

Thailand's Business Model of Electric Vehicles

Sauwaluck Koojaroenprasit ¹, Sumalee Pumpinyo ²

¹ Associate Professor, Faculty of Economics, Kasetsart University,
Bangkok, Thailand
fecoslp@ku.ac.th

² Assistant Professor, Faculty of Economics, Kasetsart University,
Bangkok, Thailand
fecosup@gmail.com

Abstract

The objectives of this paper was to study the obstacles to using electric vehicles (EVs) and the business model of EVs in Thailand. The researchers interviewed five entrepreneurs involved with EVs in Metropolitan Bangkok. Primary data was obtained from questionnaire. The sample size was 224 of those who use EVs. This research conducted in 2021. In Thailand, environmental problems, especially from PM 2.5 particulate matter, arise partially from the use of fossil fuels. The personnel factor of the sample was as follows; most of them were male, monthly income between 50,001 to 70,000 baht per month, aged between 28 to 37 years old with Bachelor's degree. The study found that the EVs users thought that EVs sold in Thailand are too expensive, lack of government subsidy, high import tariff, and have few EV charger stations (making it necessary to plan trips carefully), and have low battery capacity. Therefore, the important factors motivating the purchase and use of EVs in Thailand are location and adequate numbers of charging stations, battery capacity, and the prices of EVs. In Thailand, the use of Internal Combustion Engine vehicles (ICEs) is very prevalent because their price is lower than those of EVs. Infrastructure in terms of parts availability and engines is greater for ICEs vehicles, allowing them to be priced lower than EVs. These factors should receive governmental support through taxation, innovation, and promotion to stimulate the use of EVs. For the Business Model of electric vehicles, most the customer is a new generation, interested in technology and environmental concern. Using electric vehicles would save more cost than combustion engine vehicles because of low maintenance cost, no need to drain the engine oil, and the user pays only for charging costs.

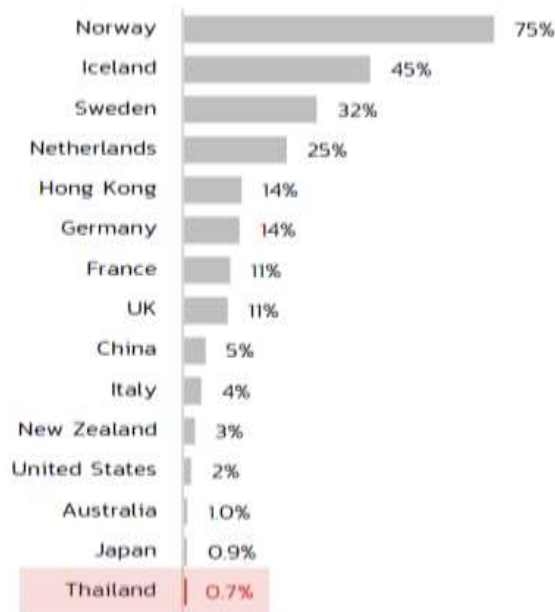
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Introduction

Increased energy demand and our need to protect the environment dictate that we find new ways to meet our energy needs. Increasing the number of EVs is a promising approach to promote energy production and improve its utilization. Vehicles powered by internal combustion engines (ICE) are major emitters of air pollutants and greenhouse gases (GHG). In 2017, ICE-powered vehicles emitted about 24% of the CO₂ released globally and accounted for 49.2% of all fuel consumed, compared to 30.8% in 1973 (IEA, 2019). Vehicles of six countries (the United States, France, Germany, China, India, and Japan) are projected to collectively release 2.6 giga tones of CO₂ in 2030, representing a 13–32 percent increase from 2020 to 2030. The human health impacts from air pollution are great, so revising carbon policies will significantly improve air quality. Technological innovation and the need to reduce oil demand and emissions have stimulated the development of new vehicle systems that have already been introduced into the vehicle market. Growth in the global EV market has been significant since 2011 (IEA, 2016). Electric vehicles positively contribute to reducing vehicle emissions (Gomez Vilchez and Jochem, 2020).

Government measures have played an important role in the growth of EVs sales, especially in Europe. Governmental focus on environmental issues is a key factor supporting Evs. In 2020, Europe's share of EV purchases increased to 43 percent of total EVs sales, increasing from 2019 when it was 26 percent, with Germany taking the largest share of 12 percent (Roland Irle, 2020). Many countries have set up policies to promote EVs. Measures have been used to motivate consumers to switch to EVs, such as subsidies to buy EVs, allowing EVs to run on tollways for free, imposition of carbon regulations, and requiring automakers to increase their EV production. Additionally, 11 global member countries in the Clean Energy Ministerial group, which accounts for 49 percent of the global automobile market, have agreed to the EV30@30 project that targets each country to have EVs sales increase to 30 percent of total car sales by 2030. This will be a key factor encouraging automakers to change their production from ICEs to EVs to support the future global car market. This market will evolve greatly over the next 10 years. Figure 1 shows that some Scandinavian countries now have the highest percentage of EVs sales in the world (KKP Research, 2021)

Figure 1 Passenger EVs market share in 2020



In Thailand, environmental problems, especially from PM 2.5 particulate matter, arise partially from the use of fossil fuels. This may provide impetus to reduce battery prices and thereby stimulate EV sales. Thailand has made a strong commitment to reduce CO₂ emissions by 20-25% before 2030 through reducing carbon emissions in electricity generation and increase the use renewable energy in the transportation sectors by promoting the use of EVs. However, producing EVs is still a new technology of which Thailand lacks knowledge. So, governmental support is very important (National Science and Technology Development Agency, 2018). Innovation and production in one in ten Thai industries support development of EVs, making them important for economic development.

The research question is, to what extent a policy package might be more supportive of EVs. The market prospects of EVs are highly uncertain, so the current research aims to study the business model of EVs in Thailand.

Literature Review

Situation of EVs

Among the policy measures to support electro-mobility, purchase incentives are widely cited. Axsen and Kurani (2013) did a survey to compare consumers' stated interests in buying new cars. The study found that only a few percent intended to buy EVs. EVs are limited in range, charger availability and have higher vehicle purchase prices. Levay *et al.* (2017) estimated the impact of fiscal incentives on the total cost of EV ownership in France, Germany, Hungary, Italy, Netherlands, Norway, Poland, and the United Kingdom. The study showed flat taxes favor larger EVs, while lump-sum subsidies favor small ones. Long-distance trips and

long charging times are barriers to the adoption of electric vehicles (Graham-Rowe *et al.* 2012). Consumer demand, industry technology developments, government stimulation, and regulations are the three main driving forces for the adoption of electric mobility in Europe (Biresselioglu, Kaplan, & Yilmaz, 2018 cited in Pardo-Bosch F *et al.* 2021. Noel *et al.* (2020) interviewed 227 transportation and electricity experts from 201 institutions across 17 cities in Denmark, Finland, Iceland, Norway and Sweden in 2017. They found that common barriers such as driving range, price and charging infrastructure continue to persist. Driving range was the top concern among the 53 people investigated. From the study of Danielis *et al.* (2020), driver preferences for EVs in Italy revealed that purchase price, fuel economy, time spent charging, and financial incentives are very important in making purchasing decisions and Italian drivers are becoming more optimistic about EV driving range. BCG (2019) by 2030, EVs are expected 50%–60% of total new car sales. If consumers purchase EVs at the expected rates a lack of charging infrastructure could become an obstacle to EV uses (Engel, H et al., 2018). Home charging using a private charging station during nighttime is the option preferred by most owners, and almost 90 % of daily trips used a night-time home charging (Sun, Chen, & Yin, 2020)

Concept of Business Model

In this study, the business model canvas concept is applied to explore the models of EVs available in Thailand. Business Model Canvas are tools to help businesses run sustainably. This will have various activities related to partners, resources suppliers, deliveries and customers. Each part of the model is important. It has nine components, as shown in Figure 2 (Osterwalder and Pigneur, 2010).

Figure 2. Business Model Canvas (www.businessmodelgeneration.com)



Research Methodology

Primary data was obtained from questionnaire. The sample size was 224 of those who use EVs. This research was conducted in 2021. The personnel factor of the sample was as follows; most of them were male, monthly income between 50,001 to 70,000 baht per month, aged between 28 to 37 years old with Bachelor's degree. In this work, a case study was used to do a business model of EVs in Thailand. Key informant interviews were conducted throughout the duration of the project in March 2021. The researchers interviewed five entrepreneurs involved with EVs in Metropolitan Bangkok. The interviews followed the business model canvas concept.

Results of the Study

The personnel factor of the sample was as follows; most of them were male (194 sample or 86.61 percent, monthly income between 50,001 to 70,000 baht per month (118 sample or 52.68 percent, aged between 28 to 37 years old (163 sample or 72.77 percent) with Bachelor's degree (159 sample or 70.98 percent). The study found that the EVs users thought that EVs sold in Thailand are too expensive, lack of government subsidy, high import tariff, and have few EV charger stations (making it necessary to plan trips carefully), and have low battery capacity

In 2019, the trends associated with EVs have been more interesting. This is because there are various car groups starting to launch EVs in Thailand with prices ranging from hundreds of thousands to millions of baht. In 2020, a total of 1,056 units of EVs were sold, representing 0.13 percent of the domestic car sales of 792,146 units.

The business model in Thailand, most EV customers are of the younger generation as they are interested in technology and they are environmentally conscious. The use of electric vehicles could cost less due to the lower maintenance costs for EVs. A user just pays for charging costs. In Thailand, the use of ICEs is very prevalent because their price is lower than those of EVs. Infrastructure in terms of parts availability and engines is greater for ICE vehicles, allowing them to be priced lower than EVs. The key components of EV systems are its battery, electrical equipment, and charging stations. Currently, these parts are imported due to limited investment in Thailand (KKP Research, 2021). There are two sales channels for EVs. A company, such as Tesla, may sell directly to its customers or it may involve a dealer who sells to customers, as is done by MG and Nissan. EV sales volume in Thailand is still low because prices are high (in part due to high taxation). Furthermore, there are few charging stations. Currently, charging stations are mainly located in metropolitan Bangkok and other cities. Charger availability is only 56 stations per 1 million of the population in the provinces, so range anxiety for long-distance travel is high. EVs can travel about 350 km on a charge, so this is a significant obstacle to EV use in Thailand. However, several power companies plan to install more charging stations in fuel stations, condominiums, and rest areas. These companies include PTT, the

Metropolitan Electricity Authority, the Provincial Electricity Authorities, and EV companies. Solving this problem is very important to support EV use in Thailand. The detail of the business model in Thailand can be summarized as in Table 1.

Table 1 Summary Business Model of EV in Thailand

Mission Statement: To reduce the greenhouse gas emission, Improve quality of life			Customer Segments -Younger generation -people who are interested in technology and environmental concern
Key Partners -Public and private power company -Charging station -Battery company -Private parking -Other suppliers	Key Activities -setup advantage for EV owner - find the potential charging station -smart system to find the charging station -install a charging station in the parking area on the main road of the country -EV charging in rest areas and condominiums	Value Position -Promote the use of EV -Install charging stations in public and private parking spaces -Expand charging stations to out of town, provinces -Low maintenance cost -Low charging cost of battery per time -Plan to install a charging station every 150 km -reduce co ₂ & NO _x emissions	
Key Infrastructure and Resource -Lithium Battery -Parking space for charging station -EV Charging station located in the gas station -Co-operated with the Electricity company -Innovation about Intelligent Battery Temperature Control	Channels -Directly to Customer -Dealer	Customer Relationship -High guarantee -24 hours roadside assistance -Emergency service -Mobile service -24 hours call center	
Cost Structure -High taxes -Cost of charging station -Operation and Maintenance support -Short-distance EV trip Environment cost -Increase electric consumption Social Costs -Long time charging -Congestion for charging		Revenue Structure -Reduction cost of maintenance -Municipal taxes Environment Benefits -reduce greenhouse gas -reduce noise -reduce fossil fuel consumption -reduce engine oil consumption Social Benefits -Increase quality of life -Clean air -Development of a smart ecosystem	

In conclusion, the study found that the important factors motivating the purchase and use of EVs in Thailand are location and adequate numbers

of charging stations, battery capacity, and the prices of EVs. These factors should receive governmental support through taxation, innovation, and promotion to stimulate use of EVs. Limited range, charger availability, and higher vehicle purchase prices are identified as barriers, as did the study of Axsen and Kurani (2013).

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