A Framework for Assessing the Maturity Level of Implementing Quality 4.0 in Higher Education Institutions

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Abstract

The advances in technology in the recent decade have led to the introduction of a new term called Industry 4.0 or the fourth industrial revolution, which has led to the emergence of the term lead to Quality 4.0. Quality 4.0 is the digitalization of traditional quality approaches and focuses on digital tools used to improve an organization's ability to meet customer requirements with high quality. The application of Quality 4.0 practices in higher education institutions (HEIs) has the potential of driving innovation through technological advances in various aspects. Therefore, the digital transformation would be leading to transformation in education to achieve a comprehensive set of practical and significant goals through the formulation and execution of quality initiatives supported by Industry 4.0 related technologies. The research aims to develop a framework to assess the maturity level of HEIs towards transformation to Quality 4.0 while considering the impact of such transformation on the process, people, and technology dimensions defined in the Quality 4.0 model proposed by the LNS Research. Around 93 practices were categorized into 11 Quality 4.0 axes to form a survey that determines the current level of HEIs transformation efforts and find out their strengths and weaknesses and locate them at one of the five defined maturity levels accordingly. The proposed framework has been validated by determining the maturity level of Quality 4.0 implementation within Saudi HEIs. The result showed that all 26 Saudi HEIs obtained scores in the second, third, fourth, and fifth levels, indicating that all HEIs are above the first level (initial quality). This finding indicates that some HEIs have a basic understanding of digital transformation and are familiar with some processes but are unfamiliar with new technologies, while others are at the most advanced level of Quality 4.0 adoption.

Keywords
Quality 4.0, Industry 4.0, Higher Education Institutions, Quality 4.0, and Digital Transformation.

Biography / Biographies

Bandar A. Alzahrani, a Ph.D. candidate at UCF in the Industrial and Systems Engineering department, and he holds a B.S. in Mechanical Engineering from Umm Al Qura University in Saudi Arabia, and an M.S. degree in Industrial Engineering from the University of Central Florida. His research focuses on developing a framework for assessing the maturity level of implementing Quality 4.0 in higher education institutions**.**

Ahmad K. Elshennawy, Ph.D. is Professor and Executive Director of The UCF Quality Institute in the Department of Industrial Engineering and Management Systems at the University of Central Florida (UCF). Prior to joining UCF, he served as a Guest Researcher with the Precision Engineering Division of the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland for two years. Dr. Elshennawy combines over 30 years of international experience with exemplary academic record in the areas of quality management and strategic improvement, as a researcher, academician and a consultant in the United States and different parts of the world. He is the co-author of the Certified Quality Engineer Handbook (1st and 2nd Editions), the Certified Quality Technician Handbook, and the Certified Quality Inspector Handbook (ASQ publications) and Manufacturing Processes and Materials (SME publication). Elshennawy received a BS and MS degrees in Production Engineering from Alexandria University and M.Eng. & Ph.D. degrees in Industrial Engineering from Penn State University. His teaching and research areas of expertise include Quality and Reliability Engineering, Quality Systems and Management, Six Sigma Quality/Lean Six Sigma, Statistical Process Control, Lean Service, and Business and process Performance Improvement and Management. Elshennawy is a Fellow of the American Society for Quality (ASQ), Senior Member of the Institute of Industrial Engineers (IIE), and the Society of Manufacturing Engineers (SME). He is an ASQ Certified Quality Engineer (CQE) and a Certified Reliability Engineer (CRE) and is a Certified Lean Six Sigma Master Black Belt. Dr. Elshennawy has served on the Editorial Review Board of Quality Press of the American Society for Quality and currently serves on the Editorial Board of Quality Progress and is a Senior Editor for the Journal of management and Engineering Integration. He is also the Director of Development and Quality Control of the Association for Industry, Engineering, and Management Systems (AIEMS).