# Chapter 9
# Policy Perspective for Developing Electric Vehicle Ecosystem

**Oliver Shivava Shirunda**
*Namibia University of Science and Technology, Namibia*

**Kalaluka Kanyimba**
*Namibia University of Science and Technology, Namibia*

**K.S. Sastry Musti**
https://orcid.org/0000-0003-4384-7933
*Namibia University of Science and Technology, Namibia*

## ABSTRACT

*Use of electric vehicles (EVs) is rapidly increasing all over the world, and new ecosystems are being developed. The chapter investigates EV-ecosystems, possible business prospects, related challenges, and customer adaptation models linked to the mass adoption of EVs. Establishment of logistical support, EV charging infrastructure, overall energy requirements, possible changes in the demand response of the grid, impact on environment are presented. Geolocation studies for EV charging stations for Namibia are investigated. A simplified ecosystem for EV adaption with four major constituents for wider EV adaptation is proposed. In the end, the chapter makes recommendations for the best ways to mitigate various challenges linked with establishing a functional EV ecosystem in Namibia.*

## INTRODUCTION

Growing concerns about the global energy crisis and threatening environmental issues have led to new opportunities and technologies that can meet sustainable and cleaner energy systems. This brings forth the development of sustainable power generation and transportation systems. Establishing a functional EV ecosystem is thus a way to make the transportation system green and reduce issues of carbon emission and climate change (Habib et al., 2018). Even though these vehicles are not totally 'emission-free' due

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to the manufacturing processes, or the fossil fuels used in the generation of the energy for recharging, electrical vehicles (EVs) pave a way for combating the climate change through reduced carbon emissions (Das et al., 2020). Adapting EVs comes with challenges such as high capital cost, high maintenance cost, as well as range anxiety by the users. This anxiety is increased as a result of EVs being fitted with electrified power-assisted steering, stability program, traction control, intelligent light system, smart electromagnetic suspension, all-wheel drive, airbag deployment system, and more. This means should the car be involved even in a minor accident, a skilled person and advanced technology will be needed for repair requirements and that might call for higher costs as these technologies may not be found in all parts of the world (Mali et al., 2022). There are however other infrastructural challenges associated with the adaption of EVs, especially in developing countries, such as charging infrastructure, charging times, the capacity of grids, financing of EVs as well as policies and standards to mention a few of them. Though there are several challenges do exist, wider adoption of EVs by consumers in a region can significantly influence the establishment of an EV ecosystem. Customers may not be willing to change their existing non-EVs to EVs due to wide ranging issues such as availability of charging stations, concerns about the maintenance issues, limited range of the EVs etc. Specifically, establishing a functional EV ecosystem can be challenging in Namibia, due to longer distances between the cities and absence of any logistical support between the cities can lead to hardships in event, of the vehicle experiencing breakdowns mal-functions. On the other hand, EV technology is lagging in developing countries, specifically Namibia besides lack of skilled human resources. In developing countries, numerous challenges impede the widespread adoption of EVs. These challenges need to be addressed, investments need to be made and policies need to be put in place to support the pick-up of EV technology in developing countries. This chapter first examines how developed nations have established EV ecosystems and related infrastructure through an elaborate literature review.

The objective of this chapter is to investigate and assess possible measures for mitigating challenges in establishing a functional EV ecosystem in Namibia. To accomplish this objective, the chapter studies various challenges reported from developed nations with adapting EVs. Prospects of EV ecosystem on environment and new employment opportunities will be illustrated.

## LITERATURE REVIEW

Electric vehicles (EVs), unlike traditional internal combustion engine (ICE) vehicles, use electricity to power their motion. They can be all-electric vehicles, meaning they run fully on electrical power, or can be hybrid electric vehicles, where they use both electrical power and the conventional ICE for motion. All-electric vehicles include battery electric vehicles (BEVs), which use batteries as electrical energy storage, and fuel cell electric vehicles (FCEVs), which use tanks for the storage of hydrogen gas and fuel cells for the conversion of hydrogen gas to electrical energy. These fully run on electricity and produce no tailpipe emissions but only water vapour and warm air. On the other hand, vehicles that use both electricity and internal combustion engines include hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs). In the HEVs, the batteries are only recharged by the internal combustion engine (The ICE runs a generator which supplies power to the batteries) and by regenerative braking, whereas in PHEVs, the batteries are charged by the internal combustion engine, regenerative braking and by plugging the vehicle into an electrical outlet or a charging station.