Finally, the paper by Majumdar and Singh (2021) investigates the behavior of IT firms regarding the COVID-19 pandemic risks at the beginning, the communication with participants in the capital market, and the impact on information asymmetry. The paper analyzes annual reports of USA-listed firms on the Securities and Exchange Commission website. The authors use a text analytics approach to assess disclosures of the risk sentiment of COVID-19. The results reveal that the information asymmetry of the firms is improved when there is communication about the emergency situation in the annual reports, which in turn tranquilizes investors.

Table 1. Overview of the papers accepted in the special issue

Title of the paper	Authors	Research context	Research method/approach	Key findings/contributions
Manufacturing strategy 4.0: a framework to usher towards industry 4.0 implementation for digital transformation	Dohale et al. (2022)	Industry 4.0 technologies to support competitive advantage and mitigate the disruptions of emergency situations in the manufacturing context	• Experts interviews • Text mining	• Development of a framework based on Industry 4.0 to support manufacturing strategy to support the firm's competitiveness during emergencies and normal contexts
Organizational resilience under COVID-19: the role of digital technology in R&D investment and performance	Guan et al. (2022)	Digital technology in R&D investment and performance, considering organizational resilience during the COVID-19 emergency situation	• Listed firms in China's Shanghai and Shenzhen markets • Regression analysis	• Prior R&D investments can support the firms' resistance during an emergency situation like COVID-19. • R&D has higher prior investment, supports higher levels of digital technology, and supports the firm's resilience
A study on the changes in the ICT industry after the COVID-19 pandemic	Yang (2022)	Changes in the ICT industry and global value chains (GVC), before and after COVID-19	• Korean government composite indexes • Causality analysis	• The exponential growth of contact-free technologies and non-face-to-face. • Reconfiguration of the GVCs. • The operation of the GVCs of the ICTs is affected by the competition and cooperation of the countries
Manufacturing servitization in the digital economy: a configurational analysis from dynamic capabilities and lifecycle perspective	Zhan et al. (2022)	Manufacturing servitization in the digital economy, considering dynamic capabilities and contingency factors such as environmental uncertainty	• Longitudinal dataset of China-listed manufacturing firms • fsQCA	• The manufacturing servitization performance can be achieved by a set of different configurations, considering the relationship between dynamic capabilities and contingency factors
Unleashing the potential of digital technologies in the emergency supply chain: the moderating effect of crisis leadership	Dubey (2022)	Digital technologies to support the emergency supply chain in the humanitarian supply chain	• PLS-SEM • India NGOs	• The moderation of crisis leadership on digital technologies plays a significant effect in information visibility and collaboration in humanitarian relief operations

A digital transformation-enabled framework and strategies for public health risk response and governance: China's experience	Lee et al. (2022)	Public health risk response	• Interpretive research • Case study	• Development of the framework "Expected digital-enabled emergency management," which can support emergency actions from different stakeholders
Impulse purchases during emergency situations: exploring permission marketing and the role of blockchain	Nigam et al. (2022)	Consumer's impulse purchases during the COVID-19 and the retailer's implications	• Interviews • Thematic analysis	• Empirical analyses of the effects of COVID-19 on purchase behavior • Blockchain is a technology to aid retailers in swift trust and trust-based marketing
Can intelligent manufacturing empower manufacturing? – an empirical study considering ambidextrous capabilities	Lu et al. (2022)	Intelligent manufacturing and its contribution to manufacturing performance, taking into account ambidextrous capabilities	• Chinese listed manufacturers • Quantitative approach	• Intelligent manufacturing can improve a firm's performance. • Also, intelligent manufacturing can improves the firm's capabilities with ambidextrous capabilities. • Technologies are feasible to be used as strategies
Determinants of blockchain adoption as a decentralized business model by Spanish firms – an innovation theory perspective	Hashimy et al. (2022)	Determinants of blockchain adoption, considering the integration between technological, organizational, and environmental factors with technology acceptance model	• PLS-SEM	• Blockchain's intention to adopt is influenced by top management support, relative advantage, competitive pressure, and competence • Surprisingly, blockchain's intention to adopt causes a negative effect on the adoption
Nexus among blockchain visibility, supply chain integration, and supply chain performance in the digital transformation era	Tan et al. (2022)	Association of blockchain visibility, supply chain integration, and supply chain performance in Malaysia's semiconductor industry	• PLS-SEM	• Blockchain visibility can promote supply chain performance. • IT seems a challenge to perform in the last positions of the priorities related to improvements
Risk management of supply chains in the digital transformation era: contribution and challenges of blockchain technology	Rauniyar et al. (2022)	Supply chain risk management and the role of blockchain	• Interviews • Thematic analysis	• Identification of internal and external risks

				• Development of a framework that integrates innovation and blockchain to mitigate supply chain risk
Determinants of big data analytics adoption in small and medium-sized enterprises (SMEs)	Maroufkhani et al. (2022)	Determinants of the big data analytics adoption in SMEs taking into account technological, organizational, and environmental factors	• PLS-SEM	• Top management support exerts an important influence as a mediator variable • Environmental factors play a relevant influence as a moderator on big data analytics adoption
Evaluating the effectiveness of drones in emergency situations: a hybrid multi-criteria approach	Zhang et al. (2021)	Drone's effectiveness in firefighting and logistics support emergency situations	• Hybrid-multi criteria (AHP, ANP, DEMATEL, best worst • Use-case	• Novel ensemble ranking technique • Drones utilities and capabilities measuring is essential to support disaster recovery emergency situations
Digital transformation to mitigate emergency situations: increasing opioid overdose survival rates through explainable artificial intelligence	Johnson et al. (2021)	Artificial intelligence to support the medical emergency response to opioid overdose situations	• Design science research	• AI framework to predict the survival rates of opioid emergency response
Analysis and impact of COVID-19 disclosures: Are IT services different from others?	Majumdar and Singh (2021)	Analysis of the IT service firm's disclosures considering the impact of COVID-19	• Reports of the USA-listed firms in the Securities and Exchange Commission • Text analytics	• The information asymmetry of the firms is improved when there is effective communication about the emergency situation in reports

3. Looking back and moving forward: future research directions exploring the digital transformation during emergency situations

Although the recent emergence of the digital transformation field has increased rapidly in the last few years, different types of emergency situations are rising (Fosso Wamba et al., 2021; Queiroz, Ivanov, et al., 2022). The papers in this SI can significantly contribute to scholars, practitioners, government, and policymakers. From this perspective, considering the rapid growth and popularization of digital transformation initiatives, as well as the frequency and complexities of emergency situations and environmental uncertainties, there are some opportunities for key topics to be explored by academia, industry, and government:

- Digital transformation and its contribution to policy formulation to support intermittent emergency situations (i.e., pandemic outbreaks, humanitarian crises, etc.).
- Policy research associated with digital transformation to understand and make effective responses considering simultaneous and intertwined crises (i.e., war risks, climate changes, etc.).
- The role of cutting-edge technologies like metaverse supporting firms, supply chains, and the government during all stages of the crises.
- Leveraging the integration of human resources with technologies to improve the plan's efficiency and response in the pre and post-stages of emergency situations.
- Develop frameworks that can integrate technology, organizations, and people to provide constant and real-time monitoring of emergency situations in a disrupted world.

4. Final remarks

This editorial presented some aspects of the digital transformation strategy's relevance, including technology, organizations, and people, and the impacts during emergency situations and environmental uncertainties. Emergency situations happen several times daily and have grown in frequency in the last few years. Because of this, this SI explored the digital transformation phenomenon and its potential contributions to supporting firms, supply chains, and the government during these situations. Thus, by a competitive process, we selected 15 papers to integrate this SI. On the one hand, the papers cover different emergency situation-related contexts. On the other hand, because of the contemporary influence of COVID-19, several papers in this SI explored its impacts and the role of digital transformation in responding to and minimizing the effects. Finally, we provide some insightful research directions considering scholars, practitioners, and government.

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