Chapter 56
Industry 4.0 as the Last Industrial Revolution and Its Opportunities for Developing Countries

Egemen Hopali
Üsküdar University, Turkey

Özalp Vayvay
Marmara University, Turkey

ABSTRACT

In this chapter, better understanding of Industry 4.0 is presented by investigating the role of different technologies and business partners on success of Industry 4.0. Enablers for smart factory are discussed in detail, and how to match these enablers with value chain partners of Industry 4.0 are identified as a new perspective on Industry 4.0. Furthermore, the aim of this chapter is to present actions to be taken from the point of the emerging economies to sustain and increase competitive advantage by catching and implementing Industry 4.0. Consequently, Industry 4.0 can enable developing countries to get a bigger slice of the world manufacturing value chain.

INTRODUCTION

Technological developments have enabled the emerge of three main industrial era since the beginning of industrial revolution. They all increased efficiency in the industry. The recent globalization movement is challenged to meet the continuous worldwide demand for capital and consumption goods. In order to overcome this challenge, the industry should assure sustainable manufacturing.

Wıth the fourth stage of industrialization, industry 4.0, it is expected to achieve an enlarged integration of information and communication technologies (ICT) with manufacturing. This young German term describes not only the automation of value chain items but also the integration of these instruments with

DOI: 10.4018/978-1-7998-8548-1.ch056

constant communication and real time features. This process provides an intelligent and self-adopted industry as well as, more flexible, efficient, quicker and more qualified industrial products.

Industrialization revolution started with the use of steam power at the plants in England by the end of 18th century whereas a second revolution of electricity use enabled mass production. After 1970s, third industrial revolution occurred. Thanks to this revolution, information technologies (IT) made the use automation wider in the industry. Eventually, Cyber Physical Systems (CPS) made actualization of the fourth stage of industrialization which is also known as name Industry 4.0 possible.

As a first impression, Industry 4.0 looks like the rebirth of an old paradigm, Computer Integrated Manufacturing (CIM) idea, strengthen by modern information and communication technologies (ICT). However, Industry 4.0 differentiates from CIM by its network approach which is based on the improved internet standards and ability of creating smart machines and components (Kohlberg & Zühlke, 2015).

CIM era has failed because of the challenging complexity of the required automation technology. Hence, Lean Production took part in CIM with its high effectiveness by reducing complexity and avoiding impractical or non-value-adding process steps. Therefore, Industry 4.0 vision is parallel with Lean Production and enables new implementation areas through the potential of Industry 4.0 technologies such as powerful, flexible and affordable CPS applications or extended applicability of Lean Production with various production types (Kohlberg & Zühlke, 2015).

According to three leading German associations; VDMA, Bitkom and ZVEI, contributed the definition of Industry 4.0 in spring 2014. By applying an autonomously controlled and dynamic production, Industry 4.0 should optimize the value chains. (Acatech Platform Industrie, 2014). It uses CPS instruments in order to reach increased automation. CPS is capable of working autonomously and its interaction capability with production environment makes it factory smart (Lee, 2008; Broy, 2010).

Industry 4.0 has been discovered by developed countries. The inventors of Industry 4.0 aimed to knock down competitive advantages of developing countries. By definition, developed countries where people generally have high income have a lot of industrial activities and whereas developing countries where people generally don't have high income have less industrial activities.

In this chapter, it is aimed to provide a better understanding for Industry 4.0. .How this notion was formed is presented in the following sections. The role of different technologies and business partners on success of Industry 4.0 such as cloud, intelligent robots, internet of things, simulation, big data analysis, augmented reality, cyber security; human factor is discussed and their roles in smart factory are identified by matching value chain partners with smart factory providers. It was important to match these two terms for the first time so that their roles in the smart factory system are identified. Additionally, areas of usage of industry 4.0 such as agriculture, health care, security, logistics, transportation, smart home and cities are mentioned since Industry 4.0 implementations doesn't only influence smart factories but also started to influence the daily life of people. This chapter explains how crucial Industry 4.0 is for the nation's welfare as well as its importance for daily life in many aspects. This technology proportionally grows with the market demand and the needs of customers.

The main problem is how developing countries act against the developed countries which are the inventors of Industry 4.0. This chapter mainly focuses on presenting actions to be taken by emerging economies to sustain and increase competitive advantage by catching and implementing Industry 4.0. All countries and industries are affected by this new term and they have to adopt if they are willing to save or improve their position in this competitive environment. Consequently, With Industry 4.0, developing countries like Turkey get a bigger share of the world manufacturing value chain.