


Chapter 24

Building High Quality Big Data–Based Applications in Supply Chains

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ABSTRACT

Global retail business has become diverse and latest Information Technology (IT) advancements have created new possibilities for the management of the deluge of data generated by world-wide business operations of its supply chain. In this business, external data from social media and supplier networks provide a huge influx to augment existing data. This is combined with data from sensors and intelligent machines, commonly known as Internet of Things (IoT) data. This data, originating from the global retail supply chain, is simply known as Big Data - because of its enormous volume, the velocity with which it arrives in the global retail business environment, its veracity to quality related issues, and values it generates for the global supply chain. Many retail products manufacturing companies are trying to find ways to enhance their quality of operational performance while reducing business support costs. They do this primarily by improving defect tracking and better forecasting. These manufacturing and operational improvements along with a favorable customer experience remain crucial to thriving in global competition. In recent years, Big Data and its associated technologies are attracting huge research interest with academics, industry practitioners, and government agencies. Big Data-based software applications are widely used within retail supply chain management - in recommendation, prediction, and decision support systems. The spectacular growth of these software systems has enormous potential for improving the daily performance of retail product and service companies. However, there are increasingly data quality problems resulting in erroneous testing costs in retail Supply Chain Management (SCM). The heavy investment made in Big Data-based software applications puts increasing pressure on management to justify the quality assurance in these software systems. This chapter discusses about data quality and the dimensions of data quality for Big Data applications. It also examines some of the challenges presented by managing the quality and governance of Big Data, and how those can be balanced with the need of delivery usable Big Data-based software systems. Finally, the chapter highlights the importance of data governance; and it also includes some of the Big Data managerial practice related issues and

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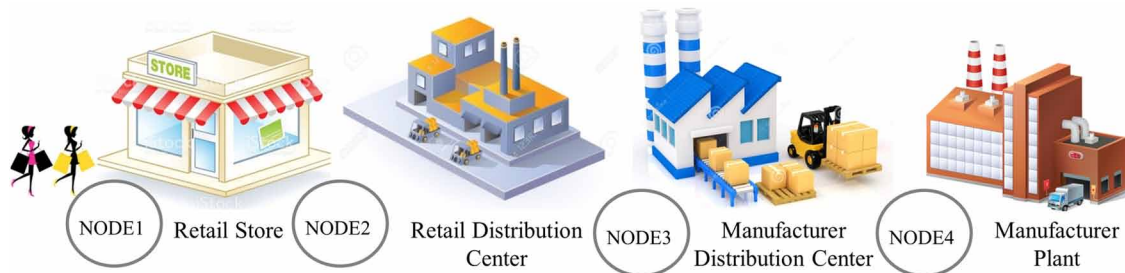
their justifications for achieving application software quality assurance.

INTRODUCTION

The retail business world is grappling with major changes of new retail channels, increasing global customers, and growing complexity of supply chain operations. Customers are increasingly influencing how retail businesses design and set out their supply chain operations. These demanding customers can now do their shopping *anywhere* and *anytime*, and expect a more fulfilling experience from retailers. However, many retail businesses are dealing with how to find an innovative approach to sourcing, replenishment and distribution strategies to address these changes. Retail businesses are starting to consider seriously how best to optimize their supply chain operations to face fast-changing customer demand, while minimizing corporate expenditure and achieving healthy growth.

A retail supply chain consists of interconnected activities, and their associated business processes together to provide value-added service to its customers. Customer-engaged retail companies, from *automobile dealers* to highly attractive summer *beachwear makers*, always need different stakeholders' information for their supply chains. An entire network of manufacturers and distributors, transportation and logistics agencies, financial institutions, warehouses and freight-forwarders work together to make sure that the right goods and services are available at the right price, where and when the customers want them. Having supplied value-added services (e.g. products and associated customer services), the supply chain does not terminate. The retail supply chain is comprised of several steps from the front end, through the customer request, supply chain order processing initiation, quality assurance assessment for products and services, relevant training processes for staffs, customer support facilities, to maintenance and replacement facilities. Retailers are investing in *state-of-the-art* operational practices to optimize both cost and efficiency of their supply chain.

Figure 1. A schematic diagram of retail supply chain



In a typical retail supply chain, raw materials are purchased from suppliers and products are manufactured at one or more manufacturing plants. Then they are transported to intermediate storage (e.g. warehouse, distribution center) for packaging and shipping to retailers or customers. The path from supplier to customer can include several intermediaries such as wholesalers, warehouse, and retailers, depending on the products and markets. In this way, supply chain management relates to business activities such as inbound and outbound transportation, warehousing, and inventory control. Importantly, it also embodies the information systems necessary to monitor these business activities. Figure 1 presents a simple diagrammatic representation of a retail supply chain, which consists of two separate legal entities, a retailer and a manufacturer. The retailer owns the first two nodes on the left-hand-side of the diagram,

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