

# Application of AHP and PAM in Green Manufacturing

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**Abstract**—*The present paper recognizes the ranking of those factors which help to execute the green concept in the industry. To determine the ranking among the factors for implementing the green concept, we have used the idea of Analytical Hierarchy Process (AHP) group decision-making. For group decision-making, AHP and Data Envelopment Analysis (DEA)-based preferential aggregation method (PAM) is used. Execution of these elements in the business helps in accomplishing green concept as well as achieving financial development at different levels.*

**Keywords:** *Green Manufacturing, Green supply chain, Green Concept, AHP, PAM.*

## 1. INTRODUCTION

Resources and population are major problems in our existing global world. The environment is important and crucial one because the change in climate will lead us to the imbalance of the earth. A new quality management system has been proposed by International organization for standardization for products and environment management systems. As a sustainable development strategy, green manufacturing is required. Tan et al. (2002). One of the strategies is that we can accommodate for the price fluctuations by passing it to the customer.

In the mid 19<sup>th</sup> century, the production framework embraced was primarily the large-scale manufacturing system. In the 20<sup>th</sup> century, the idea of green manufacturing began to take shape. The concept of green assembling can be looked into two ways; the manufacturing of green items, especially those utilized as a part of sustainable power source frameworks and clean innovation hardware of numerous types.

The best strategy for minimizing waste and pollution is green manufacturing. It moderates the exhaustion of regular assets, besides bringing down the broad measures of junk that enter landfills. Green manufacturing is a strategic priority. The question emerges do we truly require green manufacturing? Is it only a trend? Or on the other hand, is it creating a pattern in the manufacturing area, which is politically, fiscally or socially motivated? These questions should be answered to understand the basis, popularity and the market need for green

manufacturing. The green concept which incorporates green manufacturing, has its origin in Germany, and requires bringing importing companies to assume the liability and furthermore remove the packaging stuff utilized for an item. Indeed, the Germans have set up an accepted worldwide assembling standard signifying that, "any organization wishing to contend internationally should begin making items that will agree to the green dictates of the huge European market".

Green manufacturing not just includes the utilization of green design of the item but also includes the utilization of eco-friendly crude materials, eco-friendly packaging, distribution, and reuse of the items (**Figure1**).

The part combination is likewise a part of design for disassembly. Since there are fewer pieces to fabricate, thereby reducing energy costs. According to the Industry Weeks states, planning for disassembly is one important way to make items more environment-friendly. It is based on the notion that items should be designed in a manner so that it can be dismantled modestly. In the event that we can't do that, we'll never go anyplace in the reusing procedure. This procedure is today effectively utilized as a part of the American car fabricating

industry and in a few polymer producing units. Another new idea that grew out of green manufacturing is green auditing, where we consider the cost related to environmental losses and resource depletion to gauge total welfare.

**Figure 2** shows the rate of emission of CO<sub>2</sub> during the last thirty year and also projects the anticipated emission in the coming years. It is very much clear from the figure that CO<sub>2</sub> emission is likely to become doubled by 2050, if the present emission trend continues.

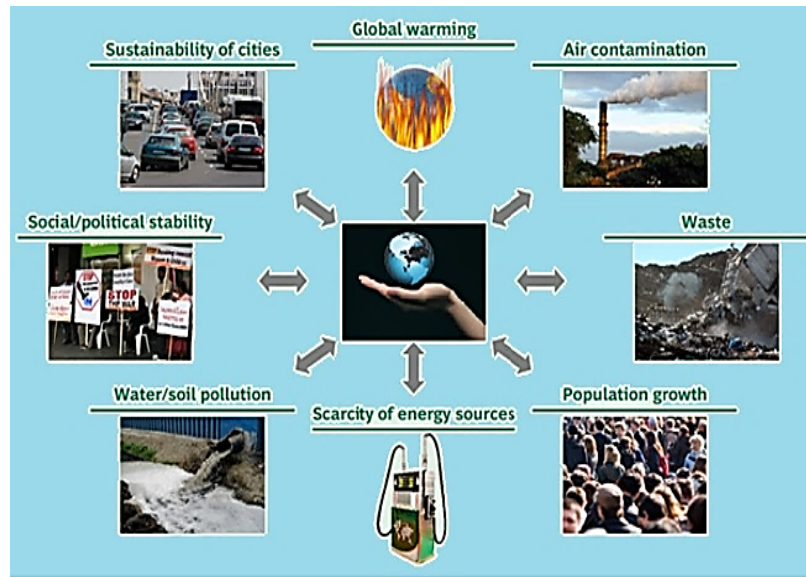


Figure1: Components affecting a green supply chain.

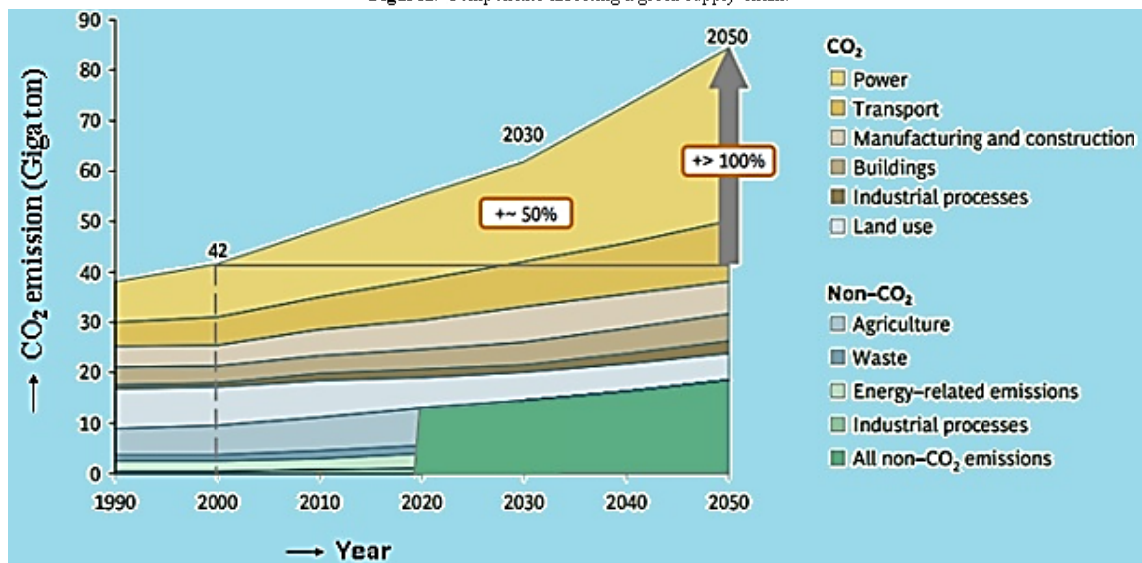


Figure2: Emission of CO<sub>2</sub> (Source: Stern Review)

**2. LITERATURE REVIEW**

Mohnty and Deshmukh (1998) featured the significance of green profitability as a focused edge. To achieve the hard goal of reducing wastes, they characterized the exercises for green profitability. For analysing the potential of green efficiency, they worked upon different case studies on various waste disposal practices. Jovane et al. (2003) concluded that the new worldview will react to the client requirement for more eco-accommodating items. Lai and Lun (2011) proposed an expansive triple primary concern structure to track and sort

supportability data at the corporate level through a maintainability record framework.

Different contextual investigations have been carried out by various authors on green manufacturing. Lamming and Hamps on (1996) stressed on the idea of ecologically solid administration and connected them to the supply chain management system, natural acquisition arrangement system, the community-oriented supply systems, the sellers' evaluation and working with the suppliers to empower enhancements. Walton et al. (1998) proposed numerous approaches to observe the effect of procurement on green manufacturing.



#### 4. CONCLUSION

The main focus is to determine the ranks among factors which are critical for green manufacturing and their significance in an industry. Environmental policy is the most imperative factor followed by green supply chain, green purchasing, green applications, green design and training and employee involvement as demonstrated in the paper. The industries having little manufacturing limit cannot intensely contribute to green supply chain than the industries having vast manufacturing potential. This is because of fact that the smaller firm has lower investment limit with regards to the investments included in the green idea than the larger firm.

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