EXPLAINING THE ADOPTION OF EV POLICIES IN OIL-RICH COUNTRIES

PETROL ZENGİNİ ÜLKELERDE ELEKTRİKLİ ARAÇLARI TEŞVİK EDEN YASALARI AÇIKLAYAN FAKTÖRLER

Yedidia Owusu ACHIAW
Near East University
Master Student – Political Science
ydee1994@gmail.com
ORCID: 0000-0002-7749-3558

Assoc. Prof. Dr. Direnç KANOL
Near East University
Political Science Department
direnc.kanol@neu.edu.tr
ORCID: 0000-0002-9276-474X

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Abstract: ***Electric Vehicles (EVs) may be regarded as better alternative to Internal Combustion Engine (ICE) vehicles; as such, few countries including oil-rich ones have begun implementation of policies that will favour its uptake and render ICE vehicles less attractive to purchase or use. However, our understanding of how oil-rich countries may contend with the adoption of EV policies is limited. We argue that oil as a natural resource cannot by itself hinder the adoption of EV friendly policies and that one has to look elsewhere like economic and governance elements to explain policy adoption. In this study, we consider two oil-rich countries (United Arab Emirates and Nigeria) to explain EV policy adoption.***

Keywords: ***Electric vehicle policies, EVs, oil-rich countries, United Arab Emirates, Nigeria***

Öz: ***Elektrikli Araçlar (EV'ler), İçten Yanmalı Motorlu (ICE) araçlara daha iyi bir alternatif olarak kabul edilebilir; bu nedenle, petrol zengini ülkeler de dahil olmak üzere çok az ülke, onun alımını destekleyecek ve ICE araçlarını satın almak veya kullanmak için daha az çekici hale getirecek politikalar uygulamaya başladı. Bununla birlikte, petrol zengini ülkelerin EV politikalarının benimsenmesiyle nasıl başa çıkabileceğine dair anlayışımız sınırlıdır. Petrolün doğal bir kaynak olarak kendi başına EV dostu politikaların benimsenmesini engelleyemeyeceğini ve politikanın benimsenmesini açıklamak için ekonomik ve yönetişim unsurları gibi başka yerlere bakmak gerektiğini savunuyoruz. Bu çalışmada, EV politikasının benimsenmesini açıklamak için petrol zengini iki ülkeyi (Birleşik Arap Emirlikleri ve Nijerya) ele alıyoruz.***

Anahtar Kelimeler*: Elektrikli araç politikaları, EV, petrol zengini ülkeler, Birleşik Arap Emirlikleri, Nijerya*

INTRODUCTION

Global transport policy is currently going through a revolution as Electric Vehicles (EVs) are taking over the Internal Combustion Engine (ICE), mainly due to the increasing concern about climate change. Although, China, Europe and North America are leading the way in this revolution, countries in other regions are following suit. Previous research suggested various factors which explain adoption of EV friendly policies across countries (Altenburg *et al*., 2015; Rajper and Albrecht, 2020; Wesseling, 2016; Zimm, 2021). However, our understanding of how oil resources affect these policies is still limited. Natural resources can be a double-edge sword for

countries as they give a head start to countries to use these resources and prosper, they can also stall innovation as explained by the resource curse theory.

This paper treats this issue by employing a small-N comparative analysis where primary (news sites, policy papers, and statistics) and secondary (journal articles) sources of data shall be drawn upon in completing our task. Comparing two oil-rich countries (United Arab Emirates (UAE) and Nigeria), we argue that oil as a natural resource cannot by itself hinder the adoption of EV friendly policies and that one has to look elsewhere like economic and governance elements to explain policy adoption.

Section two discusses the literature on the adoption of EV-friendly policies. This section touches on available policies that promote EV uptake and the factors that explain variations in adoption of EV policies among countries. Section three discusses EV policies specifically in oil-rich countries. In section four, we compare EV policies in UAE and Nigeria. Finally, discussion and conclusion will constitute section five.

1. ADOPTION OF EV-FRIENDLY POLICIES

Policies which promote EVs are believed to increase EV adoption among consumers (Kumar and Alok, 2020; Rietmann and Lieven, 2019). Similar policy instruments exist across countries to promote adoption (Styczynski and Hughes, 2019), yet not all countries have adopted such instruments and a number of factors have been suggested to influence this variance among countries (Wesseling, 2016; Zimm, 2021). Before delving into why countries may or may not adopt EV policies, it will be critical to know the numerous policies that exist to promote EV uptake.

Various policies to support and promote EV adoption have been implemented in different parts of the world. Researchers and analysts have tried to categorise these recent and manifold policies in various and compatible manner (Bruckmann and Bernauer, 2020; Kotilainen *et al*., 2019; Li *et al*., 2019; Melton *et al*., 2020). We will adopt the classification done by Kotilainen *et al.* (2019) because of its flexibility and adaptability to different countries. These authors suggest that there are four types of pro-EV policies developed so far across literatures. They are the regulatory instruments; economic instruments; education and information instruments; and management and planning instruments. The regulatory instruments include regulations such as carbon emission regulations, restrictions/regulations for certain types of vehicles, technology and performance standards, feed-in tariffs, and tradable certificates. Second, economic instruments comprise emission trading schemes, public investments, tax credits, government funding, and subsidies. Again, education and information instruments encompass for example information campaigns or voluntary schemes. Finally, management and planning instruments or policies can be tailored to promote EVs.

Table 1 summarises the various EV policies that are widely known under the classification adopted for this study.

Table 1: Classification of Available EV Policies

Regulatory Instruments	**Economic Instruments**	**Education and Information Instruments**	**Management and Planning Instruments**
Unrestricted access to HOV lanes for EVs	Reduce costs of EVs and infrastructure	Information requirements on cars' energy consumption	Charging station planning
Minimum sale of EVs	Rebate programs for EVs	Battery swapping model option	Low emission zone planning
Vehicle emissions standard	Tax exemptions		Funding for technology demonstrations
Low-carbon fuel standards	Tax credit		Charging facilities for new homes and companies
ICE bans	Government subsidies		Parking space privileges
parking restrictions for ICEs	Public charging facilities		Dedicated license plate
Public procurement in favour of EVs	Carbon tax		Registering priority policy
No purchasing restrictions for EV buyers	Feebates for ICEs		Vehicle registration fee exemption
	Charging discount		Dedicated registration channel
	Subsidy of private charging piles		vehicle inspection fee exemption
	Circulation tax		Dedicated inspection channel
	Free tolls and ferries for EVs		
	Insurance discounts		

Source: Kotilainen et al., 2019.

A careful consideration of table 1shows that diverse EV policies aim at addressing the needs of potential consumers starting from the purchasing of EVs through registering, driving, and charging of these vehicles. However, education and information instruments are less developed and may need more government and stakeholder efforts and research to broaden its scope. To this end, how do we account for why certain countries adopt EV policies and others fail in doing that? First of all, research has indicated that proximity of countries encourages the adoption of similar policies and cooperation on issues affecting them all (Kestera *et al.*, 2018). This is seen in the case of the five Nordic countries where they share similar stance on policies affecting climate change and transportation (Kestera *et al.*, 2018). Even in this instance, the authors reveal that the countries involved have different policy mechanisms when it comes to the actual transition away from fossil fuel powered ICEs.

Debatably, the single most challenging factor confronting countries that want to design and carry out EV policies is opposition by stakeholders including owners of ICE vehicles (Bruckmann and Bernauer, 2020). The degree of resistance by opposing forces and actor groups can determine whether a country adopts EV policies or not. Zimm (2021) in her recent comparative study of countries that are early adopters and late adopters of EV policies came out with the finding that countries with large-size local automotive industry like Brazil are late adopters whilst those with a small-sized local automotive industry, Norway for instance, are early adopters. The early adopters face little or no resistance from an existing automotive industry and that makes it easier for them to adopt EV policies than the late adopters who have a lot of considerations and adjustments to make in their local automotive industry (Zimm, 2021; Bruckmann and Bernauer, 2020).

Also, wealthier nations implement EV policies quicker than developing nations; the reason being that the adoption of EV policies requires greater spending and long term investments that only wealthy nations can afford in the shortest time (Zimm, 2021). Furthermore, Bruckmann, Willibald, and Blanco (2021) in their study revealed that countries with EV manufacturing capacity such as Germany and China have strong support for EV policies than countries lacking the know-how in that field.

Rietmann (2019) concluded in his study that climate targets adopted either at the national or supranational levels can explain why a country adopts EV policies or not. Usually, countries that are members the European Union (EU) are somewhat pressured to implement the common climate goals set by the organization (Rietmann, 2019). Supervision and monitoring by the EU organisation translates into the adoption of cleaner measures and environmental-friendly modes of transportation by its members. Same cannot be said about countries that do not fall directly under EU's umbrella. Even among countries that voluntarily adopt climate targets differ in their individual implementation of the climate goals (Rietmann, 2019). For instance, Norway is keen on implementing its nationally adopted climate goals whilst Brazil is relaxed in reaching its climate targets (Rietmann, 2019). Rietmann (2019) argues that the nature of climate goal or target can drive certain countries to be more active in implementation than others. This explains why certain countries adopt EV policies as a way of reducing carbon emissions whilst others may not.

To help round up the many factors responsible for the differences in the adoption of EV friendly policies among countries, Zimm (2021) puts forward three broad themes that make an analysis of this sort concise and comprehensible: 1. State characteristics, 2. State capacity, and 3. State impediments. Here, we understand state characteristics to mean the social, political, and economic factors such as demand conditions, political priorities, energy and economic system of a country. We also see state capacity to mean a country's manufacturing and technological readiness. Finally, state impediment implies opposition from the civil society, actor groups or stakeholders who may be against the roll-out of EV policies.

What is more, Zimm (2021) mentions how international or external factors can foster or hinder the uptake of EV policies across countries. Influential countries, country groups, or global and regional blocs can adopt mechanisms that will keep third world or member countries in conformity with global climate policies (Zimm, 2021). Third world countries respond to international pressures through imitation, learning, and emulation (Zimm, 2021). The international actors are able to influence the domestic practices of third world countries through coercion or sanctions (Zimm, 2021). Competition and proximity are other external mechanisms that can help explain why countries may or may not adopt EV policies (Zimm, 2021).

Table 2 summarises the factors responsible for the differences in the adoption of EV policies among countries.

Table 2: Factors Responsible for The Variance Among Countries Adopting EV Policies

General Factors Responsible for the Variance among Countries	
Internal Factors	**External Factors**
State Characteristics a) Political Priorities b) Demand Conditions c) Economic System d) Energy Sector Characteristics (energy security, major oil producers, grid over-supply, etc) e) National Climate Targets	a) Coercion b) Imitation c) Learning d) Emulation e) Proximity f) Competition g) Supranational Climate Targets
State Capabilities a) Technological Readiness b) Manufacturing Capacity	
State Impediment a) Opposing Forces (i.e. stakeholders, actor groups)	

Sources: *Zimm, 2021; Wesseling, 2016; Altenburg et al., 2015; Rietmann, 2019.*

Referring to table 2; Zimm (2021) hints that the energy sector characteristic of a state should not be heavily relied on in explaining the EV policy adoption of a country. In her study, the assertion that oil-rich countries will be more reluctant in adopting EV policies could not be confirmed. In other words, there was little or no evidence to prove the validity of that assertion. The popular assertion also that oil-importing countries are more likely to implement EV policies in time could not be confirmed in the same study. She therefore argued that other factors such as the existence of a local automotive industry, political prioritisation of EVs, and meeting climate targets may have more bearing on the topic than energy-related characteristics.

2. EV POLICIES IN OIL-RICH COUNTRIES

The analysis here will be done thematically and the themes will be taken from table 2 for this purpose:

2.1. Political Priorities

Under this theme, we have found evidence that cite political roles as explanatory element to the adoption of EV policies in oil-rich countries. Eccarius and Lu (2019) argue that government policies play a major role in the adoption of EVs in a country. Governments or political leaders initiate or prioritise EV policies because of the need to harmonise climate preservation, advancement of novel technologies, growing mobility demands, and energy dependence (Eccarius and Lu, 2019). They however argue that in the design and implementation of EV policies, regulators should be mindful of the use of cash incentives as that may not always generate the desired results. Politicians could adopt measures such as banning of ICEs, preferential parking for EVs, preferential license plate issuance, and to mention a few to induce support and uptake of EVs (Eccarius and Lu, 2019).

Between 1998 and 2002, Figenbaum (2017) explains that the Norwegian government introduced set of policies and incentives to improve the sales of EVs when the patronage of such vehicles was low as at that period. Despite the fact that Norway produces and exports oil in large quantities, it is currently regarded as the land of EVs. The possible explanation for Norway's fame with EVs is its political commitment to control pollution and reverse the effects of climate change even if that will cost them the largest contributor to its Gross Domestic Product (GDP) (Duffer, 2019).

Wesseling (2016) indicates that a number of oil-rich countries spend a great deal of their GDP on EV policies as a matter of political prioritisation. For instance, Wesseling (2016) found that Norway spends a chunk of its GDP on EV policies due to a very high sales incentive put in place by the government. Similarly, authorities in the Middle East bloc use their oil-wealth to fund various EV incentive policies; Saudi Arabia and UAE for instance are currently championing the adoption of EV policies in the region (Jacobs, 2020).

Altenburg and Chaudhary (2015) state that various governments implement EV policies for different reasons. In their study, they indicated that a country like China adopted EV policies mainly to mitigate the effects of air pollution in its urban areas and that the government was committed to whatever means to attain that outcome. That necessitated the widespread implementation of EV policies across China.

Furthermore, Zhou and Zhang (2013) discuss action-oriented policies which the Chinese government implemented in the years between 2009 and 2011. Many of those policies sought to test the energy efficiency performance of EVs. In this regard, the Chinese authorities selected few cities in a pilot programme where EVs will be introduced and its energy efficiency level observed (Zhou and Zhang, 2013). That did not end there; the government further revised its local automotive industry policy to enhance the production of more EVs and to streamline the manufacturing requirements or standards of the same. For instance, the Chinese government decided on a production target of 0.5 million EVs for the years between 2009 and 2012 (Zhou and Zhang, 2013). The Chinese authorities again introduced EVs into its fleet of public vehicles to promote energy efficiency in the sector and public charging infrastructure was also put up by the government along with subsidies to encourage private persons to own EVs (Zhou and Zhang, 2013).

Yang (2010) contends that the boom in electric bike market in China was largely driven by policy. According to Yang (2010), Chinese authorities implemented certain policies to control the usage of fuel-based motorcycles that had become so popular among road users in the country. They did that for reasons of easing traffic congestions in the cities, putting air pollution under check, and for safety concerns that were posed by the usage of these motorcycles (Yang, 2010). What was interesting about the Chinese motorcycle policy was that the policies so designed did not place any restriction on the use of electric bikes and that caused many people in the country to adopt that means of transport (Yang, 2010). For instance, China's annual sales of electric two-wheeled vehicles catapulted from fifty-six thousand (56 000) sales record in 1998 to over twenty-one million (21 000 000) annual sales in 2008 (Yang, 2010). Yang (2010) considers this phenomenal turn around as being influenced by policy – policy accident. Yang (2010) recommends that restrictive policies on ICEs should be prioritised and implemented alongside other lenient policies that are aimed at boosting EV uptake.

2.2. Climate Targets

Climate change and its looming effects may serve as a basis for many governments to initiate sustainable transportation measures. In this regard, Figenbaum (2017) argues that climate issues chiefly explain Norway's decision to adopt EV policies since 2009. He added that in the bid to meet national climate targets, Norway initiated incentives for citizens to buy EVs, and then in 2012, the country officially adopted a policy document on EVs. Further steps were taken by Norway authorities to discourage the use of fuel-powered vehicles through the introduction of hefty taxes and other purchase restrictions (Figenbaum, 2017).

Wesseling (2016) explains that countries such as Canada, United States, and Norway justified their huge investments in EVs on the basis that it will benefit their natural environment and help bring down harmful emissions from ICE vehicles that are contributing to global rise in temperature.

One of the key motivations for EV adoption in China according to Zhou and Zhang (2013) is the tackling of air pollution that has bedevilled the country for awhile. Chinese authorities have crafted policies to ensure the usage of efficient or environment-friendly vehicles beginning in the major cities of China as that is where air pollution is concentrated most (Zhou and Zhang, 2013).

2.3. Energy Sector Characteristics

Rajper and Albrecht (2020) argue that electricity power structure and transmission has a vital role to play in the adoption of EVs. Figenbaum (2017) explains that a country like Norway generates excess electric power from its hydroelectric dam that makes it easier for it to adopt electric vehicles without experiencing the negative effects of grid overload.

Zhou and Zhang (2013) in their study on China determined that one of the reasons China is adopting EV related policies is to reduce the additional importation of oil into the country and to clamp down on the demand for it locally. Chinese authorities seek to provide security for its energy sector and the EV approach is one of the means to satisfy this objective.

2.4. Demand Conditions

Rajper and Albrecht (2020) have argued that there is a high demand for gasoline-based vehicles in developing countries and thus accounting for why there is a low uptake of EVs in such places. For instance, in China, there is a higher demand for gasoline-based motorcycles than any other vehicle (Rajper and Albrecht, 2020). They contend that unless EVs come with a special offer or an added value, the taste for fuel-based vehicles may not subside.

Altenburg *et al*. (2015) argue that the demand conditions prevailing in a country may explain the adoption or not of EV policies and even determine the nature or specifics of an EV technology to adopt. In China for instance, Altenburg *et al.* (2015) explain that there is a high demand for simple electric vehicles like scooters and motor-cycles (two-wheeled vehicles), and rickshaws (three-wheeled vehicles). This has led to a massive production of these kinds of vehicles in China. The adoption of sophisticated four-wheeled cars may be uncommon in China as these kinds of vehicles are not preferred in the region (Altenburg *et al*., 2015). They explain further that countries that were early adopters of EVs like Norway have car consumers who are environment-friendly but lovers of smart and fancy technologies. This may prompt the production of sophisticated electric vehicles such as the four-wheeled type. The inappropriateness of a technology type to a region may call for its widespread boycott.

Figenbaum (2017) states that Norway do not locally produce fuel-powered vehicles as such there is no high demand for ICE cars and that makes the transition to EVs easier.

2.5. Opposing Forces

Here, Figenbaum (2017) explains the introduction of EVs into the Norwegian market received less resistance from various actor groups such as dealers and businessmen who were directly involved in the sale of ICE vehicles. In other words, there were limited opposing forces to EV policy implementation in the country - Norway. Actor groups in the country including sub-government agencies, NGOs, and private businesses lobbied the Norwegian government for incentives to experiment with EVs (Figenbaum, 2017). The Norwegian case was such that existing autodealers and automakers did not see the introduction of EV policies as a threat but rather as an opportunity to diversify their portfolio and to attract new customers who may be interested in EVs (Figenbaum, 2017). On fewer occasions did EV policies receive criticisms and that was even from the academic circles (Figenbaum, 2017). It can

therefore be said that the successful introduction of EVs into the Norwegian transport system is largely attributable to the welcoming attitudes of stakeholders and actor groups in the country.

2.6. Manufacturing Capacity

A number of the oil-rich countries may also be a car manufacturing country. As revealed by an empirical finding, oil resource in these countries does not keep them from advancing with EV policies (Wesseling, 2016). In fact, some of these countries have made investments in automotive research development programmes, as an EV policy measure, with the hope that progress in such an area will boost and enhance the manufacturing capabilities of their existing automotive industries. In places like China and USA despite their vast oil reserves already support their automotive industries with grants and loans for research purposes (Wesseling, 2016). However, oil-rich countries with weak car manufacturing strengths prefer to invest in EV sales incentive programmes that may profit their local automotive industries (Wesseling, 2016). Norway, for instance, has adopted sales incentive approach as a means of ensuring EV diffusion in the country (Wesseling, 2016). Their approach may be due to its weak car manufacturing know-how and capacity.

Altenburg *et al*. (2015) explains that differences exist in national technological or manufacturing capabilities and that is why certain countries will embrace EVs early and others late. China may have progressed with car manufacturing but have limitations especially with the making of electrified vehicles that may be good enough for commercial consumption (Altenburg *et al*., 2015). For instance, Chinese automakers are yet to come out with efficient car batteries that can power electric vehicles for long hours (Altenburg *et al*., 2015). Manufacturing limitations may affect how a country chooses to advance with EV policies.

2.7. Economic System

According to Wesseling (2016), the type of market economy may partly account for differences in EV policy adoption and approaches among countries. He argues that statist economies are likely to invest in EV infrastructure than any other type of a market economy. He further explains that governments with liberal economies like the United States that favours a free market system will sometimes intervene when it comes to the introduction of EVs into their market domain. However, Wesseling (2016) found out in his study that the penetration of EVs into any market structure or economy may take an arbitrary path; it was only in the exceptional case of a statist economy where the state heavily championed EV policies and that was even in the area of providing infrastructure to support EV roll out.

Altenburg *et al.* (2015) argue that there are market failures inherent in many national economies and how these nations address the market failures may differ in approaches. As a result, in order to introduce EVs into markets ridden with much inefficiency may require government or state support or intervention and these may differ on country basis (Altenburg *et al*., 2015). Specifically, what governments may subsidise and how they plan on dealing with coordination failures may differ according to a country (Altenburg *et al.*, 2015). Because of this, China provides generous purchase subsidies to start an EV market (Altenburg *et al*., 2015). Norway took similar path in 2009 when the sale of EVs or patronage was low (Figenbaum, 2017). According to Figenbaum (2017), the Norwegian transport sector is a heavily taxed one

ridden with high taxes on car registration, yearly taxes, fuel taxes, and many toll roads. He contends that in order to create a market for EVs and boost its uptake, Norwegian authorities had to reduce the tax burden for EV users plus other incentives that encouraged more people to purchase EVs.

2.8. External Factors

Technologists argue that major technologies seem to follow a revolutionary path to its adoption; hence a major technology like EV may not require initial government decision and authorisation as the adoption of EVs may happen naturally everywhere (Rowlatt, 2021). For instance, the growth and dominance of major technologies like the internet, photography, steam engine, and even ICE vehicles followed a revolutionary path and had little to do with prior political decision by a country to adopt or not (Rowlatt, 2021). Technologists postulate that the adoption of a principal technology like EV will occur gradually, grow at an exponential rate, and get to the mature stage where growth will slow down again, and this process is normally represented in an S-Curve (Rowlatt, 2021). Again, Ben Pullen - CEO & co-founder of Global EVRT- is on record to have said that not even the oil-rich countries will be spared from the technological revolution to adopt EVs; they have no means to dodge or resist this tide of change (Enel Foundation, 2018).

Figenbaum (2017) argue strongly that there were ongoing developments in the international space that served as a motivation for countries like Norway to carry on and expand its EV adoption policies. He argue that already there were stringent policies adopted by regional blocs like the European Union to cause its members to reduce carbon emissions, several global climate policy negotiations had been initiated, and there were other car manufacturing companies like Nissan and Tesla joining the race to be the first to manufacture electric vehicles that could outperform fuel-powered vehicles. These external developments summed up led to an increasing number of electric vehicles on the global market and subsequently made EV adoption in Norway an easy choice (Figenbaum, 2017).

Wu and Zhang (2017) argue that the effects of recent oil price fluctuations in the global economy and the need to protect the environment (reduce carbon emissions) are two important factors driving the adoption of EVs among many countries including oil-rich ones. Concerns of this nature have ensured that countries put in place policy measures aimed at influencing EV uptake. For instance, oil producing nations such as Russia and China, due to these external factors as aforementioned, have all acted through policy means to create EV market in their economies (Wu and Zhang, 2017). Russia tows the direction of setting up EV infrastructure and to boost EV uptake through policy measures like tax exemptions and many more (Wu and Zhang, 2017). China is a bit more elaborate in crafting and implementing EV policies alike. China, apart from introducing subsidies and incentives to encourage the purchase and use of EVs, have gone further to introduce EVs into government or public fleets of vehicles, set up fast charging infrastructure for EVs in many areas and established a giant automobile industry focusing on EV production at unprecedented rates (Wu and Zhang, 2017).

There are also global initiatives such as the Electric Vehicle Initiative (EVI) that is aimed at providing a common platform for the discussion and cooperation on EV development and deployment across the diasporas. EVI was started by two oil-rich

nations – USA and China – and has since received the support of many countries (Zhou and Zhang, 2013). A meeting was convened in Shanghai, China by EVI members in 2011 to discuss issues regarding EVs and a Shanghai Declaration was adopted (Zhou and Zhang, 2013). China has already taken wider steps in implementing various provisions agreed on in the Shanghai declaration. It is hoped that other member-countries will act in accordance to the provisions established in the proposal.

3. COMPARING EV POLICIES IN UNITED ARAB EMIRATES (UAE) AND NIGERIA

In this part, we compare the policies adopted by UAE and Nigeria which are quite different in terms of EV friendly policy adoption. UAE has been experimenting with EV friendly policies whereas Nigeria is a laggard compared with UAE. Both countries are major oil producing nations; in fact, UAE's resources are more than Nigeria's when factoring in the population size and area. Therefore, we expect that this variation should be attributed to other factors.

Generally, UAE's adoption of EV policies is far-reaching and comprehensive. There is a conscious attempt by the emirates to keenly embrace the EV idea and gradually phase out ICE vehicles. We deem it necessary to throw more light on pro-EV policy initiatives in UAE:

To begin with, UAE has adopted a regulation that is concerned with the general requirements for electrical motor vehicles; it includes requirements for setting up charging stations, guidelines for dealing with electrical vehicles after been involved in an accident, and performance evaluation of these vehicles (Emirates Authority for Standardization and Metrology).

Furthermore, through government announcements, the people of Dubai have been urged to patronise EVs over traditional cars, and the Dubai Supreme Council of Energy has issued a directive to ensure that ten percent (10%) of all cars are eco-friendly by 2030 (Berdikeeva, 2020).

The Dubai Electric and Water Authority (DEWA) has set up close to one-hundred (100) electric vehicle charging stations (Mahroogi and Narayan, 2019). Non-commercial EV owners can charge for free at all DEWA public charging stations till December 2021 (Gulf News, 2019) There are currently about 650 charging points in UAE (Gupta, 2020).

The Dubai Roads and Transport Authority (DRTA) intends to operate almost fifty percent (50%) of passenger taxicabs using hybrid technology by 2021 (Plotz, Funke, and Jochem, 2018). Likewise, Dubai and Abu Dhabi have together launched E-Scooters in their region to ease traffic congestions (Brank, 2020).

According to Mahroogi and Narayan (2019), the government of Dubai has incentive schemes in place such as allocating free parking spots in forty (40) different locations to owners of EVs. Also, EV users in Dubai enjoy discounted car registration and renewal, toll exemptions, bonus warranty for EVs, and incentives for local businesses to begin using EVs (Berdikeeva, 2020). As part of the incentives to boost EVs, Sharjah offers free charging for EV owners till 2025 (Brank, 2020).

Proceeding further, there are private or individual initiatives that enhance EV's prospect in UAE:

1. The Al-Futtaim Group based in UAE has released the first expensive hybrid vehicle in the GCC and the Middle East;

2. Lexus also offers hybrid models in the UAE (Mahroogi and Narayan, 2019).

According to Mahroogi (2019), UAE's policy makers do not want to lose out on the economy especially when there are fluctuations in oil prices lately, this has caused policy makers in the country to resort to alternative technologies like renewable energy resources and electric and hybrid automotive systems in order to diversify and make the economy more resilient.

In light of the foregoing policies and measures to boost the uptake of EVs in UAE, there are lingering challenges that lower the potency of these measures such as, limited car models that would appeal to the large consumer base or driving population in UAE, delay that comes with charging of EVs, limited knowledge and advertisement of EVs, and addictiveness to ICE vehicles (Gupta, 2020).

Nigeria has been lax in embracing green automobile technology and accompanying policies. The level of preparedness to adapt to the changing trend towards electro-mobility or EVs is not noteworthy. Even if there has been actions taken to introduce EVs in Nigeria, it has been frustrated by opposing forces in government. A telling example is the electric cars bill of 2019 – sponsored by Senator Ben Murray-Bruce - which was rejected by the Nigerian parliament. Agunbiade and Siyan (2020) explained that the bill failed because the law makers thought it would hurt the Nigerian economy so bad since it was a major oil producer, and again, it will be difficult shifting from the use of ICE vehicles to EVs.

On the 7th of September, 2019, Nigeria showcased its first home-made electric car to the world; this was accomplished by the University of Nigeria, Nsukka (Onyilo *et al*., 2020). The electric car can be charged from any electric socket and can reach a distance of 30 kilometres when it is fully charged (Pulse, 2019). Despite this attempt to encourage the production of EVs in the country, there is currently nothing done to realise mass production of electric vehicles. This claim is supported by Onyilo *et al*. (2020), who assert that there is no manufacturing or production of green automobile in Nigeria.

There is still a glimmer of hope in that one could perceive the enthusiasm that certain foreign and local car manufacturing companies demonstrate towards further enhancing EV uptake in Nigeria. The Stallion Motors of Nigeria and Hyundai Motors have together launched the Hyundai-Kona EV in November 2020, an event that was welcomed by the EV community in Nigeria (Iruoma, 2021). We can also make mention of a local firm, Nigus Enfinity and its Chinese partner (Build your Dreams), that promised to introduce EVs into the Nigerian automobile market in 2018 and set up a local assembly plant for EVs by 2020 (Onyilo *et al*., 2020). PSC industries limited of Nigeria has arranged to introduce EV chargers for electric vehicles in Nigeria and in some parts of West Africa (Ebele, 2019). Again, a Slovak-based company, Sirieco, has come public with its plans to establish a plant in Calabar, Nigeria that will assemble electric cars (TNAP, 2019). Onyilo *et al*. (2020) finally hint that there are ongoing

trainings and workshops for potential employees for the green automobile industry in Nigeria and that gives hope for the eventual realisation of EVs in Nigeria.

Nonetheless, authors or researchers who have tried to explore the Nigerian case with regards to its adoption of EV policies have all concluded that Nigeria at the moment is not prepared to embrace EV technologies (Onyilo *et al*., 2020; Agunbiade and Siyan, 2020). This assertion is valid in many ways:

At the domestic level, many energy experts have argued it will take decadeslong to experience widespread diffusion of EVs in Nigeria (Iruoma, 2021). It is worth noting that Nigeria has a general auto policy in place but it does not include clear-cut guidelines on a seamless shift to EVs (Nigeria Energy, 2021). Additionally, Nigeria is faced with several challenges in the roll out of EVs: Importation of second-hand ICEs into the country is predominant; the few domestic motor manufacturing companies prioritises the production of ICEs over EVs, and poor electricity power supply (Iruoma, 2021; Onyilo *et al*., 2020).

At the comparative regional level, Cape Verde happens to be the only African country to have taken bold steps to halt the import of ICE vehicles by 2035 (Gaventa, 2021). Nigeria is yet to come out with specific plans to phase out ICEs. Africa's unending preference for used cars, power generation concerns in Africa, and the unattended infrastructure deficit does not make it clear when EVs can penetrate its automobile market (Gaventa, 2021; Iruoma, 2021).

To this end, we continue to argue that the existence of large oil reserves does not necessarily stall adoption of EV friendly policies. Whilst the UAE seems to be closing in on countries in Europe, North America, China, and the Scandinavian region in terms of EV policy adoption or implementation, Nigeria is still struggling to pick up speed. Both are major oil-producing countries, but why this variance?

Findings indicate that UAE's adoption of newer technologies like EVs is as a result of a political resolve. Authorities in UAE want to diversify the country's economy through the adoption of newer technologies like EVs that may have the potential to affect economic growth positively. For this reason, the government of UAE and its institutions has taken it up to introduce certain policies that will induce its citizens or inhabitants to patronize EVs. UAE authorities have tried to vary these policies and to make it all-embracing. They have and are still investing in EV infrastructure and incentive programmes that will attract more people to adopt this new technology. The emirates have introduced safety and performance regulations for car makers and vehicle importers to follow in order to put quality EV models on the market for potential consumers. UAE authorities have also endorsed EVs openly for their citizens to have confidence in the new technology. As another way of boosting public confidence in EVs, regulators and heads of ministries in the country have introduced EVs into government fleets of vehicles. These developments are typically a political decision to enhance the uptake of EVs in UAE.

UAE can be said to be technologically prepared to adopt EVs. The necessary technological setup to make EV roll out successful may be available and accessible by everyone who chooses to adopt EVs. There are functional charging points installed in many areas in the country; electricity supply may not be a hindrance to EV deployment as supply is adequate to support such a programme; finally, the leaders of UAE have

demonstrated susceptibility to the EV idea that can be easily imparted to citizens or inhabitants through various policy mechanisms.

Again, UAE has one of the supportive, progressive, and innovative actor groups and stakeholders in the Middle East region. The activities of these interest groups and other stakeholders make EV adoption much more realisable in the country. They have shown little resistance to the numerous EV policies implemented across UAE. Ultimately, their continued support and innovativeness have ensured the consolidation of EV policies in the country. For instance, AL-Futtaim group of UAE is supplementing government's efforts through the manufacturing and promotion of luxurious hybrid EVs that may suit the taste of many Arab car consumers. Also, citizens who may be key stakeholders have so far exhibited little resistance to the numerous EV policies implemented in the country.

Furthermore, there are economic factors that make EV policy adoption important and attractive to a major oil-producing nation like UAE. It is about achieving economic security and lessening the impacts of fluctuations in world oil prices on UAE's economy. UAE's vision to grow a more stable and thriving economy may have led its policy makers to want to bring diversification into its oil-dominant economy. Economic diversification programme will at least ensure that whenever there is an abrupt global shift to electrified mobility, they may be prepared and will not be on the receiving end of such technological revolution. The adoption of EV technology in UAE will ensure the country benefits from the economic advantages that come with EV adoption such as the creation of new employment opportunities and revenues that may be generated from EV users and investors.

EV adoption in UAE can be said to have been influenced by external factors as well. There is the influx of foreign car manufacturing companies into the country. Mentioning can be made of famous car manufacturing companies such as Lexus and Tesla who normally showcase their new EV models through their branches in the country and even lobby government agencies to patronize their products. Their activities could be said to have contributed to the wider adoption of EVs in UAE.

By and large, the success story of UAE is as a result of the pivotal role of the government or authorities to place the EV agenda at the forefront of policy discussions and consideration.

The case of Nigeria is one that lacks government support and policy framework. Despite the private sector doing its part to support EV diffusion, there has been none recorded on the part of government to support this similar goal. There are no substantive policies directed at ensuring EV adoption in Nigeria. To reiterate, the government has shown very little commitment towards investing in the green automobile industry and has blatantly refused to consider any idea or policies that will prepare the grounds for EV diffusion in the country. For instance, the refusal to pass the electric car bill for fears of hurting the oil economy is a clear indication of government's lack of support or disinterest in EV initiatives.

Also, there may be no fully-operational EV manufacturing industries in Nigeria; the few car manufacturing and assembling companies prioritise the production of ICEs over EVs. The unavailability of green automobile manufacturing companies dims EV prospects in Nigeria. Potential buyers are therefore deprived of model choices from which they can patronise. UAE has gone a little further in advancing this idea and

making it more attractive for electric car makers to site their plants in the country. In this sense, it can be said that Nigeria lacks the manufacturing capability to support the diffusion of EVs.

Nigeria has a crippling energy challenge in terms of electricity supply. The reality of this crisis makes EV diffusion almost impossible. Onyilo *et al.* (2020) admit that Nigeria has insufficient power supply and that in a way limits consideration of ever settling for EVs.

As noted earlier on, car importation into Nigeria is mainly secondhand petrol vehicles. The taste for these cars is insatiable and that altogether makes EV penetration into the Nigerian market a hurdle. Car importers and consumers in Nigeria may not wish to change their preference for ICEs; a probable reason may be that they are less interested in EVs due to their limited exposure and trial of the new technology. Also, infrastructure to support EVs may be unavailable. One can therefore argue that Nigeria is not technologically prepared to adopt EVs.

There is a vibrant private sector in Nigeria that has embraced the idea of electromobility and is continuously advancing steps such as the establishment of EV assembling plant by Nigus Enfinity and capacity building for potential employees of the EV industry to make EV diffusion a widespread phenomenon in the country. However, we caution that without the support and total commitment of the government to embrace EV ideas, the efforts of these well-meaning private agencies and other stakeholders may bear fewer fruits.

DISCUSSION AND CONCLUSION

In explaining the adoption of EV policies in oil-rich countries, we have argued that oil as a natural resource cannot by itself hinder the adoption of EV friendly policies and that one has to look elsewhere like economic and governance elements to explain policy adoption. In the two cases we studied, whereas the oil resource in Nigeria served as an obstacle to the adoption of EV friendly policies – take for instance, the declination to pass EV policy bill in parliament for fears that it may hurt the oil economy -, similar cannot be said about UAE and its adoption of EV policies. UAE and Nigeria are both oil-rich but in terms of EV policy adoption, there exist differences. Nigeria's refusal to adopt EV policies could be explained and understood from a viewpoint that it does not want to hurt its oil economy, but that of UAE and the numerous EV policies it has implemented can be properly accounted for by considering other factors as the existence of oil in the country could not stop its policy makers from adopting EV friendly policies. Even in the case of Nigeria, there were other indications besides the oil factor that altogether worked against any attempt at adopting EV friendly policies.

The findings of this research point to the fact that in explaining EV policy adoption in oil rich countries, our focus should not only be on oil resources as an explanatory element as other factors may also be helpful in explaining EV policy adoption in oil-rich places. Research has even shown that these other factors may be more pertinent than the oil resource factor when explaining EV policy adoption in oil rich countries. Zimm (2021) concluded in her study that pre-eminence should not be given to oil resource factor in explaining whether or not a country may adopt EV friendly policies;

instead, we should look to other factors such as existence of car manufacturing industry, climate targets, politics and governance elements, and to mention a few.

We therefore conclude that the political role or government involvement will be key to promoting EV uptake now or in the near future. As we have observed in the cases of UAE and Nigeria, the political presence in boosting EV uptake in UAE was essentially effective whilst the absence of political initiative and involvement in the case of Nigeria is chiefly to blame for the failure of EV uptake in the country.

This study was a small-N type and conclusions derived from it may not be easily transferrable to other cases. It studied two cases and as such generalizations from it should be done with caution. Also, there were only few prior researches done on the topic and this can be attributed to the recent nature of the topic.

This study should be regarded as a preliminary study to explain EV policy adoption in oil-rich countries. We recommend that similar studies be conducted in future to add more insights to the topic.

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