

# Chapter 20

## Green Logistics and Supply Chain Management

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### ABSTRACT

*Logistics and supply chain management are an integral part of business activity today. They are crucial drivers of globalization as well. As such, these activities are responsible for a large share of greenhouse gas emissions. In fact, transportation in the United States is the business sector which contributes the most human-generated greenhouse gas emissions. This chapter will discuss the role of logistics and supply chain management in the generation of such pollutants and examine methods to mitigate this byproduct of modern business activity. It will be shown that a series of trade-offs exist which are complex in nature and require careful consideration when confronting environmental concerns.*

### INTRODUCTION

This chapter will lay out the nature of Green activities appropriate to logistics and supply chain management. After defining and differentiating between logistics and supply chain management, transportation will be singled out as a logistical activity crucial to environmental friendliness. Green initiatives will be discussed in the context of how transportation is managed across complex supply chains. There are many trade-offs involved in the artful management of traditional business

goals and environmental friendliness. This chapter will discuss how to identify and deal with these trade-offs. Areas for future research will also be discussed.

### WHAT IS LOGISTICS AND SUPPLY CHAIN MANAGEMENT?

Logistics is the art and science of dealing with time, space and location. Logistics deals with the flow of inputs, outputs (tangible and intangible), people, information, and financial capital along a supply chain. Logistics adds value from primary

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products all the way to final delivery to the end customer. Logistics is supported by supply chain management which represents the contractual linkage of organizations with a common strategic goal. Metaphorically, logistics involves a flow of blood and oxygen through a physical body which is the supply chain. Logistics involves the procurement of material for the production process; the storage and distribution of inputs and outputs; and the sale of outputs to customers along the supply chain. The logistical activity which is critical to all of these—and the one most likely to generate significant greenhouse gas (GHG) emissions—is transportation.

In the United States, the transportation sector, at 34% (in 2007) accounted for the largest share of human-generated carbon dioxide emissions. It grew by about 19% over 1995 to 2007 while growth in emissions from commercial, industrial and residential sources remained flat. Within transportation itself the mode with the biggest share is the passenger car at 34% followed by light-duty trucks (28%), medium and heavy duty trucks (21%), aircraft (9%), rail (3%) and ships (2%) (Transportation Statistics Annual Report; pp. 5-6). People traveling to and from work; transporting passengers for business or pleasure; and hauling cargo for production and sales are, as noted, the largest source of carbon dioxide emissions. This is a result of the reliance on logistics and supply chain management for economic growth and social activities. As companies seek cheaper sources of labor and other resources; strive for higher revenue through expanding into foreign markets; embark on logistical programs such as lean manufacturing and just-in-time purchasing, more transportation will be occurring and over larger expanses.

## **GREEN INITIATIVES**

From the Kyoto Protocols to the Copenhagen Accord, the United Nations has been working to

set a global standard for the reduction in carbon dioxide emissions. Without a legal authority to impose any sort of rules, the best it can do is to provide political guidance. Of course, to see global emissions drop to some past year's level, the developed countries would have to cut emissions to a higher degree than developing countries so that the latter can still grow economically (and perhaps socially as well). Developed countries have access to technology and politically-aware populaces which are willing to accept (or at least discuss) taxes, cap-and-trade, and other pollution premiums attached to production. Together they are also the largest source of GHG emissions. But the largest single source of carbon emissions, China, is understandably less willing to be pinned down to any binding and measurable carbon reduction target. The world economic downturn of 2008 only served to strain the discussion further as China wished to see its export engine continue and, indeed, some Western nations switched gears to the pressing concerns of job protection and fiscal stimuli. Fossil fuels are relatively abundant and cheap compared to Green energy technologies. Nonetheless, the Copenhagen Accord of December 2009 did pledge \$10 billion in transfers per year for three years from developed to less developed countries in order to assist with carbon dioxide reductions. And China agreed to reduce its level of carbon *intensity* (as a proportion of product outputs) by 40-45% by 2020 (*The Economist*, p. 43). At this point in time, Green energy sources (e.g., solar and wind) are not as efficient as fossil fuels because they cannot facilitate the same level of production. This is a research and development problem. And switching a portion of the production process over to Green energy technology would just serve to raise costs at this point. Why would a firm do so at this stage?

Environmental sustainability, eco-friendliness, and Green activities, among other terms, are given weight in many quarters of the marketplace. Businesses are now tapping into society's concern over global climate change by trying to mitigate

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