

QUALITY PAPER

The r-evolution of Lean Six Sigma from Industry 4.0 to Society 5.0: Excellence 5.0

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Abstract

Purpose – The Excellence 5.0 (EX5.0) model provides a strategic framework for enhancing operational, environmental, social and digital performance, aiding the organizations to reach the highest level of performances, in the least time possible, with the best manner, and by working synergically on process optimization, on improved interpersonal behaviors and on a proper use of new technologies.

Design/methodology/approach – The EX5.0 model is based on three pillars: Process Excellence, Human Excellence and Digital Excellence.

Findings – The proposed method was applied to optimize the profiling process at an automotive plant, addressing recurring issues such as high defect rates, machine downtime and environmental impact. The improvement project achieved an overall problems' reduction, thanks to key interventions like machine upgrades, revised procedures and enhanced maintenance practices, resulting in significant operational and environmental improvements.

Practical implications – This is the first study to use EX5.0 model to improve operational efficiency and environmental impact via employee engagement, and digital transformation, fostering a culture of continuous improvement.

Originality/value – This new model represents an innovative and holistic approach for sustaining a Continuous and Sustainable Improvement culture in the organizations over time, by integrating human, process and digital dimensions.

Keywords Lean Six Sigma, Industry 4.0, Society 5.0, Life cycle assessment, Human artificial intelligence

Paper type Research paper

Introduction

The Lean Six Sigma (LSS) methodology is a Continuous Improvement approach (Singh and Singh, 2012; Arcidiacono *et al.*, 2016a, b) that combines Lean Production principles (Bhamu and Singh *et al.*, 2014; Martínez-Jurado and Moyano-Fuentes, 2014) with Six Sigma tools and techniques (Alexander *et al.*, 2019; Noori and Latifi, 2018). It aims to streamline procedures and processes by eliminating non-value-adding phases (NVA) and improving production phases that add value (VA) on a statistical and scientific basis. Such a combination has proven effective in collaborative endeavors (Fogarty, 2015) across industries, including service, public administration and healthcare (Bhat *et al.*, 2023a, b).

In the context of Industry 4.0 (I4), which guides industrial production towards an increasingly automated and interconnected structure, the aforementioned methodology is applied today (Buhr, 2017; Arcidiacono and Pieroni, 2018), on the basis of four main development guidelines: use and analysis of data, human-machine interaction and transition from digital to reality, as well as from data to matter (Sodhi, 2020).

The I4's natural declination and evolution was to Society 5.0 (S5.0), a new paradigm which represents the fifth form of society in human history, where the human being comes back to the

