# Chapter 7
# Industry 4.0 in the Textile Sector: Applications, Influencing Factors, and Opportunities

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## ABSTRACT

*Industry 4.0 is a phenomenon that describes technological advancement in all sectors to bring the best business practices and to create a sustainable society. Textile sector which remained at the forefront in the past three industrial revolutions is lacking its spot in the fourth industrial revolution, making it difficult to sustain in the competitive environment. The sector can realize the benefits of Industry 4.0 by following a systematic strategy to implement it. To follow a systematic strategy, it is important to have the necessary background knowledge and ongoing trends in the field. For this purpose, we reviewed and analyzed the current literature to know the status of Industry 4.0 in Textile sector. This review mainly focused on three categories: the type of research, focused technology in Industry 4.0, and focused dimensions (i.e., applications, influencing factors, and opportunities). This review will prepare researchers to conduct the research in the field and will suggest solutions to implement Industry 4.0 in textile sector*

DOI: 10.4018/979-8-3693-1862-1.ch007

## INTRODUCTION

Industrial Revolutions are considered the most significant part of civilization. Inventions and innovations that took place during these revolutions, had majorly contributed to the growth of industries and society. From the First Industrial Revolution to the Fourth Industrial Revolution, many transitions have taken place in the manufacturing segment. Textile sector is one of those sectors that contributed significantly to the first two Industrial Revolutions. For instance, the invention of the flying shuttle by John Kay in 1773 led to the foundation of the first Industrial Revolution followed by the invention of the jacquard mechanism which led to the base for the second Industrial Revolution, related to information processing (Park & Jayaraman, 2001). The third industrial revolution linked to automation and ICT also aided to textile sector by providing support through computer-aided manufacturing, flexible manufacturing systems, etc. (Xu et al., 2018). In short, textile sector has played an important role in all three Industrial Revolutions.

Textile sector which has evaluation of approximately $920 billion in 2021 in global textile, is assumed to reach $1230 billion by 2024. In India, textile sector contributes to approximately 2.3% to GDP, 13% to industrial manufacturing and 12% to exports. Apart from this, India accounts for about 4% of the world's textile and clothing trade. It can be observed that textile sector is a vital support in nation's economy. Therefore, it is vital to focus on the sector to ensure its growth and to make it upgraded according to the ongoing technological trends.

Industry 4.0, which is known for its extraordinary characteristics such as advanced connectivity and communication with the external environment, has set new goals in the manufacturing sector. The implementation of Industry 4.0 technologies promotes efficiency in manufacturing and know-how of the existing processes (Xu et al., 2018). Many industries comprising large and small medium enterprises (SMEs) have already implemented or are in the process of realizing Industry 4.0 solutions as their strategic plans. However, some SMEs are still facing challenges due to their rigid organization structure and lack of external support. Many Textile industries are categorized as a part of SMEs and suffers problems such as lacking financial inputs, IT infrastructure and human competency (Majumdar et al., 2021). Although some of the processes related to Industry 4.0 are already in practice in textile sector such as defect detection and classification of fabrics based on visual techniques (Alruwais et al., 2023; Czimmermann et al., 2020; Devarajan et al., 2022).

To know the status of Industry 4.0 adoption and implementation in textile sector, it is essential to review the existing work in the area. This will provide a gist of the ongoing work in the domain and will help researchers to contribute to the field in terms of more academic papers and implementation roadmap for textile professionals. To achieve this goal, the authors reviewed the existing literature at the juncture of Industry 4.0 and textile and presented the research papers focusing on three categories: type of research, focused technology in Industry 4.0, and focused dimensions (i.e. applications, influencing factors, and opportunities).