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# GREEN MANUFACTURING: A CHALLENGE FOR MSMEs

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**ABSTRACT**

*An Eco-friendly practice in the manufacturing process of MSMEs is a great challenge to be fulfilled. Green manufacturing is a new era's demand which will help in reducing waste and discharging of effluents that pollute the environment. Green management leads to the sustainable development of the country. This paper attempts to study the literature reviewed by different authors on the environmental impact of MSMEs (Micro, Small and Medium Enterprises). Green manufacturing of Indian MSMEs is discussed in this paper. The objective is to find out the difficulties faced by Indian MSMEs in adopting green manufacturing (GM) in their organizations. The paper is conceptual and the study is based on the secondary data. Lots of literature available on Green manufacturing is comprehended.*

***KEYWORDS***: *Green Manufacturing (GM), MSMEs, Sustainable Development, Eco-friendly.*

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## Introduction

### Industry and the Environment

Occurrences of polar ice dissolve, tsunamis and snowstorms are so common. Deaths from such causes are steadily on the rise. Are these the vagaries of the planet or people? This put a question mark on the environment or industry? Natural resources or technology?

### Past and Present Scenario

Centuries ago, when reserves were plentiful and labour was inadequate, industries focused on increasing labour competence through introducing miscellaneous manufacturing techniques. Strategies ranged from division of labour, time-and-motion study and mass production, whereas technologies including machine tools, engines, and automated devices to robots and mechanized lines; all these were designed to increase labour efficiency in order to satisfy the consumers demand. On the other hand, modern manufacturing consumes abundant resources, generates waste, and pollutes the natural environment. So, green manufacturing has become a challenge for these industries.

It is indistinct of how the best possible sustainable methods of production would be developed for Micro, Small & Medium enterprises (MSMEs). However, developing a focal point on green manufacturing is innovative and complicated challenge for Indian MSME"s. Micro, Small and Medium enterprises are having less awareness in the environmental issues as majority of business is family owned business or being run by single owners. In addition to eliminate the wastes, there is need for fundamental shift in business model. The businesses that are dynamic will have competitive advantages. Those that are not putting efforts won't be competitive.

This paper attempts to study that green manufacturing is a challenge for MSMEs, but with the implementation of green manufacturing, MSMEs can act as a catalyst in the environment protection.

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**Literature Review**

The research is aimed to determine the importance of green manufacturing (GM) being used in MSMEs for increasing eco -friendly production. So, the paper is based on the investigations of accredited scholars and researchers. This review is based on the definitions, concepts and performance measurement analysis of GM by different authors and researchers. It will explore the approaches towards the GM in MSMEs. The subdivision explores the GM in Indian MSME.

- **Outline of Green Manufacturing(GM)**

GM is an emerging field in recent years and is also helpful in sustainable development for modern manufacturing industries. Sustainable green manufacturing emerge as the thought of combining technical issues of design and manufacturing, energy preservation, prevention, health and safety of communities and customers. [1]

Green manufacturing is "a system that integrates product and process design issues with issues of manufacturing planning and control in such a manner as to identify, quantify, assess, and manage the flow of environmental waste with the goal of reducing and ultimately minimizing environmental impact while also trying to maximize resource efficiency"[2].

As per Basappaji K. Ma and N. Nagesha [3], Cleaner Production (CP) is a preventive environmental strategy in agro based industries. The authors presented a model developed to evaluate the CP status and execution of this model on 22 cashew processing units near Mangalore, Karnataka, India by collecting data through structured questionnaire.

E.E Smith, (2010) [4] suggests the perception of consumers regarding greening in the manufacturing industry. Two hundred self administered questionnaires were distributed to consumers in the designated population and 120 of these questionnaires were completed. Manufacturing firms are regarded as the major contributor to environmental pollution and global warming and thus need to realize the environmental impact of their activities. Practical guidelines are provided to assist manufacturing firms to become greener. Green awareness or environmental awareness has increased significantly over the years and therefore the need for green products has become essential.

Esty & Winston, 2009.suggested that SMEs follow business nature to reduce resource waste. But when faced with the prospect of no short term gains, SMEs may find these investments as a non priority expense.

Porter and Linde (1995) have discuss that the most competitive firms are ones which have the capacity to innovate more and are not the ones with cheapest inputs They discuss several examples of creating a cost advantage where environmental regulation has caused firms to innovate for solutions.

Angell et al. (1999) suggested that GM cause to grow economics, environmental, and social performance through reduction of waste and costs

The growing contribution of SMEs to pollution and environmental concerns is not documented, yet is suggested to be equal, if not more, by some researchers (Hobbs, 2000).

**MSMEs and Green Manufacturing (GM)**

In latest years, many studies in countries, like United Kingdom, Europe, Australia and the USA, have identified several common trends to most SMEs (Hutchinson et al., 1998). SMEs are growing concerns towards the GM in their business, but still SMEs are less likely to have environmental plans and management practices than large firms. Related to this concern of MSMEs, there are three main barriers that hinder them from practicing GM. These are the characteristics of SMEs, resource availability, knowledge of environmental management and their personal interest (Yacob et al., 2012). Many SMEs do not care for environmental issues, or the need to act in an environmentally responsible way, as a significant issue for their business (Revell et al., 2007).

Here are approaches that identifies, that the MSMEs can adopt and integrate environment into business strategy. These approaches are as follows:

- **Innovate the Product**: The idea behind environmental product differentiation is straightforward: MSME"s create products or employ process that offer great environmental benefits.
- **Manipulating the Scenario**: Not all companies will be able to increase their profits through environmental product segregation. But some manage the competitors be able to achieve the environmental and business benefits by changing the rules of game so that things change in their favour.

- **Cost Effective**: Third approach is focusing not only environmental issues but also lowering down the internal cost. Some firms are able to be cost effective and thus improve environmental performance.
- **Environmental Management**: For many firms Environmental management means risk management. Most of the cost like lock outs, accidents, and law suits are being taken care directly by risk management.
- **Paradigm Shift**: Some companies can follows several approaches and in the process the redefine the markets through remanufacturing.

**General Variables of Green Manufacturing**

- **Company culture** Ghazilla et al. (2015), Garg et al. (2014), Chen (2008), Shrivastava (2007), Hosseini (2007), Gutowski et al. (2005), Pujari et al. (2003), Allen et al. (2002), Florida et al. (2000)
- **Competitive advantage** Tseng et al. (2013), Agan et al. (2013), Searcy et al. (2012), Deif (2011), Castka et al.(2009), Sangwan (2006), Pun et al. (2002), Chin et al. (1999)
- **Employee demands** Govindan et al. (2014), Searcy et al. (2012), Castka et al. (2009)
- **Environmental concerns** Ghazilla et al. (2015), Govindan et al. (2014), Searcy et al. (2012), Castka et al. (2009), Tan et al. (2008), Rusinko (2007), Fijal (2007), Curkovic (2003),Pun et al . (2002), Maduet al. (2002)
- **Financial profit** Ghazilla et al. (2015), Govindan et al. (2014), Garg et al. (2014), Agan et al. (2013), Yacob et al. (2012), Searcy et al. (2012), Deif (2011), Castka et al. (2009) Searcy et al. (2012 ), Marsden et al. (2012), C astka et al . (2009), Neto et al. (2009), Sadorsky et al. (200 7), McKeiver et al. (2005), Madu et al. (2002)
- **Health and safety** Zailani et al. (2012), Lee (2008), Cheng et al. (2008), Rusinko (2007), Sangwan et al. (2007), Pun (2006), Digalwar et al. (2005)
- **Innovation** Ghazilla et al. (2015), Singh et al. (2014), Govindan et al. (2014), Tseng et al. (2013),Chen (2008), Lin et al. (2001)
- **Market trend** Govindan et al. (2014), Garg et al. (2014), Agan et al. (2013), Searcy et al. (2012), Deif (2011), Massoud et al. (2010), Castka et al. (2009), Pun et al. (2002), Chin et al. (1999)
- **Stakeholder relations** Govindan et al. (2014), Singh et al. (2014), Despeisse et al. (2013), Yacob et al. (2012),

**Importance of Green Manufacturing for MSME's**

- **In the Process**

  Material saving, resulting from more substitution, reuse or recycling of production inputs.
  - Optimum utilization of residual product, conversion of waste into valuable forms.
  - Less energy consumption during process of production.
  - Minimizing material storage and handling cost.
  - Reducing the cost involved in discharge or waste handling, transportation and disposal.
- **Product Benefits**
  - Material substitution by better quality products thereby lowering down products cost.
  - Cost effective packaging of products.
  - Cost effective of product for the customer.
  - Better product resale and scrap value.

**GM in Indian MSMEs**

The virtual status of GM implementation in Indian context was revealed by Rehman et al. (2013a) with their study was done from the Vidharba region of Maharashtra (India) with the aid of their survey instrument. Their study clearly showed that there is a substantial gap between virtual and literature resources; their study also confirmed that more effort is needed to establish GM concepts.

Sangwan (2006) developed a multi-attribute decision model with 61indicators to analyze the performance value of a GM. According to the findings of Sangwan, GM offer far better competitive advantages than non-GM and the ability to maintain competitive advantage. Sangwan (2011) with the assistance of the empirical study where 198 SMEs were surveyed and the data was analyzed through statistical software (SPSS). With the help of a fuzzy TOPSIS multi criteria decision model, he explored the qualitative and quantitative positive impacts of GM in Indian MSMEs The final quantitative benefits of GM in order of their decreased ranking are enhanced morale, better brand value, lowered regulatory concern, increased market opportunities, better product performance and decreased liabilities. Whereas, the quantitative benefits of GM are related to either wastes or life cycle of the product.

Digalwar et al. (2013) made an empirical investigation among Indian manufacturing firms to find the performance measures of GM. In this study, they approached 400 industrial managers and got a response rate of 27%. They found several performance measures, including top management commitment, employee empowerment, knowledge management, employee training, green product and process design, environmental health and safety, production planning and control, suppliers and materials management, quality, cost, customer environment performance requirement, customer responsiveness, and company growth. Sustainable GM emerges the concept of combining technical issues of design and manufacturing, energy conservation, prevention, health and safety of communities and consumers.

Goel et al. (2013) for manufacturer; sustainability has been emerged as a new competitive requirement to achieve differentiation in market. The current proposed work is based on development of sustainable manufacturing model for Indian manufacturing MSME's and proposed a framework for improving the performance to make them more sustainable.

Garg et al. (2014) has attempted to identify and estimate drivers in implementing sustainable manufacturing in Indian context. Nine possible drivers for successful implementation of sustainable manufacturing has been identified from extensive review.

Jain et al. (2015) explores the multifaceted relationship between different motivational factors and firms' characteristics to determine the CEP adopted across different industries in India Seven different motivational factors and three characteristic variables have been investigated for Indian industries

Khurana et al. (2018) has compared manufacturing enterprises in developed (UK) and a developing country (India) which have incorporated sustainability with innovation. Therefore, the differences and the similarities in the magnitude of integration of sustainable oriented innovation are included.

**Findings and Conclusion**

Hence, getting more from less is the approach that has been missing from these MSMEs strategies. It is argued that for MSMEs to become more eco-friendly, managers can practice the sustainability at the strategic level, by decision-making process and as part of the strategy all the levels. The firms must have eco-friendly practices with reference to the waste management. This is important for the disposal of waste generation. The general variables of GM are company culture, competitive advantage, employees demand, financial profit, health and safety, innovation, market trend, stakeholder relations must be taken into consideration GM is a challenge to the MSMEs as there is a lack of awareness in its implementation. Hence, change in the existing product and improving its efficiency has to be focused. For creating awareness into MSMEs about implementation of GM, it is necessary that the government should make efforts through campaigns, conferences, seminars etc, so that it becomes the part of manufacturing of MSMEs.

Although, it could be seen that the potential contribution of SMEs to cleaner environment is not yet realized. In India, present policy and legal frameworks do not encourage and support SMEs in this direction. With lack of enforcement mechanism, the local regulatory bodies may be missing much of the environmental

**Impacts by MSMEs.**

However, many initiatives by the government like PAT, CBIPM, and Zero Effects - Zero Defect are taken to make industry more efficient and sustainable. With this a good start has been made to improve manufacturing sector. GM is still a challenge for MSMEs due to many factors that could be studied further for future research.

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