

Editorial Introduction to Issue 43 of CSIMQ: Data-Driven Approaches for Complex Dynamic Environments

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The rapid evolution of digital technologies continues to reshape complex systems across diverse domains. Business ecosystems, supply chains, consumer behavior, and environmental monitoring are domains where organizational and technological change have been constant over the years. This issue of Complex Systems Informatics and Modeling Quarterly (CSIMQ) presents five cutting-edge studies using data-driven approaches to address challenges in these areas. Through these contributions, the articles offer systematic reviews, advanced decision-making frameworks, psychological issues modeling, computational justice, and IoT innovations, advancing theoretical understanding and practical solutions for managing complexity in dynamic environments. Together, the articles contribute to the interdisciplinary mission of CSIMQ by bridging informatics, modeling, and systems thinking to drive innovation.

In their review article *“Business Ecosystem Profiling Visualization with Data Analytics: A Review”*, Minnu Helen Joseph and Timo Kärri explore the role of data analytics in profiling business ecosystems. The authors perform a systematic literature review to synthesize frameworks for profiling and visualizing ecosystem dynamics. These frameworks integrate data analytics and visualization tools such as network analysis and interactive dashboards. Their study also highlights how these tools transform complex data into actionable insights for market analysis, risk management, and strategic decision-making. In order to deal with the interconnected nature of business ecosystems, the authors address semantic ambiguities and data integration challenges and provide a comprehensive foundation for researchers and practitioners.

The next article of the issue, written by Fadoua Tamtam and Amina Tourabi, entitled *“Advancing Digital Supply Chains through Generative AI: A Strategic Framework with the ELECTRE III Method”*, employs the ELECTRE III multi-criteria decision-making methodology inspired framework to investigate the optimization of digital supply chains. Their study ranks AI-driven initiatives within DHL’s logistics operations, such as IoT integration, predictive analytics, and blockchain, based on performance metrics such as cost efficiency and real-time tracking. Their findings reveal that IoT-driven real-time tracking and predictive maintenance offer the greatest benefits for resilience and efficiency. This work provides practical guidance for industry stakeholders in intelligent supply chain management.

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In “*Fear of Missing Out (FoMO) and Preferential Hunting Behavior on E-Commerce Platforms: A Case Study of Shopee and Lazada*”, Nguyen Duy Phuong et al. examine the psychological drivers of consumer behavior in e-commerce, focusing on Fear of Missing Out (FoMO) and preferential hunting behavior (proactive deal-seeking) on Shopee and Lazada platforms in Vietnam. The study integrates FoMO theory, scarcity theory, and social influence theory using a structural equation model to demonstrate how FoMO shapes deal-seeking intentions through perceived scarcity, benefits, and consumer sentiment. With effects moderated by social influence and online shopping experience, the findings offer a nuanced understanding of consumer psychology, providing e-commerce platforms with strategies to design psychologically attuned promotions.

Juan Pablo Ospina and Joaquín Fernando Sánchez in “*A Computational Justice Model for Dynamic Resource Allocation in Ad Hoc Networks*” propose a computational justice model for dynamic resource allocation in ad hoc networks. The authors develop a novel framework to address fairness and efficiency in decentralized systems, thereby tackling challenges of scalability and adaptability. Their model leverages computational techniques to ensure equitable resource distribution, offering implications for designing ad hoc networks in dynamic environments. This study contributes to the field by introducing a rigorous approach to balancing justice and performance in complex network systems.

Finally, Pooja N. Sawant et al. in “*Internet of Things Enabled Low-Cost and Portable Multi-Parameter Water Quality Testing System for Environmental Monitoring Applications*” tackle the problem of environmental monitoring applications by presenting a portable system for multi-parameter water quality testing. Their work shows how IoT technologies can deliver low-cost, real-time, accessible solutions for assessing water quality parameters such as turbidity, pH, temperature, and conductivity. The study addresses a critical sustainability challenge by emphasizing affordability and portability. It offers practical tools for environmental management, supporting ecological resilience through accessible, data-driven technologies.

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