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PRESENTS

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SHAPING THE DISRUPTIVE LAST-MILE LOGISTICS IN EV ECOSYSTEM

by Yash Pratap Singh ,
World Resources Institute(WRI) - India

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Figure 1: Revolutionary L3 Cargo EV, EDel Mahindra

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SHAPING THE DISRUPTIVE LAST MILE LOGISTICS IN EVs ECOSYSTEM

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The penetration level of demand and supply in E-commerce is substantially increasing digitally all across the cities of India where last-mile logistics plays an important role in delivering those goods or products safely, on time to the consumer from various merchants.

It is also estimated that last-mile accounts for 13-75% of total supply chain costs depending on various factors such as time windows and consumer densities, congestion, fragmentation of deliveries, shipment size and homogeneity.

E-commerce's rise has transformed the physical distribution of commodities in our cities. We may say that Internet purchases and customized delivery are the developments with the most influence on urban freight networks. The common understanding of E-Commerce is Internet-based business to consumer (B2C) transaction.

E-commerce is causing a boom in customized delivery, which in turn is causing freight distribution networks to have even greater social and environmental externalities. To improve the delivery efficiency of last-mile city logistics, the emergence of Intra city-based distribution with EV (2W & 3W) was found to be the most sustainable modes of transport for cities. (Roig & Alvarez Palau, 2020)

Challenges: Last Mile Delivery and EVs Infrastructures

Figure 2: Logistics in Cities, the challenges in last-mile deliveries

As the shift from brick-and-mortar to online purchasing continues, the issues of last-mile delivery are becoming more difficult to manage. Consumer expectations for delivery speed, whole delivery experience, and transparency have prompted online merchants to invest in innovative technology solutions to manage their delivery operations. When it comes to last-mile delivery for E-commerce, there are several problems, but the most important ones fall into four categories.

Efficiency - Both delivery firms and merchants lose money as a result of inefficiency. The same may be said about dispatchers who plan routes by hand, contact centers that deal with dissatisfied or confused consumers, and so on.

Efficiency is important for both retailers and logistics providers when it comes to expanding last-mile fulfillment capacity. Large order quantities might throw your services off track if you're not efficient. This will result in a late or unsuccessful delivery, as well as dissatisfied consumers, which no one wants.

Meeting demand with efficient Operations - Businesses will waste money and resources attempting to meet growing demand if they don't have an effective supply chain and operations system in place.

Last-mile delivery challenges for retailers - In the final mile delivery process, managing both internal and external fleets can be a challenge for businesses. When employing different delivery methods, it might be challenging to retain visibility and control over the last mile experience.

Last-mile delivery challenges for logistics providers – Reducing logistics costs, on-time deliveries, minimizing rebounds, aligning warehouse and logistics operations are the key challenges that every logistics providers faces in their day-to-day operations.

Total delivery costs itself constitutes 28% in the overall distribution process of city logistics due to traditional practices of conventional vehicles, lack of real-time information and dynamic delivery route planning. (Fixlastmile, n.d.)

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These challenges make it necessary for logistics providers and fleet operators to enhance their delivery system by partnering with various business model operators (B2B & B2C) retailers for hub and spoke kind of distribution in the cities.

This helps to reduce congestion, costs and the handling time for providing better efficiency in the last mile delivery segments.

Figure 3 (right): Cargo E-2W (Li-Ions) Spock Model & ZYPP Power (Heavy Duty Delivery Vehicle), Credit: Li-Ions Electrik

Cargo EV's segment like E-2W and E-3W are the prominent modes in the last mile delivery operations for Business-to-business (B2C), Business-to-consumer (B2C) and hyper-local where the range anxiety and public charging infrastructures emerges as a barrier for OEMs, logistics providers, etc.

Many cities have adopted and operate revolutionary cargo electric vehicles (E2W and E3W) for their last-mile logistics operations without having permanent hubs for deliveries, charging infrastructures, batteries chemistry knowledge, financial leasing practices, captive charging facilities, Intelligent route planning and other skills in this domain.

Figure 4 (left): Cargo E-2W (Li-Ions) Spock Model & ZYPP Power (Heavy Duty Delivery Vehicle), Credit: Li-Ions Electrik

Following are the major challenges that cargo EVs faces are –

- **Lack of Spare Parts** – Due to lack of spare parts many fleet operators have to face difficulties in their operations. Some spare parts may not be locally available as several are Chinese imports.

- **Lack of Battery Swapping Network** – Many fleet operators face vehicle range anxiety due to lack of battery-swapping stations along the routes or across the network. This also creates inefficiency in the operation and loss of valuable time.

- **Lack of Telematics in EV Fleets** – Lack of telematics in the EV fleet will cause theft issues and unavailability of operational data for scaling and improving the EVs performance planning.

Cargo Electric Vehicle Operations In Last-Mile Delivery :

Figure 5: Green Last-Mile Delivery Intra-City, Credit: Zypp Electric

Cities were experiencing a complex logistical challenge in their daily operations by cargo electric vehicle due to the lack of charging infrastructure, range-anxiety, overloaded capacity and delay in deliveries affecting the overall last-mile delivery in terms of vehicle utilization time, distribution costs, inventory scheduling and other their distribution patterns.

At area-specific, E-2W and E-3W are distributing goods daily by getting their vehicles charged at hubs twice a day during operational hours. This causes vehicle inefficiencies with their battery usage, capacity, overloading and also the weather conditions.

There will be additional idle time and delay as a result of additional stops. Driving and dropping off products in the city results in much additional idle time during the rest of the shipping process. It's hard to avoid all the traffic signals, different vehicles on the road, and meandering streets. There will be additional idle time and delay as a result of additional stops. Driving and dropping off products in the city results in much additional idle time during the rest of the shipping process. It's hard to avoid all the traffic signals, different vehicles on the road, and meandering streets.

With the emergence of cargo electric vehicles and the shift toward operating sustainable vehicles for intra-city distribution of goods where Original Equipment Manufacturer (OEMs) are still lacking standard benchmarks, international practices and factors to be considered during pilot and deployment of vehicles for commercial uses which impacted the service delivery, battery and spare parts issues to fulfill the consumer demands on time.

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In last-mile distribution, the quoted range for electric 2W vehicles in a single charge is said to be 100-120 km as per the OEMs standard whereas for E-3W it is around 80-100 km with the payload capacity of 1500 kg per vehicle. The standard daily vehicle utilization of 60%-75% is considered in their effective operations, which is not met in case of any cities due to lack of route planning, accurate demand estimation of goods, lower operating range of the vehicles, and cross-utilization operations of the vehicles. (Olsson, Hellstrom, & Pallson, 2019)

Figure 6: Green Last-Mile Delivery Intra-City, Credit: Zypp Electric

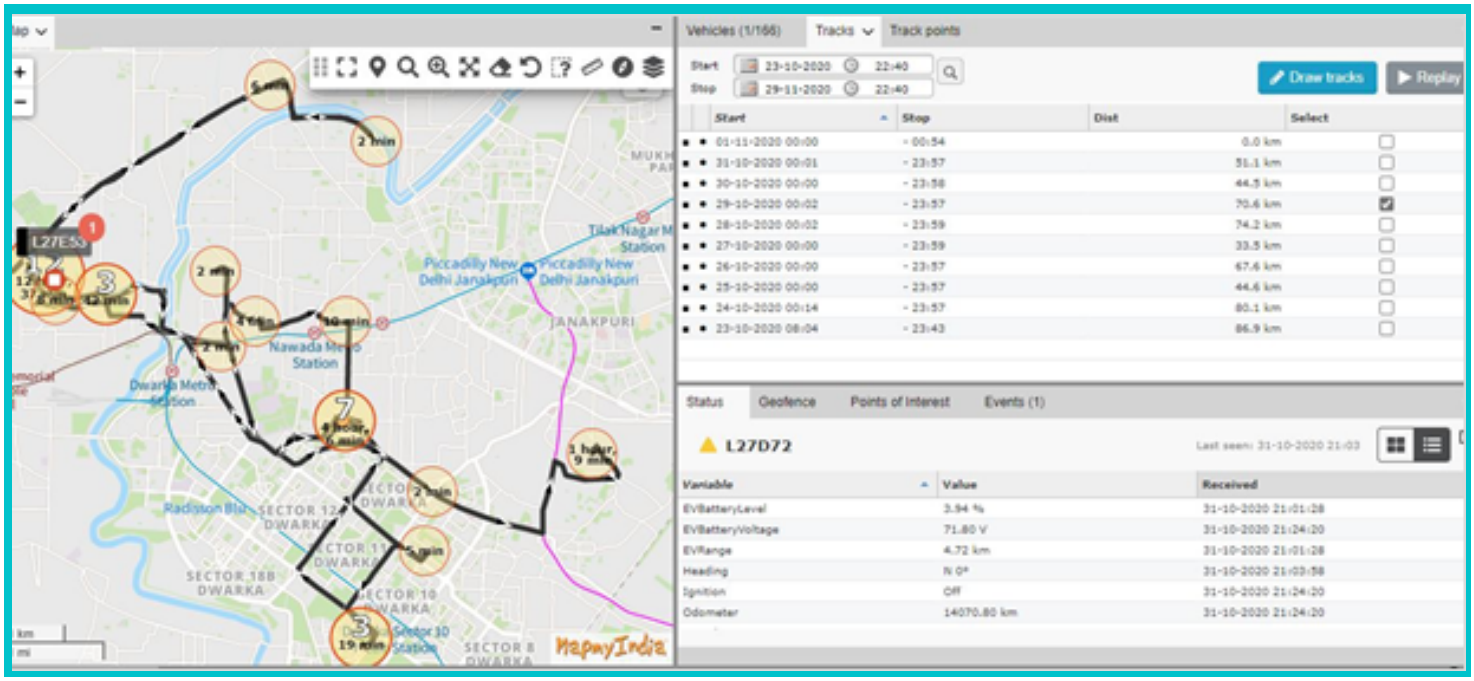

Figure 7: - Real-time Information of Fleet Operators for last-mile logistics (Author Self Database), 2020

Complex Routes lead to more out of route miles with a large number of shops around and it is a lot easier for drivers to lose track of the route and rack up unnecessary miles.

Due to greater operating costs and lower profit margins, the markets for electric vehicles in last-mile logistics are experiencing several challenges. When a single unsuccessful delivery may cost your organization over $2.5, it's critical to optimize every stage of your order fulfillment process, especially last-mile delivery. To enable the adoption and deployment of electric vehicles for E-commerce operations where route planning, service optimization, cross utilization, telematics, and battery swapping stations could be a viable option for fleet operators in the last mile logistics where a comprehensive understanding of logistics planning process and system integration is need to be addressed and adopted in an integrated manner to increase the efficiency of last-mile logistics through IOT based analytics data, locational planning of distribution hubs and charging infrastructures for the cities. (Sion, 2020)

Recommendations and Strategies: Potential Solution for EVs Cargo Deliveries

1. Cross Utilization in Deliveries: Cross-utilization of electric vehicles for last-mile delivery not only saves time and money, but also allows the merchant to switch to a longer range of travel on a single charge (Patella, Grazieschi, Gatta, Marucucci, & Caresse, 2021)

For example, the merchant may use E-2W for morning deliveries from 4 a.m. to 8 a.m., where a 40-kilometer range is required, and 1-hour idle time may be used to charge the vehicle at the hub which sets up the same vehicle for another 120km trip. This will provide more efficient and scheduled delivery to benefit fleet operators and logistics providers.

2. Battery As a Service (BAAS) – This is a subscription-based model of chargeable batteries with a rental plan to provide quick chargeable batteries to drivers, which take 2-3 minutes to swap the battery (2-3 kWh for E-2W & 7 kWh for E-3W) and cost Rs. 50 for each swap.

Typically drivers or riders swap two times a day based on their operational routes, which costs them less than ICE vehicles with more distance travelled and maximum vehicle utilization as well as the payload. (Das, Sasidharan, & Ray, 2020)

Figure 8 : Battery As a Service (BAAS) - Shared Revenue Model for EVs

- In this approach, startups are forming partnerships with local Kirana stores to provide them with batteries that they can charge using their energy and then distribute to the driver/rider, with a 60:40 profit split determined under this partnered revenue model.

3. Using Telematics for EVs Fleet Management – Route planning and optimization with telematics not only helps you increase your business's profitability by keeping track of your fleet's real-time data, but it also helps you build a strategic logistical infrastructure, where gap analysis trends derived from day-to-day operations help in the development of an EV supply chain network, as well as charging stations.

Figure 9 : Reference Pic

Way Forward

In the logistics and supply chain sector, the major purpose of last-mile delivery solutions is to get a shipment or an order to the end-customer as quickly as possible, making the entire transportation experience speedy and hassle-free for all parties involved. These procedures provide a step-by-step process for developing, simplifying, managing, monitoring, and improving last-mile delivery performance.

Last Mile Delivery

 Inventory Tracking – This involves a last-mile delivery system that allows you to scan products as they enter a truck and follow them until they arrive at your destination. You're effectively converting your delivery vehicle into a moving warehouse, with total real-time visibility over all products.

 Proof of Delivery – This involves using a digital time stamp that includes both time and location. This provides far greater security and tangible confirmation that a product was delivered.

Cargo Electric Vehicle

 Many large B2B firms in E-commerce, grocers, food, and courier service have been testing EVs, and some have progressed to the deployment stage. New business models, such as pure-play energy operators entering, owning, and operating battery production, are also emerging.

 The FAME II commercial vehicle subsidy helps lower the price from INR 0.25-0.3 million to INR 0.2-0.25 million, allowing OEMs and fleet operators to use commercial EVs more widely in the future. (Ramachandran, Rao, Jacob, & Arora, 2020)

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