



# IMPLIMENTATION OF GREEN PRACTICES IN LOGISTICS FOR SUSTANABLE SUPPLY CHAIN:CASE STUDIES

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## Abstract.

With environmental concerns on the rise amidst a general push for sustainability, more and more companies are incorporating green practices into their systems. The transport sector is directly involved in environmental issues, and transport emissions are a major contributor to climate change for the energy sector and industry, transportation accounts for about 70% of global emissions. Different modes of transport are responsible for global Traffic emissions, road vehicles are at the heart of the issue. So, changing the way we use road vehicles today could have a very positive effect Impact on Earth. Take supply chain logistics as an example. Research shows how new technology can improve the transportation of goods Cleaner without sacrificing service efficiency and speed.

**Keywords:***Supply Chain Logistics, Green Logistics, Optimize Goods Transportation.*

## 1 Introduction

Emissions produced by supply chain transportation are linked to how far products travel and how they get there. Supply chains can really make a difference to the environment by optimizing product transportation. In a nutshell, better planning leads to greener transport. Unpredictability, however, does not mean that an optimized transportation plan cannot be achieved. The best way to aggregate loads and maximize capacities, minimizing the number of trucks needed for deliveries.

So, the best and greenest transportation plan is always guaranteed with better planning, as are substantial cost savings. This is particularly important now that petrol prices are skyrocketing, massively increasing transportation costs. An optimized transportation plan can indeed make the job less stressful and increase worker satisfaction. Emissions from transport are expected to grow rapidly, but new technologies such as supply chains are making transport cleaner, more sustainable and more sustainable by improving working conditions and making workers safer. It helps keep people centered. And all this while minimizing costs, without sacrificing the efficiency and speed of supply chain services.

## 2. Literature Review:

Supply since Beamon (1999) Chain management has traditionally been viewed as the process of processing raw materials. Materials are transformed into finished products and finally delivered consumer. Some of the key factors that have led to the adoption of environmentally friendly practices. New government regulations, changing consumer attitudes, limited supply of raw materials and resources, abundant landfills and These factors and the pollution they cause.

According to Nelson and Rao (2012) Green Supply Chain Management (GSCM) emerged to address these issues. Engage companies and extend their environmental responsibility to SC activity.

Stakeholders are increasingly blaming companies for the environmental damage caused by their supply chains and are putting pressure on companies to expand their environmental stewardship by adopting Green Supply Chain Management (GSCM) practices. (Silva et al., 2021). In a 1996 study entitled "Sustainable Manufacturing," the Manufacturing Research Consortium (MRC) at Michigan State University first "Green Supply Chain". The focus of research in this program was 'Green Supply Chain Management'. A new supply chain design was proposed by his Beamon (1999) and several environmental factors were integrated into the supply chain model.

According to Srivastava (2007), "green supply chain management" incorporates environmental considerations at various stages including product design and material sourcing, manufacturing, sales, delivery of finished products to customers, and product care. It's a kind of supply chain management that incorporates after reaching the end of life. Zhu (2004) reported that GSCM Collaborate with upstream and downstream responders to maximize Environmental benefits across the supply chain – from product design to material selection through to retail and recycling - and to achieve sustainable supply chain expansion.

Green supply chain management includes green Purchasing, manufacturing, material handling practices, distribution, Marketing, and reverse logistics to optimize waste and energy consumption Initiatives to reduce packaging, waste, and emissions. It also plays an important role in achieving our green supply goals Chain management (Walker and McBain 2008, S Bag et al (2022). Their basic idea is Investing in greenery saves resources, avoids waste, Productivity Improvement S.S Panpatil and R Kant (2022) three The GrSCM approach – reactive, proactive, value-based –recommended. The main themes of the literature are green design, green operations, reverse logistics, waste management, green manufacturing (Srivastava,2007).

Green supply chain management aims to promote the coordinated development of environmental, social, and economic performance by achieving optimal resource allocation, increasing economic benefits, and enhancing environmental consistency throughout the product life cycle.

### **3. Case Studies:**

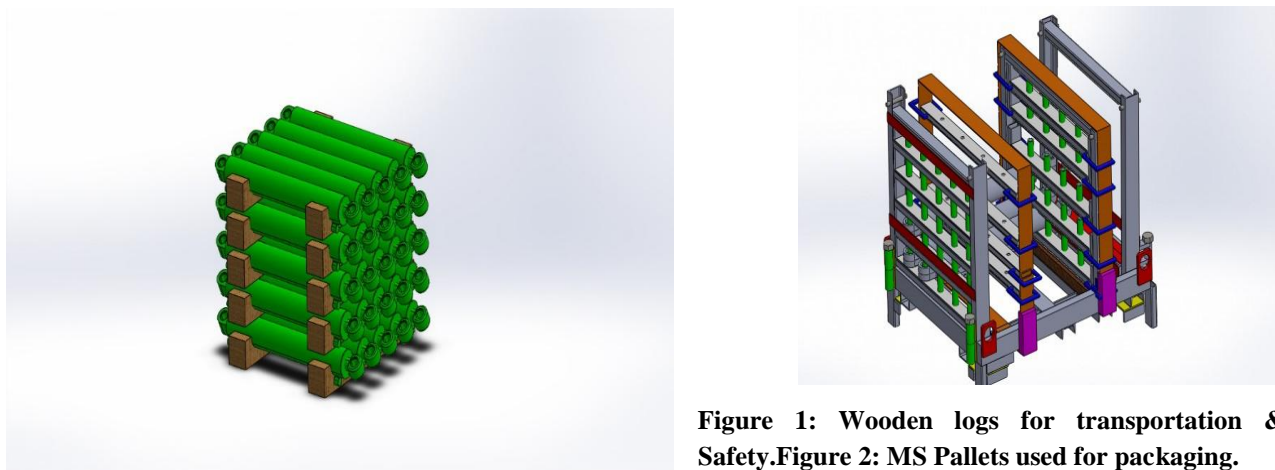
With the objectives to reduced CO2 emission, minimized fuel consumption, optimizing truck loading, less stressful activities, Safer work environment and Improved traffic safety the following case studies are conducted in various industries and appropriate solutions are suggested and implemented.

#### **Case Study- 1**

##### **(MS pallets for packaging and transportation is proposed instead of Wooden logs.)**

In context of green supply chain management here it is necessary for all concern to optimize the use of resources and it should be closer to green environment. Still here is found most of the companies still using the wooden logs to arrange the material safely and securely in the trucks. In supply chain management everything comes after how one can save the tree. Once all efforts

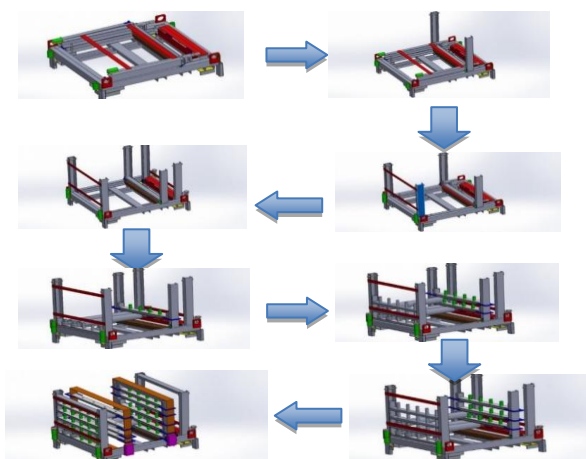
made to avoid the use of woods or trees in transportation that is much ahead of any tactics used in business the better planning of resources. So, every stack holder needs to stop the use of woods, once it achieved it is one step ahead in green supply chain. One of the companies,using wooden log to be transporting the part from very long distance, as shown in figure.



**Figure 1: Wooden logs for transportation & Safety.****Figure 2: MS Pallets used for packaging.**

As depicted in figure-1 shows that wooden logs are used for arranging the material in trucks for careful handling and properly arranging the material in trucks. But this is very alarming to use woods that needs to cut the tree. So, every company must investigate their operation where such use of wood is occurring. Same effort has been made here, to cut the use of wood from its root, a design is proposed here. Now the company has started to use MS pallets which is shown here in figure 2.

By this proposed design the use of wood is eliminated and on other hand it also provides the effective utilization of vehicle too. This part bought from more than 2000 KM, so second challenge arise here to make it foldable so that reverse logistics cost can be reduced to great extent. This is explained here by pictures the standard operation process (SOP) of these pallets.



**Figure 3: Standard operation process (SOP)**

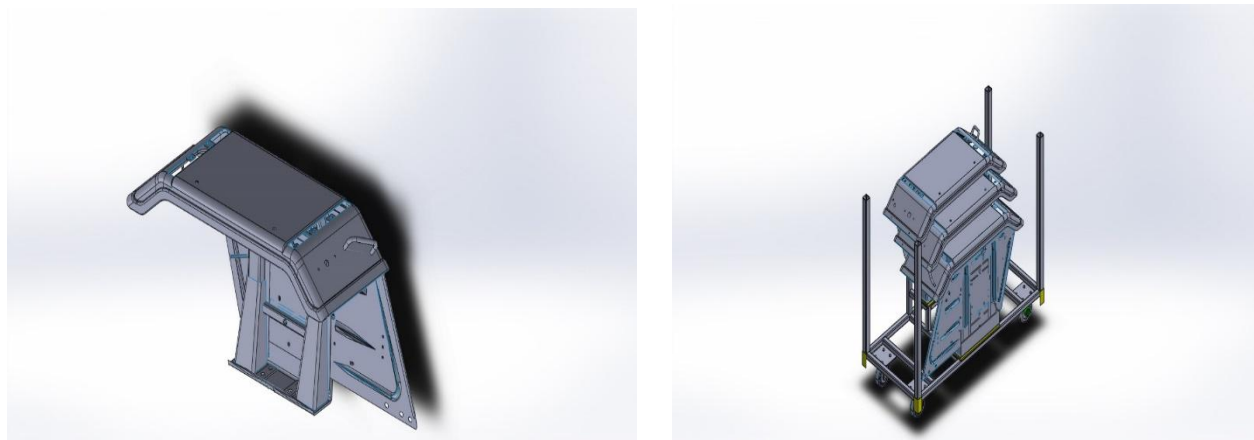
In above picture this collapsible type pallets so, reverse cost will be minimized, and the three to four truck material can be dispatched in single one, so return cost reduced to one fourth of total logistic cost which is much cheaper than the use of woods. These pallets also eliminated the use of woods thus it saves the forest/ trees, as green step initiativeitssaves the earth.

1. These pallets are stackable in both open & in closed condition. Thus, it is a better option for effective utilization of the space of vehicle.
2. These pallets are more robust.

### CASE STUDY-2

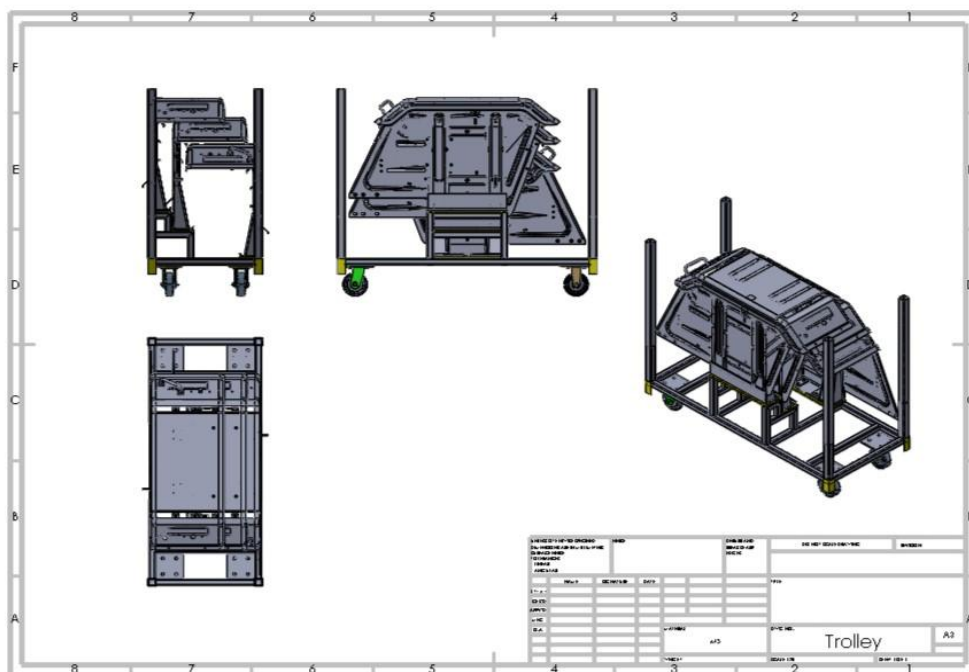
**(In this study mechanism for optimizing space during transportation has been proposed)**

Most of the company using the different types of transportation means to transport their material from one point to another for different causes like inbound transportation, outbound transportation or for some operations on the part. Here we are taking a case of a company which send its part for one operation to another company which is situated 70 KM from its position. So, this part moves to &fro for the performance of one operation on it and in all it travels around 150 KM for an operation.

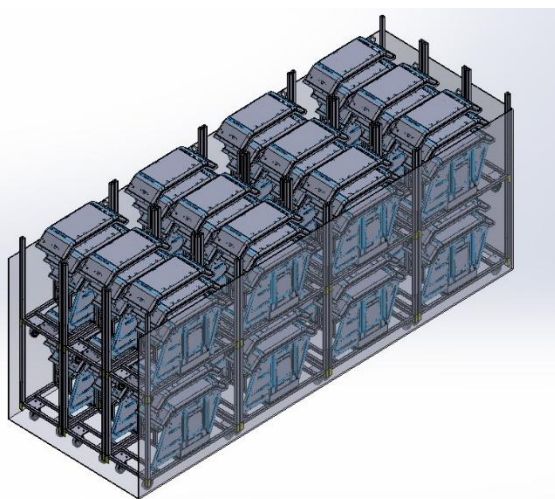


**Figure-1: PartFigure-2: Developed Device**

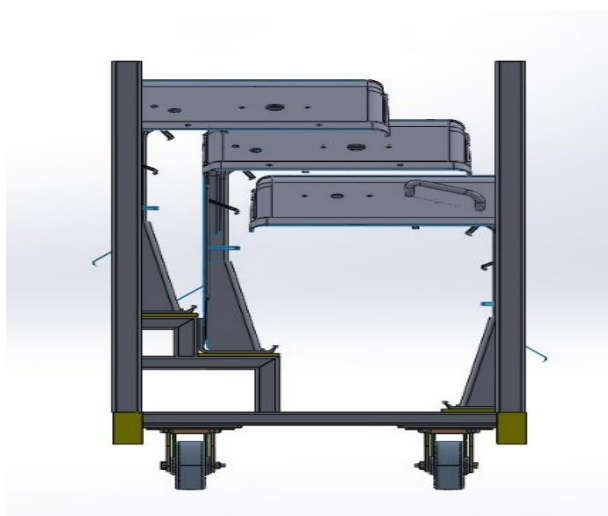
Problem arise here this transportation is done by truck and required to used it with optimum capacity. Part is shown here in **figure 1**.As part shown in figure-1 is used to transport from one location to another for performing one operation before to used it. As this part moves 150 KM so here it required to optimize the truck utilization. So, the cost of transportation and carbon footprint need to be reduced per part. Here a device is developed for transporting it, as shown in figure 2.



**Figure-3**



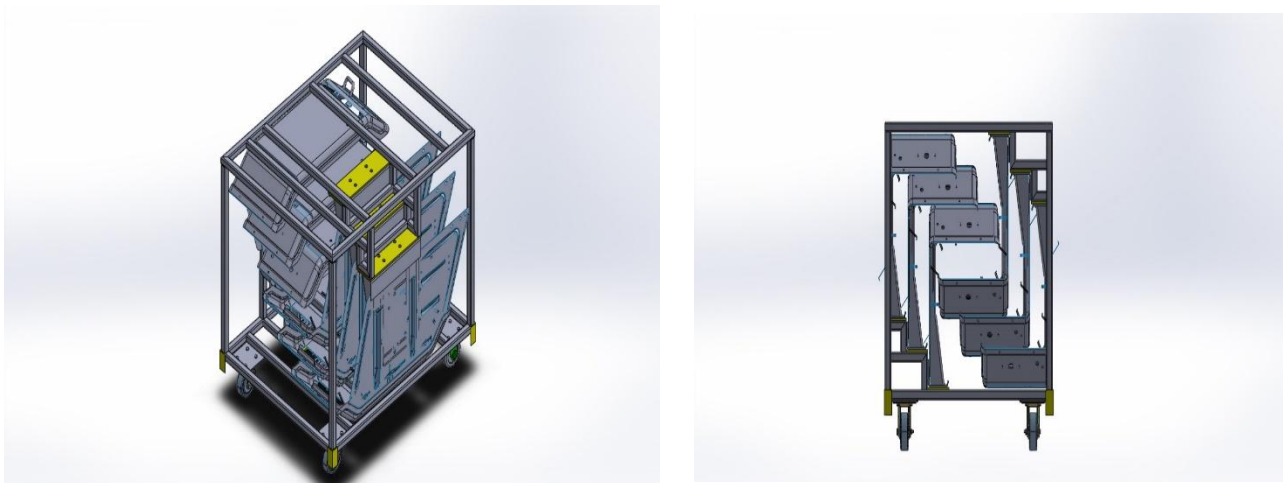
**Figure-4**



**Figure-5**

As shown in above picture this trolley is used to transport the part between the industries for performing their operation. How this trolley arranged in truck is shown by the following figure 4. In figure-4 the container used whose dimensions are 7'x7'x20'. In this container total number of trolleys that can be accommodated are 24, and in each trolley, there are 3 parts are there. So total number of parts in a container are  $24 \times 3 = 72$  Nos. Suppose this container moves 100 KM, if charged Rs 30/KM then there will be total amount for 100 KM would be Rs 3000. Then expenditure per part for this operation is Rs41.66 will occur.

As far as concern of green supply chain management here it calls upon to reduce the cost of transportation and CO<sub>2</sub> emission per part. This could be done easily by putting efforts and try to accommodate more and more parts in a truck. This can be done making physical or virtual model and try adjusting more & more parts per trip. This can be done easily by proper planning or thought process.



**Figure: 6****Figure:7**

The above figure shows the trolley front view and just by observation here it is clear that there is lot of the empty space in the trolley and try to develop such model which can occupy this space so that hereby we can accommodate some more parts in the same truck.

Above concept has developed in keeping in mind to occupy the empty space were there in previous model for the same part. This can be done by developing the several model/concept so that we can develop a concept in which we can adjust some more parts. The front view of the same concept is shown in figure. By comparing the figure 5 and Figure7, here we used much space of trolley so that we can adjust more part in the same vehicle. Here in figure 8 shows the layout of the truck for newer concept of the trolley.



**Figure:8**

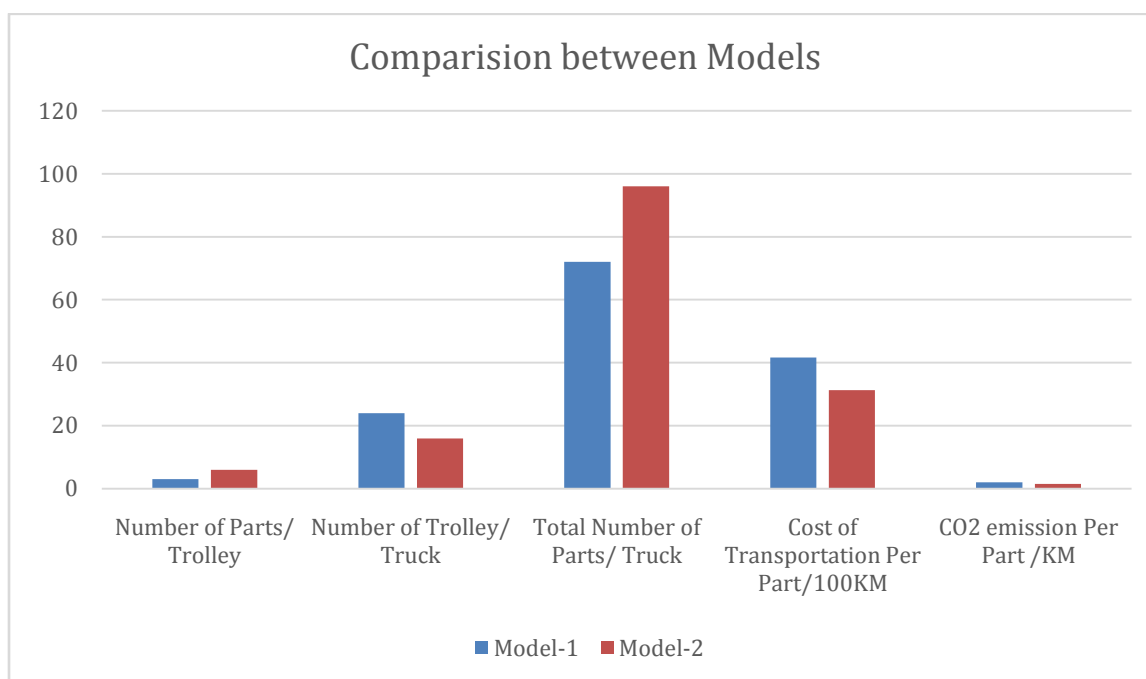


In newly design as shown in Fig.6 in which we have adjusted the 6 parts. And in truck of same capacity whose dimensions as 7' X 7' X 20', in which we have accommodated total 16 trolleys. So, in all we have arranged  $16 \times 6 = 96$  parts in the same truck instead of 72.

Now comparing with the previous model, here transportation cost for the same 100KM run is Rs 3000, so as per the new design this cost of transportation per part will be  $3000/96=31.25$ . So, by this we have reduced the cost of transportation per piece by  $24.98 \sim 25\%$  and CO<sub>2</sub> emission for the newer concept will be  $150/96=1.56$  Gm/KM and same way here we have saved carbon emission by the 25%.

**Table 1: Comparison between Model I and Model II**

	Model-I	Model-II
Number of Parts/ Trolley	3	6
Number of Trolley/ Truck	24	16
Total Number of Parts/ Truck	72	96
Cost of Transportation Per Part/100KM	Rs 41.66	Rs31.25
CO <sub>2</sub> emission Per Part /KM	2.08 Gm	1.56 Gm
CO <sub>2</sub> emission Saving Per Part/KM	-	25%
Transportation Cost Saving	-	25%



#### 4. Conclusion-

Emissions produced by supply chain transportation are linked to how far products travel and how they get there. Supply chains can really make a difference to the environment by optimizing product transportation. As most of the CO<sub>2</sub> Emission is by Transportation only this is the reveal by the study and this emission can be reduced to a great extent only by doing the proper

planning. This is also clear by this case studies. Every concern must go for the proper planning instead merely doing the business make proper effort for optimizing the resources so that cost incurred will be reduced to a great extent and even also can reduced the carbon footprint. This way we can implement the green initiative in the movement of materials.

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