

# AAKRUTI Global

Shaping Imagination

# 2024

**Project Name : Modular Rear Cargo Section  
For Light Commercial Vehicle**

**Selected Theme: Sustainability**

**Team Name : Mech Inovetors**

**Team ID: AG24-14001527**

**Team Leader E-mail ID: charak22landage@gmail.com**

**Final Design Submission**



# Mech Inovetors



Name : Charak Ramesh Landge

Title : Leader, Ideation.



Name : Aditya Vitthal Darekar

Title : Simulation and Analysis.



Name : Achyut Anant Deshpande

Title : CAD Designer, Research.



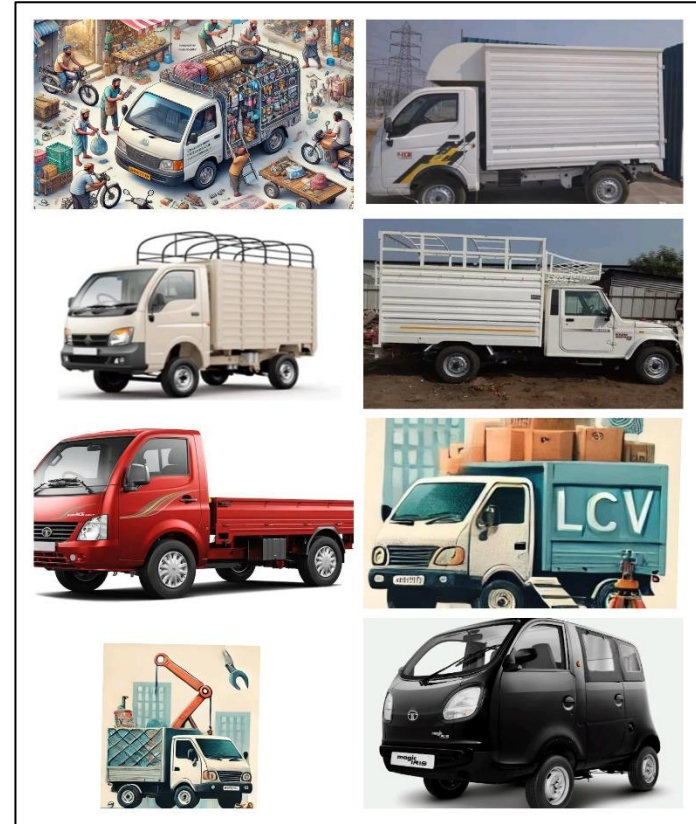
Name : Yash Shital Magdum

Title : CAD Designer, Presentation Designer.

# Problem Identified

## PROBLEM DESCRIPTION

India has a very large market for Light commercial Vehicle. With recent increase in many small business and start-up's, LCV market is growing rapidly due to its affordability, multi-use ability, and freedom to modify according to need. LCV are popular due to their affordability, compact size, lightweight nature, mobility and versatile applications. Although many LCV models of many different companies are available, they come in standard variants. After buying the required type of LCV, user usually modify the LCV according to their needs in a local workshop. These **modifications are permanent, expensive** which requires more money to change it if needed, i.e. **they are Not Versatile**. Also it limits the use of vehicle in some cases which results into **lower productivity...**



# Significance

## WHY IT IS AN URGENT PROBLEM..?

- India has a very large market for Light Commercial Vehicles.
- With the recent rise in small businesses and start-up's, the LCV market is growing rapidly due to affordability and multi-usability.
- › However, existing LCV models often require costly, permanent modifications that limit their versatility across different use cases.
- › The proposed modular LCV carriage system is *highly innovative*, offering users *exceptional flexibility and efficiency*.
- › By allowing easy customization with interchangeable cost modules such as Open Top for bulky items, Enclosed for delicate goods, Passenger for transporting people, and Specialized for unique needs and Book shelf.
- › These Flexibilities as mentioned above are *easily customizable*.



This is a sample of LCV in the current market which has no Versatility limiting the overall usage of the vehicle.

# Research findings

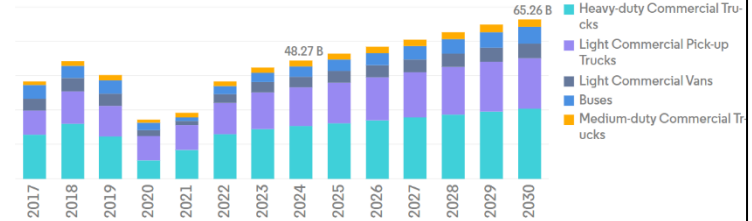
LCVs, a crucial segment in the commercial vehicle market, increasing demand for efficient and cost-effective transportation solutions.

## Specific Market Analysis (India):

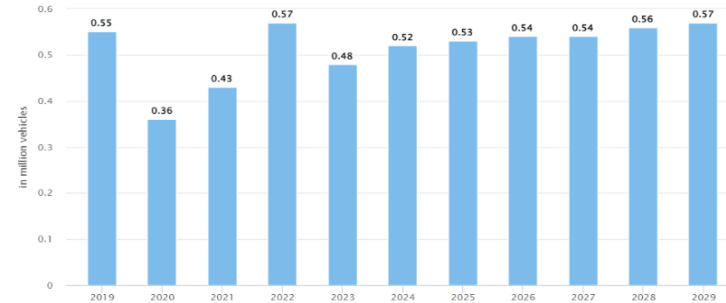
India's LCV market is one of the fastest-growing globally, driven by *economic growth, urbanization, and the expansion of e-commerce*.

The government's focus on promoting electric vehicles and infrastructure development presents significant opportunities for LCV manufacturers.

India Commercial Vehicles Market, BY vehicle body type, By Value In USD, 2017 - 2030



SALES SALES CHANGE



Most recent update: Apr 2024



# Research findings

- According to reports, the global LCV market was valued at around **\$500 billion in 2021** and is expected to grow at a **CAGR of 5-6%** over the next few years.
- Electric LCVs (e-LCVs) are gaining traction due to stricter emission norms and the push for **cleaner energy solutions**.

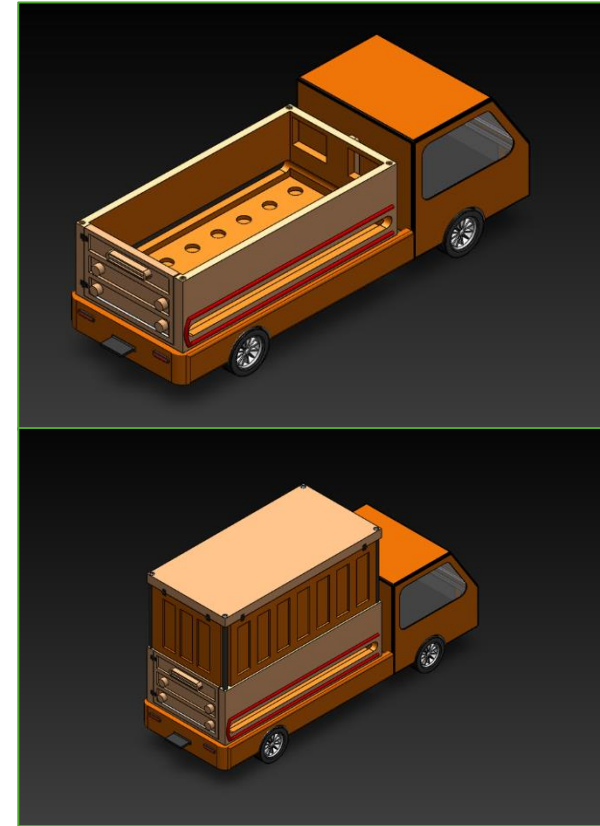
## Promising Future of Light Commercial Vehicles:

1. Electrification and Sustainability
2. Continued Electric Vehicle Adoption
3. Autonomous LCVs
4. Urban Mobility Solutions
5. Connected and Smart Vehicles
6. Customization and Modular Design

# Final solution & Innovation

## HOW DOES OUR SOLUTION ADDRESS THE PROBLEM IDENTIFIED...

- We propose a modular LCV carriage system. This system empowers users to *seamlessly customize* and reconfigure their vehicles to suit a wide range of applications with minimal effort and *cost reduction* and also *saves your time*.
- **Open Top Module:** Ideal for transporting bulky or tall items like construction materials.
- **Enclosed Module:** Provides protection for delicate goods and during adverse weather conditions.
- **Passenger Module:** Easily convert the vehicle for passenger transport with add-on seating.
- **Specialized Modules:** Create bespoke configurations for unique applications such as book shelves, food trucks, mobile stores, or service vehicles, even used for advertising purposes...



# Final solution & Innovation

## HOW IS IT INNOVATIVE?

- » Our modular LCV solution offers *unmatched flexibility at a fraction of the cost* of traditional modifications.
- » By enabling quick and easy changes, *our system enhances operational efficiency* and *supports a wide range of business models*.
- » Extends the lifecycle and utility of the vehicle, making it a *smart investment* for small businesses, vehicle owners, and rental agencies.
- » *LCVs running in the current market* (for e.g. All mini trucks, pickup trucks and minivans etc.) are intended to do their respective work which is *limited to flexibility and productivity*. Hence, we come up the brilliant Design of Light Commercial Vehicle which will *solve the problems of many*.





# Final CAD Product Images:

1.



## ❑ OPEN CARRIAGE MODULE

A module similar to the rear cargo of regular LCVs. But this one contains additional holes, threads and slots for customization giving it a specific design.

# Final CAD Product Images:

2.



## ☐ CLOSED CARRIAGE MODULE

This module provides protection to delicate goods and also to the passengers in harsh weather conditions.

# Final CAD Product Images:

3.



## ❑ PASSENGER MODULE

Passenger seats can be easily added/removed with the help of crane.

# Final CAD Product Images:

4.



## ❑ SPECIALIZED MODULE

Any special part as per user requirement could be Designed and Manufactured within the constraints.

# Final CAD Product Images:

5.



## CRANE

The main carriage is also able to fit a crane system which will help in customizing vehicle.



# Product Design Specifications

- Components required

*Sheet Metal, Fibre, Wood, Nuts-Bolts, Hinges*

- Technical requirements

*Tool Kit, Crane Operator.*

- Human factors requirements

*Two persons required for the assembly, Experienced Commercial vehicle driver.*

- Constraints

*Weight limits, cargo volume, seating capacity, overall heavy weight  
\*(all the constraints are under R&D process)*

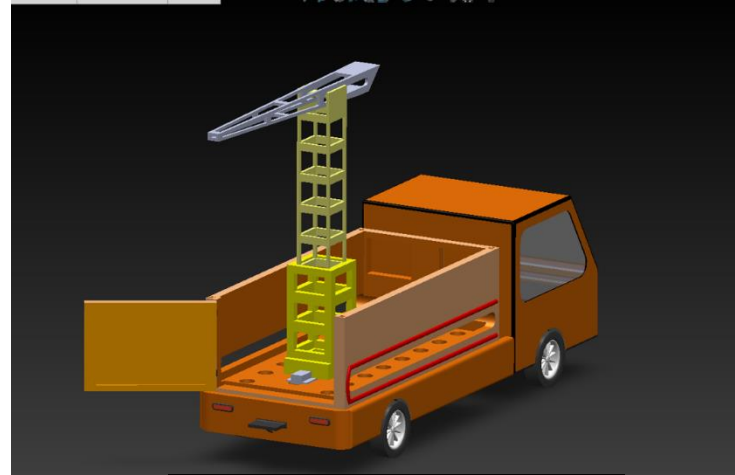
# Product Details:

## ▪ Working Principle of the product

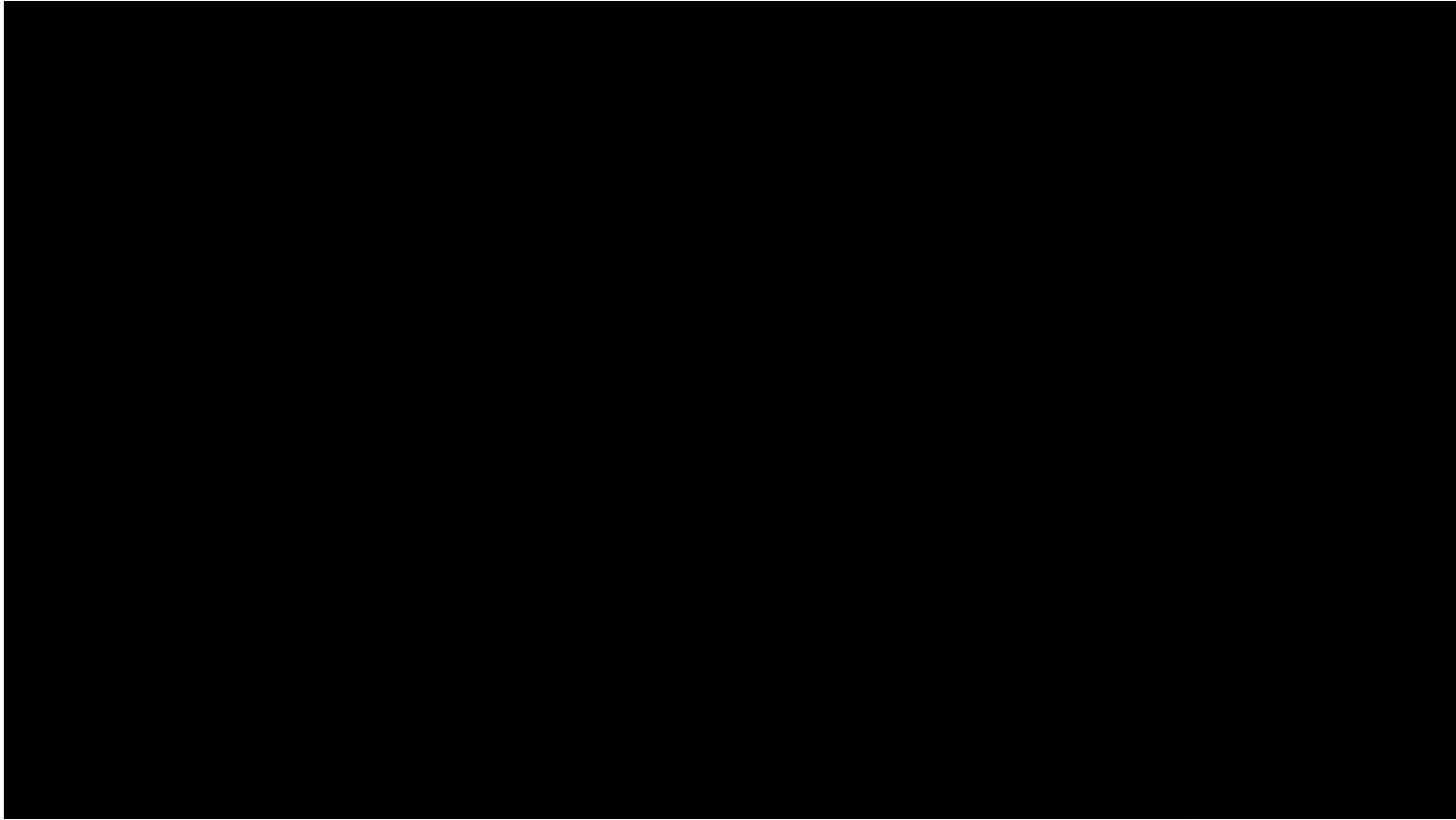
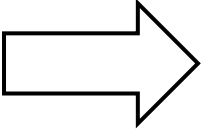
The working principle of this vehicle is based on the *versatility* of the carriage which could be used as per need. This design made LCVs more versatile and efficient, saving costs of reconverting it into another useful type which also saves time by easier assembly.

## ▪ Product Structure

Our design have introduced a basic structure of carriage and chassis as that of other LCVs. But the main theme of our design is to modify the rear section or convert the use of the vehicle which will be done by using a crane as per the need of the customer. Using High-Quality engineered material for manufacturing to *sustain product's life* enhancing 'one time investment' term.



# Product Simulation Video:



# Product Reflection

## ❖ Benefits of our product : Overcoming Drawbacks of Existing Solutions.

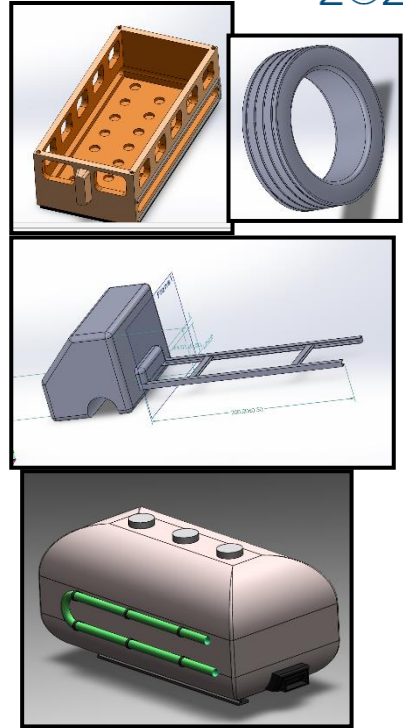
- ✓ *Specialized carriage modules*
- ✓ *Cost Effective*
- ✓ *One Time Investment*
- ✓ *Flexibility*
- ✓ *Increased productivity and Time-saving*
- ✓ *Versatile*
- ✓ *Eco-friendly product*

## ❖ Drawbacks of our product which will be optimized in future study.

- *Overall Weight Reduction*
- *Mass Production and Quality Improvements*
- *More Optimized Storage Systems*
- *Cost Reduction*
- *Foldable Seats*
- *Additional Small Compartments*
- *Variable Personalized Customization*

# Design Process

- **Research** : *Both offline and online researches on modular kits, their sustainability, chances of failure, value and efficiency helped.*
- **Reframed design brief**- *Initially, we designed all the different usability as a single exchangeable carriage section, but later reframed all of it into one.*
- **Ideation & Concept Selection**: *After intensive researches on limited flexibility of LCV we come up with this flexible and customizable module as an idea and implementation of it.*
- **Mock-up Testing and Final Solution**- *Tested various assembly and simulations, calculations, Reliability, Sustainability, Tolerance based design, material properties ,etc. to get the final design of modular rear cargo section for LCVs.*



(product design images before finalizing)



# Impact of our solution

## Positive Impact Created By Our Solution in the Society.

- *Adapt the vehicle to a wide range of business needs.*
- **Cost-Effective**: Lower upfront and long-term costs compared to traditional customization.
- **Eco-Friendly**: Supports sustainable practices by reducing the need for multiple vehicles.
- **Scalable**: Can be expanded or reconfigured as the business grows or changes.
- Our modular LCV design not only meets immediate market demands but also contributes to a sustainable future by reducing waste and maximizing resource efficiency. By **enabling businesses to do more with less**, we help drive **economic growth while minimizing environmental impact**.



# Sustainability

ONE TIME  
INVESTMENT

- ❖ **Sustainable Development:** *Environmental protection & Enhancement, Economic Development, Social Progress..*
- ❑ **Eco-friendly:** *Contributes towards the environment as output is same in a single customizable module.*
- ❑ **Economic Boost:** *Supports current businesses which are singularly based on Light Commercial Vehicles and also providing opportunity for Start-ups in the future.*
- ❑ **Social progress:** *Allow citizens to enhance and sustain the quality of their lives and create the conditions for all individuals to reach their full potential.*



# Business Viability

## Design solution to be implemented. Why it will be successful...

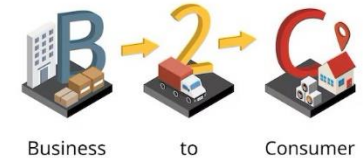
- *Our go-to-market strategy includes:* **Initial Deployment:** Launch modular kits that can be retrofitted to existing LCVs, minimizing entry barriers.  
**Strategic Partnerships:** Collaborate with LCV manufacturers to develop industry-specific modules.
- **Long-Term Vision:** Introduce fully modular LCV models with integrated customization options directly from the manufacturer. To pioneer the next generation of Light Commercial Vehicles that are as flexible as they are functional, ensuring sustainability and affordability for all users.
- **Mission:** To deliver high-quality, versatile, and customizable LCV solutions that empower businesses to operate more efficiently and profitably.



# Business Viability

□ *We plan to generate revenue through multiple streams, including:*

- ✓ **Direct Sales(B2C)**: Selling modular LCVs through online and offline channels.
- ✓ **Modular Kits**: Offering a range of personalized modular kits for various industries.
- ✓ **Licensing & Partnerships**: Collaborating with other automotive brands and manufacturers.
- ✓ **Maintenance Services**: Partnering with local workshops to provide maintenance and customization support...



# “Thank You!”