

# Achieving Sustainability through Green Supply Chain Management Practices with Reference to Indian MSMEs

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## Abstract

The Micro, Small, and Medium Enterprises (MSMEs) are the pillars of the Indian economy by creating job opportunities for nearly 70 million people, 40 % of the export, and 45% of the manufacturing output. Over a period of time MSME's growth has boosted the production as well as the exporting activities in India. This has contributed to the rise in industrial pollution. Enhanced awareness towards sustainable practices to minimize pollution, the MSMEs have initiated to adopt green practices to support the economy, society, and most essentially the environment. Green supply chain and logistical practices aid the organizations to minimize the cost at the same time reduce the contribution to carbon footprints. Green supply chain practices in the area of manufacturing, inventory/warehouse, transportation, and maintenance facilities for reducing pollution to a greater extent. The study was an empirical effort of the researcher to explore the green supply chain practices followed by MSMEs. Current study aims at identifying the reasons and measures taken by MSMEs towards green supply chain management. Data was been collected from 30 MSMEs from Bangalore by using a simple random sampling method. A simple percentage method and correlation were adopted for the analysis. It has been found that the prime reason for adopting GSCM practices was due to government rules and compliances and recycle and reuse of products as the major measures adopted. It has been found a positive correlation between measures adopted towards GSCM practices and Overall satisfaction.

**Keywords:** Green supply chain, Sustainability, MSME, Manufacturing sector

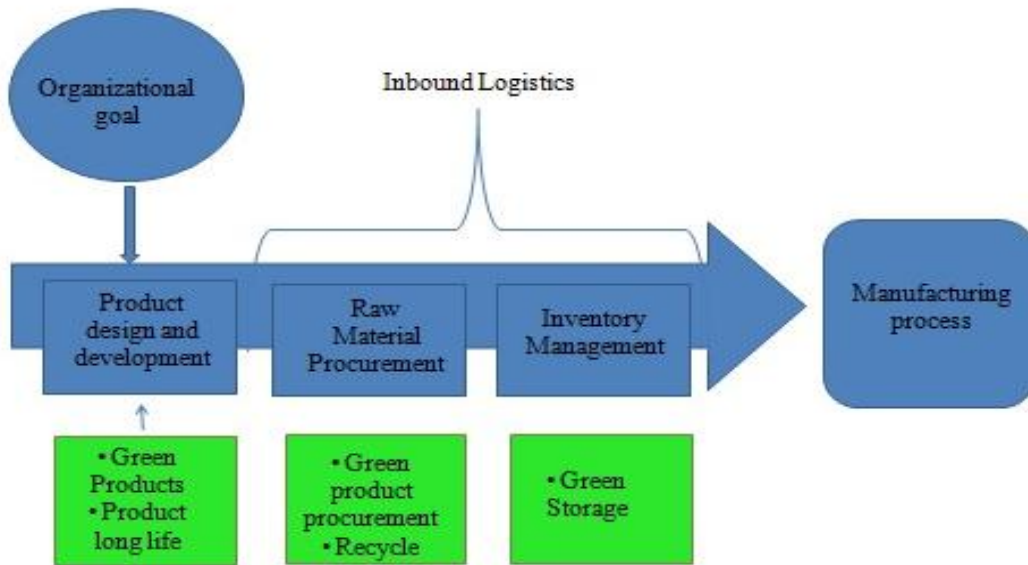
## I. INTRODUCTION

Global warming and its effects are raising concern in the 21<sup>st</sup> century. Industrial developments, growing logistics services and increased online operation has contributed immensely to raise the temperature level. The progressive trends in online shopping and more use of digital platforms are also causing damage to the environment. To handle customer demand and to provide high responsiveness, companies are utilizing a more effective supply chain model at the cost of environmental damage. Internal and external stakeholders have explicitly included the environment parameter in their planning and execution of strategic and operational level plans (Hervani,

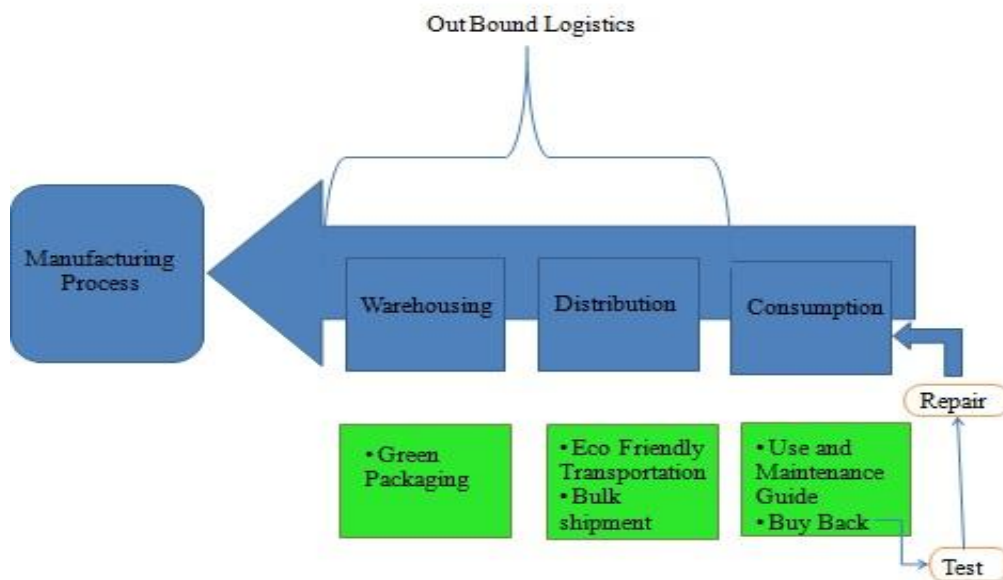
A.A. et al.,2005). Mandatory adoption of sustainable measures from the companies has facilitated to reduce the carbon emission issue to some extent. The different forms of waste emitted, use of energy, and resources by the manufacturing industries have huge impact on the environment (Beamon, B.M., (1999)). Sustainable development not only focuses on the environmental factor but emphasizes the social and economic development of the nation. Sustainable developmental practices adopted in the supply chain process have not only enhanced the organizational competitiveness (Vipul Jain, 2019, pp. 1001-1049) but also facilitated the government to impose certain policy measures towards controlling the environmental damage (Sudheer& omkar,2011, pp 234-245). The green supply chain (GSC) is the initiation by the manufacturers towards the sustainable growth. GSC implies approaching factors as per imperatives of the environment and strategies adopted towards the sustainable development (Larisa Ivascu, et al.,2015, pp702-708).Green supply chain management has gained it prominence in recent days due to ineffective waste management system, non-availability of scarce resources, and deterioration of the environmental quality.

Micro, Small and Medium Enterprises (MSMEs) play a major role in the country's economy. MSMEs are facing severe competition in the modern world. To face the competition and to build the competitive edge MSMEs are adopting the green concept. The government is encouraging the MSMEs with monetary support to implement sustainable practices. Adoption of green supply chain practices have improvised the performance of economic and environment along with the operational performance (Green, KW et al, 2012).Offering an efficient supply chain management system can bring cost benefits as well as a competitive advantage for these enterprises.

The supply chain trackabilities are found strong relationship between the cost and green supply chain practices (Cousins, P.D, et al., 2019). The green practices are an initiation from MSMEs to make their supply chain system more efficient. Even to operate at a global level, these companies require meeting global environmental standards. At the same time, products need to clear the customs regulations to flow across the boards. Some of the MSMEs are implementing the green supply chain over pressure from the government and customers.



**Figure. 1:** Green Inbound logistics process



**Figure. 2:** Green Outbound logistics

Figure. 1 represents the green supply chain practices of the manufacturing industries. Based on the organization’s goal, the research and development team develop and designs the new products. Inbound transportation starts with the procurement process, green and eco-friendly products and raw materials would be procured. The inventory system takes the initiation to reduce the temperature exertions in the raw material maintenance process. The manufacturing process would consider the green manufacturing practice and remanufacturing of the scrap.

Figure. 2 represents the green out bound logistic process which comprises warehousing, distribution, and consumption.

Considering the environmentally friendly packaging system at the same time gives higher protection will be the practice of warehousing. Using more electrical vehicles inside the organization and outside the organization helps the companies to minimize the carbon emission caused due to transportation. Bulk shipment is an additional measure organization are inculcating in their practices along with shared shipping. Providing a manual for the effective use of the products helps in using and maintaining the products for a long duration and disposable products are purchased back by the companies and make it ready for consumption after repair.

## II. LITERATURE REVIEW:

The MSMEs are adopting the green supply chain management system over internal and external pressure. Indian MSMEs lack external and internal pressure due to which there is low involvement of green supply chain management has been observed (Mohanty & Anand, 2014, PP. 438-456).

The installation of green supply chain management in Chinese automobile enterprises has improved the performance of operational and environmental, whereas the economical performance was not much improved (QinghuaZhu, et al., 2007, pp 1041-1052). Some of the Chinese companies have enhanced their awareness towards GSCM through regulatory measures, completion, and pressure from the market, and other drivers. But the awareness has not made them implement the GSCM practices (Qinghua Zhu, et al., 2005, pp. 449-468).

Application of green concepts in the supply chain system involves green inbound logistics consist of green sourcing and process, green production system or an internal supply chain, and green outbound logistics which comprises green distribution. Increase in greening at inbound logistics, ie. through sourcing, leads to an increase in green manufacturing initiation, which in turn leads to an increase in the greening of outbound logistics (PurbaHalady Rao, 2019, 15-24).

Among the various concerns under green supply chain management, green supplier identification and selection considered as an essential issue. The prime factors to consider for comparing traditional SCM over GSCM are cost, service performance, eco-friendly manufacturing, quality, risk bearing, assessment of environmental performance, innovation and creativity, delivery, and learning. Out of these factors, the cost is identified as the most essential factor for identifying and selecting the suppliers (Ashish and Hari, 2016, pp. 73 – 85). With the installation of green supply chain practice, firms enjoyed the enhanced performance in operational, environmental as well as economic (Manoj Kumar, 2015, 631-645).

## III. OBJECTIVES OF THE STUDY

The prime objective of the study is to explore the various green supply chain practices adopted and preference given by the micro, small and medium scale enterprises in India. The secondary objective is to find whether any relation exists

between GSCM measure adopted and satisfaction obtained by the enterprises.

## IV. METHODS

The study was conducted based on the survey method. A well-constructed questionnaire was used as an instrument for data collection. The data was collected from the production and operation managers of the selected micro, small and medium scale enterprises scattered in Bangalore city by using a simple random sampling method. Out of 50 mail responses, 30 complete and valid responses were considered as samples. For the analysis percentage analysis and correlation test was used.

## V. RESULTS AND DISCUSSION

The reasons acted as an instigator for the MSMEs to adopt green supply chain practices shown in Table 1. As per the Table 1 to meet the government standards and compliance (40%) is the first reason influenced the MSMEs to adopt GSCM followed with to reduce the cost (26.7%) and to enhance the image of the organization (13.3%).

Table 2 depicts the various green practices followed by the MSMEs in their supply chain process. As per Table 2, producing eco-friendly products (33.3) was the measure adopted by most of the enterprises followed with Eco friendly raw material (26.7%) and eco-friendly transportation system (20%).

MSMEs are introducing more of the green system in their Supply chain process due to various reasons. Some of the green practices followed at their procurement process are shown in Table 3. Purchasing the green products from their supplier (33.3%) is the most adopted practice at their procurement process followed with encouraging Paperless transaction (20%), Inbound transportation (20%) and waste recycle (20%).

The enterprises following green production practices are represented in Table 4. As per Table 4, optimum utilization of resources (46.7%), reuse and remanufacturing of materials (20.0%) and perfect design (avoid the error – 20%) are the practices followed by the MSMEs.

Table 5 depicts the green distribution practices adopted by the MSMEs. Green transportation practices (46.7%), prefer for low carbon emission.

**Table 1:** Reason behind adopting Green practices

Reasons	Frequency	Percentage
To improve the image of the organization	4	13.3
To meet the Standard / Compliance	12	40.0
Corporate social responsibility	4	13.3
To minimize the cost	8	26.7
To improve the quality of life	2	6.7
<b>Total</b>	<b>30</b>	<b>100.0</b>

**Table 2:** Green SCM practices adopted

<b>Factors</b>	<b>Frequency</b>	<b>Percentage</b>
Eco friendly transportation mode	6	20.0
Eco raw materials	<b>8</b>	<b>26.7</b>
Recycle	2	6.7
Eco products	<b>10</b>	<b>33.3</b>
Eco packaging	4	13.3
Reusable products	<b>0</b>	<b>0</b>
<b>Total</b>	30	100.0

**Table 3:** Green Procurement practices

<b>Factors</b>	<b>Frequency</b>	<b>Percentage</b>
Green raw materials	10	33.3
Paperless transaction	6	20.0
Inbound transportation	6	20.0
Waste recycling	6	20.0
Green packaging	2	6.7
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 4:** Green production practices followed

<b>Factors</b>	<b>Frequency</b>	<b>Percentage</b>
Optimum utilization of resources	14	46.7
Reuse the materials	6	20.0
Use of technology	4	13.3
Perfect design	6	20.0
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 5:** Green distribution / transportation practices

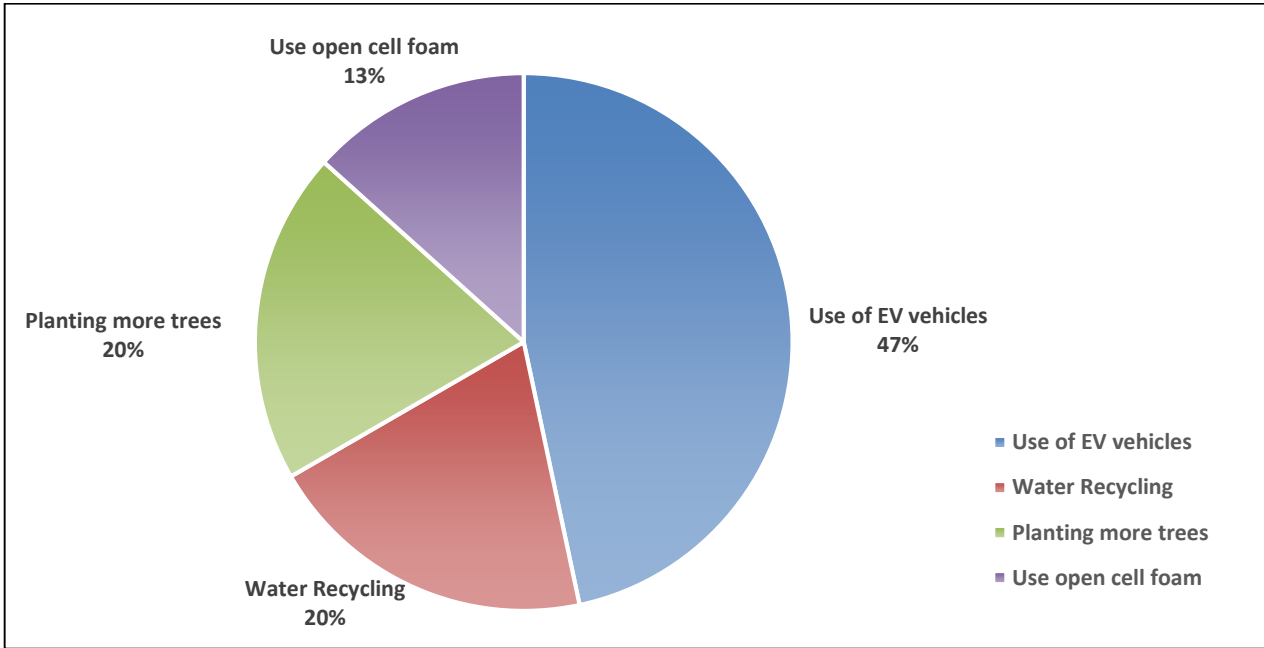
<b>Factors</b>	<b>Frequency</b>	<b>Percentage</b>
Green transportation	14	46.7
Use of low carbon emission vehicles	8	26.7
Vehicle pooling	8	26.7
<b>Total</b>	<b>30</b>	<b>100.0</b>

Figure 3 explains the measures taken by the MSMEs to reduce pollution at the factory. Adoption of EV vehicles (47%), Water recycling methods (20%) and planting more trees (20%) are the prime measure taken towards reducing pollution.

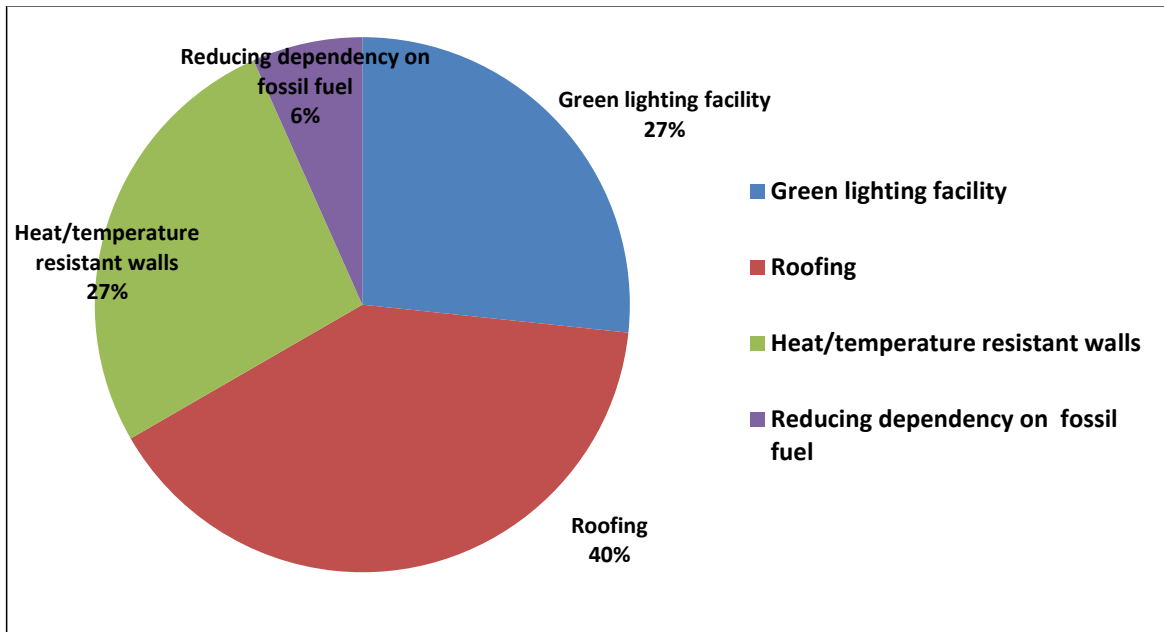
Adoption of the roofing system which reduces the temperature (40%), Solar and green lighting facility (26.7%) and heat and temperature resistant walls (26.7%) are considered as the some

of the key measures adopted by the enterprises to reduce the heat and carbon emission at warehouses (Figure 4).

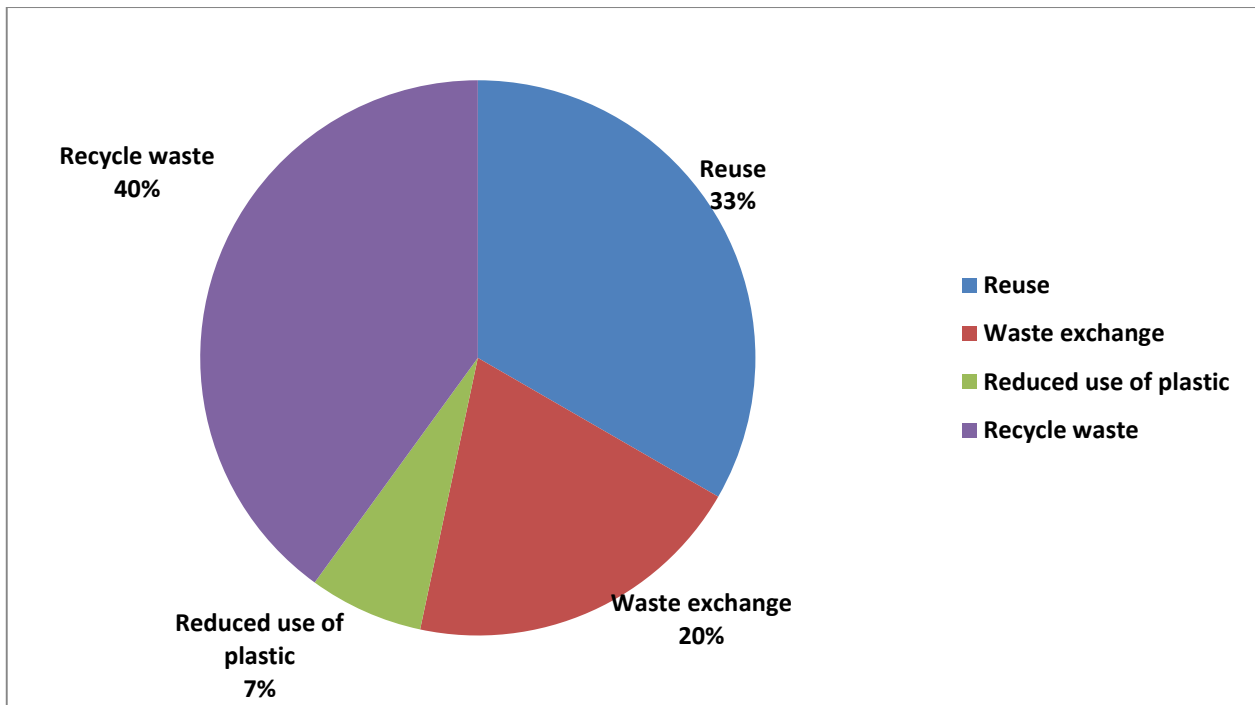
Figure 5 represents the various measures adopted by MSMEs for managing the waste. Recycle of the waste (40%) most adopted practice followed with reuse of the waste products (33%) and waste exchange (20%).



**Figure 3:** Measures taken to reduce the pollution



**Figure 4:** Measures taken to minimize the heat and carbon emission at warehouse



**Figure 5:** Measures taken for Waste management

**Table 6:** Correlation between measures adopted and overall satisfaction

		Measures taken towards GSCM	Satisfaction towards GSCM practices Adopted
Measures taken towards GSCM	Pearson Correlation	1	.470**
	Sig. (2-tailed)		.009
Satisfaction towards GSCM Adoption	Pearson Correlation	.470**	1
	Sig. (2-tailed)	.009	
**Correlation is significant at the 0.01 level (2-tailed).			

As per Table 6 the significant calculated value is 0.009 which is less than the table value i.e. 0.01. Therefore we can be concluded that there is a statistically significant positive correlation between the two variables i.e. Measures taken towards GSCM and Overall satisfaction towards GSCM practices adopted. As the Pearson correlation value is positive, there is a positive correlation between two variables.

## VI. CONCLUSION

Green supply chain management is one of the identified solutions for sustainable development. The enterprises are exploring the various innovative and effective green practices to adopt in the supply chain process. MSMEs being the backbone and being the prime contributors of India's economy,

needs to adopt more green growth practice to become the benchmark for many large-scale organizations. It was found that to match to the compliance and policies some of the green supply chain initiations were been taken by the company. The eco-friendly products for production, procuring green raw materials, optimum utilization of resources at the time of production and adopting green transportation system was the very essential GSCM practices of MSMEs. To reduce the pollution companies started using Electric vehicles, and control the temperature at warehouse location green roofing system was been adopted. The measures adopted and planning to implement are considered more cost efficient. The successful implementation of green measures will contribute immensely to global warming reduction. These adopted green procurement, production and transportation practices adopted was providing the satisfaction to employer

## REFERENCE

1. Sudheer Gupta, Omkar D palsule,(2011), Sustainable supply chain management: Review and research opportunities, IIMB Management Review,23(4), 234-245.DOI.10.1016/j.iimb.2011.09.002.
2. Vipul Jain, (2019), Sustainable supply chain management: A review of literature and implications for future research, Sustainable supply chain management, 30(5), 1001 – 1049. DOI 10.1108/MEQ-01-2018-0003.
3. Larisa Ivascua, Marian Mocana , Anca Draghicia , Attila Turia , Simona Rusa, (2015), Modeling the green supply chain in the context of sustainable development, 4th World Conference on Business, Economics and Management, WCBEM, ScienceDirect, 702 – 708. DOI: 10.1016/S2212-5671(15)00819-9.
4. Qinghua Zhu, Joseph Sarkis, Yong Geng, (2005), Green supply chain management in China: pressures, practices and performance, Green supply chain management, 25(5), 449-46.
5. Ashish J. Deshmukh and Hari Vasudevan, (2016), Analysis Of Supplier Selection Criteria In Traditional As Well As Green Supply Chain Management In Indian Msmes, International Journal Of Business Quantitative Economics And Applied Management Research, 3(3), 73-85.
6. Environmental Progress News – (2020), [https://warmheartworldwide.org/environmental-news-/?gclid=CjwKCAjw2Jb7BRBHEiwAXTR4jd6wLjd2x6ehY30b07LjMvrvZdri7UuIwrhUaAeLT-viO\\_VQ6O7BzRoC0BQQAvD\\_BwE](https://warmheartworldwide.org/environmental-news-/?gclid=CjwKCAjw2Jb7BRBHEiwAXTR4jd6wLjd2x6ehY30b07LjMvrvZdri7UuIwrhUaAeLT-viO_VQ6O7BzRoC0BQQAvD_BwE).
7. Mohanty R.P, Anand Prakash, (2014), Green supply chain management practices in India: a confirmatory empirical study, Production and Manufacturing Research, 2(1), 438-456.
8. PurbaHalady Rao, (2019), Green Supply Chain Management: A Study Based on SMEs in India, Journal of Supply Chain Management Systems, 8 (1), 15-24.
9. QinghuaZhu., JosephSarkis., Kee-hungLai.,( 2007), Green Supply chain management: Pressure, practices and performance with in the chines automobile industry, Journal of clear production,15(11),1041-1052<https://doi.org/10.1016/j.jclepro.2006.05.021>
10. Manoj Kumar, Vivek Kumar and Pradeshi Ram, (2015), Factors affecting Green SCM Implementation in MSME's, International Journal of Innovative Science, Engineering & Technology, 2(12), 631-645
11. Green, K.W., Zelbst, P.J., Meacham, J. and Bhadauria, V.S. (2012), "Green supply chain management practices: impact on performance", Supply Chain Management, Vol. 17 No.3,pp.290-305. <https://doi.org/10.1108/13598541211227126>.
12. Beamon, B.M. (1999), "Designing the green supply chain", Logistics Information Management, Vol. 12 No.4,pp.332-342. <https://doi.org/10.1108/09576059910284159>.
13. Hervani, A.A., Helms, M.M. and Sarkis, J. (2005), "Performance measurement for green supply chain management", Benchmarking: An International Journal, Vol.12, No.4, pp.330-353. <https://doi.org/10.1108/14635770510609015>.
14. Cousins, P.D., Lawson, B., Petersen, K.J. and Fugate, B. (2019), "Investigating green supply chain management practices and performance: The moderating roles of supply chain ecocentricity and traceability", International Journal of Operations & Production Management, Vol. 39 No. 5, pp. 767-786. <https://doi.org/10.1108/IJOPM-11-2018-0676>

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