

Chapter 1

Sustainable Supply Chains

Amulya Gurtu

University of Wisconsin – Green Bay, USA

Cory Searcy

Ryerson University, Canada

Mohamad Y. Jaber

Ryerson University, Canada

ABSTRACT

This chapter discusses sustainability in supply chains. It starts with a review of the concepts of sustainability and supply chain management; provides a discussion on the globalization of supply chains, its influence on sustainability, benefits of sustainable supply chains followed by the factors affecting the sustainability of supply chains, challenges in integrating sustainability into supply chains and managerial implications. It discusses the influence of supply chains on the triple bottom line. Examples of major factors affecting environmental and social sustainability include travel distances, modes of transportation, vessels used, frequency of trips, packaging materials, efficiencies of manufacturing processes, efficiencies in power generation/distribution, treatments given to polluted air/water generated during various processing from industries, expected product lifetime, manufactured quality of items, management of items failed during warranty or transportation, and the management of disposal of items, among others. The chapter concludes with a future research agenda.

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INTRODUCTION

The activities associated with modern supply chains have been carried out for centuries, though the use of the term supply chain is a relatively recent phenomenon. Spice trade from the Far East to Europe via Africa existed for many centuries prior to the industrial revolution and flourished even in the absence of modern means of transportation and communication (information technology). Despite this long history, the focus of research in the area of supply chain management (SCM) is relatively new as compared to other areas of engineering and management. The study of supply chain management has generated a lot of interest among academicians and practitioners in the last three decades. Perhaps for this reason, Feller, Shunk, and Callarman (2006) wrote that the term supply chain was first used in 1982. However, the earliest documented use of the term supply chains could be traced back to the middle of the 20th century in the context of petroleum products for a Shell refinery in Essex (Petroleum Times, 1951). Later, this term was used in the context of electricity supply (Banbury, 1975) from generation to distribution to final consumers. As a further illustration, Burns and Sivazlian (1978) performed an analysis for multi-echelon supply chains for optimization of inventory well before 1982.

The globalization of manufacturing and trading activities resulted in an increase in the complexities of supply chains and helped in popularizing the term “supply chain management”. These increased complexities required a better understanding of many variables involved in global supply chains. The challenges of optimizing supply chain performance have made supply chain management a key competitive advantage in a number of industries over the last two decades. The scope of supply chain management, as defined in most of the earlier literature, is from the acquisition of the raw materials and parts through delivery of the finished products to the end customers. One of the earliest definitions of supply chains was “the supply chain is the connected series of activities which is concerned with planning, coordinating and controlling material, parts and finished goods from supplier to customer” (Stevens, 1989; pp 3). Until a decade ago, there was an active debate about the boundaries of supply chain management and its role with respect to the other functions of an organization.

In an effort to address this gap, Mentzer, DeWitt, Keebler, Min, Nix, Smith, and Zacharia (2001) defined a supply chain “as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer.” As a second example, the Canadian Supply Chain Sector Council (CSCSC, 2014) explained that a supply chain encompasses “supply of materials to a manufacturer”, “the manufacturing process”, and “the distribution of finished goods through a network of distributors and retailers to a final customer”. The various organizations

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