



A Study of the Battery Operated E-rickshaws in the State of Delhi

Shashank Singh

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ABSTRACT

This research paper aims to undertake a comprehensive study of the battery operated e-rickshaws in the state of Delhi. It studies the socio-economic impact and the technical characteristics to make a case for regularisation of e-rickshaws in the state. The paper also attempts to make policy recommendations to make these vehicles safer and more efficient. The number of battery operated e-rickshaws in Delhi has risen from 4,000 in 2010 to more than 1,00,000 in 2014, and is now an integral part of the transport eco-system in the state. With a proper regulatory framework in place, this mode of transport can contribute to the revenue generation of the government, urban planning and help improve the transport structure of the state.

The Socio-Economic impact of the functioning of the battery rickshaws has been studied by collecting primary data from the shareholders within the battery rickshaw industry, in order to understand the role of the industry in urban employment and income generation, and the various problems that affect the system. It also tries to propose a structure which would be cohesive in nature, and support the public transport system. The technical parameters have been studied to suggest effective manufacturing policy recommendations for the state of Delhi. Safety is an important issue for the governing authorities, as a study found that 80% of the passengers felt unsafe while traveling by these rickshaws.

The paper also analyses the Tripura Battery Operated Rickshaw Rules, 2014 to analyse which aspects of the rules can be incorporated to help in the formulation of the rules in the state of Delhi. The mode of transport has some clear merits and some demerits to it, and the paper has tried to deconstruct these aspects.

Key Definition

This paper defines Regularisation as given below:

The present e-rickshaws should be allowed to function but they should be brought within the ambit of the law, and special rules should be framed for their regulated operation within the city. The functioning of the vehicles should also be regulated by the government to ensure a more efficient transport structure in the city.

1. INTRODUCTION

The word rickshaw's origins lie in the Japanese language, and it literally translates to "a human-powered vehicle". The rickshaw is one of the oldest modes of transport, and was first introduced in the late 19th century. It is used all across the world, but more common in the Asian countries, especially in India and Bangladesh. The various types of rickshaws have also evolved over time with the earliest ones being the pulled-rickshaws. Other variations of the mode of transport include the cycle-rickshaw, the auto-rickshaw and the relatively newer iteration of the e-rickshaws. . Historically, India's urban as well as rural areas have depended on the various rickshaw types for their travel requirements. The state of Delhi has close to 1,00,000 Auto-rickshaws, and an estimated 7,00,000 cycle rickshaws, of which a large percentage is unlicensed. [DIMTS 2011]

The most recent modification called the battery operated e-rickshaws (Referred as battery rickshaws subsequently in the study) was introduced in the city of New Delhi during the Commonwealth Games 2010, with the plan to eventually phase out the physically taxing cycle-rickshaws in the city. Even though no government figures are available, rough estimates put the number of rickshaws in the city close to the figure of 1,00,000. [Hindu 2014 a.] The e-rickshaws in Delhi are presently unregulated and are not registered with the government.

There are many concerns regarding the mode of transport and its functioning in the state of Delhi. The battery rickshaws should technically come under the ambit of the Motor Vehicles Act, 1988 but these vehicles are not registered or licensed, and there no special rules governing the actions of these battery rickshaws. Thus, they are not be prosecuted by the Traffic Police, or reprimanded for breaking any rules. The battery operated e-rickshaws in the city have also been deemed unsafe because of a lack of policy framework which governs the manufacturing of the vehicles, and no safety ratings exist for these vehicles. 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. [Indian Express 2014] In addition to the safety concerns, there have also been debates over the functioning of the rickshaws on arterial roads which have resulted in traffic jams in the city which is witnessing a major surplus of motor vehicles and is already under severe traffic stress. The government can utilize the data received with the help of regularisation and registration of the battery rickshaws to plan to relieve the traffic flow in the high-concentration areas. It can also help in fixing routes and fares so as to facilitate the operation of these rickshaws.

From a socio-economic point of view, there are no financing options available for the e-rickshaw owners as the e-rickshaws are not recognized by the state as a mode of transport. A

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Public Interest Litigation filed in the Delhi High Court in January 2014, also pointed out the absence of insurance options for the rickshaws since they are not recognized as motor vehicles in the state. [The Economic Times 2014]

This puts the passengers of e-rickshaws at risk as they cannot claim any insurance in case of a mishap.

This paper tries to recommend the rules for the regularisation of the rickshaws in the state of Delhi, by examining the socio-economic as well as the technical characteristics of these types of vehicles. Regularisation would help in improving the safety of the vehicles, better urban planning, and improving the transport infrastructure in Delhi. The urban planning and the transport infrastructure can be accomplished once the government obtains figures on the number of vehicles according to the region after registering the vehicles. It would also help to bring the vehicles under the ambit of the law, increase the government revenue and provide the essential amenities and financial support for the rickshaw drivers. The safety would be increased with the help of a proper regulatory framework for manufacturing the vehicles, and safety ratings along with a standardized prototype testing for the manufacturers..

2. LITERATURE REVIEW

The Battery Operated Electric Rickshaws is a new mode of transportation introduced in the state of Delhi in 2010. The number of these type of rickshaws has increased from 4,000 in 2010 to approximately 1,00,000 in 2014. These e-rickshaws are a popular mode of transport for short-distance commute within the city, and almost 3,00,000 people in the country rely on it for their livelihood.

[Rana et al 2012 a.] showed the role of the battery operated rickshaws in the urban income generation and the employment creation in Bangladesh. It also shows the role of the mode of transport in depressurisation of the migration to the capital state of Dhaka. [Rana et al 2012 b.] checks the efficiency of the battery operated rickshaws in Bangladesh, and recommends route fixation and the issuance of driving licenses to increase the efficiency in these areas. The situation in Bangladesh is similar to the one observed in Delhi, as a report estimated that there were more than 50,000 unlicensed battery rickshaws in the cities of Dhaka and Chittagong. The High Court, in July 2014, rejected writ petitions that sought permission to allow the functioning of these vehicles in the cities, and banned the rickshaws in Dhaka and Chittagong. [Daily Star 2014]

[Nandhi – I.F.M.R. 2011] studied the financial behavior of the cycle rickshaw pullers in Delhi, and showed the use of case study method to substantiate their findings. The results were utilized to assess the rickshaw pullers' strategies and choices in savings as well as to address the challenges faced by them. The case method has been applied in the study to elucidate the importance of the mode of transport in a social context. The paper makes use of the research conducted to support the arguments in favor of regularisation of the battery rickshaws in Delhi.

3. METHODOLOGY

3.1 Selections of Areas of Study

The study has been divided into two parts to cover the different aspects of the functioning of e-rickshaws:

- a. The Socio-Economic impact of the battery rickshaw industry
- b. The Technical Specifications of the battery rickshaws

To conduct the socio-economic study, 7 locations in different areas of Delhi were taken as data samples, with a total of 140 battery rickshaws being sampled. A common questionnaire was used for all the areas to assess the socio-economic impact of the mode of transport. The areas for the survey were chosen after considering the demographics, and the location within the state. To avoid a sampling selection bias, 7 areas with diverse characteristics were considered. Both rural and urban locations within the state were studied to conduct the study. The locations in Delhi where the sampling was done : Dwarka-Najafgarh Route (South- West; Najafgarh Villages-Rural Location 1) ; Palam (Rural Location 2 -West) ; Patel Nagar (Central Delhi); Shahadra (East Delhi) ; Sarojini Nagar (South West/Central); Rohini (North-West) ; North Campus, University of Delhi (North Delhi).

The Memorandum created by The Battery Rickshaw Welfare Association to the Ministry of Road, Transport and Highways was also analysed to provide relevant recommendations for the study.

For the technical study, 5 manufacturing organisations were interviewed. The common questionnaire for the sample set of the e-rickshaws also had a technical section to study the operational characteristics. The secondary data was collected with the help of city academicians working on battery rickshaws for their research.

The Socio-Economic study aims to check the role of the rickshaws in the employment and income generation in the city, as well as its contribution to poverty alleviation of the drivers by doing a comparative analysis with their previous livelihoods. The technical study is aimed at checking the safety and the efficiency of the vehicles, in order to recommend the most effective policies for manufacturing and functioning of these vehicles.

The variables and parameters have been selected accordingly, to attain the objectives of the study.

4. BACKGROUND OF THE STUDY

The battery-operated e-rickshaws were introduced in Delhi for the Commonwealth Games in 2010, and close to 4,000 rickshaws were supposed to be introduced and regulated by the end of the year. [Telegraph 2010]

The number of such battery rickshaws has increased exponentially in the period between October 2010 and July 2014 with the present number standing close to 1,00,000. In the 4-year period, there have been many attempts to initiate a policy regarding the functioning of these vehicles but there has been no concrete decision on the matter. [Hindu 2014 a.]

TABLE 4.1: Comparative Cost Analysis of the different types of rickshaws in Delhi

Type of Rickshaw	Number (in Delhi)	Initial Cost (Rs.)	Daily Earnings (Rs)	Rent (Rs.)
Cycle Rickshaw	7,00,000 (Govt. Figure)	6,000-12,000	300-450	30-40
Auto-Rickshaw	1,00,000 (Licensed- 55,000 45,000 in the process after 2011)	1,50,000-3,00,000	700-1000	300-350
E-Rickshaw	1,00,000 approximately	60,000-1,10,000	550-800	250-300

As of July 2014, the battery rickshaws are not registered by the Transport Department of Government of N.C.T. of Delhi, and are unregulated in the city. According to the Motor Vehicles Act, 1988 and the Motor Vehicles Rules, 1993, vehicles with a motor power less than 250W and speed less than 25 kmph are not considered as motorized vehicles and were exempted from

the rules.

The rules of the Central Motor Vehicles Rules of 1989 that are of importance for this study are Chapter 1 –Preliminary 2 (u), Rule 126 and 126A. [CMVR 1989]

The Chapter 1- Preliminary 2(u) rule was inserted on 16 September 2005.

Central Motor Vehicles Rules,1989

“CHAPTER I

2 [(u) "Battery Operated Vehicle" means a vehicle adapted for use upon roads and powered exclusively by an electric motor whose traction energy is supplied exclusively by traction battery installed in the vehicle: Provided that if the following conditions are verified and authorised by any testing agency specified in rule 126, the battery operated vehicle shall not be deemed to be a motor vehicle.

(i) the thirty minutes power of the motor is less than 0.25 kW;

(ii) the maximum speed of the vehicle is less than 25 km/h;”

The Rules which govern the verification and authorisation of electric vehicles is given here.

“[Rule 126] Prototype of every motor vehicle to be subject to test.—On and from the date of commencement of Central Motor Vehicles (Amendment) Rules, 1993, every 71 [manufacturer or importer] of motor vehicles other than trailers and semi-trailers shall submit the prototype of the vehicle 72[to be manufactured or imported by him] for test by the Vehicle Research and Development Establishment of the Ministry of Defence of the Government of India or Automotive Research Association of India, Pune, or the Central Machinery Testing and Training Institute, Budni (MP), or the Indian Institute of Petroleum, Dehradun, and such other agencies as may be specified by the Central Government for granting a certificate by that agency as to the compliance of provisions of the Act and these rules.

[Rule 126-A. The testing agencies referred to in rule 126 shall, in accordance with the procedures laid down by the Central Government, also conduct tests on vehicles drawn from the production line of the manufacturer to verify whether these vehicles conform to the provisions of 355[rules made under section 110 of the Act:]] “

If the battery rickshaws comply with the rules of Chapter 1 – 2 (u), then they can be approved by the following organisations: ARAI, CIRT or iCAT under the rule 126, 126A of the CMVR 1989 and it comes under the 'type approval' under the CMVR 1989 as motorised vehicles.

However, 140 out of the 140 vehicles inspected as part of the data collection had a motor power greater than 250W and the maximum theoretical power was greater than 25 km/h, which created problems for the law enforcement agencies. The Battery Rickshaws operating on the roads of Delhi are technically under the ambit of the Motor Vehicles Act, 1988 but due to the lack of a regulatory framework and registration of these vehicles, they are not fined or reprimanded for any unlawful activities or dangerous driving on the roads.

On 24 April 2014, the Ministry of Road, Transport and Highways issued a notification that rendered these vehicles illegal, but the notification was annulled after a statement by the Minister for Road, Transport and Highways Mr. Nitin Gadkari in June, 2014 where he stated that new rules were being drafted to govern the e-rickshaws which would come into force from August-September, 2014. [PIB 2014]

Additionally, the rules governing the manufacturing and assembling of the battery rickshaws have not been formulated by the government which have led to a number of safety concerns and structural flaws with the vehicles.

These aspects of the battery rickshaws have been discussed and addressed later in the study.

5. SOCIO-ECONOMIC STUDY

5.1 Parameter Selection

The effect of the introduction and the operation of the e-rickshaws on the socio-economic front can be gauged by the data analysis that will be done in this section. The parameters for the sub-aspect of the study are mentioned in this section.

While introducing the battery rickshaws, the government aimed to replace the physically taxing cycle rickshaws with these battery rickshaws. In the case of Hemraj vs. C.P. Delhi (2006), the Delhi High Court said that the cycle rickshaws offended human dignity and the state would make attempts to remove the trade altogether.

In this section, it will also be examined whether the introduction of the battery rickshaws has resulted in a successful transition from the cycle rickshaws or not.

The parameters used for the social study included relevant benchmarks such as education, previous employment and the salary change with the profession. To understand the significance of the profession in the urban setup, and the reason behind the large influx of the rickshaws, various factors such as job security and independence, change in the social status and living conditions of the drivers were considered and studied. For the subjective questions on status, independence, living conditions and security, the questions had a Yes/No component with an open-ended interpretation. The subjective views, apart from the Yes/No component, were used to create a case study, which would represent a section of the study.

5.1.1 System Description

The battery rickshaws being operated in Delhi are either owned by the drivers, or they are given to them for a daily rental cost. Unlike the system followed by the auto-rickshaws in Delhi, there are no formal financing options for the drivers and most of the owners buy it with the help of personal savings, or borrowed money. These rickshaws run for small distances and ferry passengers on sharing-basis for nominal costs. Since there is no central rate system, the local unions form their own local rates according to distance and location. For the non-operative routes, the cost is considered according to individual case basis.

The parameters chosen for the study determine the social impact of the mode of transport, as well as its role in the income and employment creation in Delhi. [Rana et al 2012 a.] The breakeven time period for self-owned rickshaws was calculated by adding the annual charges which includes the initial investment and the annual costs such as the cost incurred to replace the batteries. This sum was divided by the net daily savings of the driver to get the breakeven time period. The values chosen to represent the system were mean values since the variation was not too great in most of the parameters.

TABLE 5.2 : Parameters for the Socio-Economic Study

General Objective	Section	Variables
To study the socio-economic impact of the battery operated e-rickshaws in the state of Delhi.	Non-Rental Rickshaws (Owned by the drivers)	Initial Investment; Daily Cost; Daily Income; Net Daily Profit; Battery Replacement Cost; Breakeven Time Period.
	Rental Rickshaws (Owned and driven by separate individuals)	Daily Earnings; Daily Rental; Net Daily Profit;
	Social Parameters	Previous Occupation; Migrant Percentage; Professional Advantage; Job Security and Independence; Change in Social Status, Living Conditions; Education of the drivers; (In the Questionnaire)

5.2 Socio-economic Conclusions

The findings from the data, as well as the analysis can provide sound reasoning behind the increasing number of battery rickshaws on the roads. The battery rickshaws can be considered as a serious alternative to the physically taxing cycle rickshaws as well as other relatively physical tasks. From the chart given below, one can see that 37% of the e-rickshaw drivers were either unemployed or cycle-rickshaw pullers before turning to the profession. This helps the government in achieving the respective aims of generating employment, and the initial idea of a transition from the cycle rickshaws to the battery rickshaws. Another 21% were either factory workers or daily wage laborers involved in jobs such as painting or woodworking where the job security is low and the physical work is relatively higher. It was also found that a staggering 89% of the rickshaw drivers saw an increase in their salary.

Results of the Socio-Economic Study

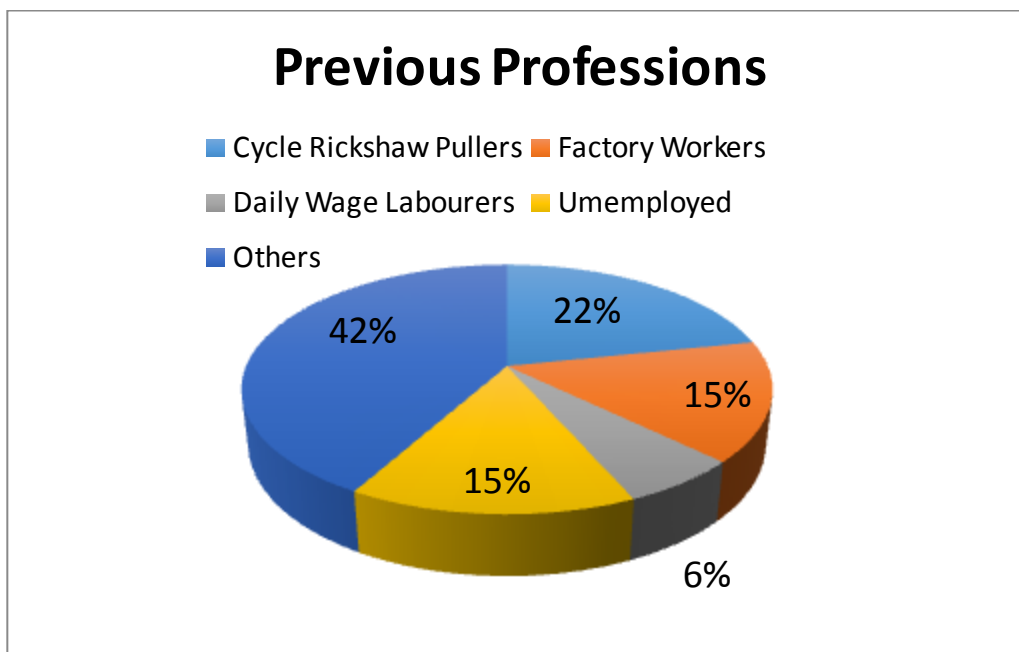
TABLE 5.3 Rented Rickshaws

Parameter	Mean Values (Rs)
Daily Rent	269
Daily Earnings	644
Net Profit	+395

TABLE 5.4 :Self-Owned Rickshaws

Parameter	Mean Values (Rs)
Initial Investment	87324
Daily Cost	63
Daily Income	644 (Value Common to Rental and Owned Vehicles)
Net Daily Profit	+581
Net Daily Savings (Section with extreme variations)	+351
Battery Replacement Cost/Other Annual Costs	21660
Breakeven Time Period	310 working days (Approximate Figure)

FIGURE 5.5 : Previous Professions of the Battery Rickshaw Drivers



The primary research also shows that the drivers who earn lower than their previous professions exchanged the economic loss for more individual freedom and dignity of labor. The battery rickshaws also allowed the drivers to stay within a particular location, which is a marked advantage over the other occupations. The results also show the difference in operation between the battery rickshaws owned by the drivers and the ones which are rented out to the drivers. The mean figures indicate that a driver who owns the rickshaw has a breakeven time period of 310 working days. It was also found that the mean daily rent of the battery rickshaws is quite high at Rs. 269, and is quite close to the daily rent charged for plying an auto-rickshaw in the city for 12 hours. However, some rickshaw drivers who chose the rental option did so because of the uncertainty associated with the battery rickshaws in Delhi in the absence of a regulation structure, and were wary of investing the high initial amount for the rickshaws.

CASE STUDY: SOCIAL IMPACT

A Switch from cycle rickshaw to the battery rickshaw in an attempt to move out of the 'poverty-trap'

Sonu Kumar is a 25-year old battery rickshaw driver who lives in a village in the Najafgarh District. He was born in a small town called Kheragarh in Uttar Pradesh. Sonu is the sole earning member of his family after his father returned to the native town after an accident. He has to support a family of 4, which includes his parents, sister and wife. After being unable to clear the Xth standard examinations, Sonu started working as a cycle-rickshaw puller in the sub-city of

Dwarka in South-West Delhi. He worked on a rented rickshaw and earned an amount of Rs. 350-500 in a day. According to Sonu, he wanted to get some initial capital to start a small business of his own so that he could save more, or buy his own cycle rickshaw to save on the daily rent amount of Rs. 50 but he decided against that because of the licensing and maintenance requirements. He couldn't earn more than the meager amount because of a lack of money or strict government policies. His situation can be described as a case of 'poverty trap'.

In June 2013, after 5 years of working as a cycle rickshaw puller, Sonu decided to buy a battery rickshaw after witnessing an influx of similar vehicles in the city. The rickshaws were a lucrative option because of the high-earning potential, no legal requirements or license quotas, and a dignity of labor. According to Sonu, the battery rickshaws were an upgradation over the cycle-rickshaws, in terms of both technology and social status. The battery rickshaw owners were considered at par with the auto-rickshaws in the local community, and provided an advantage as he could ply them close to his home and save on food and other requirements during the day. The idea of owning one's own vehicle was also appealing. He paid Rs. 92,000 for the vehicle and bought it from a dealer in the Paharganj area in Delhi. Since he couldn't get any loans from banks, he took a loan of Rs. 50,000 from friends and family, and paid the rest from personal savings.

Sonu was able to pay back his loan amount in under a year, and now gets to save a major part of what he earns. He has been able to take the first step to beat the poverty trap, but is convinced that without government support and a set of rules for the battery-rickshaws, he cannot be sure of his future. He also insists that almost every e-rickshaw driver in his locality, as well as the daily commuters want a legal framework and the drivers are willing to register their vehicles and pay a small amount as a registration fee if there is a requirement. On being asked about his investment plans for his savings, he replied-"I am not going to spend or invest it right now because no one knows what will happen to these battery rickshaws. In case of a ban or outlawing of the rickshaws, I will have my savings and the vehicle, but I don't think the other drivers will be able to survive the ordeal because of the loans and liabilities."

It was also found that 46% of the respondents were migrants from various states of North India, and this profession helped them in earning a decent wage which they could send back to their home towns or villages. From the perspective of employment and income generation, battery rickshaws are an effective source of income for the rickshaw drivers who come from varied backgrounds – cycle rickshaw pullers, unemployed and daily wage workers.

TABLE 5.6 : Educational Qualifications of Drivers

Educational Qualifications	Percentage of Drivers
Higher Education (Graduation)	1.4%
High School	8.2%
Middle School	25.4%
Primary School	41%
No Schooling	24%

The social advantages to the profession of driving battery rickshaws are also evident in the results. As the table shows, most of the drivers do not have the educational qualifications for pursuing skilled labor. However, the battery rickshaws are an appropriate alternative as almost 65% drivers thought that there was an increase in their social status after buying or running the battery rickshaws. In a hierarchical setup, these rickshaws were perceived to be above the cycle rickshaws in terms of social status, and equal to the auto-rickshaws. The co-relation can also be justified through the daily earnings in the different professions. Even though there was an increased job security and independence in the job along with higher earnings, most respondents (81%) believed that there had been no significant change in the living conditions. This can be attributed to the uncertain future of the profession, and the fact that the battery rickshaws are only a few years old in Delhi, which may not be sufficient time-period for a change in living conditions of the drivers and their families.

The Minister of Road, Transport and Highways Mr. Nitin Gadkari, in a bid to support the e-rickshaws, announced the Deen-Dayal E-rickshaw scheme for the year 2014-15. He said the drivers of these rickshaws should be their owners and they should be able to register their vehicles with the Municipal corporation with a fee of Rs.100/- along with an identity card for their operation. Loans for the vehicles would be given at an interest rate of 3% per annum. . [Press Information Bureau, 2014] The minister said the objective of the scheme was to remove the practice of man pulling a man and luggage through manual rickshaw, which shows the efforts put in by the government to encourage the rickshaws and to phase out the cycle rickshaws and the manual labour associated with it.

The conclusions of the socio-economic part of the study help us in determining the importance of the battery rickshaws in the state of Delhi. The important ones have been summarized below :

- 89% of respondents had an increase in their salary from previous professions.
- 37% of respondents were either unemployed, or cycle rickshaw pullers.
- An estimated 1,00,000 can contribute to the government revenue.
- Approximately 3,00,000 people in the country depend on the profession including the manufacturers, the workers and families.
- The Government of India announced the Deen-Dayal scheme in June 2014, which would help in the financing and procurement of the battery rickshaws in the country.
- 80% of the respondents traveled to-and-fro from the Metro Stations as well, thus adding to the transport eco-system of the city.
- 46% were migrants from various states in North India.
- 65% of the drivers believed that their social status had increased due to the change in profession, but only a small number(19%) thought that the change was extended to living conditions as well.

These rickshaws have become a part of the eco-system in the locations surveyed, and a proper regulatory framework would help in channeling the potential of the revenue, and creating infrastructure that would support the transport structure.

6. TECHNICAL STUDY

6.1 Parameter Selection

The 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. The technical study also tried to assess the efficiency of the e-rickshaws. This would help in suggesting the recommendations for the manufacturing policies that can be adopted by the state government. 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. [Indian Express 2014]

6.1.1 System Description

In India, the battery rickshaws are not built or designed within the country. Instead the rickshaws are imported into the country from countries like China, in CKD (Completely Knocked Down) form, or CBU (Completely Built-Up Units) after paying a high amount of import duty. These rickshaws are then assembled here, and the various components are put together to form the final product. The duty and the assembling put a markup on the initial cost price higher than even 125%. To cite a case as an example, the manufacturer bought the e-rickshaw from China at a cost of Rs. 34,000 in CKD format. After paying the taxes and assembling the vehicle, the cost went upto Rs. 60,000. These rickshaws were sold in the open market for Rs. 75,000-Rs. 85,000. Out of the 5 manufacturers interviewed, zero had an assembly line in place or any procedures to check the safety of the vehicles.

There are no strict manufacturing or assembling rules for the e-rickshaws, but the production of e-rickshaw is allowed only to manufacturers which have obtained a license from the Council of Scientific and Industrial Research (CSIR). Out of the 5 manufacturers interviewed, none was licensed by the organisation. Furthermore, official figures state that only 7 e-rickshaw manufacturers have approached CSIR for licensing to manufacture the rickshaws. [Press Information Bureau, 2014] The safety concerns put forward by The Energy Research Institute and The Indian Federation of Transport Research and Training make it imperative for the rickshaws to be regulated and licensed before they can be deemed fit as a mode of transport used by the general public.

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

TABLE 6.7 : Parameters for the Technical Study

General Objective	Parameters	Variables
To study the technical characteristics of the battery operated e-rickshaws in the state of Delhi.	Vehicle Parameters	Motor Power; Battery – Voltage, Capacity; Weight; Seating Capacity;
	Operational Parameters	Travel Speed; Cost (covered in the previous section); Charging Time; Distance Covered on one charge;
	Life Cycle Parameters	Battery Recycling Time; Durability; Safety Ratings – Certification;

6.2 Conclusions

The study and analysis of the technical data provides a fair amount of information on the operation of the battery rickshaw industry in the country.

TABLE 6.8: Results of the Technical Study

Technical Parameters	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	8.2 hours (8 hours and 12 Minutes)
Distance Covered (1 Charge)	63 Kilometers
Battery Recycling Time Period	7.5 Months

The study showed that the mean value of the motor power is 850W, which is even higher than the proposed upper limit of 650W power on the rickshaws, which was put forward in 2014 and has not been formulated yet. The mean value of the maximum speed of the rickshaws was found to be 33 kilometers per hours, which is higher than the 25 kilometer per hour limit in the Central Motor Vehicle Rules presently. The distance that can be covered by a battery rickshaw is 63 kilometers, which makes it unsuitable for large distances.

It was found that none of the manufacturers had any safety setup or safety ratings in place. The design was adapted from China, and thus a virtual testing was also not possible for the rickshaws. In the survey of the e-rickshaw drivers, it was found that 7% of the drivers had experienced a situation where their vehicle was prone to toppling, and thus creating a dangerous situation for the passengers. Moreover, the batteries of the rickshaws had a life-cycle of 7.5 months and the disposal of the batteries was not done in an environment friendly or efficient manner. The regularisation of the e-rickshaws can result in framing of rules for the manufacturing. This would result in a safer design and a safer mode of transport for the city.

Fitness ratings and registration of the rickshaws can help in city planning, structuring and government revenue. The life cycle of the e-rickshaws can be made more environment-friendly and the disposing off of the batteries can be turned efficient. The regulations may be framed so as to help the manufacturing sector of India with the help of subsidies or infrastructural support rather than direct CKD import from China

6.2.1 Key Findings

- None (0/5) of the manufacturers had any safety ratings or safety setup in place.
- 7% of the e-rickshaw respondents reported a possible toppling of their rickshaws on a turn.

- Only 1 of the manufacturers was given the fitness rating by a government body and there was no setup to regulate the rating.
- The rickshaw manufacturers bought a majority of the components from China in CKD format and assembled it in India to come up with the final product. This resulted in a 100%+ markup of the sale price against the actual cost price of the rickshaw in China.

7. LESSONS FROM THE TRIPURA BATTERY OPERATED RICKSHAW RULES, 2014

In January 2014, Tripura became the first state in India to regulate the functioning of the e-rickshaws, and they came up with the Tripura Battery Operated Rickshaw Rules for the purpose. [Business Standard, 2014] [Tripura Battery Operated Rickshaws Rules, 2014]

There are a few structured aspects of the rules that can be incorporated while drafting the rules for the state of Delhi. The suggested changes in the rules, keeping the transport structure of the state and city planning in mind, are documented in the this section. The sections of the Tripura Battery Operated Rickshaw Rules are being recommended for the state of Delhi primarily to achieve two specific purposes

- a. Safety of the mode of transport
- b. To help in city planning, and to increase the efficiency of the transport system.

8. RECOMMENDATIONS

The recommendation section is based on the three sections that have been studied and analysed in the paper.

8.1 Based on the technical study

- a. A manufacturing policy framework should be setup by the government to regulate the manufacturing sector of the vehicles.
- b. The safety ratings and prototype testing should be mandatory for all vehicles, similar to the sections 126 and 126a) of the Central Motor Vehicles Rules, 1989.

8.2 Based on the analysis of the Tripura Battery Operated Rules, 2014

1. For safety of the mode of transport and to streamline the recommendations made in the previous section, the following chapters of the Tripura Battery Operated Rules, 2014 can be incorporated while making the rules for the state of Delhi. These recommendations have been taken from Chapter IV,V, VI and VII of the Tripura Rules.

a. Certificate of Fitness

- The Certificate of Fitness should be issued to every driver after registration of the vehicles.
- The Certificate should be renewed after a specified period of time.

b. Submission of a prototype for testing

- A prototype of the vehicle should be submitted to the Transport Department of NCT of Delhi, and one of the automotive research organisations for clearance.

c. Safety Standards

- Safety Rating for the vehicles should be in place, according to certain parameters which should be updated after a specified period of time.

2. To help in city planning, and to increase the efficiency of the transport system.

a. Area of Route

- The Area of Route should be specified by the Municipal Corporation of Delhi or the NDMC to regulate the functioning of the vehicles.
- Special zones should be made to regulate the number of vehicles within a specified area.

b. Parking Places and Halting Stations

- In order to avoid the traffic problems and obstruction of the path, special parking places and halting stations should be designated for these battery rickshaws. The stations can be started in the Delhi Metro stations, and then the plan can be followed in other places.

c. Rate of Fare and hire of a Battery Operated Rickshaw

- The rates should be specified according to the distance, location and the zoning of the e-rickshaws mentioned in the previous section.

8.3 Based on the Socio-Economic Study

- a. Financing and Credit/Asset-based lending options should be available for the battery rickshaw drivers to finance their vehicles. The Government of India announced the Deen-Dayal Scheme that would have provisions to make it easier to own and operate a rickshaw.
- b. Insurance options should be introduced for the rickshaws, and the vehicles should be recognized as motor vehicles. This would help the commuters in claiming insurance in case of mishap or a motor accident.

9. EXTENDED RECOMMENDATIONS

The extended recommendations in this section are made to support the battery rickshaw system after the initial rules are in place. The memorandum sent by the Battery Rickshaw Welfare Association (BRWA) to the Lieutenant Governor of Delhi, and the Ministry of Road, Transport and Highways recommended suggestions for the effective operation of these vehicles.

9.1 The operation of the Battery rickshaws as an effective Metro Feeder System.

There are 139 Metro Stations in the Delhi Metro Rail Network, and it has a daily ridership of 2.4 Million. The feeder system, in contrast, operates on 23 routes and has 120 buses in operation. The government plans to add 400 new ones in 2014. [Daily Mail 2014] Given the demand, the battery rickshaws can be utilized as an alternative to the feeder system for the Delhi Metro to cater to short-distance and medium-distance requirements of the commuters.

In the study, it was found that 80% of the e-rickshaw drivers traveled to-and-fro from the Metro Stations at least once a day. The regularisation of the system would greatly benefit the commuters of the Metro. It would result in fixed rates according to distance and more infrastructural support from the DMRC.

9.2 Infrastructural Support at the Metro Stations for the rickshaws and specified parking places.

Special Infrastructural Support and charging stations can be created at the Metro Stations in the city. The number of Metro Stations is planned to be greater than 200 in the VI Phase and a

system can be built to support the battery rickshaws as well as the electric vehicles that exist on the road. As of June 2014, there are over 5,00,000 Electric Cars in the world and the number is gradually increasing. With the presence of government plans such as the National Electric Mobility Plan, the government aims to encourage the use of electric vehicles. [Press Information Bureau 2012] Charging stations at the Metro Stations can be used to build an electric vehicle network similar to the ones in Australia, Denmark, Canada etc.

10. CONCLUSION

The battery operated e-rickshaws have become an important part of the transport system of the state of Delhi, and there is a need to regularize the operation of these rickshaws.

The rickshaws have impacted the socio-economic status of a large number of people in the city, and its role in the income generation can be seen as 89% of e-rickshaw drivers saw increase in their salaries from their previous employment, and 39% of the surveyed rickshaw drivers were either unemployed or cycle rickshaw drivers before turning to the profession. The absence of a regulatory framework and manufacturing policies for the rickshaws have resulted in a lack of safety structure for the rickshaws, and is a hazard for the commuters.

The paper recommends the formation of strong policies which ensure a safe design of the rickshaw and efficient functioning within the city. The analysis of the Tripura Battery Operated Rules, 2014 provided some pertinent recommendations for the formulation of policies in the state of Delhi. Based on the Tripura rules, the paper recommends specified parking spots for these vehicles and zoning of the rickshaws. The findings of the socio-economic study suggest the need for financing and credit/asset lending options for the drivers, and insurance policies for the battery rickshaws.

The extended recommendations propose a future course of action of creating an infrastructure for the electric vehicles with the help of the Delhi Metro and extending the operation of the rickshaws to support the presently inadequate Metro Feeder System.

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12. APPENDIX

12.1 TRIPURA BATTERY OPERATED RICKSHAWS RULES, 2014

- (i) An application for the grant or renewal or duplicate of a trade certificate shall be made in Form-5, and shall be accompanied with the appropriate fees as prescribed in the Schedule;
- (ii) On receipt of an application for the grant or renewal or duplicate of a trade certificate in respect of a battery operated rickshaw, the registering authority may, if he is satisfied that the applicant is a bona fide dealer and requires the certificates specified in the application, issue to the applicant one or more certificates, as the case may be, in Form-6, within thirty days from the date of receipt of such an application and shall assign in respect of each certificate a trade registration mark.
- (iv) No application for trade certificate shall be refused by the registering authority unless the applicant is given an opportunity of being heard and reasons for such refusal are given in writing.
- (v) A trade certificate granted or renewed under this rule shall be in force for a period of twelve months from the date of issue or renewal thereof.
- (vi) If at any time the trade certificate is lost or destroyed, its holder shall report to the police station in the jurisdiction of which the loss or destruction has occurred and intimate the fact in writing to the registering authority by whom the certificate was issued and apply to the said authority for a duplicate certificate accompanied by the Form and appropriate fee, as specified for grant or renewal of a trade certificate.
- (vi) On receipt of an application alongwith the fee, the registering authority may issue a duplicate 'Trade Certificate' clearly marked 'Duplicate'.
- (vii) If after the issue of a duplicate certificate the original is traced, the same shall be surrendered forthwith to the registering authority by which it was issued;
- (x) A trade registration mark and number shall not be used upon more than a battery operated rickshaw at a time or upon any vehicle other than a battery operated rickshaw *bona fide* in the possession of the dealer in the course of his business or on any type of vehicle other than the one for which the trade certificate is issued;
- (x) The trade certificate shall be carried on a battery operated rickshaw in a weatherproof circular folder and the trade registration mark shall be exhibited in a conspicuous place in the battery operated rickshaw.
- (x) A trade certificate shall be used only by the person to whom it is issued and such person shall not allow or offer or cause the certificate or the number assigned in connection therewith to be used by any other person;
- (xi) No holder of a trade certificate shall deliver a battery operated rickshaw to a purchaser without registration, whether temporary or permanent.

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- (xii) If the registering authority has reason to believe that the holder of any trade certificate has not complied with the provisions of this chapter, it may, after giving the holder an opportunity of being heard, suspend or cancel the trade certificate held by him.
- 20. Transfer of ownership of the battery operated rickshaw:-**
- (i) Where the owner of a battery operated rickshaw dies or otherwise transfers the ownership, the person succeeding to the possession of such rickshaw may for a period of three months, use the Rickshaw as if it has been transferred to him, if such person has, within thirty days of the death of the owner, informed the registering authority of the occurrence of the death of the owner and of his own intention to use the rickshaw;
- (ii) The person referred to in sub-rule (i) shall apply in Form-7, within the period of three months to the said registering authority for the transfer of ownership of the rickshaw in his name, accompanied by-
- the appropriate fee as specified for renewal of a licence;
 - the death certificate of the registered owner or an affidavit indicating the transfer, as the case may be; and
 - the certificate of registration.
- 21. Fees:-** The fees which shall be charged under different provisions of this chapter shall be as specified in the SCHEDULE-1.
- CHAPTER-IV**
- Certificate of Fitness**
- 22. Certificate of fitness of battery operated rickshaw:-**
- Subject to the provision of registration, a Battery Operated Rickshaw shall not be deemed to be validly registered for the purpose of these rules, unless it carries a certificate of fitness in such form and containing such particulars and information as may be prescribed by the inspecting authority.
- 23. Validity of certificate of fitness:-**
- A certificate of fitness in respect of a Battery Operated Rickshaw shall be made to the registering authority, in Form-8 and such certificate of fitness shall be valid for two years.
- 24. Renewal of fitness of certificate:-**
- Within one month before the expiry of certificate of fitness, an application shall be made for renewal of such certificate in Form-9 and shall be accompanied by:-
- Original certificate of fitness;
 - fees as prescribed in the Schedule.
- 25. Issue of certificate of fitness:-** On receipt of an application under rule 24 and after verification of the documents furnished therewith, the inspecting

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authority shall conduct inspection and issue certificate of fitness, if the provisions are complied with.

26. **Fees:-**
The fees which shall be charged under different provisions of this chapter shall be as prescribed in SCHEDULE-I.

27. **Seating capacity:**
Seating capacity of the battery operated rickshaw shall be as prescribed by the manufacturer in the sale certificate.

CHAPTER- V Control of Battery Operated Rickshaws

28. **Necessity of Permits:-**

(i) No person, including a Dealer or Manufacturer, shall use or permit the use, demonstrate, sale or exhibit for sale, of a battery operated rickshaw in any public place, whether or not such rickshaw is actually carrying any passenger or goods, without a permit granted by the Registering Authority or any other prescribed authority;

(ii) No person shall use or permit the use of a battery operated rickshaw in any public place, in any manner beyond the conditions mentioned in such permit.

29. **Permit issuing authority:-**

(a) The State Government shall, by notification in the official gazette, constitute Permit issuing Boards for the Agartala Municipal area and for other urban areas, to exercise and discharge the powers and functions as may be specified in the notification;

(b) Each such Permit issuing Board shall consist of six members including the Chairperson and Member Secretary.

(c) For the Permit issuing Board of Agartala Municipal area, Chairperson of the AMC shall be the Chairman of the Board and the Chief Executive Officer of the AMC shall be the Member Secretary of the board, respectively by virtue of the posts. The other members of the Board shall be nominated by the Chairman of the Board, one of whom shall be an officer of the District Transport Authority;

(d) For the Permit issuing Board of an urban area, Chairperson of the concerned Nagar Panchayat shall be the Chairman of the Board and the Chief Executive Officer or Executive Officer of the Nagar Panchayat shall be the Member Secretary of the board, respectively by virtue of the posts. The other members of the Board shall be nominated by the Chairman of the Board, one of whom shall be an officer of the District Transport Authority;

30. **Application for permit of Battery Operated Rickshaw:-**

(i) An application for an offer of permit in respect of Battery Operated Rickshaw shall be made to the Member Secretary, Permit Issuing Board, in Form-10 and may contain the following particulars namely:-

(a) the route or routes or the area to which the application relates;

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- (b) type and seating capacity of the rickshaw,
- (c) the arrangement intended to be made for housing, maintenance and repair of the rickshaw for the comfort and safety of passengers.

(ii) An application for permit in respect of Battery Operated Rickshaw shall be made in a prescribed form and accompanied with the following particulars namely:-

- (a) valid offer of permit;
- (b) address proof,
- (c) registration certificate registered in his name and against the offer of permit;
- (d) appropriate fees, as prescribed in the Schedule,
- (e) copy of FRTC,
- (f) copy of ST/SC/OBC/EX. Serviceman, if the applicant is of that category,
- (g) copy of the society registration certificate, if the application is on behalf of a society.

(iii) Upon receipt of an application for permit of a Battery Operated Rickshaw, the Member secretary of the permit issuing board shall, if the application is in order, circulate particulars to members of the authority with intimation whether the matter is to be decided at a meeting of the Board or by circulation. In the latter case, he shall inform the date in which the decision will be taken on the issue.

31. **Area of route:-**

Route or area of a Battery Operated Rickshaw shall be limited within the area of Municipality or Nagar Panchayat, where permit is issued to ply the Battery Operated Rickshaw.

32. **Fees:-**

The fees which shall be charged under different provisions of this chapter shall be as prescribed in SCHEDULE-I.

CHAPTER- VI

Seizure and Penalty

33. **Compounding of infringements:-**

(i) Any infringement of the provisions of the Act and these Rules may be compounded by such officers or authorities and for such amount as the State Government by notification in the Official Gazette, specify in this behalf;

(ii) Where an infringement has been compounded under sub-rule (i), the infringer shall be discharged from the liability and no further proceedings shall be taken against him in respect of that infringement.

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- 34. Power to detain Battery Operated Rickshaw:-**
 (i) Any police officer or other person authorized in this behalf by the State Government may, if he has reason to believe that a Battery Operated Rickshaw has been or is being used in contravention of any of the provisions of the Act and Rules, seize and detain the Battery Operated Rickshaw and for this purpose take or cause to be taken any steps he may consider proper for the temporary safe custody of the Battery Operated Rickshaw.

(ii) Where a Battery Operated Rickshaw has been seized and detained under sub-rule (i), the owner or person in charge of the Battery Operated Rickshaw may apply to the registering authority or any officer authorized in this behalf, together with the relevant documents for the release of the rickshaw and such authority or officer may, after verification of such documents, by order release the rickshaw subject to such conditions as the authority or officer may deem fit to impose.

CHAPTER- VII
Miscellaneous

- 35. Parking Places and halting stations:-**
 The State Government or the respective urban area authority having jurisdiction over the area concerned may, determine places at which Battery Operated Rickshaws may stand, either indefinitely or for a specific period of time and may determine the places at which such rickshaws may stop for a longer time that is necessary for the taking up and setting down of passengers or goods.
- 36.** No Battery Operated Rickshaw shall be loaded in such a manner that the load or any part thereof extends beyond the overall dimension of the rickshaw, in any manner.
- 37. Fitting of reflectors:-**
 Every Battery Operated Rickshaw shall be fitted with two reflectors, one each on both sides and at the rear.
- 38. Lamps:-**
 (i) Every Battery Operated Rickshaw, while being driven in a public place, during the period half an hour after sunset and at any time when there is no sufficient light, shall be lit with the lamps which shall render clearly discernible persons and vehicles on the road at a distance of one hundred and fifty five metres ahead.
 (ii) Every Battery Operated Rickshaw shall be fitted with two rear lamps showing red light to the rear and such lamp shall be fixed either on the centre line of the rickshaw or to the right hand side, necessary to illuminate the registration mark.
- 39.** No such Battery Operated Rickshaw shall be used in drawing another rickshaw of all class or type or any other vehicle.

- 40. Speed Limit:-**
 (i) The designed speed of a Battery Operated Rickshaw shall not exceed fifteen Kilometres per hour and shall be fitted with an instrument so constructed and fixed in such a position as to indicate to the driver of the rickshaw the speed at which it is travelling and the speed governor of every such rickshaw shall be so set that the rickshaw is incapable of being driven at a speed in excess of the maximum preset speed.
 (ii) No person shall drive or draw a Battery Operated Rickshaw or cause or allow a Battery Operated Rickshaw to be driven or drawn in any public place at a speed exceeding fifteen kilometers per hour.

41. Safety standards:-
 The State Government or the Urban Area Authority may, from time to time, specify, by notification in the Official Gazette, the standards or the relevant standards of any part, component or assembly, to be used in a Battery Operated Rickshaw and the date from which such parts, components or assemblies are to be used.

42. Passenger entrance and exit:-
 The passenger entrance-cum-exit door shall be located on the left side of the Battery Operated Rickshaw and the door handle should be capable of being handled from inside as well as from outside, with suitable locking devices.

43. Driving or drawing dangerous or hazardous to human life:-
 No person shall drive or draw a Battery Operated Rickshaw in any manner, which is dangerous or hazardous to human life or property and this is in addition to comply with the provisions of any law for the time being in force.

44. Duty to obey traffic signals:-
 Every driver or drawer of a Battery Operated Rickshaw shall drive or draw the rickshaw in conformity with any indication given by mandatory traffic sign and in conformity with the driving regulations made by the Central Government, and shall comply with all directions given to him by any police officer for the time being engaged in the regulation of traffic in any public place.

45. Rate of Fair and hire of a Battery Operated Rickshaw:-
 (i) The rates of fair to be charged by a owner, driver or drawer from a passenger or from any other person obtaining the service of a Battery Operated Rickshaw and the rate of hiring of such rickshaw, shall be as prescribed by the AMC or the concerned Urban Area Authority, from time to time.
 (ii) The rate so fixed by the authority, shall be affixed in a conspicuous place or Notice Board of the office of the authority and a certified copy of the same shall be kept preserved in a Battery Operated Rickshaw for showing it to a passenger on demand.

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have on the day of the year
 sold and delivered the Battery Operated Rickshaw
 to Shri/Smt. (Name son/wife/daughter
 of residing at (House
 no./Street/Village/Town/Dist./State).
 We have furnished an authenticated copy of the Death Certificate and Survivorship
 Certificate of Late

The Registration certificate No. have been handed over
 to him/her/hem.
 It is prayed to transfer the ownership of the Battery Operated Rickshaw in favour of

 To the best of my/our knowledge and belief the Battery Operated Rickshaw is free
 from all encumbrances and information furnished is true. We undertake to hold
 my/our self responsible for any inaccuracy or suppression of information.

Signature or thumb impression of the
 REGISTERED OWNER (Transferor)
 (In case of death of the Registered Owner
 Signature of all the Legal Survivors)

Date
 Signature or thumb impression of the
 Transferee

OFFICER ENDORSEMENT
 Ref. No. Office of the

The ownership of the Vehicle has been transferred to the name
 of
 with the note of the above said agreement with effect from
 (Date)

Date Signature of the REGISTERING AUTHORITY
 Strike out whichever is inapplicable with Office Seal

(To be duplicate and the copy with the endorsement of the Registering Authority to
 be returned to the transferor immediately on making entries of Transfer of Ownership
 in certificate of Registration).

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FORM 8
[See Rule 23]
FORM OF APPLICATION FOR CERTIFICATE OF FITNESS

To,
 The Registering Authority,

I hereby apply for the issue of a certificate of Fitness for Battery Operated Rickshaw,
 as required by Rule 22 of the Tripura Battery Operated Rickshaw Rules, 2014.
 Necessary Particulars are given herein below--
 1. Registration mark of Rickshaw
 2. Name of Registered Owner
 3. Address of Owner
 4. Place where the Rickshaw is ordinarily kept
 5. Name of manufacturer of Rickshaw.
 6. Manufacturer's model, or if not known, wheel base.
 7. Type of Rickshaw.
 8. Engine number.
 9. Chassis number.
 10. Particulars of any previous certificate of fitness granted in respect of the
 Rickshaw.
 11. Authority by which granted.
 12. Date when certificate ceased to be valid.
 13. Reasons for cessation of validity.
 14. Reasons for not producing certificate of fitness.

Date Signature or thumb-impression of applicant

FORM 9
[See Rule 24]
Application for renewal of certificate of fitness

To,
 The Registering Authority,

I hereby apply for renewal of the certificate of fitness, for Battery Operated
 Rickshaw, as required by Rule 24 of the Tripura Battery Operated Rickshaw Rules,
 2014.
 Necessary Particulars are given herein below--

1. Registration mark of the Battery Operated Rickshaw;
2. Name of Registered Owner;

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12.2 QUESTIONNAIRE FORMAT

QUESTIONNAIRE: BATTERY E-RICKSHAW PROJECT

For Rickshaw Drivers

Initial Investment-

Daily Cost-

Daily Income-

Net Daily Profit-

Battery Replacement Cost

Battery Recycling Time

Previous Occupation;

Charging Time:

Charging Cost:

Distance Covered on one charge:

Battery Replacement Cost:

Education :

Migrant: Yes _____ / No _____

If yes, which state:

Professional Advantage:

Job security and independence: Yes _____ / No _____

Better Living Conditions : Yes _____ / No _____

Change in social status: Increase _____; Decrease _____; No Change _____

For Manufacturers

Motor Power:

Battery- 1. Voltage:

2. Capacity:

Weight:

Seating Capacity:

Safety Ratings:

Manufacturing Type: Assembly Line Manufacturing _____;

CKD / CBU Assembly Format _____;