

# Chapter 57

## Antecedents of Green Manufacturing Practices: A Journey Towards Manufacturing Sustainability

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### ABSTRACT

*The purpose of this chapter is to identify green supply chain practices and study their impact on firm performance. In this study, the authors have adopted a two-pronged strategy. First, they reviewed extant literature published in academic journals and reports published by reputed agencies. They identified key variables through literature review and developed an instrument to measure the impact of GSCM practices on firm performance. The authors pretested this instrument using five experts drawn from industry having expertise in GSCM implementation and two academicians who have published their articles in reputed journals in the field of GSCM and sustainable manufacturing practice. After finalizing the instrument, the study then randomly targeted 175 companies from CII Institute of Manufacturing database and obtained response from 54 which represent 30.85% response rate. The authors also performed non-response bias test to ensure that non-response bias is not a major issue. They further performed PLSR analysis to test our hypotheses. The results of the study are very encouraging and provide further motivation to explore other constructs which are important for successful implementation of GSCM practices.*

### 1. INTRODUCTION

The paradigm shift of policies towards green economy is forcing the companies to consider the green initiatives seriously. There is a need for the companies especially manufacturing companies to take a proactive approach rather than reactive approach in this aspect. According to UNEP (2011) report, global manufacturing industry consumes 35% of the total electricity consumed worldwide and responsible for

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20% of the world's Co<sub>2</sub> emissions, which is detrimental to lives on the earth. While the above arguments indicate, that this the high time for empirical research on green manufacturing and implementation of green manufacturing framework, especially for countries like India which is becoming one of the global manufacturing hubs next to China. Before we delve into "green manufacturing" discussion, it is important to understand the evolution of green manufacturing.

## **1.1 Background**

### **1.1.1. Evolution of Green Manufacturing**

The field of Manufacturing and Operations has seen radical changes through the years. It started with the "The Industrial Revolution" in the late 1700s, has been through several phases but real challenge emerged in front of manufacturing was its sustainability. The issues that have forced developed economies like USA, Canada, Great Britain and European countries to shift their manufacturing base to China and India was cost and other was to put check on greenhouse gas emissions. However the approach of these developed economies was questionable. Rather than shifting location of manufacturing hubs is never going to solve problems but there is need for more sustainable solution which can optimize between cost and environment. The search of amicable solution has led to the growth of green manufacturing term. Green Manufacturing is defined as elimination of wastages and redefining existing process to minimize the carbon emissions during each process without increasing cost and affecting production targets. However except few literatures, green manufacturing has been used in context of green supply chain practices in recent years (Sarkis, 2003; Zhu, 2005; Srivastava, 2007; Vachon, 2007; Zhu et al., 2008; Simpson & Sampson, 2008; Darnell et al., 2008; Shukla, 2009; Yung et al., 2011; Bhateja et al., 2012; Luthra et al., 2012).

The green manufacturing addresses repeated processes (redundancy), frequent troubles related to man and machine and high cost due to traditional methods of producing goods. Today speed and cost are not only criteria to evaluate manufacturing performance but other factors such as types of materials used in manufacturing, generation of waste, effluents and their treatment, product life cycle and finally, treatment of the product after its useful life are all important considerations. Today, we have two manufacturing systems "Lean" and "Green." While lean focuses on removal of non-value added activities; green emphasizes on reducing waste having negative impact on environment. Green manufacturing is the need of the hour. Balancing the development with the earth's capacity to supply natural resources and process wastes will lead to environmentally sustainable manufacturing.

Operations management involves managing the processes which convert inputs into outputs of higher value. Green operations management involves integrating the Principles of Environment management to the Field of Operations Management. Green Operations Management embraces many concepts such as Green Building, Green Manufacturing, Green Supply chain, Reverse Logistics, and Green innovation. Hence, Green Manufacturing is an integral part of Green Operations Management. In its Sustainability Initiative, the Commerce Department defines Green manufacturing as "the creation of manufactured products that use processes that minimize negative environmental impacts, conserve energy and natural resources, are safe for employees, communities, and consumers and are economically sound. Consumers have become more environmentally conscious and that reflects on the companies from which they buy. World Commission on Economic Development defines sustainability as a practice "to meet the needs of the present without compromising the ability of future generations to meet their own needs"

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