

Chapter 4

Process Excellence and Industry 4.0

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ABSTRACT

The process excellence discipline comprises several philosophies, approaches, and techniques with different headings and origins. The history of the industrial revolutions is related with the beginnings and development of these process excellence approaches. Therefore, the aim of this chapter is to explore the evolution of process excellence throughout these four industrial revolutions in order to propose recommendations to successfully cope this new revolution from the process excellence perspective. The chapter reviews publications about the history of the industrial revolutions, technologies of the fourth industrial revolution, and it includes the outputs from a roundtable with Industry 4.0 experts. The chapter concludes that the concept of process and process excellence is essential to implement this new revolution and that the current practices of process excellence must be review in with the perspective of Industry 4.0.

INTRODUCTION

Process excellence involves several philosophies, approaches and techniques such as Quality Management System (QMS), Toyota Production System (TPS), Theory of Constraints (TOC), Business Processes Reengineering (BPR), Lean Management (LM), Six Sigma (SS) and much more. Regardless of the heading or origin, all of them aim to improve organizations by exploring their processes and determining specific changes.

The history of these approaches relates with the industrial revolutions. Each revolution brings into the scene new characteristics and aspects that influence these process excellence approaches and consequently, it is expected similar scenario from this current revolution.

Therefore, the aim of this chapter is to explore the evolution of process excellence throughout these four industrial revolutions. The chapter explores milestones in the process excellence philosophy, techniques and tools. The chapter proposes recommendations to cope this new revolution from the process excellence perspective.

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The chapter reviews publications in the topic to determine theoretical perspective. This includes the outputs of professional and academic conferences on the topic and the outputs from a roundtable with industry 4.0 experts (Martinez, Jirsak, & Lorenc, 2017).

The main conclusions of the chapter are that the concept of process is essential to implement i4.0 initiatives and that the industry 4.0 provides process excellence methodologies with new aspects that enhance its activities and therefore the organizational improvement.

PROCESS EXCELLENCE AND ITS METHODOLOGIES

The relationship between i4.0 and process excellence has little presence in the current literature. It relates with the technological aspects, but it has less attention to processes excellence. The analysis of abstracts of i4.0 related papers shows some keyword occurrence of main process excellence concepts such as process (40%), Value (8%), Waste (1%) and Continuous Improvement (18%) but it illustrates low correlation with i4.0 keywords within these papers (Martinez, Jirsak, & Lorenc, 2016). Therefore, this chapter focuses on the comparison of the process excellence approaches throughout the four industrial revolutions. This timeline perspective contributes to determine the importance of process excellence to develop i4.0.

Processes are inherent to organizational performance. The pursuit of process excellence belongs to the strategy and management of organizations that continually seek to achieve better results. Early organizational theories introduce the importance of time in processes to manage and control organizations (Taylor, 1911). Henry Fayol publishes in 1916 “the administration theory” which summarizes fourteen principles of management. This also includes activities to achieve goals (Fayol, 1967). The creation of Ford Motor company in 1903 (Henry Ford Heritage Association, 2017) utilizes the manufacture model of Henry Ford (1863-1947) which increases process productivity with mass production.

Contemporary models also include processes among their elements. The “7S” model contains the organizational processes in the element “systems” (Peters & Waterman, 1982). The mechanisms for collaboration and the workflow determine the element “processes” in the “Star Model” (Galbraith & Kates, 2008, p. 17). The “Six Box” model (Weisbord, 1987, p. 9) present similar element: “Helpful Mechanism”. The congruence model observes the entire organization from a process approach (Nadler & Tushman, 1980). Other models such as “Holonc Enterprise” (Ulieru & Este, 2004) and “Fractal Web” (McMillan, 2004, p. 170) also employ elements of the process approach.

These different organizational performance approaches develop several definitions and understandings of the concept of process in organizations. The mechanisms to achieve goals; activities to perform; interconnected activities that allow the functioning of the organization; time measuring for performance and others are attempts to define processes in organizations. Contemporary definitions of the term involve these elements. Hammer, et al. (1993) defines process as *a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer*. Similar, Rosing, et al. (2015) understand the concept of process as

a collection of interrelated task and activities that are initiated in response to an event which aims to achieve a specific result for the consumer of the process.

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