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Preface

ICQIS2025 was the sixth edition of the International Conference on Quality, Innovation and Sustainability, proudly coordinated by the International Scientific, Advisory and Organizing Committees. This year, the conference took place in the charming city of Urbino, Italy — a UNESCO World Heritage Site renowned for its cultural legacy and academic tradition.

Originally launched in northern Portugal, the ICQIS conference series has continued to expand, establishing itself as a vibrant platform for international exchange. In 2025, the event once again offered an opportunity for scholars, researchers, professionals, and practitioners to present cutting-edge contributions and engage in rich discussions on quality, innovation, and sustainability across the domains of engineering, business, and societal transformation.

The 2025 edition brought together one hundred and forty-four authors from fourteen countries, reflecting the global relevance and growing impact of the conference. The diversity of topics discussed — ranging from digital transformation and circular economy to lean management, sustainable tourism, Industry 5.0, human-centric innovation, and inclusive leadership — highlights the interdisciplinary nature of the event and the shared commitment to building more sustainable and resilient systems.

A key highlight of ICQIS2025 was the participation of three outstanding keynote speakers. Professor Rodrigo Lozano, affiliated with TU Dresden, Vienna University of Economics and Business, and the Central University of Technology in South Africa, delivered an insightful presentation on tools, initiatives, and approaches for sustainability in organizations, emphasizing the integration of sustainable practices into organizational strategies.

Professor Maria Francesca Renzi, Full Professor at Roma Tre University and President of the Italian Association of Commodity Science (AISME), offered a forward-looking lecture on the digital transformation and its social impacts in the agri-food sector. Her talk explored emerging trends and the evolving intersection between technological innovation, sustainability, and societal well-being.

Lastly, Professor Jiju Antony, Vice President of Research at the International Academy for Quality, discussed the application of Lean Six Sigma in higher education, addressing challenges, benefits, tools, techniques, and providing examples of successful projects.

The Organizing Committee is deeply grateful to all participants, authors, and reviewers for their invaluable contributions. Every paper presented offered a chance to explore innovative research questions, modelling approaches, case studies, and critical perspectives. We also sincerely thank the members of the International Scientific Committee and Advisory Committee for their dedication and efforts, which helped ensure the quality and relevance of the conference content.

ICQIS2025 was a forum not only for presenting results, but also for nurturing collaboration, strengthening academic and professional networks, and envisioning new paths for sustainable innovation.

We look forward to welcoming all of you again at ICQIS2026.

Chair of ICQIS 2025

Prof. Federica Murmura

Urbino (Italy), June 2025

Adoption of Lean Manufacturing in Italian Mechanical Engineering Industry: Impacts on Sustainability and Barriers to Implementation

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Abstract

This study explores the adoption of Lean Manufacturing within the Italian mechanical engineering industry, aiming to assess awareness, adoption levels, perceptions, and impacts on sustainability, while also analyzing the challenges faced by non-adopters. A survey was conducted among 115 Italian companies to evaluate their implementation of Lean practices and its effects on the economic, environmental, and social pillars of sustainability. Descriptive statistical analysis was employed to synthesize the findings.

Results reveal that only 16.5% of the surveyed companies have adopted Lean practices, reporting significant benefits, including enhanced productivity, operational efficiency, and resource utilization. Lean adopters also highlight improvements in employee satisfaction, health and safety, and waste reduction, demonstrating alignment with sustainability objectives. Conversely, non-adopters face critical barriers such as time constraints, insufficient knowledge, and resistance to change, which are particularly pronounced in micro and small enterprises. Despite these challenges, many non-adopters recognize Lean as a valuable opportunity, underscoring the potential for broader implementation through targeted support.

The study emphasizes the importance of customized interventions, such as training programs and institutional support, to facilitate the adoption of Lean practices and overcome barriers. It also confirms that Lean Manufacturing, when effectively implemented, serves as a strategic enabler for sustainability by fostering operational, environmental, and social improvements.

By offering insights into both adopting and non-adopting companies, this research contributes to the understanding of Lean Manufacturing's role in advancing sustainability within the mechanical engineering sector, providing actionable recommendations for practitioners and policymakers.

KEYWORDS: Lean Manufacturing, Sustainability, Lean Tools, Lean Adoption, Mechanical Engineering Industry