Future of feeder system: E-rickshaw

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Abstract: Feeder system is the essential part of well woven transport system of any country. Large amount of regular commuters are using public transport as their regular transport medium. So it is important to provide a better feeder system, which connects different medium of public transport. Safety and security are the basic requirement of any private or government feeder system. Regular commuters want a feeder medium which is more easy to access and can be a faster medium which may help them to save time during their regular journey. The electric rickshaws or E-rickshaw fits perfectly as per public requirements. Studies have shown that E-rickshaws are having great potential in areas of low to medium public transport demand. Further research is necessary in order to exploit the potential benefits of E-rickshaw and tagged them as 'Future of feeder system'. This paper identifies key objectives and functionality of E-rickshaw as well established feeder service.

Key Words **- System, E-rickshaw, Regular commuters, Public Transport.**

1. INTRODUCTION

With the growth of cities, demand for transportation grows with the growing business and trade all over the globe. Thus urban transport forms one of the most essential components of urban development. A good network of roads and an efficient transport system make a great contribution to the working efficiency of a city. The evolution of industrial development calls for an expansion of transportation systems to tackle down the increasing demand. Primary analysis highlights the unavailability problem of linkage infrastructure between different modes of public transport. Lack of proper feeder system, is leading regular commuters towards overcrowded private rickshaw or shuttles. This may be results as the traffic issue and safety issue of user due to excess loading and also creates delay issue. Implementation of E-rickshaw as feeder system between the public transports hubs may solve the discomfort facing by the regular commuters.

2. OBJECTIVES OF PROVIDING E-RICKSHAW

- To provide convenience to the passengers by providing first & last mile connectivity with availability of eco-friendly feeder services at important junctions of city or at public transport hubs.
- To provide the flexible feeder service.
- To ensure dedicated, safe & secure, punctual and reliable feeder services to the regular commuters.
- Short loop services covering 3-4 kms route (not parallel to regular to regular routes) be covered by e-rickshaws.
- The services may act as Hop on-Hop off service public transport stations with neighbouring areas.
- Reduce the overall pollution by shifting towards the E-vehicles.
- **Hub-and-Spoke concept:** There are places where feeder buses / buses cannot have access because of narrow roads & streets. Feeder services with e-vehicles will facilitate hub-and-spoke concept. (1)

Figure 1. E-rickshaw provide at Noida station, Delhi
(Source: Goenka Electric Motor Vehicles webpage)

3. FUNCTIONAL REQUIREMENTS

E-rickshaws are powered exclusively by electric motors whose traction energy is supplied by batteries. There are many E-rickshaw models available in open market, so it is important to understand the basic functional requirements. A typical e-rickshaw for the purpose shall have the following features:

- **e-rickshaw Type and Seating Capacity:** 3-Wheeler aesthetically designed electric vehicle (eco-friendly) that have seating capacity of max 4-pax (excl. driver) per e-rickshaw with maximum luggage of 40 kg in total as defined in the notification by Ministry of Road Transport & Highways, Govt. of India. The model of the e-rickshaw must be duly approved as per the statutory provisions and the e-rickshaw shall be registered with the appropriate authority.
- **Security Features of e-rickshaw:** In-built CCTV and GPS tracking system to be available installed to ensure added safety for passengers especially ladies / women commuters. The vehicle should be equipped with First Aid box and Fire Extinguisher.
- **Make in India:** The e-rickshaw shall be fully compliant with the Government's Make in India campaign.
- **Environmental benefits:** Zero Carbon emissions as vehicle being electric.
- **Design:** Aesthetic, safe, stable and aesthetic design.

4. PARAMETERS TO BE CONSIDERED WHILE SELECTING AN E-RICKSHAW

The parameters for the study have been selected to address issues related to the functioning and the manufacturing of the e-rickshaws. These have been further divided into vehicle parameters, operational parameters and life-cycle parameters.

Table 1: Basic parameters of E-rickshaw

Parameters	Variables
Vehicle Parameters	Motor Power; Battery - Voltage & Capacity ; Weight ; Seating Capacity
Operational Parameters	Travel Speed; Cost; Charging Time; Distance covered per charge
Life cycle parameters	Battery recycling time; Durability; Safety ratings

(Source: A Study of the Battery Operated E-Rickshaws in the state of Delhi| Centre for Civil Society report)

Figure 2: E-Alfa- electric rickshaw by Mahindra
(Source: Mahindra Electric Motor Vehicles webpage- Google Image)

5. TECHNICAL SPECIFICATIONS FOR E-RICKSHAW

Technical specifications are the most important thing one should consider while selecting any mode of transport. It provides clear instructions on the intent, performance and construction of the vehicle. The study and analysis of the technical parameters provides a fair amount of information on the operation of the battery rickshaw industry in the country. Following are the mean technical parameters of E-rickshaw model, available in Indian Market.

These technical parameters are aimed at checking the safety of the e-rickshaws in operation, as well as understanding the manufacturing cycle of the battery rickshaws for efficient application. The Indian Express, quoting a report prepared by TERI, finds that more than 80% of passengers felt unsafe in an e-rickshaw, and expect a better design after the regulations are in place. So this analysis may help manufactures to get the exact know how of product.

Table 2: Mean technical specifications of an E-rickshaw

Technical Specifications	Mean Values
Motor Power	850W (Mode Value – 650W)
Battery Voltage (System Value)	48V
Single Battery Capacity (Peak)	85 Ah
Maximum Load Capacity	380 kilograms (5 people)
Vehicle Weight (Approximate Figure- Large Variations)	215 kilograms (With Batteries)
Maximum Speed	33 Kmph
Charging Time	2 hours (8 hours and 12 Minutes)
8Distance Covered (1 Charge)	63 Kilometres
Battery Recycling Time Period	7.5 Months

(Source: A Study of the Battery Operated E-Rickshaws in the state of Delhi| Centre for Civil Society report)

6. METHOD FOR INCLUSION OF E-RICKSHAW AS FEEDER SYSTEM

E-rickshaws are usually demand responsive last mile connectivity mode and operat depending on regular commuter's demand. E-rickshaw inclusion in a city may result from a planned initiative from the government bodies or an unplanned inclusion or adhoc basis by the operators itself. (2)

1. **Planned inclusion-** This initiative is usually made by the government through support from various schemes/ programsto attract people towards use of E-vehicles. Local government follows an action plan including background study, feasibility study, route rationalization, financial incentives, along with simultaneous development of supporting infrastructure for charging and parking of e-rickshaw. Regulation and operation is controlled and managed by the government or any specified private body. This system is better than the ad-hoc inclusion system as there is a record of all the vehicles, supporting services and service providers. At present typical example of this type of implementation is not available.
2. **Unplanned ad-hoc inclusion-** This inclusion system is applied in majority of Indian cities at present. It includes a system in which e-rickshaws are owned and operated by private individuals on routes decided by the associations or operators. There is a lack of supporting infrastructure, operation and maintenance system for the betterment of service. Though e-rickshaws are operated in large numbers in this area, authorities face difficulty in managing and regulating these due to glitch in policy implementation and law enforcement. Provision of supporting infrastructure and other service provision also become very difficult because of deficiency of data to validate e-rickshaws as there are large numbers of unregulated or un-registered e-rickshaws; which are not reported anywhere.
3. **Planned inclusion to unplanned expansion-** This is the system in which the city introduces e-rickshaw in a planned way but with time, it expands in an unplanned way because of unexpected variation. Example of this exists in various cities of India including Ludhiana, Karnal, Noida, Delhi, etc. where e-rickshaws were introduced by the government or in partnership with a private organization through an initiative under a project. With time, these e-rickshaws spread in areas of the city in an unplanned manner due to absence of periodic supervision and due to lack of regulations structure.

7. CONCLUSION

Over the next few years, E-rickshaw can help create a more compact and energy-efficient urban feeder system. In contrast, electrification of private petro or diesel auto rickshaws would make it easier to commute safe within city, and could decrease the urban pollution level. E-rickshaws will eventually be able to operate at moderate speeds on public streets with adequate number of passenger. Thus well planned implementation of E-rickshaws as a feeder system can change overall attitude towards public transportation and ease out existing traffic problems. Though further research is required regarding overall cost of implementation but one cannot deny benefits of such a system over financial benefits.

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