

# **Crisis-Driven Transformation: Lean, Agile, and Leagile Approaches to Operational Excellence and Supply Chain Resilience**

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## **Abstract**

Global crises, particularly the COVID-19 pandemic, have exposed significant vulnerabilities in production and supply chains. During this period, lean production played a critical role by reducing waste and ensuring efficiency, while agile systems provided rapid adaptation and flexibility in the face of uncertainty. However, in times of crisis, neither lean nor agile approaches alone proved sufficient; instead, hybrid “leagile” models emerged as effective solutions. This article examines the contribution of leanness and agility to operational excellence and supply chain resilience within the context of the pandemic and similar crises, while also discussing their interrelation with sustainability and digital transformation.

## **Keywords**

Lean production, agile systems, operational excellence, crisis management, supply chain

## **Biographies**

**Ecem Avcu**, a graduate of the Industrial Engineering Department, is currently developing a book focused on lean production techniques and their practical applications. The work examines how these methodologies are applied in real-world contexts, featuring illustrative case studies from the service, healthcare, and tourism sectors in Turkey.

**Semail Ülgen** is a Professor in Industrial Engineering Department at Antalya Bilim University, Antalya, Turkey. She earned B.S. in Mathematics from Bilkent University of Faculty of Science, Turkey, Masters and PhD in Mathematics from Purdue University, West Lafayette, IN, USA. She has published journal and conference papers. She had worked as a professor at the University of Mississippi, Oxford, MS, USA, at Grand Valley State University, Allendale, MI, USA, at Northwestern University, IL, USA and at Indiana University, Bloomington, IN, USA. Dr. Ülgen was a recipient of the Young Scientist Award for Turkish American Scientists and Scholars Association (USA). Her research interests include Finsler Geometry, Applications to Mathematical Physics, Stochastic Processes and its Applications. She is a member of IEOM, AMS, Turkish Mathematical Society. She owns a research and trade company (INNOSU) on water efficiency in agriculture and industry.