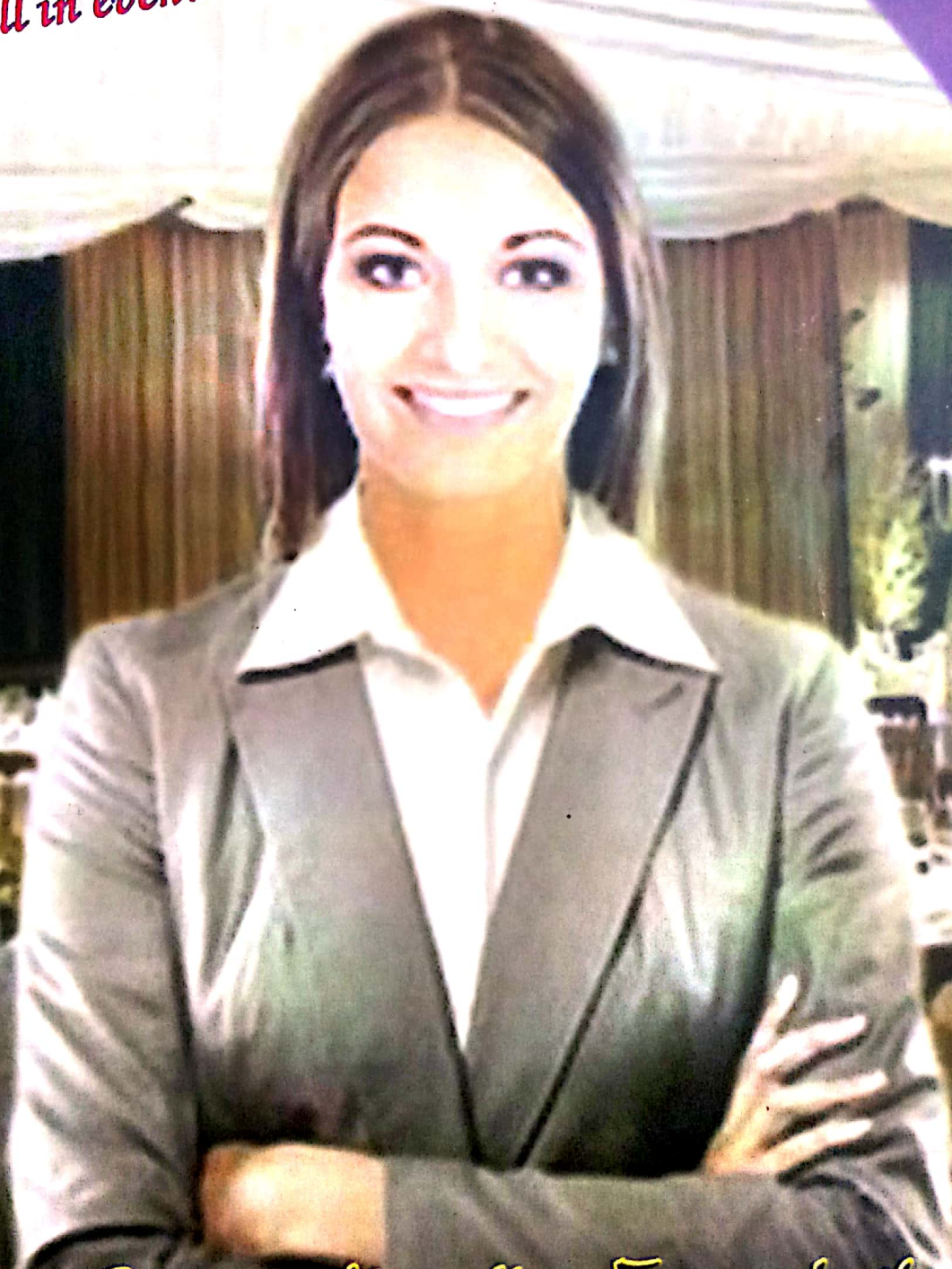


# BUSINESS VISION

Management & Business Journal

*Thinking well is wise,  
Planning well, wiser,  
but, doing well in event management is the wisest*




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# Business Vision

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## In This Issue

Editorial	- Dr. V. Kondal Rao	3
Science and Shaping our Agricultural Destiny	- Dr. M.S. Swaminathan	4
Is FDI in Indian Retail Sector Detrimental to the Interests of Unorganised Sector?	- Dr. S.R. Subba Rao	12
Impact of Celebrity Endorsement Towards Brand	- Ms. K. Suvarchala Rani	
Brand Awareness of Smartphones with Android OS	- Mr. C.S. Jayanthi Prasad	16
Talent at Workplace	- Prof. Y. Vinodhini	21
Retail Banking in India	- Ms. Naiyunnisa Begum	28
Interpretation of the Trends in Gold and Silver Prices	- Dr T. Koti Reddy	31
	- Ms. E. Vijaya	36
	- Ms. R.Sharmila	
India as an Emerging Market - The Changing Landscape	- Mrs. Rahela Tahassum	42
	- Dr. Shehbaz Ahmed	
Customer Attitude Towards Mall	- Mr. D. Sathya Narayana	46
Job Satisfaction	- Mr. P. Venkateswarlu	56
	- Mr. T.V.V.G. Satyanarayana	
	- Mr. N. Mallikarjuna	
Micro-Credit for Rural Women Folk	- Dr. P. Purna Chandra Rao	59
	- Dr. P. Venkata Rao	
Industrial Sickness of SSI's	- Ms. Kalpana Koneru	65
	- Ms. Hymavathi Chunduri	
Volatility of Forex Market in India	- Dr. L. Srinivas Reddy	69
Foreign Direct Investment in Indian Retail Business	- Dr. N. Venkateswara Rao	74
 A Systems Model for Green Manufacturing	- Mr. Osman Bin Salam	77
	- Ms. Reshma Nikhath	
Raising through Appraising	- Dr. K.V. Ramana Murthy	79
	- Dr. Vanisree Talluri	
Entrepreneurial Success among Rural Women	- Dr. K. Srivani	89
	- D. Satyanarayana	
Accelerating Rural Development through Youth Empowerment	- Dr. S. Pavan Kumar	94
The Concept of ISBN	- Mr. Sambaji Rao	
	- Mr. Wallace Jacob	99

# A SYSTEMS MODEL FOR GREEN MANUFACTURING

The technology of green manufacturing has been growing in interest and importance recently. The opportunities for developing advanced manufacturing capabilities while, at the same time, reducing the impact of manufacturing on energy use, water and resource consumption and, overall, greenhouse gas emissions and carbon footprint are numerous. The background, vocabulary and motivation for green manufacturing and the competitive opportunities for manufacturers who embrace this growing movement are reviewed.

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## Introduction :

A significant shift in manufacturing techniques is being noticed in developed economies all over the world. Smarter and leaner production techniques have displaced inefficient means of production. On a more noticeable level, hybrid vehicles are beginning to populate our roads. The term 'Green Manufacturing' has established itself in the vocabulary of engineers and manufacturing professionals. Green Manufacturing is generically defined as 'elimination of waste by re-defining the existing production process or system'. Several other jargons such as 'end-of-line management' mean the same thing. We have all come across company examples that take their problem solving approach to the next level and develop innovative techniques towards effective solutions. Such solutions result in cost savings from reduced work handling, effluent control, process automation, etc. All these efforts are applications of green manufacturing.

This manufacturing concept is not just restricted to addressing the social and environmental impact of a pollution-centric process. Green manufacturing addresses process redundancy, ergonomics and cost implications due to faulty methods of producing goods. Faster and cheaper are no longer the only two criteria in manufacturing a product or evaluating an existing process line. Several other factors such as materials used in manufacture, generation of waste, effluents and

their treatment (or possible limitation), life of the product and finally, treatment of the product after its useful life are all important considerations.

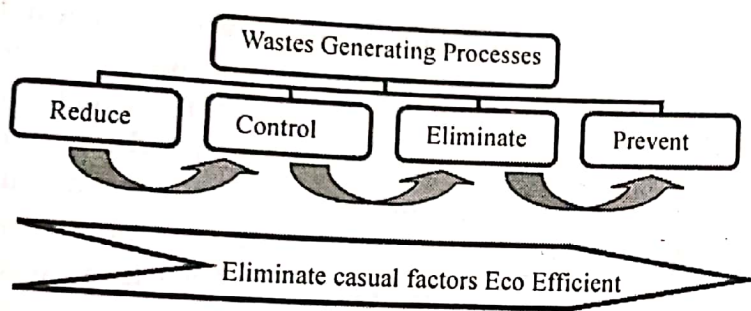
'Green manufacturing' involves product recovery activities and reverse logistics. The former reflects on various operations, which are directly applied on the returned product so as to convert it to a usable one. There are various types of such activities like remanufacturing, recycling, refurbishing, etc. On the other hand, reverse logistics is the area that focuses on inbound supply and distribution of the used products and the inventory management. This once again can be divided into inventory management activities and reverse distribution processes.

The uniqueness of these activities is mainly centered on the uncertainty factors, particularly relating to timing, quality and quantity of supply of used products. The following facts justify the reasons for the complexity inherent to 'Green manufacturing'.

- ◆ The timing, quality and the quantity of returns are unknown.
- ◆ Demand is also stochastic in nature, so balancing returns with demand is vital.
- ◆ Disassembly operations are highly variable with respect to the time required which, in fact depends on the condition of the returned product, modules, components or parts.

- ◆ There exist various methods of product recovery depending on the condition of the product, for example, returned items may be either remanufactured or used for spares or sold to secondary market or recycled.
- ◆ Logistics network is also a complex domain of 'Green manufacturing' due to the involvement of stochasticity both in supply of returns and demand of remanufactured products, and existence of both forward and reverse distribution channels.
- ◆ Uncertainty exists also in routing and processing times, as the condition of a returned product is not known before disassembly operation.

### Green Manufacturing and Efficiency :



Time is money, energy is money and consumables are money. Making the same product using fewer resources and/or energy is a good strategy to make money. In other words, being efficient through preventing waste is both eco as well as money efficiency. In manufacturing there are a lot of wastes that can be eliminated in the process as well as the product. Green manufacturing strategy to reduce wastes is outlined in Figure 1.

### Green Manufacturing with Environment:

Most large Western companies these days view going green as an imperative, not an option, as they face calls from customers, regulators, shareholders, partners, and directors to reduce their carbon footprint and the impact of their operations on the environment. And while green strategies are socially responsible, equally important is that they can lower costs, minimize energy sticker shock, and potentially provide new revenue and profit streams. Many organizations find manufacturing operations a good place to start environmentally conscious

initiatives, primarily because even before green became fashionable, production systems were focused on improving efficiencies and reducing resource consumption.

The appropriate environmental commitment varies widely among companies and among industries. But generally there are three prevalent green strategies (from simple to complex):

**Responsible:** Seeks to meet the basic sustainability demands of key stakeholders, such as trade customers and regulators, and maintain the company's competitive position. Initiatives tend to be focused on compliance.

**Efficient:** Pursues operational efficiency and cost competitiveness through environmental approaches that also leverage lean principles. The goal is chiefly to provide cost savings, with revenue opportunities viewed as a possibility down the road.

**Differentiated:** Elevates environmentally sound behavior from a social responsibility to a core operating model by placing a "green lens" on the entire product life cycle and integrating green messaging into brand positioning and communications. With this substantial effort, green strategies are the source of long-term business value and enhanced market share.

### Conclusion :

As a scientific field 'Green manufacturing' is still young. It needs new inter- and intraorganisational processes. However, the inherent scarcity in natural and environmental resources is creating the necessity and the motivational forces to make it a field of active research and an efficient business proposition in years is yet to come. And within a few years like a newspaper boy or a milkman, you may not be surprised to see a company-van coming to your doorstep collecting their products back.

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