

Chapter 17

Unveiling India's Automobile Sector Evolution: Analyzing Current Electric Vehicle Trends

Jotish John A.

Energy Institute Bengaluru, Centre of Rajiv Gandhi Institute of Petroleum Technology, India

Hakeem Niyas

 <https://orcid.org/0000-0002-9689-7718>

Energy Institute Bengaluru, Centre of Rajiv Gandhi Institute of Petroleum Technology, India

ABSTRACT

Fossil fuel-based automobiles are one of the major causes of greenhouse gas emissions and climate change. The shortage of natural resources, along with environmental concerns, has caused tremendous pressure on the automotive sector to undertake a gradual shift to clean energy-based transport, resulting in the development of electric vehicles (EVs). EVs are considered a promising solution to the transport sector as they are highly efficient. This chapter briefs the world automotive history, key players, and the reason for the current shift to EVs, with relevant market studies. India, being the third-largest automobile market, offers a wide variety of vehicles. Hence, a study on the key players in the Indian automobile history along with the EV industry is elaborated. This chapter gives insight into the comparison of different EVs in the Indian market. It explains the challenges for India's shift to EVs, government policies supporting the transition, and the socio-economic need for the same. This chapter also presents a case study on India's most-sold EV – Tata Nexon EV.

1. INTRODUCTION

The automobile sector has a significant impact on human society, from its early days when they were considered a necessary transportation component to their current standing as a symbol of luxury and technological progression. Cars enabled people to cover greater distances in less time, creating new op-

DOI: 10.4018/979-8-3693-5247-2.ch017

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opportunities for work, entertainment, and business. Additionally, they promoted the expansion of suburbs and the construction of roads and bridges.

Ever since the invention of wheels in 3500 BC, experiments in developing self-powered vehicles began. Some early propulsion forms were wind-powered vehicles, wheeled sailing ships, and muscle-driven vehicles. When fast and efficient power sources were developed in the late 18th century, they revolutionized transportation by making it quicker, more effective, and more widely available. Steam engines, Internal combustion engines (ICEs), and EVs were the three primary types of automobiles based on propulsion systems developed in the early phases of the automobile industry (Eckermann, 2001). One of the oldest forms of vehicle propulsion was the steam engine, which entailed heating water to produce steam that was then used to propel the engine. The early 20th century saw a rise in the popularity of steam-powered cars after creating the first one in the late 18th century (Hard & Jamison, 1997). Another early form of propulsion utilized in cars was the ICE which necessitated burning fuel like petrol or diesel to generate energy that could be used to power the engine. In the early years of the automotive industry, electric motors were also created, and electric cars were first extremely well-liked due to their simplicity of use and absence of pollution. However, the growth of ICE based automobiles and the invention of starter motors made them more convenient, ultimately causing a drop in the popularity of electric cars since they were constrained by the technology available at the time.

There has been a gap in the knowledge base regarding the history of electric vehicles since the same is not commonly known. Several inventors and inventions throughout history have contributed to the development of modern, practical EVs. Some of these inventions and inventors have been well documented, while others have gone unnoticed or forgotten over time. As a result, there have been debates and doubts regarding the history of EVs, including disagreements about which inventions were true and which inventors made the most significant contributions. This chapter presents a sequential account of the significant inventions and key players in the history of electric vehicles, which have shaped the technology to its present condition

This chapter traces the significant technologies, developments, and trends that have shaped the automotive industry over the past 200 years, from its primitive beginnings to its contemporary form. The chapter provides a comprehensive overview of the history of the automobile, highlighting the key drivers of innovation and change that have shaped this iconic technology and exploring its ongoing impact on our world. Additionally, this chapter focuses more on the Indian automobile market and includes a brief analysis of the need for the transition to EVs in India, government policies, prevailing challenges, and the key players in the Indian market. Furthermore, a case study is conducted on the Tata Nexon EV, one of India's most sold EVs.

2. BRIEF HISTORY OF THE AUTOMOBILE SECTOR

2.1 Steam Automobiles

The first steam automobile is credited to Nicolas-Joseph Cugnot, a French inventor who developed a steam-powered vehicle in 1769. Figure 1 shows Joseph Cugnot's steam-powered vehicle preserved at the Museum of Arts and Crafts, Paris. The vehicle was designed as a three-wheeled tractor for hauling artillery and could travel at a speed of about 2.5 miles per hour. The fire-tube boiler that powered Cugnot's steam-powered vehicle heated water to produce steam that drove the engine. The vehicle had a

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