Chapter 51
How Supply Chain Management Will Change in the Industry 4.0 Era?

Emre Aslan
https://orcid.org/0000-0002-1744-8077
Tokat Gaziosmanpasa University, Turkey

ABSTRACT

Enabled by some maturated technologies in the last decades, a new industrial revolution is predicted to arise that not only affects manufacturing or industry, but many fields of life. It is named the Fourth Industrial Revolution or Industry 4.0. The triggering technologies, concepts, or driving forces mentioned with Industry 4.0 are cyber-physical systems, vertical and horizontal integration, augmented reality, internet of things, internet of services, additive manufacturing and 3D Printers, big data analytics, cloud computing, cybersecurity. Through Industry 4.0, production activities will be made by automatic machines and robot communicating each other. Supply chains will be more integrated due to information and communication technologies based on real-time data sharing. The purpose of this study is to examine the effects of Industry 4.0 on supply chain management. For this purpose, literature is reviewed according to effects of Industry 4.0 on procurement, production, warehousing, transportation, and fulfillment functions of supply chain management.

INTRODUCTION

With the influence of globalization, developing technology and internet, manufacturing shifted to underdeveloped and developing countries where labor cost is lower when compared with developed countries. Although facilities of international corporations moved to these underdeveloped and developing countries, headquarters and critical functions like research and development or marketing were still located at home or developed countries. In this way products used to be transported and delivered to target market of developed countries cost-effectively through supply chain management.

DOI: 10.4018/978-1-7998-8548-1.ch051

Thanks to combination of some technologies that maturated, low labor cost is becoming an insignificant part of manufacturing. So, manufacturing facilities, once left their home because of labor costs, now are coming back. This wave which mainly but not only omits labor from manufacturing systems but also affects many fields of life is named Fourth Industrial Revolution or Industry 4.0.

Industry 4.0 refers to the combination of several major innovations in digital technology, all coming to maturity. Although technological infrastructure is living its infancy period, manufacturing industries started to use for traceability and upgrade of products. As technology continues to evolve, the prevalence of use and the rate at which new products and services emerge will increase (Geissbauer, Vedso & Schrauf, 2016a).

This revolution is predicted to be different than the revolutions before in some ways. First of all it is known in advance. All the previous revolutions were understood, defined and named years or decades after they happened. Secondly the effect of the revolution is predicted to be wider and deeper, not just limited with production. The whole economy of the World, daily life of people and organizations, companies, customers, nations, governments, cities, society, healthcare, education, finance, money, logistics etc. is being and going to be affected by this revolution. And lastly by the exponential development and speed of technology the spreading of new revolution is predicted to be faster.

Given that the fourth industrial revolution will radically change all production systems, it is an expected result that logistic systems or supply chains, which have a direct relationship with production, will be affected by this change. In other words, technological developments, experienced in industrial terms, affect production processes, techniques, understanding etc.; this leads to the transformation of supply chain processes like dominoes (Şekelli & Bakan, 2018: 18).

The rest of the study is as follows: Industrial revolutions, Industry 4.0 and driving forces of the revolution are presented. Afterwards Supply Chain Management and effects of Industry 4.0 on supply chains and its processes are examined. Lastly conclusions and future directions are presented.

INDUSTRY 4.0

Industrial Revolutions

Mechanical manufacturing equipment triggered industrialization (Kagermann, Wahlster & Helbig, 2013: 13). Technological leaps have led to paradigm shifts which afterwards named "industrial revolutions" (Lasi, Fettke, Kemper, Feld & Hoffman, 2014: 239). Productivity increase lies beneath every industrial revolution. The first three industrial revolutions spanned almost 200 years and had changed processes in industries, lead to increase in productivity and efficiency through disruptive innovations (Drath & Horch, 2014: 56; Pereira & Romero, 2017: 1207).

The first industrial revolution was triggered in the 18th century in England by the steam engine and mechanization of textile manufacturing (Garten, 2016: 3; Geissbauer et al., 2016a). This changed the focus of human from agriculture to the industry (Yin, Stecke & Li, 2018: 848). Extreme increase in productivity was provided by the shift of fabric production from private homes to central factories (Drath & Horch, 2014: 56). The main aim was to increase production volume, variety of products was low, mostly agricultural (Yin et al., 2018: 848).

The second industrial revolution took off in early 20th century in America with the intense use of electrical energy and innovations such as division of labor, assembly line and mass production (Garten,