Chapter 12
Artificial Intelligence and Supply Chain Management Application, Development, and Forecast

Michael Torres-Franco
https://orcid.org/0000-0001-9891-5871
Universidad EAN, Colombia

ABSTRACT

The supply chain has changed over the years, and with technological innovations, many tools have been developed today that seek the optimization of time and costs in this process; unfortunately, there is still a gap between companies with the capacity to implement these developments and small and medium-sized companies. This chapter seeks to show how artificial intelligence has emerged with a portfolio of solutions applicable to the supply chain management, some of which are still under development but are aimed at simplifying and automating these processes. The chapter will define these concepts to then show the different applications that artificial intelligence has in the management of the supply chain to conclude and pose the future challenges that the supply chain will face and that can be solved with the use of technologies innovative and disruptive.

INTRODUCTION

Transformations in society has been big and disruptive, things that some years ago used to be done in some way today can be considered as archaic or as a remain of an ancient time. In the last fifteen years we have assisted to an impressive number of changes and evolutions in the way as we communicate each other, but also in the way that companies produce and distribute their products. In this specific field technology has helped to create solutions that permit the efficient use of financial and time resources, with new tools that permit that the company evolve more and more every single day.

Nowadays it is said that companies are facing a process of change considered as the fourth industrial revolution, which has allowed changing the previous conception of the production model and thanks to different technological developments being less linear than in previous times. These changes have

DOI: 10.4018/978-1-7998-5077-9.ch012

been framed in the so-called Industry 4.0, which has allowed the company to use tools such as big data, artificial intelligence, data mining, cloud computing and internet of things in each and every one of its productive stages; with the main intention of being more efficient in the distribution of products to the customer and to reduce the costs associated with the production process.

This is the case with Artificial Intelligence (AI), the possibility to have a machine or software that evolve constantly and help us to solve our daily tasks appeared in movies and in the people's imaginary; in the last 10 years the world has seen that this possibility was not only reserved to movies or as a fantasy; was totally real and possible to think in companies ruled by a "software" that learns with every decision who takes and improve the decision making process.

This miracle has been possible and is a topic that big companies have understood and are making investments to develop solutions and implement it as a part of the supply chain. Technological development has helped to facilitate lives, production and distribution of goods; but unfortunately we do not know the reality and the implications of these changes, and also we do not know what is happening in the world with these developments and how companies are including this into its production function.

Supply chain (SC) has seen over the years the emergence of practices such as Total Quality Management, Just in Time, Lean Management, Efficient Consumer Response or many others that have sought the optimization of operations and the chain; nowadays it must be studied and understood how the supply chain is changing from the inclusion of the latest technological developments and how its structure, its processes and its future are being impacted; since the supply chain has a high degree of importance in the planning of the company's operations and in the impact and satisfaction of the final consumer.

The purpose of this chapter is to talk about the application of this technological development in the Supply Chain Management (SCM); which is understood as the series of stages that begin with the procurement of inputs and raw materials, goes through the management of operations (how the company produces) and ends with the management of the distribution of production (how it reaches the consumer final). For years the supply chain has been the pillar of the strategy to offer products in the shortest possible time and with a more cost-efficient use; leading to the need for permanent progress towards this objective.

With this, the purpose is offering to the reader the possibility to know and understand the implications and developments of this technology, showing that artificial intelligence is much more than a software or "bot" which people can interact, presenting the artificial intelligence as a possibility to facilitate productive process (having always in mind that this progress has led to create another problem, the technological unemployment); and that SCM has been positively affected by the development of this technology, in ways that have led to rethinking traditional structures in operations and operating costs.

These conditions led to the determination of the problem question that guided the investigation: *What are the applications of artificial intelligence in the supply chain management?* This meant that the research was aimed at trying to understand how the artificial intelligence developments that have been applied in the supply chain have impacted it positively or negatively; and if this has led to a change in the supply chain in terms of its conception, application and future.

The main objective of this chapter is to elaborate a framework that permits to understand the relation and the evolution between these two topics, the applications, problems and the future of AI applied in SCM. This objective is supported in five specific objectives, which are: (1) Create a theoretical framework with the existing literature about the applications of AI to SCM. (2) Identify fields and sub-fields of AI that are suitable for SCM applications and characterize them in terms of their usefulness for improving SC efficiency. (3) Show examples about the application of AI in real companies, showing areas, obstacles