

Analytical Network Process Tool for Green Manufacturing Using Prioritizing Decision Making

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Developments in environmental issues in the last few years have been forcing manufacturing companies to improve their environmental performances. Many firms developed integrated relationships with their suppliers to increase their environmental performance and to decrease their hazardous effects on the environment. Then, selecting suitable and green suppliers in the supply chain has become a key strategic consideration. A performance evaluation system for green suppliers is necessary to determine the suitability of suppliers to cooperate with the firm. Therefore, in this study, a model for evaluating green performance of suppliers is proposed, and a hybrid multicriteria decision making model is developed in order to evaluate green performance of the suppliers. The analytical network process technique is applied to handle the relationships and dependence of selection criteria and subcriteria and determine weights of the criteria. The technique for order preference by similarity to ideal solution is used to sequence the suppliers for ideal solution of the suppliers' green performance evaluation problem. After a comprehensive literature survey, evaluation criteria of green performance for suppliers are determined. Green Manufacturing saves time and money. With Green manufacturing we can produce more products in same environment then without green manufacturing

Index Terms—Green Manufacturing(g)

I. INTRODUCTION

Manufacturing plays a very strategic role in an organization, especially to build competitive advantage and improve performance. With rapid changes in technology, customer needs and globalization, manufacturing itself is constantly transforming and evolving. The beginning of the century saw the automobile industry introduce the mass production techniques which revolutionized manufacturing processes. Over the years the need for meeting individualistic customer demands without compromising productivity or quality, brought about the introduction of flexible and mass customization techniques. The fig. 1.1 below shows this change in manufacturing philosophies with time.

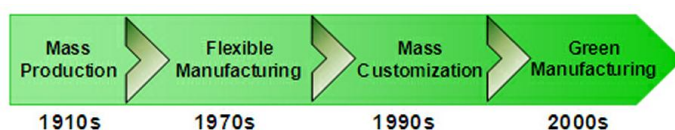


Fig1. Change in Manufacturing Philosophies

Recent volatility in the price of fossil fuels and global awareness about the finite nature of our resources is creating the need for a more sustainable way of how we produce and use. Therefore the focus is now on Green Manufacturing (Environment Conscious Manufacturing)

What is Environmentally Conscious Manufacturing (Green manufacturing)?

Environmentally Conscious Manufacturing is also known by plethora of different names: Clean manufacturing, Green Manufacturing, environmentally benign manufacturing, environmentally responsible manufacturing and Sustainable manufacturing.



Fig2. Meaning of Environment Conscious Manufacturing

II. THE DRIVERS FOR GREEN:

There are many drivers which are expanding the boundaries for green manufacturing. Frost & Sullivan recently conducted a survey among senior industry leaders to find some of the drivers for going green. A growing number of executives today feel that going green will help them to compete more effectively in the marketplace in the long term. Also organizations tend to conform to implicit expectations of their communities, which is another driver of change. In summary the major drivers can be grouped into three key areas:

- a) **Competitiveness:** The natural desire of manufacturing firms to improve its processes and capabilities for competitive advantage. This can manifest in terms of technology, new product and process development as well as opportunities for business.

- b) Corporate Social Responsibility: The growing pressure on manufacturing firms to become more responsible to the social and environmental impact it creates. Companies would like to brand themselves with a "green" image.
- c) Legislation: Manufacturing firms have to constantly strive to meet current and upcoming stricter environmental regulations

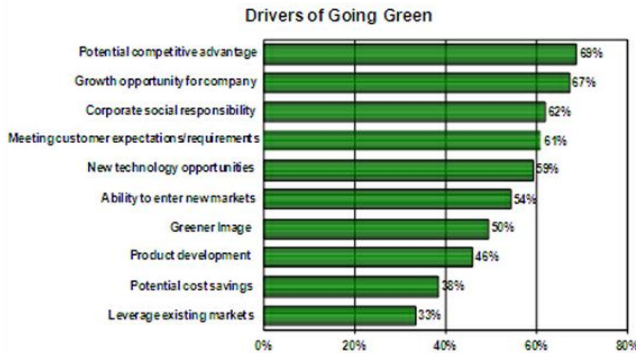


Fig3. Drivers of Green

III. OBJECTIVE OF STUDY:

- To explain the diffusion problems of green technologies through the lens of technological dominance.
- To developed a model to provide a unique framework for investigating the green manufacturing by integrated decision tools.
- Explicit use of model as a means to evaluate pros and cons of certain processes regarding environmental impacts.
- Incorporating uncertainties related with environmentally conscious manufacturing

IV. CONCLUSION

Based on considerable data from ECM practices and feasible industrial methods, while incorporating comments from experts in relevant fields, this work here developed assessment model and evaluate factors, followed by a calculation the weights of evaluating factors via ANP. Finally, the model is used for extracting successful factors of implementing ECM in any organizational system. Based on the results of this study, the following conclusion points can be drawn:

1. The proposed model contains five strategic factors, i.e. research & design process, waste control, packaging control, manufacturing control and quality control and 31 assessment factors/sub factors.
2. For strategic subjects, based on evidential analysis, the importance of assessment factors from each category can be seen judged from the result and the relative importance for five main categories can be judged from the fig 4. shown below.

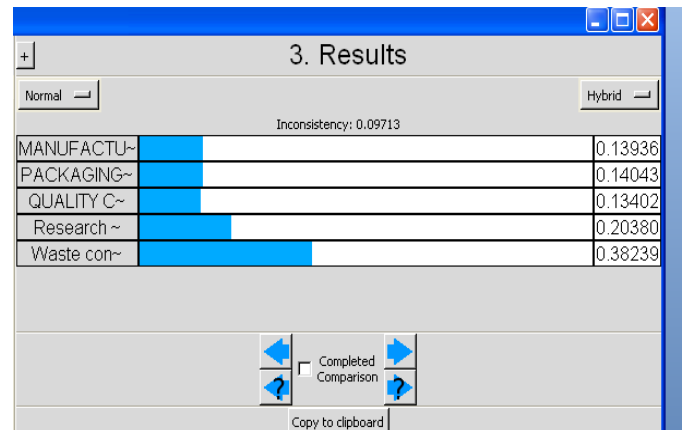


Fig4. Priority for Different Categories

3. It is observed that Waste control process plays most important role for environment conscious manufacturing and then Research and Design Process & Packaging Control comes next in the priority and these two are having almost equal importance while Packaging Control comes next in hierarchy and Quality Control is least important among the factors selected.

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