Chapter 26
Data-Driven Decision Making for Achieving Sustainability in Apparel Business Value Chain

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ABSTRACT

Data-supported decision-making and understanding the customer's behaviour has become an essential and challenging problem for apparel businesses to sustain their position in competitive markets. Current information communication technologies (ICT) are ushering hope to mitigate this challenge, particularly the blockchain with internet of things (IoT)-based enterprise information system framework providing relevant services in global networks that mediate effective and sustainable supply chain operations. Data collection and interpretation of collected data (known as data analytics) on business-specific value creation process is most important in this architecture. This chapter reviews recent literature on technology-driven supply chain automation and related data analytics-related issues for managing sustainability. Lastly, the chapter presents an application area of 'market basket analysis' technique that focuses on discovering patterns in retail transaction data with the help of an algorithmic data mining method.

INTRODUCTION

Apparel products are essential commodities for human society. The apparel industry's operational practices have been changing rapidly in recent decades, and its business activities are considered responsible for their day-to-day work that affects society directly or indirectly. The increase in human population has demanded approaches that are more adaptable to the sustainability and ecology of the apparel industry. In addition, trends in apparel product development are influenced by the globalization of manufacturing networks, digitization of business operations, and multifaceted consumer expectations related to operational sustainability. Consequently, industry experts seek detailed information regarding apparel products' constituent elements, products, and production processes' environmental impact. Besides,

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apparel product manufacturing has often fragmented, and a globally dispersed production network acts as a significant stimulus in industry-specific supply chain network deployment and value creation for the entire business operations. Historically, the concept of supply chain operations (or *value chain network* for business prosperity) and management practice is getting much more complex due to business processes outsourcing and their product traceability monitoring for regulatory purposes and quality assurance management. Supply chain operation managers appreciate the importance of enforcing assessment through achievement by using data-driven decision metrics. At the same time, enterprise operation management activities in the apparel industry have been evolving in recent decades. The whole industry relies on a new form of knowledge and network-based intelligent response to any issues related to enterprise sustainability (e.g., environmental, financial, quality assurance, customer satisfaction, and human resource utilization). In this way, traceability is essential to managing and mitigating unprecedented social, economic, and environmental sustainability in regular business operations. Industrial sectors often use technology-driven traceability systems to secure their '*band name'* and revenue protection (Eryilmaz et al., 2020). The crucial ingredients of traceability management are business process-related data gathering, data processing, data-driven decision-making, and secure information-sharing system architecture (Pal, 2023). In this way, it creates an essential ingredient for an attractive industrial operation management using technologies.

Rresearchers (Sneddon et al., 2006) described the idea of an industrial world where challenges exist to maintain sustainability for controlling environmental pollution inequality in global environmental policies and organizational approaches. The same research group also highlighted ways that need to be used in implementing industrial sustainable development practices. These approaches deal with the issues related to challenges in social integration, economic and environmental management, global policies, and disparities in industrial applications deployment. In this way, industrial sustainability is highlighting new research agenda by which it tries to understand, review, and improve the fundamental characteristic interactions among nature and society. Sustainability cares about meeting the requirements of the present and coming generations of human lead society. Academics and practitioners are introducing new business models with an emphasis on resource waste prevention and putting focus on work practice efficiency. In a simplistic apparel business model consists of procurement of textile fiber, fiber colouring, yarn preparation, knitting and finishing the products, and sending them to sales outlets, as shown in Figure 1.

The growing population and increased consumption of apparel products are causing higher environmental burdens on air, water, and soil associated with producing raw materials, manufacturing ingredients, and ultimate items of interest. Besides, the disposal of apparel products at the use end-life requires to be considered in more account. For example, apparel products are usually made from various materials and ingredients chosen by considering the design, purpose of the item, and performance needed for use. The adequate selection of materials, components, and constituent ingredients provides an immense opportunity for the overall sustainability of the apparel products through their life cycle. To develop more ecological and sustainable products, in what concerns the materials and components selection process and incorporation in the ultimate product design.

In this way, materials and constituent ingredients to develop more sustainable apparel products are: (i) type of material and components (e.g., recycled, recyclable, and/or biodegradable), (ii) origin and transportation methods associated, (iii) materials (e.g., textiles, polymers, leather) produced by ecofriendly processes and the use the minimum amount of chemicals and energy in their production process, (iv) water-based solvents and glues, (v) minimization of hazards and restricted substances, (vi) the renewable material ingredients, (vii) produced by simplified manufacturing production processes,