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Quality 4.0 conceptualisation: an emerging quality management concept for manufacturing industries

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Abstract

Purpose – Quality 4.0 refers to a modern quality management approach that uses Industry 4.0 technologies, integration and digitalisation. This research explores the current understandings of Quality 4.0 in various publications. The focus is on Quality 4.0 concepts or explanations, available models, motivation and readiness factors for adoption, enablers and technologies that can be leveraged.

Design/methodology/approach – A qualitative approach was deployed to collect the findings. This paper employs bibliometric, scientometric and visual analytic tools to identify and analyse articles from Scopus, Web of Science (WOS), Google Scholar databases and other sources such as ScienceDirect and Taylor and Francis.

Findings – The bibliometric results revealed that Quality 4.0 publications began in 2016 and increased dramatically in 2020 and 2021, with India leading the way while scientometric analysis found no clear definition of Quality 4.0 hitherto. However, several authors have defined the concept of Quality 4.0, arguing that it is characterised by digitalisation and integration, Industry 4.0 technologies applications and big data management. Some of the Quality 4.0 models published in the theoretical underpinnings include total quality management (TQM) in the basis of Industry 4.0 model, the European Foundation for quality management model, Quality 4.0 model combining operational technology (OT) and information technology (IT) through digital transformation and the LSN Research eleven axes of Quality 4.0 model. The research highlights key enablers of Quality 4.0 adoption, such as enabling technologies, big data capability, skilled and competent workers, collaboration and leadership support.

Research limitations/implications – The findings can benefit Quality 4.0 researchers and practitioners on the available Quality 4.0 models, motivation and readiness factors for Quality 4.0 adoption, enablers and leveraged technologies in Quality 4.0.

Originality/value – This study attempted to explore the current understandings of Quality 4.0 concepts to sediment these emerging quality management concepts for manufacturing industries.

Keywords Quality 4.0, Industry 4.0, Total quality management, Manufacturing industries, Digitalisation, Quality 4.0 framework

Paper type Conceptual paper

1. Introduction

The first industrial revolution (IR) was witnessed globally in the eightieth century (Taifa and Vhora, 2019) by inventing steam power which replaced muscle power in the manufacturing industry (Asghar *et al.*, 2020). Such an invention led to a massive production increase with far-reaching socio-economic significance. In the nineteenth century, the second IR was characterised by electricity invention, the introduction of assembly lines and the steel

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