Chapter 7
Reverse Logistics in the EV Industry: Sustainable Supply Chain Management for EV Components in India

Shantanu Trivedi
https://orcid.org/0000-0001-7905-0358
O.P. Jindal Global University, India

Saurav Negi
https://orcid.org/0000-0002-5553-0098
Modern College of Business and Science, Muscat, Oman

ABSTRACT

This chapter investigates the reverse logistics landscape within the burgeoning electric vehicle (EV) industry, focusing on sustainable management of end-of-life (EOL) components, particularly lithium-ion batteries (LIBs). Through a literature review, the chapter analyzes existing research and case studies to map current reverse logistics operations, with a particular focus on India. It explores processes such as collection, transportation, dismantling, recycling, and remanufacturing while identifying gaps and recommending strategies for improvement. The chapter evaluates India's battery reverse logistics program, highlighting ongoing initiatives and areas for growth. the chapter aims to provide actionable insights that contribute to a more efficient and sustainable reverse logistics framework in the EV industry, aligning with broader sustainability goals. Key considerations for effective operations include regulatory compliance, technological innovation, cost management, and stakeholder collaboration.

DOI: 10.4018/979-8-3373-0649-0.ch007

1. INTRODUCTION

1.1 Overview of the EV Market and Its Growth Trajectory

The electric vehicle (EV) market has experienced significant growth in recent years, driven by a combination of technological advancements, government regulations, and increased consumer awareness of environmental concerns. In 2023, vehicles with internal combustion engines are expected to release approximately 3.8 gigatons of CO_2 into the air, which accounts for more than 60% of all road transport sector emissions and contributes to a total of 8.24 gigatons of CO_2 in transportation-related emissions (Statista, 2023). This is a big problem for the environment and the economy. The World Bank says that air pollution costs $6 trillion a year in health problems, which is 5% of the world's GDP. This is because of health problems, lost productivity, and shorter life expectancy. In India, air pollution caused economic losses of 4.5% to 7.7% of GDP. Road transport was responsible for 12% of energy-related CO_2 emissions and caused more than 1.6 million premature deaths each year (IEA, 2023).

Global EV sales are on a steep growth trajectory, with projections estimating volumes to reach around 85 million units by 2025. At that stage, EVs are expected to secure more than one-fifth of the global automotive market, signaling a fundamental shift from internal combustion engines (ICEs) toward electrified mobility (Lozanova, 2024). Supporting this trend, Transport & Environment anticipates that EVs will achieve a 20–24% share of new car sales in 2025—an outcome closely aligned with the European Union's climate commitments. Importantly, battery-EVs alone are projected to contribute nearly 60% of the CO_2 reductions needed for automakers to comply with EU emissions standards. One of the major factors fueling this growth is the introduction of affordable EV models, with at least seven new fully electric cars priced below €25,000 entering the European market between 2024 and 2025 (Motor Finance Online, 2024).

Looking further ahead, Deloitte forecasts that global EV sales could expand from just 2.5 million in 2020 to over 31 million by 2030, representing about 32% of all car sales worldwide. Such rapid expansion will inevitably reshape automotive supply chains—creating challenges for firms that lag behind and opportunities for those that can leverage supply chain agility and resilience. Central to this transformation is the EV battery, which accounts for nearly 40% of a vehicle's total value. The battery market remains highly concentrated: China, Japan, and South Korea dominate global supply, while in 2018, less than 3% of global demand was met by manufacturers outside these three countries. By 2020, China had already established 93 battery "mega factories," compared with only four in the United States, underscoring the geographic imbalance in battery production capacity.