

## **Concept Note on vegetable vending Push cart**

- Project Proposal:** Development of Moist-Air Cooled Vegetable Push Cart
- Objectives:** To design low cost push cart having battery operated cooling system based on evaporative principle for improving shelf life of fruits and vegetables for the benefit of street vegetable vendors.
- Background:** Vegetable hawkers ferry vegetables on an open pushcart from wholesale market to residential colonies and markets for sale of fruits and vegetables. The vegetables are exposed and sold during day time when the temperature is high most of the time which leads to rapid deterioration in the quality of vegetables and fruits. It is estimated that rate of spoilage of vegetables alone increases 2–3 fold with each 10°C rise in temperature. Due to this routine of daily movement for sale, the hawkers are unable to maintain appropriate quality of vegetables for more than two days in summer. Thus, most of the perishable unsold two days old vegetables are disposed of at throw away price or discarded as waste incurring heavy loss to vendors.
- Perishable vegetables need low temperature and high relative humidity for longer storage, especially during summer months. There is a need therefore to design and develop a mobile vending cart that has a low powered cooling component and high relative humidity as well as moisture control mechanism. Among various methods, evaporative cooling is an environmental friendly air cooling system where water and air are the working fluids. The unit is an inexpensive, energy efficient, environmental friendly cooling system.
- Description** It is proposed to develop a mobile preservation unit for 70-80 kg vegetables using evaporative cooling. A prototype mobile preservation composite box of the size 1.5x1x0.9 m is integrated with small cooling and display unit that can fit on already existing cart. It will have cooling unit based on evaporative principle. Cool air rich in humidity circulates

the storage area to cool and keep required humidity for long storage time. A battery is integrated for powering a DC pump for spraying water over evaporating mats and powering a DC fan for circulation of moist and cool air, humidity control air exit, and an LED bulb for lighting. The battery will be charged at the residence of vendor each night and it will be used throughout the day without any onboard charging. A small water tank of 15 -20 liters capacity is attached for watering the evaporating mats. The cooling as well as storage cum display box is proposed to be mounted on a regular Pushcart used by the vendor. It will also be provided with some additional shelves that are not being cooled for storage of onion, garlic and potato.

Activities involved:

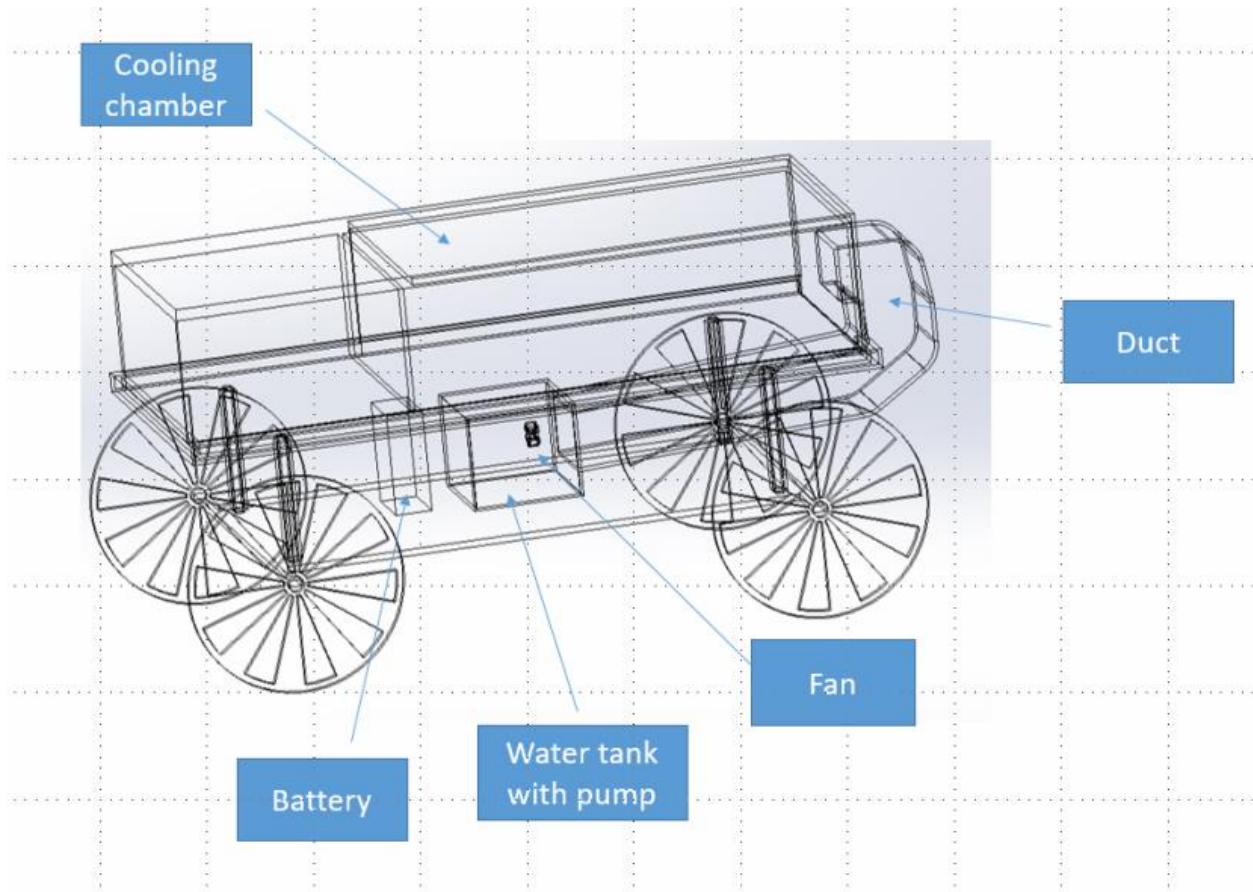
- i. Design of moist air cooled cart based on further research, status of technology.
- ii. Fabrication of working unit.
- iii. Performance testing and analyzing monitoring parameters such as temperature, Humidity, quality of selected vegetables over time, battery health, water required for cooling, following daily routine of vendor.
- iv. Fixing capacities of fan, pump, battery and control unit.
- v. Analysis using Feedback from vendors cost of electricity for charging battery, savings by the use of cooling cart. Impact on the health of the vendor.
- vi. Changes in design for improved efficiency based on feedback and analysis of data.
- vii. Highlights of interviews with vendors on the performance and suggestions for further improvements.
- viii. Identification of entrepreneur for fabrication of units in the future and size up gradations.

Time duration:                      One year

### Technical specification for the pushcart (Tentative)

Sr. No.	Particular	Rating/values
1.	Cooler Motor	12 Volt, 42 Watt, 1440 RPM
2.	Pump Motor	12 Volt, 8 Watt, Flow 10 LPM, Head 4m
3.	Aluminum Duct (Rectangular)	1.5 m approx
4.	Battery	12 Volt 45 Ah
5.	Cold Chamber Size	1.5 m x 1 m x 0.9 m
6.	Water Tank	0.30 m x 0.30 m x 0.15 m (10 liters)
7.	Operating hours	8.0 hours

Target Cost: Rs. 25000/- (including push cart)



**Schematic of the proposed vegetable pushcart**