

Chapter 40

A Study of Quality Tools and Techniques for Smart Manufacturing in Industry 4.0 in Malaysia: The Case of Northern Corridor Economic Region

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ABSTRACT

This chapter explores the key factors for selecting quality tools and techniques in industrial revolution 4.0, particularly in the smart manufacturing context. What are the factors determining which quality tools and techniques are more applicable in specific circumstances related to quality performance in Industrial Revolution 4.0? To answer this question, authors employ a multiple case study and an in-depth literature review as the research design approach. Two key data collection methods (qualitative methods) are used: (1) Primary data from face-to-face interviews with Toyo Memory Technology and Intel Malaysia (2) Secondary data from previous studies. This review, coupled with the case study analysis, leads to the identification of the real implementation of quality tools and techniques in the industries. The chapter can enhance the reader understanding of Industrial Revolution 4.0 and quality management practices as well as highlight opportunities for further research.

DOI: 10.4018/978-1-7998-8548-1.ch040

INTRODUCTION

The world is facing a tremendous 4th industrial revolution with being dominated by the penetration of internet technologies into smart manufacturing environments and a paradigm shift from hierarchic production management to self-organization and self-optimization on the manufacturing floor, also the changes in quality control will be revolutionary (Gluck, M., Wolf, J. 2014). With the involvement of the Industrial Revolution it is important to have a good through quality management where is a source that become the competitive advantage and leadership that carry the values in the organization and successfully not neglecting the technology and the capabilities of the organization have to analyse and operationalize that data towards optimizing and benefiting the organization, (Davenport et al., 2012; McAfee and Brynjolfsson, 2012; Constantiou and Kallinikos, 2015; Henke et al., 2016).

Likewise, the advanced technical features suggest that Industry 4.0 exhibits an attractive and promising production paradigm. It has a significant contribution to the quality improvement system as well as a product that can cope with global challenges. As such, customized products can be produced effectively, efficiently, and profitably (Gluck, M., Wolf, J. 2014).

In turn, the measure of modern quality management aiming for sustainable success means not only to avoid the delivery of defective products to the customer but seek to establish maximum efficiency in the performance of all process of the company. With such optimized procedures, it can provide products of high quality with a minimum effort of time and costs (Werner and Weckenmann, 2012). For all those quality improvements to be happening, the implementation of smart manufacturing is needed. Smart Manufacturing can improve quality management by improving productivity in the production process as well as manufacturing planning (Wang & Wang, 2016).

Further, smart manufacturing can communicate with each other under the quality management system to reconfigure themselves for flexible production with high-quality improvement. Smart manufacturing has the potential advantage in bringing higher integration of the top floor and shop floor and thus more intelligence and flexibility to production. An additional, smart manufacturing will allow the manufacturer to improve the quality system by using data from production, service, and quality control that lead to quality improvement of both product and process.

In relation to the quality perspective, it has conducted several studies to verify the priority and importance of different tools and techniques for quality improvement. In the previous study conducted by Tari and Sabater (2004) found that the most frequent tools and techniques used within ISO certified firms in Spain are audits, graphs, SPC, and flowcharts. The least used tools and techniques in the firms studied were the basic tools. Meanwhile, another study by Drew and Healy (2006) of Irish organisations highlighted that the most used quality tools were customer surveys, followed by competitive benchmarking.

In the study by Fotopoulos and Psomas (2009), it was found that two-thirds of the organizations used to understand quality tools, which included check sheets, flowcharts, and data collection, while the remaining tools and techniques had the very limited implementation. As such, a study conducted by Lagrosen and Lagrosen (2005) discovered that it generally limited the application of all quality tools and techniques, except for flowcharts, which were used. Although quality tools and techniques were used more often in larger organizations (Fotopoulos & Psomas, 2009), they could be implemented in all organisations, regardless of size or type (Basu & Wright, 2012).

In most recent studies carried out by authors such as Gluck, M., Wolf, J. (2014); Mosconi, (2015) in the areas of quality management and Industrial Revolution 4.0 seems lack to see how current qual-

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