

Assessment of Quality Management Practices in Industry 4.0 within the Automotive Components Sector A Case Study of an Auto parts Industry

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Abstract

This study aims to assess the maturity of product quality management within Industry 4.0. The study employs a case study approach, applying a maturity assessment tool to two manufacturing units of an automotive components enterprise, which serves as a supplier to prominent trucks and buses manufacturers. The assessment instrument comprises a questionnaire encompassing six dimensions such as customer service, product development, process control management, system integration and management, leadership and culture. Managers with high-ranking leadership positions from various functions, evaluate the significance criteria and the degree of application or progression of these practices within the organization. Radar charts were employed to visually present the acquired results, thereby highlighting gaps that emerge between the level of importance attributed to these practices and their implementation within the organization. The research underscores that certain dimensions are still in incipient stages, warranting prioritized attention, particularly in the event of a Quality 4.0 development agenda. The assessed maturity levels unveil ongoing initiatives, with some dimensions nearing consolidation; however, opportunities for advancement in embedding quality within Industry 4.0 persist across the dimensions. This study underscores the multidimensional nature of the proposed assessment tool, positing it as a valuable instrument for navigating the evolution of organizational processes over time, specifically in the context of integrating quality within Industry 4.0 implementation journeys.

Keywords

Industry 4.0, Maturity Models, Quality 4.0, Product Management.

Biographies

Felipe Henrique da Silva Gomes is a student in the Professional master's program in Production Engineering at São Paulo State University (UNESP), located in Guaratingueta, São Paulo, Brazil. He holds Bachelor of Science degree in Mechanical Engineering from the Federal University of Itajubá (UNIFEI) in Minas Gerais. With over 15 years of professional experience, Felipe currently serves as Quality Engineer at the Maxion Wheels plant in the state of São Paulo, Brazil. In this role he is responsible to lead projects of continuous improvement, increase operational performance as well customer satisfaction and quality culture in the company. He has a large experience in

engineering positions in automotive segment and had another holes like as Product Development Engineer, Industrial Engineer and Project Management. Before joining Maxion, Felipe also has a background of 4 years with the Mahle Metal Leve, an important player for engine components. His research interests encompass a wide range of topics, including, quality management, maturity models, industry 4.0, and digital transformation.

João Batista Turrioni is Graduated in Production Engineering from the Federal University of Itajubá (1983), Master's degree in Engineering (Production Engineering) from the University of São Paulo (1993), Ph.D. in Engineering (Production Engineering) from the University of São Paulo (1999) and postgraduate -PhD from the University of Texas (2007). He retired as Full Professor at the Federal University of Itajubá. He is currently Permanent Professor of the Professional Master's Degree in Production Engineering at the Faculty of Engineering of Guaratinguetá at UNESP. Universal Fapemig Project for the development of the Quality Management System in the Municipality of Itajubá. BRAFITEC/CAPES project approved for academic exchange with the Technological University of Troyes/France. Has experience in the area of Production Engineering, with emphasis on Quality Control Assurance, presented mainly in the following subjects: quality, quality management, qfd, iso 9000, Six Sigma and quality in services.

Jorge Muniz Jr is Associate Professor at São Paulo State University (UNESP), Visiting Professor at the University of Birmingham (UK, 2022-2023), Coordinator of the Professional master's in production engineering - MePEP (2013-2020), Associate Editor of Production Journal (since 2018). He has a PhD in Engineering from UNESP (Production Engineering), with thesis awarded by the Brazilian Association of Production Engineering (ABEPRO) on Labor Knowledge Management, and a master's from the Polytechnic School - USP (Production Engineering), with dissertation distinction related to dissertation on Concurrent Engineering at Embraer. Additionally, he was an executive at the Ford Motor company. He currently works in an international research group on Social Systems and Future Manufacturing (Industry 4.0), and Knowledge Management in Production Systems.